

Green Energy and Technology



Giulio Mondini · Enrico Fattinanzi
Alessandra Oppio · Marta Bottero
Stefano Stanghellini *Editors*

Integrated Evaluation for the Management of Contemporary Cities

Results of SIEV 2016

 Springer

Green Energy and Technology

Climate change, environmental impact and the limited natural resources urge scientific research and novel technical solutions. The monograph series Green Energy and Technology serves as a publishing platform for scientific and technological approaches to “green”—i.e. environmentally friendly and sustainable—technologies. While a focus lies on energy and power supply, it also covers “green” solutions in industrial engineering and engineering design. Green Energy and Technology addresses researchers, advanced students, technical consultants as well as decision makers in industries and politics. Hence, the level of presentation spans from instructional to highly technical.

More information about this series at <http://www.springer.com/series/8059>

Giulio Mondini · Enrico Fattinnanzi
Alessandra Oppio · Marta Bottero
Stefano Stanghellini
Editors

Integrated Evaluation for the Management of Contemporary Cities

Results of SIEV 2016

 Springer

Editors

Giulio Mondini
Politecnico di Torino
Turin, Italy

Marta Bottero
Politecnico di Torino
Turin, Italy

Enrico Fattinanzi
Sapienza University of Rome
Rome, Italy

Stefano Stanghellini
Università Iuav di Venezia
Venice, Italy

Alessandra Oppio
Politecnico di Milano
Milan, Italy

ISSN 1865-3529

ISSN 1865-3537 (electronic)

Green Energy and Technology

ISBN 978-3-319-78270-6

ISBN 978-3-319-78271-3 (eBook)

<https://doi.org/10.1007/978-3-319-78271-3>

Library of Congress Control Number: 2018936178

© Springer International Publishing AG, part of Springer Nature 2018

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Printed on acid-free paper

This Springer imprint is published by the registered company Springer International Publishing AG part of Springer Nature

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

The volume comprises a selection of the best papers presented at the SIEV (Italian Society of Appraisers and Evaluators) 2016 Conference on The influence of the “*Laudato si*” Encyclical letter on Evaluation approaches—urban areas between conflict and solidarity, decay and regeneration, exclusion, and participation, which was held on April 2016 in Rome, Italy. The scientific conference brought together experts from different fields: economics, appraisal, evaluation, architecture, urban planning, sociology, decision sciences, in addition to energy companies, ONG, government and public administration representatives.

The purpose of the Conference as well as of this collection of papers is to encourage a reflection on the cultural, methodological, and procedural rationales of the evaluation of territorial transformations, with a special focus on urban regeneration. Urban regeneration is a more complex process than the renovation of existing buildings, as it concerns social and environmental problems, inhabitants’ quality of life, protection of tangible and intangible resources, innovation processes, and business activities. In this historical phase of urbanization—when the control of urban spreading is becoming a necessary and shared strategy—urban regeneration interventions always have a strategic content. In fact, the physical and structural transformations profoundly change the territorial organization of the city, producing irreversible long-term effects. Therefore, those projects characterize the medium- and long-term policy of the city.

Pope Francis’ *Laudato si*’ Encyclical mainly focusses on the issue of urban transformations and, more generally, on the questions of the protection and enhancement of the environment and the territory. In fact, the Encyclical addresses some crucial issues concerning the development, management, and transformation processes of the territory. Moreover, it principally reflects on the present ecological crisis and on which strategies may be envisaged to overcome it according to the principles of sustainability and solidarity. The way in which the Encyclical declines these arguments raises important questions. Essentially, the document considers the urban issue as one of the most important contemporary global structural crises and it correctly provides an interpretation which overlaps the environmental and social issues tackling them at the same time and as a single problem.

The 72% of European people live in an urban environment and this percentage is expected to rise to 80% by 2050. Due to this trend, cities are continuously growing with an ever greater risk of social segregation, decreasing security and enhancement of environmental problems. All these phenomena, together with the structural fiscal crisis of the States, are the main features of the contemporary urban issue. Moreover, the urban actors' wide range of values, and the decreasing power of public interest in favor of individual or partisan interests, calls into question the credibility of both the decision-making process and the anticipated results of projects and plans. Therefore, local politics is itself failing to deliver effective strategic decisions in coping with globalization, market conditions, and local individualism.

One of the key aspects of the urban issue is the spread of distressed urban areas. Urban suburbs and distressed pockets within historic centers are the places where the social and environmental crises overlap each other. They are symbolic places where economic exclusion and social relegation dominate, where any attempt to improve people's social and existential conditions is defeated by first, the progressive erosion of opportunities, and second, the lack of confidence in the effectiveness of State's and their own actions. The polarization of urban spaces (mirrored, on one hand, by anonymous outskirts, and on the other hand, by set-apart communities of the privileged) threatens to undermine the very idea of the city as well as the reason for its existence. In this context, the policies of the city governments are in many cases fragmented, contingent and partisan. As a consequence, the urban policy became merely an arena where many different (public and private, strategic and contingent) interests compete.

The "*Laudato si*" Encyclical tackles the contemporary urban issue integrating social and environmental issues, interpreting the city as a common good, characterizing urban degradation as a social issue, stressing the right of everyone to participate in the city government. This interpretation rises both important ethical demands and, from a theoretical-methodological point of view, a question about whether this interpretation can have implications on evaluation theories and practices in use. According to that vision, the decision-making of urban regeneration should not be longer considered individual, but collective and multilateral. As a consequence, also the very nature and the aims of evaluation changes.

It is key to note that, the more decisions move from traditional individual interests to the common ones, the more the evaluation content moves from market assessments to collective/social evaluations, where the general (political) interests are intertwined with individual (market) interests. In this case, general management rules of public and collective activities (e.g., transparency, accountability, political and social control, etc.) become important. Furthermore, urban regeneration processes have substantial effects on the natural and built environment of distressed areas, as well as their inhabitants' quality of life, employment, etc., that foster segregation, relegation, and exclusion processes and, in so doing, deeply change their prospects. As a consequence, in order to promote the citizens' right to an active participation, the nature of the decision-making itself should become deliberative. This requires that the inhabitants of the suburbs should be informed, empowered, and enabled to think "evaluatively".

It goes without saying that such choices have important consequences on the evaluation methodologies. This means to accept the multiplicity of values in the decision-making process and, as far as evaluation is concerned, to take into consideration a complex vector of values where the traditional economic-financial ones are only one of the many kinds of value to be considered. It also means that the decision-making is an interactive dynamic process, which requires an evaluation able to take into consideration uncertainty and, consequently, to accept the variability of decision parameters namely, the change of interest, objectives, structures of preference, and, consequently, evaluation criteria. Moreover, it may ask for dealing with the structure of the interests at stake that is, not simply with “traditional” cost and benefit, losers and gainers. But, and above all, it is important to establish both their social distribution and who are entitled to and who are excluded from taking part in the collective decision-making process.

It is a common understanding that evaluation plays an important role in building informed, shared, and efficient decision-making processes. Therefore, focusing on the roles of urban regeneration interventions evaluation is important for many reasons.

From the point of view of (public or private) promoters of the regeneration project, the evaluation is important due to its capacity to identify and explicitly state the objectives and the critical interests to be pursued (as well as their related strategic priorities), the constraints to be tackled, the values to be supported, the feasibility of the investment, etc. In so doing, the evaluation helps the decision-makers to make successful decisions, but at the same time, it is the main tool that the public administration and the market actors use to legitimize their regeneration projects in front of citizens.

From the point of view of the civil society (particularly of the distressed areas people), evaluation is also the main tool to recognize and understand the positive and/or negative consequences of the project. In this way, people will be able to make decisions and to behave with awareness of the facts, since the evaluation may be able to disclose the contents (i.e., results, effects, and consequences) of the alternatives from the point of view of the periphery (e.g., verifying the source and reliability of the information, the plausibility of the reasons, clarifying the responsibilities, establishing costs and benefits, identifying who -and how much-gains and/or loses, etc.). This means that evaluation provides justifications for choices.

In the difficult, complex and even conflictual context of urban regeneration projects, the evaluation process may build an orderly and comprehensible system of relevant information, useful experiences, effective practices, explicit and scientifically sustainable judgements. As a consequence, it is a suitable tool to aggregate interests and unify expectations toward credible and shared social and economic objectives and to avoid ill-advised (often ideological and opaque) judgements based on irrational fears and beliefs.

But, to be successful, these evaluations require to renew their own principles, techniques, and procedures. This means that it is necessary to look for conceptual and methodological paths that are, in some way, different from those prevailing at present.

The bulk of essays presented at the Conference proves that Pope Francis' Encyclical proposes new and innovative approaches able to cope (in an impressive and concrete way) with the complexity of the urban regeneration issue and, to set up and direct the (necessarily) integrated, multidisciplinary and transdisciplinary evaluation process.

The book aims to encourage experts' and scholars' participation in a multidisciplinary cultural dialogue about urban regeneration projects, as a consequence its organization provides the widest possible room to contributions, from various points of view, about the following four main themes: (1) Human Ecology: Values and Paradigms; (2) Integral Ecology and Natural Resource Management; (3) Intergenerational Equity; (4) How to Enhance Dialogue and Transparency in Decision-Making Processes.

In addition, two introductions highlight the main issues, namely the role and functions of the evaluation of urban transformation projects in distressed suburbs, and the integrated evaluation of environmental damage at territorial scale also in terms of intergenerational equity.

Rome, Italy

Enrico Fattinanzi

Contents

An Integrated Approach for Assessing Environmental Damage and (Inter)Generational Debt in the Definition of Territorial Transformation Policies	1
Giulio Mondini	
1 Introduction	1
2 The (Inter)Generational Environmental Debt	4
3 Regenerating the Urban Systems and the Concept of Limit	9
4 Regenerating the Environment and the Territory: The Concept of Resilience	10
5 Assessing the Complexity of Environmental Issues with a Multi-Criteria Approach	11
6 Conclusions	13
References	15
The Evaluation of Structural-Physical Projects in Urban Distressed Areas	17
Vincenzo Bentivegna	
1 Premise	18
2 Main Features of Urban Distressed Areas	19
3 Urban Transformation Projects in Urban Distressed Areas	23
4 The Evaluation of Physical Transformation Projects in Urban Distressed Areas	27
References	35
Part I Human Ecology: Values and Paradigms	
Values and Paradigms for a Human Ecology	39
Francesco Rizzo	
1 Introduction	40
2 The New Value Theory and the Neuralgic, Nodal and Strategic Point of the <i>Laudato Si'</i> Encyclical Letter	41

3 The Three Surpluses and the “Trans-Information” Process: Integral Ecology and the Human City 44

4 Science of Value and Valuation: Ontological Vision and the Operational Paradigm 45

5 Conclusions 49

References 51

“Moral” Purposes and Material “Knowledge” in the Encyclical “Laudato sí” 55

Giovanni Campeol, Sandra Carollo and Nicola Masotto

1 Introduction 56

2 European Culture and Christianity 56

3 Cultural and Religious Isomorphism 57

4 The Encyclical “A Quo Primum” by Pope Benedict XIV: The Town as an Indicator 59

5 The Encyclical “Spe salvi” by Pope Benedict XVI: Faith/Hope and the Undeniable Datum 60

6 The Encyclical “Laudato sí” by Pope Francis 60

7 Conclusions 65

References 65

For an Ethics of Urban Regeneration 67

Marcello Capucci

1 What We Are Talking About? 67

2 A Process, not a Project 68

3 Time Consumption? Another Possible Point of View 69

4 Why We Are Talking About? 72

References 75

The Project “Places of Mediation” 77

Alberto Di Cintio

1 Introduction 77

2 Spontaneous Settlements 79

3 “Outlawed” Territory 80

4 The Abusive City: Living Precariously 80

5 A Strategic and Unified Vision of the Future 81

6 Places of Mediation 81

7 Mediation Strategy 82

8 Outcome of the Project 83

References 86

True, Fair and Beautiful: Evaluative Paradigms Between the Encyclical Letter <i>Laudato Si</i> and Keynes	87
Leopoldo Sdino, Paolo Rosasco and Sara Magoni	
1 Introduction	88
2 From the Limits of Economy to the Economy of the Limit	89
3 The End of an Era: From the Money-Driven Society to the Happiness-Driven Society	91
4 The Valuation of the “True, Fair and Beautiful”	94
5 Conclusions: Encyclical Letter Paradigm Starting from Keynes	96
References	97
The Integration of Agriculture in the Politics of Social Regeneration of Degraded Urban Areas	99
Vera Teresa Foti, Alessandro Scuderi, Giuseppe Stella, Luisa Sturiale, Giuseppe Timpanaro and Maria Rosa Trovato	
1 Introduction	99
2 The Encyclical “ <i>Laudato si</i> ”, Points of Reflection on the Relationship Between Urban Areas, Agriculture and Social Inclusion	101
3 The Contribution of Urban and Social Agriculture to Urban Sustainability	104
4 Methodology	105
5 Results	107
6 Conclusions	108
References	109
Territorial Vulnerability and Local Conflicts	113
Stefano Corsi, Giordano Ruggeri and Alessandra Oppio	
1 Introduction	114
2 Method	115
3 Results	116
4 Discussion and Conclusions	120
References	121
Risk Management and Goal Programming for Feasible Territorial Investments	123
Francesco Tajani and Pierluigi Morano	
1 Introduction	123
2 Aim	124
3 The Model	125
4 Application of the Model	129
5 Conclusions	131
References	131

An Embedded Mixed-Methods Approach to Evaluating Regeneration Strategies for the Historic Center of Trieste	133
Mauro Crescenzo, Sara De Matteis, Marta Bottero, Mauro Berta and Valentina Ferretti	
1 Introduction and Overview	134
2 The Appraisal Framework for the Evaluation	134
3 Discussion of the Results and Conclusions	145
References	146
To Plan, Design and Evaluate “Urban Mending”	149
Marta Berni, Riccardo Renzi and Rossella Rossi	
1 Introduction	150
2 The Concept of Periphery	151
3 Urban Mending: A Culture of Care Versus an Autocratic Approach . . .	153
4 Marginalized People’s Participation in Public Decision Making	157
5 Conclusions and Further Steps	160
References	161
Promotion and Evaluation of the Creative Industry in Inclusive Urban-Ecology Strategies. The Turin Case Study	163
Rossella Maspoli	
1 Introduction	164
2 Methodology and Experimentation	165
3 Results and Discussion	167
4 Conclusions: Proposal for Creative Neighborhood Centers	172
References	173
Part II Integral Ecology and Natural Resources Management	
Valuation of Historical, Cultural and Environmental Resources, Between Traditional Approaches and Future Perspectives	177
Vincenzo Del Giudice, Pierfrancesco De Paola and Fabiana Forte	
1 Introduction	177
2 Aims of HCERs Valuation	179
3 Market Value of Cultural and Environmental Heritage	180
4 Financial and Economic Valuations	181
5 Multidimensional Valuation	182
6 Conclusions	184
References	185

**The Complexity of Value and the Evaluation of Complexity:
Social Use Value and Multi-criteria Analysis 187**
 Grazia Napoli

1 The Challenge of Complexity 188

2 The Complexity of Value 190

3 Complex Values 192

4 Complexity in Multi-criteria Evaluation 193

5 Conclusions and Remarks 195

References 196

**Towards the Circular Economy Paradigm: The Response from
 Agriculture** 199

Donatella Banzato

1 Introduction 200

2 The Encyclical *Laudato Si'* and the New World Ecology 200

3 The Circular Economy 202

4 The Biogas Plant for a Circular Economy in Agriculture 204

5 Conclusions 206

References 207

**Towards a Cultural Ecology in Urban Environments: New Challenges
 for Environmental Impact Assessment** 211

Federica Appendino and Francesca Giliberto

1 Urban Crisis and the Need of a “Global Ecological
 Conversion” 211

2 Toward a “Cultural Ecology”? Parallelisms Between the Encyclical
 Letter and the UNESCO Recommendation on the Historic Urban
 Landscape 212

3 The Need of Innovative Tools: What Role for Evaluation? 213

4 Liverpool, World Heritage Site in Danger, as a Case Study 215

5 Learning from Liverpool’s Experience: Limits and Strengths of
 Existing Impact-Assessment Tools 218

6 Conclusions 219

References 219

**The Privatization of Water Services in Italy: Make or Buy, Capability
 and Efficiency Issues** 223

Chiara D’Alpaos

1 Introduction 223

2 The Privatization of Water Services 225

3 The Reform of Water Services in Italy 227

4 Discussion and Conclusions 229

References 229

Historic, Artistic and Cultural Patrimony for a “Habitable City”: Incentives for Care	233
Fabiana Forte	
1 Historic, Artistic and Cultural Patrimony: Meaningful Convergences . . .	234
2 Financing the <i>Care</i> of Historic, Artistic and Cultural Patrimony: Some Innovations	236
3 Private Cultural Property: The Challenges for Care	238
4 Conclusions	240
References	241
Marketing Nature	245
Cecilia Scoppetta	
1 Framing Ecology Within the Complexity Turn	245
2 Lessons from Katrina (New Orleans, August/September 2005)	246
3 Resilience as a Useful “Boundary Object”	249
4 Rethinking Resilience	250
References	252
A Green District to Save the Planet	255
Domenico Enrico Massimo, Mariangela Musolino, Cinzia Fragomeni and Alessandro Malerba	
1 Introduction	256
2 Methodology	259
3 Case Study on the District Level	261
4 Real-World Green District. Design and Appraisal	262
5 Green District. New Evidence	264
6 Conclusions	267
References	268
Urban Blight and Redevelopment: An Urban Participation Path	271
Teresa Cilona	
1 Introduction	271
2 New Methods of Territorial Governance	272
3 A Participatory Planning Experience. The Case Study and <i>Action-Planning</i> Method	275
4 Conclusions	280
References	281
Evaluating Tangible and Intangible Aspects of Cultural Heritage: An Application of the PROMETHEE Method for the Reuse Project of the Ceva–Ormea Railway	285
Marta Bottero, Federico Dell’Anna and Massimo Nappo	
1 Introduction	285
2 Methodological Background	286

3	Application	288
4	Discussion and Conclusions	293
	References	294
	Valuating Historic Centers to Save Planet Soil	297
	Alessandro Malerba, Domenico Enrico Massimo and Mariangela Musolino	
1	Introduction	297
2	Aim of the Paper	298
3	Specific Contributions of the Paper. Methodological Steps	299
4	Testing the Methodology. The Case Study	302
5	Conclusions	310
	References	310
	An Integrated Assessment Model on Local Aptitudes for Green-Energy Self-sustainability	313
	Maria Fiorella Granata and Filippo Gagliano	
1	The Energy Question in the Encyclical Letter Laudato Si	314
2	Normative and Theoretical References on the Energy Question	315
3	The Proposed Assessment Model on Local Green-Energy Self-sustainability	316
4	The Case Study	318
5	The Sub-Model Assessing the Technical Performance of Lands	321
6	Financial Analysis and CO ₂ Balance of the Project	322
7	Concluding Discussion of Results	324
	References	325
	Urban Spaces in the City of Climatic and Social Changes	327
	Valentina Dessì	
1	“Laudato Si” Versus Some Institutional Courses	327
2	Virtuous Initiatives	333
3	Conclusions	337
	References	338
	Part III Intergenerational Equity	
	Intergenerational Justice in the Evaluation of Urban Regeneration Projects	341
	Patrizia Lombardi and Ian Cooper	
1	Introduction	341
2	Time and Urban Sustainable Development	342
3	The Lack of Intergenerational Justice in Urban Regeneration Evaluation Approaches	343

4	Conclusions	345
	References	346
	Climate-Change Adaptation: New Paradigms for Environmental Urban Planning	349
	Mara Balestrieri, Giovanni Maciocco and Clara Pusceddu	
1	Introduction	349
2	The National Strategy on Adaptation and City Issues	351
3	Impacts of Climate Change on Urban Systems	352
4	Social and Ecological Crisis. Transition to an Integral Ecology in Urban Settings	354
5	New Paradigms for Environmental Planning	355
6	Conclusions	358
	References	359
	When Efficiency Is Not Enough: Should Equity be Embedded in Decision Making and Evaluation?	361
	Marta Berni and Laura Gabrielli	
1	Introduction	362
2	Flaws of Neoclassical Mainstream Economics and Cost-Benefit Analysis	363
3	The Equality Issue	366
4	Evaluation of Urban Transformation and Inter/Intra Generational Equity	368
5	Conclusions and Further Steps	376
	References	377
	Economic Evaluation and Urban Regeneration: A New Bottom-up Approach to Local Development Policies	379
	Rosa Maria Caprino, Gianluigi De Mare and Antonio Nesticò	
1	Emigrate or Cooperate? the Experience of the Genovesi Prize	380
2	Cross-Sectoral Matrices for the Measurement of the Generated Effects on the Regional Economy	382
3	Conclusions	389
	References	390
	Territory, Social Capital and Resilience: The Workers' Buy-Out Case	391
	Alberto Maria de Crescenzo, Alessia Mangialardo and Arcione Ferreira Viagi	
1	Introduction	392
2	Origins and Characteristics of WBO Experiences	392
3	A Critical Analysis of WBO Experiences in Italy	395

4 Conclusion	397
References	398
Integrated Valorization of Cultural Heritage: A Case Study of the Cammino dei Monaci Route	401
Alessandra Oppio, Ila Maltese and Iaria Mariotti	
1 Introduction	402
2 The Evaluation Methodology	403
3 The Case Study	404
4 Results	405
5 Conclusions	408
References	408
City as Hope. Valuation Science and the Ethics of Capital	411
Salvatore Giuffrida	
1 Prologue	411
2 Hope	412
3 Ecology of Reality and the Ethics of Limit	414
4 Ecology of the City and the Ethics of Capital	419
5 Epilogue	423
References	424
A Fair City. Value, Time and the Cap Rate	425
Salvatore Giuffrida	
1 Prologue	425
2 Ecology of Value and Ethics of Valuation	426
3 Ecology of Time and Ethics of Capitalization Rate	431
4 Epilogue. “Emotional Investment” and the Cap Rate	436
References	438
Marginal Opportunities: The Old Town Center in Palermo	441
Giovanna Acampa and Sergio Mattia	
1 Research Objectives	441
2 Analysis of Urban Redevelopment Phenomena: From Gentrification to Urban Acupuncture	442
3 The Old Town Center of Palermo	444
4 The Proposed Methodology	447
5 Conclusions	449
References	450

Green SOAP. A Calculation Model for Improving Outdoor Air Quality in Urban Contexts and Evaluating the Benefits to the Population’s Health Status 453
Maddalena Buffoli, Andrea Rebecchi, Marco Gola, Annalisa Favotto, Giulia Palma Procopio and Stefano Capolongo

1 Introduction 454
2 Methodology 456
3 Results 462
4 Discussion and Conclusions 465
References 465

The Protection of Territory from the Perspective of the Intergenerational Equity 469
Maria Rosa Trovato and Salvatore Giuffrida

1 Introduction. Legacy Interrupted 470
2 Materials. Solidarity and the Damaged Territories 470
3 Intergenerational Fairness. Methods and Approaches for Calculating the Social Discount Rate 474
4 Discussion 480
5 Conclusions 482
References 483

Generational Equity in Italian Urban-Planning: Urban Standards 487
Claudia de Biase and Salvatore Losco

1 Planning Standards: From the 1150/1942 Act to 2000 488
2 Planning Standards in Regional Acts Over the Past 17 Years 492
3 Towards New Standards 499

Part IV How to Enhance Dialogue and Transparency into Decision Making Processes

The Value of Our Common Environment 503
Stefano Pareglio and Alessandra Oppio

1 Introduction 504
2 Nature as a Common Good 506
3 For an Integral Ecology 506
4 Conclusions: The Role of Evaluation 508
References 508

An “Urban Mending” Case Study: Designing a New Social-Housing Complex 511
Riccardo Renzi

1 Introduction 511
2 Evolution of the Project 513

3	Conclusions	519
	References	519
World Café Method to Engage Smart Energy-District Project Partners in Assessing Urban Co-benefits 521		
Adriano Bisello, Tatjana Boczy and Jessica Balest		
1	Introduction	522
2	SINFONIA: A Smart Energy-District Project	523
3	World Café Method	523
4	Practical Use of WCM in Other Studies and Adaptation to SINFONIA Project	524
5	Discussing Results	526
6	Conclusions	531
	References	532
An Integrated Assessment Framework for the Requalification of Districts Facing Urban and Social Decline 535		
Francesca Abastante and Isabella M. Lami		
1	Introduction	535
2	Integrated Assessment Framework	537
3	Case Study	540
4	Conclusions	544
	References	545
Innovative Participatory Evaluation Processes: The Case of the Ministry of Defense Real-Estate Assets in Italy 547		
Marcellina Bertolinelli, Luigi Guzzoni, Stefania Masseroni, Lidia Pinti and Gianni Utica		
1	Introduction	548
2	Participatory Models in Italy and Worldwide	549
3	Valorization of Unused Defense-Built Heritage	550
4	Building Information Modeling as a Tool to Improve the Participatory Process	551
5	Barracks in Milan as Economic Resources	553
6	Conclusions	556
	References	556
The Sustainable Management of Flood-Risk Areas: Criticisms and Future Research Perspectives 559		
Francesca Torrieri, Alessandra Oppio and Sergio Mattia		
1	Introduction	560
2	The Flood-Risk Management Plans: The Italian State of the Art	561
3	The Role of Evaluation in Flood-Risk Management	563

4	Conclusions and Future Research Perspectives	567
	References	567
	The Role of the Social Entrepreneur in Bottom-up Enhancement of Italian Public Real-Estate Properties	569
	Alessia Mangialardo and Ezio Micelli	
1	Introduction	570
2	The Role of the Social Entrepreneur in Bottom-up Enhancement Processes	570
3	Two Experiences for in-Depth Analysis: The Zo Center and Viaduct Gronchi	572
4	The Importance of the Social Entrepreneur	574
5	Conclusions	575
	References	576
	“Impact Investments” in Real Estate: Opportunities and Appraisal	579
	Maria Rosaria Guarini, Fabrizio Battisti and Anthea Chiovitti	
1	Introduction: Ethical Finance and Socially Responsible Investment	580
2	Aims of the Work	581
3	Impact Investments and Traditional Investments in Real Estate: Assessment Criteria and Definition of Properties	582
4	Assessment Procedure	586
5	Assessment Procedure: Application to a Case Study	588
6	Conclusions	591
	References	591
	An Integrated Evaluation Model as a Decision-Support Tool for Marzano di Nola’s Strategic Environmental-Assessment Plan	593
	Francesca Torrieri, Antonella Batà, Angela Aschettino and Barbara Caliendo	
1	Legal and Methodological Framework	594
2	Materials and Methods	596
3	Conclusions	602
	References	602
	The Local Center for the Arts and Culture <i>La Vetreria</i>: Example of Cultural Urban Regeneration in Pirri, Independent Municipality of Cagliari in Sardinia	605
	Francesca Leccis	
1	Introduction	606
2	The Project	607
3	Methodology	609
4	Visual Analysis	609
5	Quantitative Analysis	610

6 Conclusion	613
References	615
Risk-Analysis Techniques for the Economic Evaluation of Investment Projects	617
Antonio Nesticò	
1 The Concept of Risk and the Risk-Management Process	617
2 Risk-Analysis Techniques	620
3 Conclusions	626
References	627

An Integrated Approach for Assessing Environmental Damage and (Inter) Generational Debt in the Definition of Territorial Transformation Policies



Giulio Mondini

Abstract The paper proposes a reflection on the world sustainability emergences and new challenges on the development of innovative multidimensional techniques as support for the decision-making process in the definition of territorial transformation scenarios. The aim of the paper consists in finding a concretization of the integrated assessment paradigm finalized to evaluate the environmental damage and the (inter)generational environment debt. This paradigm is focused especially on: the Multicriteria Analysis (MCA), the Impact Assessments (IA) and the Cost-Benefit Analysis (CBA). These evaluation approaches may support in an integrated way the achievement of a conscious territorial development, favoring also networking, cooperation and synergies between public and private actors, in a logic of sustainability.

Keywords Intergenerational debt · Multidimensional techniques
Decision-making process

1 Introduction

Nowadays, the decisions related to the management and transformation of territory should be compared necessarily with environmental and social emergencies that are no longer negligible.

Firstly, we are living in an epochal change characterized by a rapid growth of the urban population with respect to the rural population for the first time in our history (Brown 2010).

Secondly, the scientific community and especially geologists have recognized the existence of a new era, named Anthropocene, which refers to the profound human transformations and activities that generate impacts and pressures on Earth.

G. Mondini (✉)

Dipartimento Interateneo di Scienze, Progetto e Politiche del Territorio,
Politecnico di Torino, Viale Mattioli, 39, Turin, TO 10125, Italy
e-mail: giulio.mondini@polito.it

According to the analysis recorded by satellites, the humans have transformed the continental surface from 75 to 83% with respect to the entire planet surface.

Thirdly, the United Nations has predicted that by 2020 around 60 million of people could migrate from sub-Saharan regions to North Africa and Europe: this migration flow should be added to the already high level of so-called environmental refugees (Brown 2010).

Lastly, it has to be noticed that the last century began with a population of 1.6 billion individuals and it was concluded exceeding of 6 billion and the forecasts for 2050 prove around 9 billion people. Therefore it becomes fundamental to reflect whether there will be sufficient food and water for all and if ecosystems will be able to withstand ever increasing human pressures. In this epochal change, it is worth remembering that, as Einstein said, *“we can not solve a problem using the same way of thinking that created that problem”*. Therefore, it is necessary to think of new paradigms and innovative approaches, able to face the complexity and multidisciplinary of this very topical issue. The present contribution takes part to the debate on these emergencies, proposing a reflection on the new perspectives concerning about the paradigm of sustainable development (Bottero et al. 2012) and considering the contents of the Encyclical Letter *“Laudato Si”* by Pope (2015).

Furthermore, some interesting reflections deal with the reversal of the traditional approach in which the attention is focused on the possibility of passing on to the future generations the economic, social and environmental heritage. According to an innovative approach, it is assumed that capital is borrowed from future generations and the attention should be paid on the way to repay this loan. The view of sustainability considered as *“loan from the future”* seems to open new fields and new challenges in which the evaluation has a very central role.

If we consider the Native American saying *“treats the Earth well: it was not given to you by your parents, it was given to you by your children”*, it becomes possible to reflect on refer to a loan contract, where the generation is subsequent to grant the loan and the current generation to receive it. So if we assume that we have borrowed the Earth from our children and we have to give it back one day by answering what we have done, that means we should try to repair the damage caused and compensate in some way for the damage we could not repair (Bottero et al. 2012; Amendola 2016). According to this view, the loan is guaranteed to us by future generations and therefore attention must be focused on key solutions to repay this loan.

More precisely, this reflection refers to the possibility of returning to future generations borrowed capital in terms of technological innovation, knowledge, safeguard of environmental and cultural resources and reserve money, which are fundamental for compensating the environmental damage.

In conclusion, it is possible to affirm that the concept of loan from the future and the method of repayment constitutes a first attempt, still open and temporary, to overcome the limits of the definition of sustainable development on of the last twenty years, expanding the reasoning to future horizons and thus opening new and interesting frontiers of research for the different disciplines.

Moreover, it is important to highlight the need to concretize a conceptual and operative system, especially in sensitive territories, characterized by complex problems and where the different interests are not equally involved into plans and projects. This issue afflicts particularly a part of society, that is, too often ignored and considered as “invisible” (Encyclical Letter *Laudato Si*, [158], p. 144).

In the present condition of global society, where injustices abound and growing numbers of people are deprived of basic human rights and considered expendable, the principle of the common good immediately becomes, logically and inevitably, a summons to solidarity and a preferential option for the poorest of our brothers and sisters. This option entails recognizing the implications of the universal destination of the world’s goods, but, as I mentioned in the Apostolic Exhortation *Evangelii Gaudium*,¹²³ it demands before all else an appreciation of the immense dignity of the poor in the light of our deepest convictions as believers. We need only look around us to see that, today, this option is in fact an ethical imperative essential for effectively attaining the common good.

The adoption of a “holistic” approach seems to be the unique path that should be undertaken by the community of evaluators and estimators, developing multidimensional evaluation methodologies. According to the solicitations of *Laudato Si* (Pope 2015; Penza 2016; Borrelli and Cittero 2016), it seems particularly important to make a substantial and timely extension of costs and benefits that should in any case be considered when activating any type of plan or project. First of all, it is necessary to estimate all the costs that directly or indirectly, obvious or hidden, will have to be effectively sustained, specifying on which individuals will fall back. As far as the benefits are concerned, it is necessary to evaluate not only the positive benefits but also the possible negative effects, considering their impact on the social environment, in particular on those realities that, in the preparation of the plans and projects are considered invisible. If we take into account the resonance of the COP21 Conference in Paris (2015), we can see how, in recent years, there has been a strong affirmation of the existence of an environmental emergency, with regard to climate change and climate global warming. These phenomena are one of the negative and relevant effects that derive from the model of development that affects the current society.

In this sense, the affirmations of Pope Francis in the Encyclical Letter “*Laudato Si*” ([48–49], pp. 42–44) are particularly near to this vision.

The human environment and the natural environment deteriorate together; we cannot adequately combat environmental degradation unless we attend to causes related to human and social degradation. [48]

We have to realize that a true ecological approach always becomes a social approach. [49]

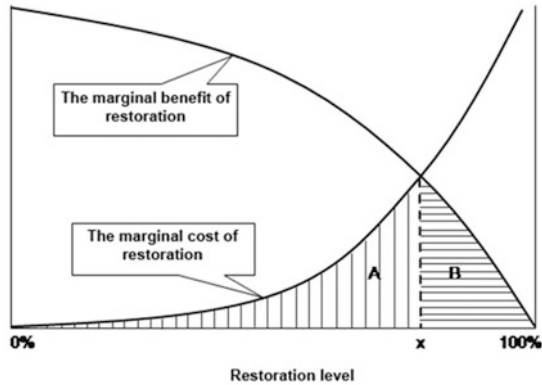
Any approach to the environment should consider the economic point of view. Economic analysis makes possible to attribute an “economic value” to the environment and its resources.

2 The (Inter)Generational Environmental Debt

The main reason for the unsustainable consumption of resources refers to the costs associated with the activities which do not have repercussions on who carried out the activity, but on future generations and people living in other countries. The environmental damage that will affect future generations leads to the concept of (inter)generational environmental debt. In general terms, the (inter)generational environmental debt is a measure of the total amount of environmental damage caused by past and present generations, which will have repercussions on future generations (Azar and Holmberg 1995). It should be noted that the question of environmental debt presupposes the existence of a loan; according to this view, the loan is guaranteed by future generations and the attention must be focused on how to repay this loan. From an operational point of view, the (inter)generational environmental debt is defined as the minimum value of the combination of the restoration cost and the damage cost. This means that recovery must be done as long as the marginal cost and the marginal benefit of the recovery are equal. In this case, the (inter)generational environmental debt is equivalent to the sum of the restoration cost and the residual damage cost. Figure 1 illustrates the concept of (inter)generational environmental debt with reference to a specific damage. The benefit of restoration is determined by the damage avoided. It is reasonable in this context to hypothesize that the marginal benefit of the restoration decreases and that the marginal cost of the restoration increases with the degree of restoration itself. The definition of (inter)generational environmental debt therefore implies that the present generation remedies a specific damage as long as the marginal benefit of the restoration equals the marginal cost (of the same degree of recovery x in Fig. 1). Therefore, the (inter)generational environmental debt for each type of damage is equal to the sum of the restoration cost (area A in Fig. 1) and the cost of the residual damage (area B). If the marginal cost of the restoration is greater than the marginal benefit of the same for each degree of restoration, then the (inter)generational environmental debt is equal to the total damage caused. The overall (inter)generational environmental debt is obtained by summing the (inter)generational environmental debt for each type of damage (Azar and Holmberg 1995).

It has to be noticed that there are two types of damage to be included in the definition of inter(generational) environmental debt: the current damage identified and the potential damage. If we consider the complexity of environment systems and the related mechanisms, it becomes extremely difficult to identify the concentration levels that correspond to changes in ecosystems, as well as the type of damage that may arise. For example, it is possible to mention how the introduction of chlorofluorocarbon molecules (CFCs) was considered a potential damage as long as it was not discovered that CFCs had a negative impact on the ozone layer, a finding that caused the potential damage would turn into current damage. Another

Fig. 1 The (inter)generational environmental debt for a specific damage. *Source* Elaboration by Azar and Holmberg (1995)



example that we consider is the case of a substance A, whose concentration in the atmosphere does not cause any damage, but for which there is a threshold not to be exceeded so that such concentration does not become dangerous. In this case, if the future generations continue to produce the substance A, environmental damage will occur probably. Similar cases refer to various human activities that produce impacts on the environment, system can increase the damage that future generations will generate on it. There are two fundamental reasons for including potential damage in the concept of (inter)generational environmental debt even if no actual harm has yet been caused: the first refers to that the potential damage could generate in the future, due to the slowing mechanisms existing in nature, while the second relates to the possibility of determining a reduction in the absorption and stabilization capacity of the ecosphere (Azar and Holmberg 1995). In light of the considerations mentioned above, the (inter)generational environmental debt must be considered as a monetary estimate of the extent of environmental damage that we transfer to future generations. Therefore, a fundamental question refers to the intergenerational aspect. From the point of view of society, it is not possible to distinguish the moment in which one generation gives way to the next one. What is the time frame to associate with each generation? The (inter)generational environmental debt is calculated as accumulated debt, or as the sum of the damage caused by the present and past generations. This may seem an injustice to the present generation that is called upon to pay for the debts of past generations but, since most of the negative environmental effects with long-term impacts have been accumulated over the past 70 years, it becomes reasonable to consider our generation responsible for the accumulated environmental debt. So it becomes of crucial importance, even if there are no guidelines on the matter, the choice of the year from which to start calculating the (inter)generational environmental debt (Azar and Holmberg 1995; Lombardi and Cooper 2016). Another issue of particular importance in the calculation of the (inter)generational environmental debt refers to the territorial

Table 1 The different possible approaches for the calculation of the national (inter)generational environmental debt

Approaches	Description
Method based on the effects	The focus is on all the negative environmental impacts caused on the territory under analysis, regardless of the nationality of those who caused them and where the activities that generated them took place
Method based on the activities	In this case, all negative effects on the global ecosystem (including that of the country concerned) due to activities carried out on the territory under analysis regardless of the nationality of those who carried out these activities are taken into consideration
Method based on the consumptions	The attention is focused on all the environmental impacts resulting from the consumption activity carried out by the citizens of the territory under examination, as well as from the production activity necessary for such consumption, regardless of where the consumption, production and impacts
Method based on the productions	In this case, all the impacts deriving from the production activity carried out in companies owned by the country under analysis and from the consumption of the goods produced in these companies are taken into consideration, regardless of where production, subsequent consumption and impacts took place

Source Elaboration by Azar and Holmberg (1995)

boundaries. In the calculation of the national environmental debt of a territory, different approaches may be considered, as illustrated in Table 1.

The methods proposed in Table 1 report both advantages and disadvantages. The choice of which method to adopt often depends on the characteristics of the territory under consideration. The approach that seems to provide the most appropriate measure of national (inter)generational environmental debt should be based on consumption, since those who use a good or service should also pay for the negative effects associated with it, consistently to what is provided by the “polluter pays” principle. How to return to future generations what we have borrowed so that they will have the same development possibilities that we have had? In this seemingly simple concept there are infinite features, a first detection could be represented by (Tables 2 and 3):

- Technological innovation;
- Knowledge;
- Production of social capital;
- Safeguard of environmental and cultural resources;
- Reserve money;
- These features, are fundamental to resolve the question of environmental damage.

Table 2 Main existing approaches in the literature for the determination of the discount rate

Evaluation approaches	Main characteristics	Discount rate proposed	Main authors
No discount	The absence of discount is the only approach able to allow complete intergenerational equity	Discount rate equals to 0	Cyriac-Wantrup (1942), Harrod (1948)
Social time preference rate	The temporal preferences of individuals are taken into account. The use of a positive discount rate is associated with the concepts of capital accumulation and technological exchange that guarantee future generations an adequate trade-off (weak sustainability)	Social time preference rate (STPR)	Lesser et al. (1997), Solow (1991)
“Stern review”	We start Ramsey’s formula (1928) for the social discount rate and we assume a very low intertemporal preference rate in order to protect the interests of future generations	Discount rate equals to 1.4%	Stern (2006/2007)
Empirical discount rate	The discount rate is derived empirically by evaluating the opinions of the present generation regarding the welfare changes of future generations	Between 0 and 3% (Johannesson and Johannesson 1997)	Luckert and Admovicz (1993), Cropper et al. (1992), Benzion et al. (1989)
Discount rate variable over time	The discount rate is not constant but varies over time since it is assumed that the preferences are not temporally consistent	Hyperbolic discount rate	Henderson and Bateman (1995), Cropper et al. (1992)
Discount rate tending to zero (“lowest-possible far-distant-future discount rate”)	The discount rate is not constant but the discount rate must consider the uncertainty related to the future	Decreasing discount rate, from an estimated value for the present period to very low values for future periods	Weitzman (1998)

(continued)

Table 2 (continued)

Evaluation approaches	Main characteristics	Discount rate proposed	Main authors
Diversified Odiscount rate	We assume a traditional discount rate (SDR) but we increase the value of environmental capital over time through the use of different discount rates depending on the nature of the resources involved	Between 0 and 2% (Hasselmann 1999)	Krutilla and Fisher (1975)
Modified discount rate	The interests of future generations are implicitly included	Matrix of discount rates with intergenerational weights	Kula (1988)
Intergenerational discount rate	The discount rate considers the interests of future generations for the calculation of the net benefits deriving from the use of environmental resources	Intergenerational discount equation	Sumaila and Walters (2005)

Source Elaboration by Bottero et al. (2013)

Table 3 Repair measures

Repair measures	Description
Primary reparation	The purpose of primary remediation is to restore the damaged natural resources and/or services to, or towards, baseline condition
Complementary reparation	Complementary repair is undertaken if the natural resources and/or damaged services do not return to the original conditions. The purpose of the complementary repair is to obtain, if appropriate also in an alternative site, a level of natural resources and/or services similar to what would have been obtained if the damaged site had returned to its original condition. Where possible and appropriate the alternative site should be geographically linked to the damaged site, taking into account the interests of the affected population
Compensatory reparation	Compensatory remediation shall be undertaken to compensate for the interim loss of natural resources and services pending recovery. Compensation consists of further improvements to protected species and natural habitats or to waters on the damaged site or alternative site. It should not be understood as a financial compensation to the public

Source Elaboration by Martin-Ortega et al. (2011)

3 Regenerating the Urban Systems and the Concept of Limit

The concept of loan between the generations brings with it one of the actions that are at the center of the debate: the urban regeneration. A substantial reference from which to start, also from a normative point of view, a very important reference is the Regional Law of 29 July 2008, no. 21, of Puglia Region, “*Regulations for urban regeneration*”, which reads: «*The Puglia Region with the present law promotes the regeneration of parts of cities and urban systems in coherence with municipal and intercommunal strategies aimed at improving urban, housing, socio-economic, environmental and cultural conditions of human settlements and through intervention tools developed with the involvement of the inhabitants and of interested public and private subjects*».

This action could not be correctly dealt without introducing the concept of limit that Magnani (1998) declines very correctly in 6 points:

1. *Limits on anthropic carrying capacity*. The application of the concept of “carrying capacity” of the territorial systems is assumed, as well as the determination of environmental thresholds and the assumption of the concept of environmental compatibility. Both make it possible to identify how a transformation can be accepted by an ecosystem, without introducing a lowering of the threshold;
2. *Limits on land consumption*. There is a need to protect the processes of “land consolidation” and to limit the consumption of agricultural land, introducing elements of rebalancing between the settlements and the bioregions;
3. *Limits on energy consumption*. Progressive replacement of fossil energy sources with renewable and clean energy sources based on energy balance strategies commensurate with the withdrawal of energy and to the generative and regenerative sources capacity;
4. *Limitations on the production of waste*. For each type of waste, the cycle must be closed to an appropriate scale of intervention;
5. *Limits on the emission of pollutants in the air, water and soil*. There is no doubt that the supranational and national pollutant reduction policies have set emission thresholds according to a preventive logic and, where this is not possible, have correctly advocated the precautionary approach;
6. *Limits in the artificialization of the territory*. Urban ecosystems should be perceived as those settlements where local communities cooperate with the delineation of the boundaries of the territory and its urban tissues. A conceptual, methodological and procedural effort, relative to the urban regeneration processes may be considered simultaneously a cultural transformation that is very slow and complex in the transition from theory to practice (Fig. 2).

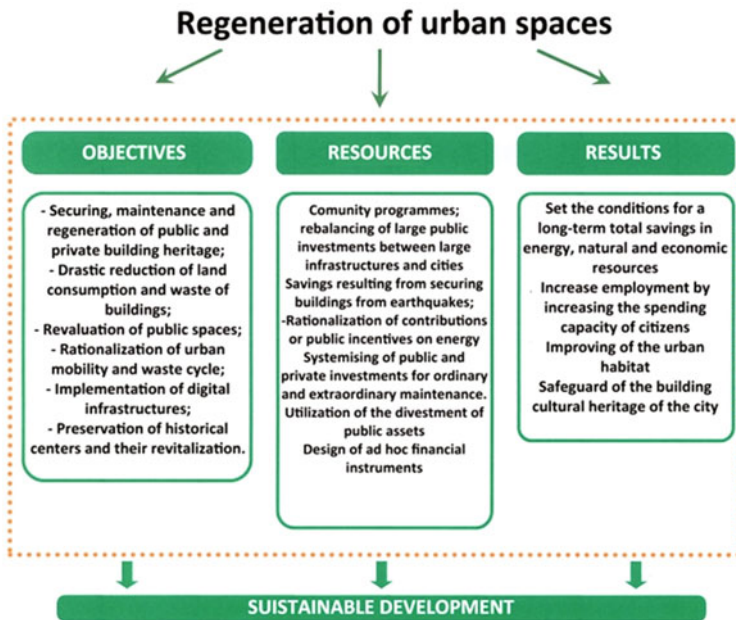


Fig. 2 Objectives, resources and results in urban regeneration processes. *Source* Own elaboration 2017

4 Regenerating the Environment and the Territory: The Concept of Resilience

The challenge in course consists in the concretization of the regeneration concept; how to achieve a regeneration of the environment on a territorial level? How to evaluate the impacts on the environment? The answer to these questions is the concept of resilience. The term resilience refers to the ability of a system to maintain its structure and its behavior in presence of external disturbances, i.e. the ability to adapt to one or more changes. The resilience consists in an intrinsic quality of the system itself. The concept of resilience is emphasized especially in the disciplines concerning the landscape ecology, even if its meaning embraces a certainly wider field. Discussing about resilience referring to the environment means taking attention to the functioning of the systems that compose it, which is necessary for the maintenance of equilibrium in presence of extreme events. Starting from the concept of resilience implies the need to organize resources, planning their use over time. For this to happen, we need to balance three dimensions: conservation of environmental resources, economic growth and social

equity. Depending on the equilibrium created between the different needs, we can consider three degree of sustainability: very weak, weak and strong; each of these types can be developed according to the ecological, economic and social dimensions. The fundamental objective of a sustainability project is to define an integrated procedure, able to guarantee a wider cooperation between the actors involved, from the preliminary phase to the management phase and to implement a shared common strategy that overcomes the specialisms generated by the single areas of competence. The need for a systematic and non-linear approach to complex problems is accompanied by the need for integration of the methods and interpretative models used in the various disciplinary fields so that it becomes possible to identify in the methodology the guiding thread of the path through sustainability. Also in this case, both multidisciplinary and transdisciplinary aspects emerges. According to De Mauro (2000) the interdisciplinary term means that it concerns different disciplines among which it is possible to identify common elements, connections and affinities, while the transdisciplinary term concerns the comparison of the disciplines that allows the analysis of new data as connective tissue between the different disciplines. Moreover, the continuous interaction of an huge number of physical, chemical and biological processes, but also technological, economic and social processes, causes in some way the whole to be constitutively different from the simple sum of the parts.

5 Assessing the Complexity of Environmental Issues with a Multi-Criteria Approach

An alternative approach is provided by the Decision Analysis, a set of theories and techniques designed to support actors and organizations in solving complex decisions, characterized by significant levels of uncertainty and a multidimensional profile of the elements involved, which are often incommensurable and conflicted.

In this sense, the techniques of Multicriteria Analysis (MCA) are the most suitable tool for dealing with complex decision-making problems, including those related to the environment, territorial development and management.

More precisely, the multi-criteria approach allows to disregard the need to evaluate everything in economic terms, to deal with multiple and conflicting aspects and to structure complex problems, increasing the transparency of the decision-making process (Bentinvegna 2016). The MCA, on one hand, is generally not included in the administrative decision-making procedures, such as Impact Assessments and, on the other hand, it loses, from a theoretical point of view, the relation with the welfare economy and the economic efficiency of the Cost-Benefit Analysis (CBA). Each of the three instruments mentioned above then carries out a partial evaluation: on the extreme level, the Impact Assessments “forget” the economic and positive impacts and the CBA “forgets” everything that could not monetize ignoring the problems of environmental sustainability, equity and

conflicts of interest. The MCA techniques may represent the bridge between these extremes in the frame of integrated sustainability assessments.

Therefore, it is necessary to use multi-criteria methods to integrate monetary and non-monetary valuations in order to compare the overall convenience of a strategy with respect to another. Analogously to the CBA approach, it is therefore necessary to reach a balance between the advantages (benefits) and the overall disadvantages (costs). In this sense, both costs and benefits must be considered simultaneously (unlike what normally happens in impact assessments) and the different types of impact (economic, bio-physical, aesthetic, socio-economic, socio-cultural, health, politicians, etc.) must be with a holistic approach included in the analysis.

Subsequently, the decision problem is expressed in the search for an equilibrium between conflicting criteria. The integration of the CBA in the decision-making process is particularly important for the following three reasons:

- The interest concerning the CBA is due to the close relation with the welfare economy, or the belief that economic efficiency corresponds to a socially desirable situation;
- The power deriving from the fact that economic values are used as evaluation parameters and thus synthesize a huge amount of information;
- The popularity of the CBA: for institutional reasons, the evaluation based on the CBA is still a reference point that can not be abandoned.

The contribution intends to lead the debate on sustainability emergence focusing on the need to integrate the knowledge of the various disciplines identifying in the social capital the resource around which the knowledge should converge to achieve a shared goal (Figs. 3 and 4).

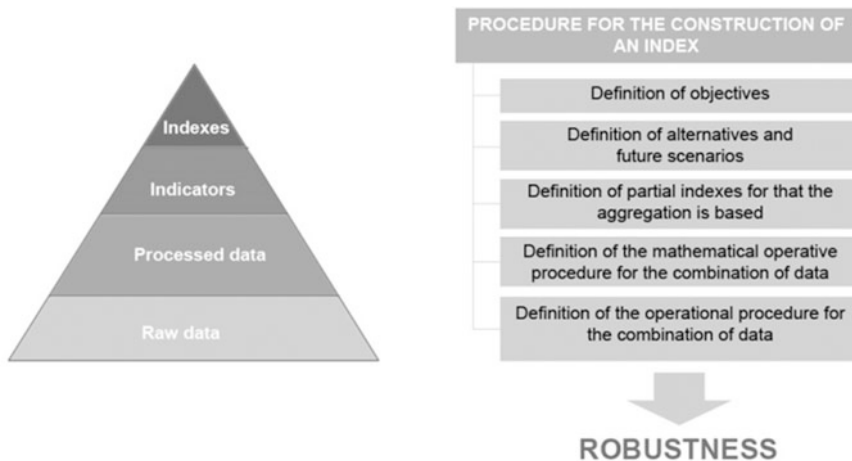


Fig. 3 The pyramid of information and the process finalized to index elaboration. *Source* Own elaboration 2017

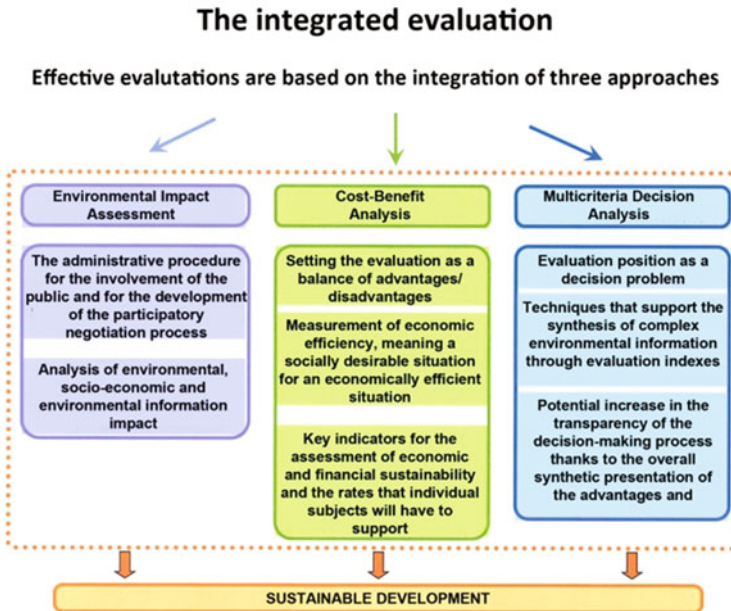


Fig. 4 The main classic evaluation approaches employed in the pursuit of sustainable development. *Sources* Elaboration by Bottero and Mondini (2009)

6 Conclusions

The contribution focuses on the attention to the ever more need to have adequate evaluation approaches for a correct evaluation of environmental damage and the related debt towards future generations. Despite these approaches are well known in the scientific literature, the practical application of the monetary evaluations methods for the compensation of environmental damage appears still rather poor in Europe (Martin-Ortega et al. 2011). In this sense, an effective support is provided by the so-called integrated assessment paradigm (Nardini 2005; Bottero and Mondini 2009; Mondini 2016), based on the harmonization and organic integration of the three dominant approaches to evaluation in the public sphere: Environmental Impact Assessments (EIA, SEA, EcIA), Cost-Benefit Analysis (CBA) and Decision Analysis (Multicriteria Analysis) in order to overcome the weaknesses and to take advantage strategically of the synergy deriving from the integration of the various disciplines and supporting the decision-making processes in the definition of sustainable territorial transformation scenarios. The new research frontiers also take into consideration the methodological approach of the Life Cycle Analysis (LCA), highlighting how the integration of this method can make the evaluation more effective. In this case, we speak of Life Cycle Cost Analysis (LCA) and Input

Output Life Cycle Assessment (EIO-LCA) (Senthil Kumaran et al. 2003; Rebitzer et al. 2002; Suh et al. 2004). It is in fact of fundamental importance to consider in detail the environmental damage in the different phases of the entire cycle. As already said, the concept of borrowing assumes an ethical connotation and it arises so spontaneous to ask this question: how to give back to future generations what we have borrowed so that they will have the same development possibilities we have had? Some key solutions may be certainly the cooperation, the networking and synergie. The cooperation includes both the public and the private: the economic difficulties faced by the public sector in fulfilling the tasks of enhancement can be mitigated through the involvement of private actors in projects. This goal may be achieved by identifying suitable cooperation formulas. It is evident that if the institutions are responsible for implementing protection policies, the local communities, associations are the main protagonists of the territory who have to cooperate. In fact, a conscious use of resources, their protection and even an enhancement could not disregard the involvement and participation of society, inviting the users of the territory to rediscover the role played by the heritage as in the construction of a shared common identity, as a engine of cultural and economic resources. In this sense, it is necessary to deal with the different groups of society, identifying strategic actions able to address each of them. The concept of “sustainable communities” derives from this view, which can be represented by the following four elements:

- Awareness of the environmental and cultural resources;
- Development of models based on energy saving, environmental protection, cycle closure;
- Predicting spaces and times for social sharing and aggregation;
- Implementation the integration between the natural system and the built one.

Capital is one of the most important issues: the monetary capital that allows us to have a useful liquidity and a possible remedy for the damage created by an incorrect use of the limited resources, while the social capital is represented by homogenous group of people who contribute with different views, objectives and values to realize a network to share sustainable common goals. The accumulation of social capital does not refer to real estate or monetary assets and could not be achieved without creating social networks of different nature. Social capital is the fundamental basis for the management of cultural heritage and environmental resources. Whoever intervenes within a territory for the conservation and enhancement of a punctual or widespread asset, so could not avoid considering three fundamental aspects: the sustainable perspective that concerns the current heritage as a loan from future generations; the territorial and biocultural context, which are containers of infinite values; the creation of networks through an integrated approach. Behind these elements that can guide the intentions of conscious evolution and development, precise challenges are identified with regard to the future. In particular, the need to ensure the essential elements, such as food, energy and water, that nowadays are taken from granted by people and if these are not properly safeguarded

through specific policies of protection and enhancement, may be lost by future generations. As mentioned above, energy is one of the non-renewable resources and will soon come to an end if we do not use properly renewable resources; food will be an emergency because the world's population is constantly expanding and the amount of food to feed us will soon be insufficient; water and the methods to guarantee and save drinking water even where there are no sources available, so as to ensure food, energy and therefore life all over the world.

References

- Amendola G (2016) The just city (La Città Giusta). *Valori e Valutazioni* 17:13–14
- Azar C, Holmberg J (1995) Defining the generational environmental debt. *Ecol Econ* 14:7–19. [SSDI 0921-8009\(95\)00007-0](https://doi.org/10.1016/0921-8009(95)00007-0)
- Bentinvegna V (2016) Dialogue and transparency in decision-making (Dialogo e trasparenza nei processi decisionali). *Valori e Valutazioni* 17:25–28
- Borrelli G, Citterio M (2016) Environmental sustainability: from theory to practice. The contribution of the Laudato si' encyclical (La sostenibilità ambientale dalla teoria alla pratica Il contributo della Enciclica Laudato si'). *Valori e Valutazioni* 17:9–11
- Bottero M, Ferretti V, Mondini G (2013) From the environmental debt to the environmental loan: trends and future challenge for intergenerational discounting. *Environ Dev Sustain* 15:1623–1644. <https://doi.org/10.1007/s10668-013-9453-1>
- Bottero M, Ferretti V, Mondini G (2012) Valori ambientali, equità intergenerazionale e sostenibilità: una riflessione a partire dall'Analisi Costi Benefici. *Valori e Valutazioni* 9:91–106
- Bottero M, Mondini G (a cura di) (2009) *Valutazione e sostenibilità. Piani, programmi, progetti*, Celid, Torino
- Brown LR (2010) *Piano B 4.0. Mobilitarsi per salvare la civiltà*. Edizioni Ambiente
- De Mauro T (2000) *Il dizionario della lingua italiana*, Paravia
- Lettera Enciclica Laudato Si del Santo Padre Francesco sulla cura della casa comune, 24/05/2015
- Lombardi P, Cooper I (2016) Inter-generational justice: time to tackle our evaluation practice? (Giustizia intergenerazionale: Possiamo finalmente affrontare la questione nelle pratiche di valutazione?). *Valori e Valutazioni* 17:19–23
- Magnani A (1998) *Il territorio degli abitanti: società locali e sostenibilità*. Dunod, Milano
- Martin-Ortega J, Brouwer R, Aiking H (2011) Application of a value-based equivalency method to assess environmental damage compensation under the European Environmental Liability Directive. *J Environ Manage* 92:1461–1470. <https://doi.org/10.1016/j.jenvman.2010.12.001>
- Mondini G (2016) Integrated assessment for the management of new social challenges (Valutazioni integrate per la gestione delle nuove sfide sociali). *Valori e Valutazioni* 17:15–17
- Nardini A (2005) *Decidere l'ambiente con l'approccio partecipato*. Collezione CIRF, Mazzanti, Venezia, ISBN:888811470X
- Penza G (2016) Pope Francis: the Laudato si' encyclical and the urban issue (Papa Francesco: L'Enciclica Laudato si' e la questione urbana). *Valori e Valutazioni* 17:5–8
- Pope F (2015) *Encyclical letter Laudato Si on care for our common home*
- Rebitzer G, Hunkeler D, Lichtenwort K (2002) *Environmental life cycle costing*. Taylor and Francis, Boca Raton
- Senthil KD, Ong SK, Nee AYC, Tan RBH (2003) A proposed tool to integrate environmental and economical assessments of products. *Environ Impact Assess Rev* 23(1):51–72
- Suh S (2004) Functions, commodities and environmental impacts in an ecological-economic model. *Ecol Econ* 40(4):451–467

The Evaluation of Structural-Physical Projects in Urban Distressed Areas



Vincenzo Bentivegna

Abstract This Introduction concerns structural physical urban projects specifically focussing on the strategic role of the evaluation in regeneration projects of urban distressed areas. The analysis framework is the Laudato si' Encyclical concerning the contemporary urban issue and the question of poverty. It fosters the following specific points in facing the urban distressed areas question: the need to integrate the environmental and social issues; the peculiarity of urban decay as a social issue; the interpretation of the city as a common good; and an explicit support to the weakest's participation in public decision-making. The analysis develops along three main axes: first, the identification of the main cultural, political, economic and social characteristics of present inhabitants of urban distressed areas—in comparison with those living in the rest of the city—underlining their subordinate role. Secondly the acknowledgement of the importance and ambiguity of the physical-environmental transformation projects in these areas (because although they may be useful and well-intentioned, they may seriously harm the weakest inhabitants) with a special attention to the role of the public administration in decision-making related to their governance processes. Finally, it is suggested an increasing attention on these projects evaluation since it is, at the same time, the main instrument to legitimise in front of the public opinion the public administration's and the market's transformation projects and, the inhabitants' fundamental tool to understand, from their point of view, the consequences of the project.

Keywords Urban distressed areas · Participative evaluation · Urban regeneration project

English translation by Marta Berni.

V. Bentivegna (✉)

Department of Architecture (DIDA), University of Florence, Florence, Italy
e-mail: vincenzo.bentivegna@hotmail.it

1 Premise

The “Laudato si” Encyclical (Bergoglio 2015) gives an interpretation of the contemporary urban issue that integrates both the social and environmental issues; it characterizes urban decay as a social issue; moreover, assuming the city as a common good, it supports the need of a widespread participation of all citizens in the decision-making process concerning urban questions. The Encyclical concludes by stating that the contemporary urban crisis can be tackled only by adopting a comprehensive, non-sectorial, non-contingent and unselfish vision of the problems. The encyclical also proposes a prescriptive theory of the city governance whose fundamental elements are the decisive importance of social and environmental choices, the supremacy of the State over the market, and the right-and-duty of every citizen to actively participate in decision-making (Bentivegna 2016).

The elicitations of Pope Francis deserve a verification in our cities and in particular an in-depth analysis on how they can influence the evaluation of structural projects in the distressed areas of European cities.

The focus on structural physical urban projects depends on their capacity to profoundly change the territorial organization of the city, that is, to produce long-term irreversible effects. As a consequence, these projects characterise the medium- and long-term policy of a city. An increasing attention on urban structural project’s evaluation is necessary because first, evaluation is the main instrument that the public administration and the market can use to legitimise their interventions in front of the public opinion, and secondly, for the civil society evaluation is a fundamental tool to understand the consequences of the project which allows people to make informed decisions. Finally, focussing the analysis on urban distressed areas and their inhabitants stems from the firm belief that urban decay and relegation processes are among the most important aspects of the current urban crisis.

Structural physical urban projects are definitely one of the most powerful tools of urban regeneration, but they may be very ambiguous. Urban regeneration may be useful and well-intentioned, but it can be harmful to some groups of citizens who, due to their social and economic conditions, need social protection. For example, physical and environmental redevelopment projects improve the quality of housing, services, and the neighbourhood spatial organisation, but at the same time, they stimulate the growth of urban rent which results in an increase in the prices and rents of residential, productive, and commercial assets. As a result, the weakest’s access to the housing market is strongly reduced, and the displacement¹ process takes place. Furthermore, the localization in the urban distressed suburbs of cluster of services (e.g. incinerators or public transport depots)—within an overall process of urban structural regeneration of the city—unquestionably meets efficiency criteria, but at the same time, it increases the environmental disadvantages of local population.

¹This displacement is referred to the phenomenon of gentrification.

These disadvantages become socially relevant if they mainly concern the inhabitants of deprived urban areas, i.e. the weakest and most vulnerable people of the urban society. This can cause conflicts. Strategic regeneration projects of urban distressed areas are ambiguous because, on the one hand, they always have positive effects on the city as a whole, on the other hand, they often conflict with the interests of the inhabitants.

2 Main Features of Urban Distressed Areas

The combined effect of the global crisis that is affecting the capitalist mode of production and its consequential major changes² pressurises European cities into a structural (and even epochal³) crisis.

Alongside this, at the local scale, there are processes of resistance to the direct and contingent effects of globalization and the consequences of the residues of neoliberal ideology which foster the reduction of the role of the State (see the contraction of welfare, and the consequences of austerity discharged on local authorities) giving rise to a deflagrating mixture that pushes towards the spread of degraded (both old and new) internal urban areas. The spread of these areas is becoming one of the hallmarks of cities at the beginning of this millennium.

This is a complex structural phenomenon with many unclear relevant aspects and consequences. The distressed areas—both central and peripheral, large and small—are places of social relegation (Wacquant 2010; Danzelot 2012), of physical, social, economic and cultural marginality accumulation (Saraceno 2016), of structural precariousness and of economic and social stagnation. They are places where people expelled from the economic processes of production and consumption⁴ and those excluded from social processes⁵ settle.

All this is due to the powerful and concomitant phenomena of de-industrialisation, industrial delocalization, mass unemployment, continental migration and the downgrading of relevant parts of the bourgeoisie and proletariat. Moreover, these processes are exacerbated by the policies and (the active and inactive) behaviours of central and local governments. Frequently, the process of social relegation is the consequence of public policies for the distribution and use of urban resources and public activities (such as urban planning and regulations,

²Namely, the quick adaptation processes to the uncontrolled globalization, the semi-permanent states of war in Mediterranean and African basins, the migration flows, the environmental degradation on a planetary scale, the abandonment of welfare, etc.

³According to Geiselberger (2017) the societies are unprepared to deal with the problems due to the inability of politics to cope with the global interdependencies among them at institutional and cultural levels. On the same point see also Secchi (2011).

⁴Namely, declassed middle classes, the permanently unemployed working class, young people who have no part in the labor market, etc.

⁵Namely, immigrants, marginalized people, physical and social deviants, etc.

infrastructural interventions, spatial and territorial diffusion of public and communal goods, fiscal and welfare policies, etc.) which stimulate, support or even cause the displacement, exclusion and marginality of the weakest people (Wacquant 2010).

Distressed areas have many distinctive characteristics. From the territorial point of view, they show a strong physical and environmental decay, a lack of services, the absence of identity characters and functions, etc.

From the economic point of view, they are characterized by the fragility of the system, a widespread (medium- and long-term) unemployment, the exclusion of the inhabitants from the advanced economy, a low level of the actual demand, and the predominance of the shadow economy.

From the social point of view, they are internally uneven areas, characterized by the presence of “different” individuals who identify themselves more as belonging to communities (national, linguistic, ethnic, religious, etc.) than as citizens. The population is therefore crossed by many barriers and segmentations that hinder the diffusion of ideas, knowledge, and information, and determine the lack of common or dominant behaviour codes and sense of belonging. All this makes ex-ante coordination between the inhabitants difficult.

Finally, from an organizational point of view, the traditional (social, political, cultural, etc.) mediating structures between the State and citizens—previously highly participated and governed by the suburbs local actors—have now disappeared or are in great difficulty.

Among the inhabitants of deprived urban areas, those political, economic, cultural and (even) anthropological connotations, that mark them socially as losers, are increasingly widespread. Not so much and not only because they are poor, but due to the generalised sense of impotence, inadequacy, loss of meaning, and inability to influence the common and collective decision-making processes. In fact, the inhabitants of degraded areas have no confidence either in their own ability to build visions for overcoming their present conditions (Honneth 2015) or in institutions which are unable to elaborate and govern a credible and convincing project to overcome their social losers status.

Therefore, due to their low levels of individual and collective empowerment (Florida 2007; Bobbio 2006), the inhabitants of the distressed urban areas are unable to «nourrire des projets, de leur donner par l’action un contour effective et pratique» (Ansary and Schoonbrot 1989), identify and solve the problems of their territory building common suitable strategies. As a result, their involvement in decision-making processes is limited and subordinate because they have neither the cultural and coordination tools nor the political, cultural or organisational means to influence the transformation of their territory. Therefore their initiatives have no strategic content: their capacity to propose decisions and their right of veto on others’ proposals has little scope. As a result, these citizens can easily be excluded from decision-making processes, because they are only individuals without a

collective importance,⁶ invisible, and therefore forced to adapt to the decisions of others.

Often, in public decisions concerning urban structural projects, the interests of the inhabitants are “presumed” and chosen by the public administrations through the mediation of “influential actors” such as political parties, trade unions, universities, religious and cultural associations, etc.

This makes distressed areas inhabitants feel that they are not complete citizens (Saraceno 2016) and, at the same time, deeply undermines their trust in the State and public institutions, prompting them to reject any involvement and participation. Therefore, inhabitants of distressed urban areas feel themselves (and are felt) separate and alienated from the rest of urban society; they are different from other citizens in terms of their abilities, powers and attitudes: they are “second-class citizens”.

If you look at the city as a whole, there is a sharp difference between the functioning city (“*the efficient city*”) and its distressed areas (“*the other city*”). In *the efficient city*, wealth is produced and distributed, the chief functions are present, people enjoy a good (individual and collective) quality of life, transnational elites are established, the inhabitants are informed, organized and aware of their own interests, able to influence the political and market decision-making. In *the efficient city*, the State successfully carries out its task as organizer of social life and there are common and generally accepted rules of social behaviour.

In *the other city*, that of distressed areas, environmental and urban degradation, precariousness, economic impoverishment, social shattering and the absence of shared strategic visions dominate. Knowledge is shattered, information lacking. Trade with the rest of the city is structurally and permanently unfavourable. In *the other city*, the State often renounces its organisational tasks showing, too often, only its repressive face (Danzelot 2012).

The efficient city is structurally different from *the other city*: in terms of the governance of urban policy, the role and importance of participation, the process of capital accumulation, the role and functions of the workforce, the distribution of wealth, the control of exchanges, the capacity to control externalities, the availability and organization of powers, the training and control of information and knowledge, etc.

Therefore, the interests of distressed areas can be—and actually are—different from those of the rest of the city. The statement that the interests of the “periphery” correspond—more or less explicitly—to those of the city (the general interest) is no longer true.

There is a structural contradiction between *the efficient city* and *the other city*, which corresponds to differences in the interests and expectations of their inhabitants. What is of interest to communities of distressed suburbs does not affect those who live and work in *the efficient city*, in fact, the needs are different, the available powers are not even comparable, and the same concept of urban quality has

⁶«C’est un garçon sans importance collective, c’est juste un individu» (Celine 1948).

different meanings (Eco 1972). As a matter of fact, the (individual and collective) interests of the inhabitants of the distressed areas mainly concern the material conditions of existence, access to the labour market, security, etc. Here, the predominant values are equity, equality and social justice. In the rest of the city, efficiency, individual and collective well-being, quality of life etc. prevail. Therefore, it is possible to say that *the efficient city* is something different from its distressed areas (the other city).

The consequence is the breakdown of the balance of the urban social system (Burgel 2006; Ansay and Schoonbrot 1989) that the State—due to its political and cultural weakness—is not able to recompose within an organic strategy.

The contradiction between the efficient city and the other city is particularly evident in the governance of the territory where the distressed areas are explicitly subordinated to the rest of the city. In fact, at the physical and territorial level, this contradiction is at the same time a competition between the two parts of the city and a class privilege. The competition concerns the allocation and use of available territorial and environmental resources, the use of space, the accessibility and the security issues, the uses and destinations of the municipal budget, public investments, urban and localisation diseconomies, etc.

In *the efficient city*, the class privilege is revealed by the formation of the urban rent and the accumulation of capital, as well as by hegemonic behaviours on the outskirts and surrounding territories, etc. Significant examples are the redevelopments of buildings and urban fabric carried out without adequate guarantees for existing inhabitants. Such interventions result in the expansion of *the efficient city*, due to the gentrification process and the displacement of the original inhabitants which shifts the run-down/distressed area elsewhere, the replacement of obsolete economic activities with more competitive ones that offer job opportunities especially for skilled workers from *the efficient city* (Bentivegna 2005) but that exclude the local workers who, having no adequate professional qualifications, are not technically competitive. In addition, the political and cultural refusal to admit the possibility of uses of public spaces other than the “proper” “normal” ones (e.g. gardens) creates conflict between citizens from different cultures.

This contradiction is evident also in decision-making processes. Most of the analyses agrees on a highly pessimistic description of the functioning of decision-making mechanisms in degraded peripheries (Bentivegna 2005). In these areas, the decision-making centres are subordinate to external (both public and private) decision-making centres; local decision-making powers are fragmented; information and knowledge are unequally distributed; there is a lack of collective, long- and medium-term, strategic visions; and the transition costs are higher than those of an efficient city.

If all this is true, the regeneration and the evaluation approaches and methods, by which physical and environmental project of degraded urban areas are carried out, need to be reconsidered.

3 Urban Transformation Projects in Urban Distressed Areas⁷

Local institutions policies in distressed areas can be referred to three major strategies. The first strategy, mainly focused on places and spaces, aims at transforming the degraded or obsolete physical-environmental structure by territorial plans and physical and structural transformation projects. The second strategy, mainly focused on the inhabitants, aims at improving people's empowerment and quality of life. It implements targeted programmes, structures and services which support employment, retrain the workforce, ensure health and training levels, etc. Finally, the third strategy may be considered a non-strategy as it practically is inactive. In fact, it consists of sporadic and contingent interventions mainly aimed at reducing the typical risks of these areas (Wacquant 2009). These notes mainly concern the first strategy.

The physical and structural transformations of urban distressed areas simultaneously affect the territory and populations producing irreversible structural effects. How they are designed and implemented depends on the city's overall reaction strategy to globalisation. We can have, on one hand, projects aimed to increase the city overall efficiency, that affect entire parts of the degraded territory (this is the case of major redevelopment projects, shopping and business centres, exchange parking lots, water purification plants, hospital and university settlements, etc.) and, on the other hand, actions aimed to promote balanced and inclusive development of the whole urban territory (this is the case of social housing, urban greenery, neighbourhood services, local markets, school centres, health districts, places of citizenship and communities, etc.).

From the degraded area point of view, the most relevant distinctive features of projects mainly relate to their effects on the territory and its population. Projects range from inclusive-effects projects—whose effects tend to aggregate mainly locally diffused interests—to exclusive-effects projects, whose effects further increase the relegation and disintegration levels of the area. According to the regulations, these projects normally require explicit evaluations.

These projects have a relevant impact on the physical structure of distressed areas, whose irreversible strategic effects are difficult to foresee. Their decision-making process involves many public and private actors, each of which refers to different decision contexts based on antagonistic values (e.g.: ethical, political, economic, environmental, aesthetic, social, etc.) which are difficult to homologate and may be even conflicting. As a result, the negotiations among dominant actors are a fundamental aspect of the decision-making process.

⁷According to Källtorp et al. (1997), Urban transformation means an intervention which modifies the built urban physical-functional structure of urban spaces whose effects spread in space and time affecting a substantial part of the city. Although vague and elusive, the term urban transformation expresses a complex concept which joins the explicit design of a programmatic change of a more or less large part of the city with the intrinsic relationships between the phenomena of concern.

They are cooperatively ruled by public (mainly local and regional) authorities and economic (public and/or private) external actors⁸ of the distressed areas. In fact, only external actors, have the immaterial and material resources, the capacities and the institutional power to conceive, design and implement the redevelopment project. In the absolute majority of cases, the inhabitants of the distressed area are excluded from the decision-making process or play a marginal role. As it has been already pointed out, external organizations and subjects play an important role of intermediation or substitute the population of distressed areas in their iteration with external decision-makers.

If we consider the issue of the inclusion of the inhabitants of distressed areas in the decision-making of the redevelopment projects, we should face the problem of the effectiveness of their participation (that is the ability to stimulate or substantially influence the decision-making process) which requires to consider further solutions, perspectives, and adaptations that are able to change the project scenarios (Fattinnanzi and Mondini 2016). Generally speaking, the effective participation of civil society in decision-making processes has many aspects, the most important one is the social actors' capacity to build and carry out collective strategies aimed at pursuing their objectives (Berni et al. 2018). If we consider individuals and communities of distressed urban areas, this capacity depends on several prerequisites, and particularly, on people's ability to build efficient coordination, produce a common knowledge system, and establish a mutual trust among actors and institutions.

As for the difficulties of coordination within the area, it is quite evident that the inhabitants are «deeply divided along lines of class, nationality, ethnicity (inside of nationality), age, and generations» (Wacquant 2010). Decision-making processes are therefore shattered and “selfish”, languages are many, expectations are multiple and often even conflicting.

As for the availability of a system of common “useful knowledge” (e.g.: routines, widespread experiences, good practices, accumulated skills, specialised knowledge, etc.) which is an important pre-requisite for the evaluation of the project, it is key to note that there are some structural relevant differences among the actors. While the political-institutional actors and economic ones have a well-stabilised, useful body of knowledge, which represents a social practice guiding actions, the knowledge of the distressed suburb inhabitants is fragmented, random, contradictory, limited and related to classes, groups, ethnic groups, etc. The inhabitants of the suburbs are the category of actors who have the greatest difficulty in building and accessing their own useful knowledge and, therefore, to effectively participate in decisions.

⁸This category essentially includes strategic projects directly or indirectly promoted and developed by the State, all the public-private partnership projects in between, variously named in the literature and in the regulations of the European Union and National states (Bult-Spiering et al. 2006).

Finally, as we have already seen, one of the characteristic aspects of the inhabitants of degraded areas, is that they do not trust in the capacity of the State and public institutions to conceive and govern credible and convincing projects aimed to overcome their state as socially losers. This mistrust leads them to reject any form of involvement and participation.

Therefore, due to the low effectiveness of the distressed areas inhabitants' participation and their limited ability to prevent those projects that increase their social exclusion, it is very difficult for them to influence the decision-making processes of urban regeneration projects.

The main actor of the governance of these projects is the public administration. Its behaviour and strategic decisions strictly condition the behaviour of the other economic and social actors. In fact, almost always, in order to subdivide their high technical and financial risks, obtain access to special credits, and redesign the urban planning framework, the economic promoters (both public and private) try to establish alliances with local public institutions, but the main reason is that the redevelopment of distressed areas always provokes a strong social pressure that requires the public administration to implement complex mitigation actions and to create adequate adjustment channels.⁹ In fact, whomever the promoter of the project is, the public governance has the tasks to legitimise the project and build consensus through an appropriate and widespread communication, economic and social compensations, public commitment, etc.

If we want that the evaluation of urban transformation projects plays a role in the social inclusion of the inhabitants (individuals and communities) of distressed areas, the relationship between the project and its decisional environment becomes particularly significant. In general, this reference environment is defined by the set of rules and subjects that, in one way or another, are involved. Therefore, it always has relevant, political, environmental, social, economic, and symbolic dimensions. Not surprisingly, actors' perception of and their attitude to the project are decisive for the success of the project.

This reference environment of the dynamic project is largely unknown and is transformed by the project itself. Its spatial, institutional, economic and social definition is part of the problem. In fact, the actors influence the decisions related to the design and implementation of the project. For example, the mere belief of a possible future urban transformation changes market expectations influencing urban rent and prices of real estate. A further example may be the impacts that a future project can have on existing urban planning tools. Not surprisingly, from an urban planning point of view, those projects are ruled by operational plans more flexible than the ordinary ones. Those operational plans are adaptable to new information and knowledge coming from the reference environment. This combination of

⁹Possible examples are the role of the local public administration as a guarantor of the environmental and urban quality of the project promoted by private investors, or as an arbitrator between the economic interests of the promoters and those of the inhabitants of the suburbs.

mechanisms and decision-making processes explains the usual strong political dimension of those projects.

The main connections between a project and its reference environment concern the legitimacy, utility, sustainability and relevance of the project itself. The legitimacy criterion concerns both the coherence of the project with the operating system of rules, norms, conditions, conventions and practices (that is its legal-institutional, economic, environmental, social, quality, etc. legitimacy), and its correspondence to criteria of justice, reasonableness and ethics¹⁰ (that is its substantial legitimacy). The utility criterion relates to the public and collective recognition of the project's capacity to solve the specific territorial problem. The sustainability criterion concerns the project's capacity to pursue, in time and space, the strategies and expectations of promoters and social actors. The relevance criterion concerns the alignment between needs/problems of society and project objectives.

The question is that the different actors often have different interpretations of both the meaning and importance of the requirements/criteria according to which the evaluation is made. In the "efficient city", the social legitimisation depends on how much an urban transformation project satisfies the general interest of the city. Its utility depends on how much it is able to cope with and solve a problem that affects the whole city. Its sustainability depends on how much it is able to integrate into time and space the expectations and strategies of all the actors involved. Finally, its relevance depends on whether the explicit objectives of the project correspond to the needs of the whole city.

In distressed areas, the same requirements/criteria have a different interpretation. For example, the social legitimisation of a project depends on the inhabitants' recognition of the project capacity to identify and solve their problems. Its usefulness depends on how much it is able to cope with the problems of the distressed area. Its sustainability depends on how much it is able to integrate their expectations and strategies into time and space. Its relevance depends on whether the objectives of the project correspond to the problems and the needs of the distressed area and its inhabitants.

This means that the two interpretations coincide only if the interests of the efficient city and those of its degraded areas coincide, but when those interests are conflicting the coincidence does not exist anymore.

¹⁰According to the on line free dictionary, legitimation means "being in accordance with established or accepted rules and standards" or being valid or justifiable (<https://www.thefreedictionary.com/legitimation>).

4 The Evaluation of Physical Transformation Projects in Urban Distressed Areas

Evaluations of transformation projects in distressed areas concern themselves with: (a) public administrations as both promoters and/or responsible of the control over other actors' initiatives; (b) market operators as promoters and service consumers; and (c) the civil society as recipients of outcomes and effects or as participants in decision-making processes. Some evaluations are public and widespread, while others—in particular, those concerning decision-making processes—often have a confidential nature.

It is worthwhile to underline the difference between process and result evaluations. Process evaluations mainly concerns itself with the design and implementation process (i.e. “how to”). They focus on the project's activities, key strengths, internal constraints (e.g.: costs, quality, needs, available resources, etc.) and on the decision-makers' expectations (e.g.: objectives, forecasts, etc.), that is, on the aspects they can control. On the other hand, result evaluations, mainly concern the relationship between the project and its environment (i.e. “what happens”). They, therefore, favour the situation-logic, focusing on external constraints of the project (that may concern results, expected effects, consequences, etc.) and giving particular importance to the project's capacity to pursue the objectives (strategic coherence, levels of compatibility, opportunities, etc.) of the territorial transformation.

Result evaluations encompass evaluations of guarantee and evaluations of social impact. The purpose of the evaluations of guarantee is twofold: to legitimise the project and to guarantee, in an open and explicit way, that the project has some institutionally essential qualities.¹¹ For this reason, these evaluations are almost always ruled by the public administration (they are institutional evaluations of guarantees). On the other hand, the evaluations of social impact, aim to allow the different components of the civil society to participate in the overall decision-making process and to judge the project according to their own point of view. The institutional evaluations of guarantee (hereinafter “institutional evaluation”) generally reflect the views of public institutions on the project and, almost everywhere, are mandatory for strategic and/or large projects which impact sensitive or fragile territories.

Evaluations involving the civil society—and therefore also, the inhabitants of distressed areas—are mainly the evaluation of the social impact. Is key to note that, in the deliberation process, normally social actors have a subordinate role and lack evaluative skills (rarely easy and free to get), specific organisations, and specialized knowledge required to manage independent evaluation exercises. As a consequence, the only kind of evaluations that social actors can access are mainly

¹¹Possible cases are different kinds of institutional and programmatic compatibility, the impacts on the urban territory and economy, on environmental quality, and on the health of the community, etc.

institutional evaluations coming from public control bodies (decision-makers and/or institutions).

Institutional evaluations follow fairly standardised procedures, whose main characteristics are as follows:

- the assumption that the proposed project provides a good solution to the problem;
- the preference for top-down decision-making which conceives the participation process almost exclusively as a public debate over the already well established project proposal (preliminary draft) and, therefore, the social actors merely perform a control over the project or may propose limited adaptations (Bentivegna 2016);
- the attention to the expected results and probable effects of the project (output, outcomes, effects) without any consideration about its decision-making process.

In the majority of cases, institutional evaluations consist of urban and environmental analyses of compatibility (e.g.: check of the consistency with other plans and programmes, of compatibility and compliance with environmental and health standards or rules, etc.) and of economic-financial evaluations (especially public budget analyses and cost-benefit analyses). They, therefore, carry out compatibility analyses of the project's results and effects with external rules, conditions, regulations, or previous agreements. Those evaluations also check the consistency between the objectives set, the expected results and how plans and programmes use the territorial and environmental resources.¹² Sometimes, they evaluate the consequences of the project on the target group too.

The rationale of these evaluations is the traditional rationalist approach, which settle them in the field of “well-structured” problems, that the substantive rationality can successfully cope with. As a consequence, current evaluations assume that the decisions related to this type of projects are exclusively technical and not also relational.¹³ According to a widespread belief, the relations between decisions and their effects may be foreseen and, therefore, their positive or negative strategic effects in the medium- and long-term are underestimated.¹⁴

It is key to note that, usually, an evaluation programme does not integrate the various sectoral evaluations into an evaluation of synthesis, and therefore it is difficult to highlight the links and similarities that are the very structure of the project and that might provide it with an explanatory consistency (including to understand its complexity). In fact, some relevant questions of the evaluation of these projects arise from the complexity of the problem which normally is a

¹²Depending on the importance of the intervention or the fragility of the natural and artificial environment, EIA and SEA may also be carried out, but these must still be considered as exceptional assessments.

¹³This means that, as the evaluation is not concerned with the project political content, it can underestimate its social content.

¹⁴As far as costs and results are concerned see Flyvbjerg et al. (2003).

“wicked problem”. In that case, the main question is how it is possible to face them (Paulré 1998).

Institutional evaluations are not without negative remarks. The prevailing criticisms stress the many doubts of the actual capacity of the project to effectively pursue its stated objectives, the accuracy of cost, timing and quality forecast, the lack of attention to uncertainty, the underestimation of (economic, financial, political, social, environmental, etc.) risks related to the project, the overestimation of positive effects matched with the underestimation of negative ones in the medium- and long-term, etc.

Usually, the public administration is responsible for the institutional governance of the project, as a consequence, it is responsible for the institutional evaluations and their diffusion among peoples during the deliberation process. Such institutional evaluations are conceived as evaluation standards¹⁵ because they directly come from the public administration’s standard of legitimacy. It is a shared opinion that anyone (the inhabitants of distressed areas included), using these evaluations, can judge the project with full knowledge of the facts.

This statement requires, at least, the accomplishment of three important hypotheses: first, the institutional evaluation should have a generally recognised value and represent a reference standard for all the other evaluations of guarantee; secondly it should have generally and universally comprehensible contents; thirdly it should be useful and exhaustive allowing any actor to make informed and effective decisions and behaviours. At this point, it is necessary to analyse in depth the three hypotheses.

- (1) **The evaluation standard.** The public administration is the standard setter of the city physical transformation projects, since it sets the operational rules under which public and private decision-makers operate. The legitimisation standard also sets out the evaluation standard i.e., the set of rules and evaluation criteria to be used to evaluate that project, in that moment and in that context. In urban transformation projects the most frequent legitimisation patterns—from which the judgement criteria come—are the city’s general interest, the compatibility with the general strategy of the administration (namely, the urban planning and budgetary tools), and the economic and environmental sustainability. Therefore, the problem is whether the public administration’s legitimisation standard and the related evaluation standard have a general value, that is, whether they are valid for all the actors involved. That is to say, are they also valid for all the people of the distressed urban area? From a more general point of view, the question is whether a “fair” evaluation standard—which all the evaluations of result should refer to—exists. If such standard existed, the set of values, their hierarchy and the related priorities would be data and stable.

¹⁵In this case, the (legitimation and/or evaluation) standard is a generally valid rule or model even if not necessarily complete and coherent. In fact, the English Oxford living Dictionary on line defines it as “Something used as a measure, norm, or model in comparative evaluations”.

For example, the criterion of the city's general interest should override the specific interests of the different urban areas or inhabitants. Moreover, the municipal administration would also have the task to establish this general interest.

For a long time, the concept of general interest meant the interest of all the—free and equal—citizens differing only in their income and subjective conditions. According to this “guarantee”¹⁶ approach a good public policy could address and solve the consequences due to living in urban distressed areas.¹⁷ Actually, in the complex and conflictual decision-making environment of the contemporary city, inhabitants of distressed areas are considered “different” from the others, as a consequence, the “guarantee” approach does not work (Urbinati 2016), because the “common interest” of the weakest may be different and even conflicting with the city's one. This means that the inhabitants of distressed areas may refuse the public administration's legitimation standard as a basis for legitimisation and evaluation of the project. A possible example may be the location of an incinerator. Suppose that, according to well-supported economic, environmental and technical reasons, the municipality proposes to locate the plant in a distressed periphery. This implies that the administration chooses the general interest of the city as a legitimisation standard and the effectiveness of the waste treatment system as a standard of judgement. Therefore, the location of the plant is one of the essential components of the evaluation whose main criteria are the environmental sustainability, business efficiency, territorial effectiveness, etc. On the contrary, from the point of view of the distressed area inhabitants, the evaluation criteria are the health risk (e.g. the risk of carcinogenicity, the level of fine particles in the air, etc.), the decrease of local real estate values, the congestion of local traffic, etc. As a result, the local population rejects the public administration's evaluation and a conflict between the city and the periphery arises¹⁸ as the public administration's evaluation standard is not of general but only of partial value.

Actually, the evaluation standard embodies the public institution's available knowledge and becomes dominant due to the role that this actor plays in the decision-making process, even though it does not necessarily belong also to the multiform world of the distressed periphery.

- (2) **The comprehensibility of the evaluation.** Not always the inhabitants of distressed areas are able to understand and realize (with reference to their own needs) the results of the evaluation of an urban transformation project.

¹⁶In this case, the term “guarantee” means that no social group or urban area are favored.

¹⁷For example, cost-benefit analysis—which, together with environmental and health analyses, is the most used public evaluation technique for urban transformation projects—refers to the citizen as a consumer (Urbinati 2016).

¹⁸It is key to note that, when the public administration defines its own standard of institutional legitimation, it may adopt a “double standard”, that is, it may use different standards in similar situations. For example, it may apply standard of efficiency to locate an incinerator in the outskirts and a standard of health safeguard to close the historic city centre to private cars. The use of a double standard may produce social conflicts if the inhabitant of the periphery feel themselves discriminated.

Nevertheless, evaluations generally assume that citizens have clear ideas about their own interests, are able to understand the evaluation contents, and know how to use the evaluation results. It is also a common opinion that evaluators and evaluation-users have a common language and share the meaning of terms and concepts (Bentivegna 2016).

But, if the institutional evaluation is addressed to the inhabitants of distressed areas, those assumptions cannot be taken for granted. In fact, the system of knowledge of those people is structurally different from that of the public administration and of the majority of the citizens of the efficient city. In the same way, also the system of interests they assume in the evaluation is different. It is also important to stress that in the distressed areas there are different communities which identify themselves according to an ethnic, cultural and social point of views and that express themselves in languages different from the public administration's one (Eco 1972).

People of distressed areas often fail to understand institutional evaluation because they lack the necessary knowledge and skills, do not share the same cultural context and use different languages.¹⁹

- (3) **The usefulness and completeness of the institutional evaluation.** As regards the claim that the institutional evaluation is generally useful (i.e., that it may take account of all the involved interests, including the ones of the inhabitants of distressed areas), one can argue that a complex project always involves different actors in a likewise complex decision-making process. Therefore, it is impossible that a single evaluation process meets all different actors' evaluation demands. In fact, a really useful and effective evaluation should thoroughly relate to the strategic rationality of the specific actor in that specific situation. This means that the choice of the decision and its evaluation (content, object, criteria and priorities) is conditional upon [depends on] the actor's strategy. Actors who use different rationality need different evaluations, which should take into consideration their specific interests, objectives, constraints and preferences. The different actors involved in the decision-making process will use their own specific rationality to interpret the project from their own point of view. Such different rationalities will, in turn, be filtered by the system of knowledge of each group and by the frameworks in which this knowledge is included (Pellizzoni 2003). As a result, an institutional evaluation will have a different utility depending on the type of actor.

As for the claim of the institutional evaluation exhaustiveness (namely, that there is no need to make any other evaluation because, being complete, it allows anyone to make effective decisions), one can oppose at least two considerations. The first one concerns the reliability of the evaluation. Since the inhabitants of distressed

¹⁹In this regard, Bobbio (1985) highlights how citizens' incompetence in the face of increasingly complex problems matched with the simultaneous need of specialized skills (accessible only to experts) to evaluating technical solutions is one of the causes of the current crisis in democracy.

urban areas are culturally disadvantaged and are unable to verify the scientific foundations of those evaluations, the public administration can propose assertions as incontrovertible truths while they are representative only of partisan interests or individual beliefs. In fact, not always an institutional evaluation is neutral and transparent, it can also be partisan reticent, misleading, etc. It is possible to use the institutional evaluation to provide an appearance of rationality and scientific value to choices that only have political justifications, endorse a business-oriented efficiency or are the result of different kinds of undue pressures (Hirschman 1967).

The second point concerns the meaning of the use of the scientific method in evaluation. It is a common opinion that an evaluation, performed using a scientific method, is objective in itself, that is, capable of giving a generally accepted and shared representation of the project. Therefore anyone can assume that a good institutional evaluation (methodologically correct from a scientific point of view) provides suitable replies to the evaluation demands of all actors, including those of the weakest inhabitants of the distressed areas. Actually, the scientific method does not guarantee the uniqueness of the judgment but only the quality of the process of analysis. In other words, the result of the evaluation may be different if the available information, the assumptions, and the contents of the analysis change.

Among social impact evaluations, the so-called democratic evaluations are becoming increasingly important. These evaluations aim to enable civil society—individuals and organisations—to judge the project from their own point of view. The democratic evaluations' aim is twofold: on the one hand, they try to make citizens and their organisations able to understand the problem at stake, verify whether the project proposal will be successful and what effects it will produce on them. On the other hand, they try to directly involve citizens in the overall decision-making process. This means to give an active role to the components of civil society in the deliberation process by supporting open and inclusive procedures that intend to directly involve local communities in the evaluation. Recognising the complexity of the social structure, these evaluations stimulate discussion among the various components of civil society in order to express judgements which integrate the facts as well as all the relevant interests, values and visions into both the evaluation process and its results. The method applied is the critical reasoning over different positions on the basis of the common—not the individual—interest. The political aspects of participation such as the ability to create identity, inclusion (giving a voice to diffuse and underrepresented interests), “empowerment”, social justice, etc. receive a particular attention (Berni et al.). Inclusion, dialogue and deliberation are the guiding principles of this type of evaluation. Inclusion means to take into account all the interests, values and points of view involved. Dialogue means that all the components of the communities are aware of the point of view of the others on that project. Deliberation is the final phase of the process where the pros and cons of the intervention are expressed and an operational solution—aimed to achieve the common advantage—is generated. In fact, the result is not the consequence of the dominant knowledge, but the synthesis of a collectively participated route.

In comparison with the standard model of evaluation, the deliberative democratic evaluation approach represents an undeniable quality leap. In fact, it is explicitly context-based, adaptive and inclusive, therefore, it can be a response to the specific evaluation problems related to strategic urban transformation projects and to civil society participation.

The problem, however, is that the democratic evaluation provides only a theoretical-methodological response which is not equally able to operatively solve the problem of evaluating physical transformation projects in distressed areas because, in this case, some fundamental assumptions of the model do not occur so that it is not enough, as for similar projects in other areas of the city, to guarantee the local inhabitants' right to participate, but it is also—and above all—necessary to provide the objective conditions for the exercise of that right.

It is important to highlight that the evaluation of urban transformation projects in distressed areas has its own specificity, which distinguishes it from the evaluations of the same kind of projects in other areas of the city. This specificity is due to—at least—three specific orders of (already underlined) problems related to these territories and their inhabitants: first, the inhabitants' widespread awareness of their weakness as an autonomous social group; secondly, their incapability to build common strategies; thirdly, the breakdown of the urban social system, that is particularly evident in the already mentioned “projects with exclusionary effects”. This means that also the evaluation should take into consideration mistrust, precariousness and difficulties of understanding that prevent participation.

Any participative evaluation of projects in urban distressed areas should be anchored in the practical horizon of the specific project context (in that place and at that time) and in the specific social actors' framework (namely, the specific communities and individuals, and their interests).

It is unreasonable that a single evaluation process can be so complex to include as many evaluation as the involved actors are, and that each of these evaluations represents the viewpoint of an actor (or a category of actors). This means that, each actor has the right to evaluate the intervention from his own point of view (Bentivegna 1997). Therefore, if the evaluation of projects in distressed areas is open to their inhabitants' participation, it is necessary to ensure them the right to perform their own evaluation exercise. The evaluation thus becomes a genuine urban right namely, an essential condition for an effective participation.²⁰

All this means that first, all the evaluations (including those of distressed areas inhabitants) should have equal dignity, and that secondly, to provide citizens with the tools and organisation for the effective exercise of this right.²¹

²⁰Obviously, this position raises the question of how to arrive at a common and shared judgment on the project among all the participants in the decision-making process. On this subject see Bentivegna (1997).

²¹These points are especially relevant when the objects of the evaluation are “projects with exclusive effects” namely, project aimed to increase the efficiency of the city as a whole, often located in distressed areas due to contingent reasons (low area prices, need for large spaces, high

In this case, the “evaluation design” of a transformation project of a distressed area should explicitly address the question of how to foster the involvement of socially marginalised groups who have no voice, and are not “at the table” where values are identified, assessed, and ranked and where decisions are made.²² In fact, even though the weakest people have a stake in the project, they have neither leverage on nor knowledge of the decision-making and the evaluation processes and even no interest in participation and remain outside (Berni 2015) Participation of outcasts in the deliberative process requires some fundamental preconditions that include «meeting places where communication without domination can take place; open access to relevant information; time for reflection and discussion; stakeholders’ mutual recognition and legitimation of all the values preferences, interests and systems of knowledge at stake; and a shared commitment to a reasoning based on rational and impartial argumentations» (Berni and Gabrielli 2018) and, of course, resources to finance the process.

Moreover, the requirement that citizens should express their own reasons publicly and consider the public reasons of others places great demands upon their abilities and it also implies an ideal of “equality” that is unrealistic for the outcasts. Assuming that citizens are similarly situated or similarly capable of making use of their opportunities and resources invariably means favouring the reasons of advantaged persons or groups, viz., who are most educated, who have access to special information, who possess the greatest resources and privileged social positions (Bohman 1997).

As a matter of fact, to mainly rely on rational argumentation, according to which «only through the impersonal force of argument that autonomous and free citizens should reach an agreement» (Vargas et al. 2016) actually excludes the weakest people who normally use other forms of communication, like rhetoric and narrative (considered strategic in nature).

The right to a “partisan” evaluation, arises the question of what kind of evaluation is useful for the inhabitants of the periphery. As a matter of fact, the real problem is neither to design evaluations to make a good project, nor to understand how to govern it effectively. Evaluations should rather aim to enable these citizens to understand the consequences of the project on their territory, the reasons of the project decisions and to verify the suitability of the choices according to their interests and needs of the degraded area. In fact, from the distressed area inhabitants’ point of view, not all projects of the public administration or of the market are equally good, but only those that increase their quality of life and decrease social relegation **are considered to be good**. This means that the evaluation should not focus on the project itself, but it should rather consider the inhabitants of the degraded area prioritizing the effects and consequences on that territory. As a

contestation levels, etc.), whose effects strongly conflict with the interests of the inhabitants as they increase the territorial diseconomies of these already structurally fragile areas.

²²On the opposite, insider actors are those who can participate in the process by right or might. They are endowed with some kind of decision power, such as public officials, bureaucrats, policy makers, and, to an extent, professionals involved in the process.

consequence, issues like inclusion, justice, equity, solidarity, become more important than the usual criteria like project's internal coherence, effectiveness, economic efficiency in the use of resources, etc. In this case the most important task of the evaluations is to make judgments on the environmental sustainability (at local level), the project's capacity to create jobs suitable for the local workforces, or to provide housing matching the needs and capacity to pay of the local population, to improve the accessibility of the area (inside and outside) services; to increase the security (including environmental protection), to support social growth, etc.

In conclusion, it is key to note that a participatory/participative and scientifically supported evaluation can be an antidote to the loss of hope of the weakest inhabitant of the distressed outskirts, because, firstly, it subjects the interpretation of the project to the scientific knowledge examination/scrutiny (avoiding, in so doing, arbitrary, instrumental, or due to fear, ideologies, hidden interests interpretations), and, secondly, it provides those inhabitants with the capacity to influence the decisions. As a result, these evaluations have a strong political content, which is normally absent in the usual evaluation procedures.

References

- Ansary P, Schoonbrodt R (1989) *Penser la Ville Choix de Textes Philosophiques*. Editions des Archives d'Architecture Moderne, Bruxelles
- Bentivegna V (1997) Limitations in environmental evaluations. In: Brandon PS, Lombardi PL, Bentivegna V (eds) *Evaluation of the built environment for sustainability*. E&FN Spon, London, pp 25–38
- Bentivegna V (2005) Decision making process in LUDA: a governance approach. *Urbanistica Dossier* 74
- Bentivegna V (2016) Dialogue and transparency in decision-making. *Valori e Valutazioni* 17:25–28
- Bentivegna V (unpublished) *Frantumazione del processo di decisione, partecipazione democratica e valutazione*. In *Città' visioni e strategie*, 8° Incontro del Ciclo dedicato al "Diritto alla Città", 8 e 22 aprile 2015, Facoltà di Architettura di Firenze
- Bergoglio J (2015) *Laudato Si'*—encyclical letter. Vatican
- Berni M (2015) Partecipazione e analisi multicriteri: la valutazione democratica dei progetti. In Fattinanzi E, Mondini G (eds) *L'analisi multicriteri tra valutazione e decisione*. De Rosa, Roma, pp 31–46
- Berni M, Gabrielli G (2018) When efficiency is not enough: should equity be embedded in decision-making and evaluation?
- Berni M, Renzi R, Rossi R (2018) To plan, design and evaluate "urban mending"
- Bobbio N (1985) *Stato Governo e Società*. Einaudi, Torino
- Bobbio L (2006) Dilemmi della democrazia partecipativa, in *Democrazia e diritto*, n 4 pp 11–27
- Bohman J (1997) Deliberative democracy and effective social freedom. In: Bohman J, Rehg W (eds) *Deliberative democracy*. The MIT Press, Cambridge, pp 321–348
- Burgel G (2006) *La revanche des villes*. Hachette Littératures Paris
- Celine FL (1948) *L'Eglise*, in *Epigraph à J.P. Sartre «La Nausée»*, Galimard, Paris
- Danzelot J (2012) *A' quoi sert la rénovation urbaine?* Presses Universitaires de France, Paris
- Davis M (2006) Planet of slums. *New Perspect Q* 23(2):6–11

- Dewulf G, Blanken A, Bult-Spiering M (2006) *Strategic Issues in public-private partnerships: an international perspective*. Blackwell Publishing Ltd, Oxford
- Eco U (1972) A semiotic approach to acculturation and participation. *Fears and hopes for European urbanization*. Springer, Dordrecht, pp 38–59
- English Oxford Dictionary on line. <https://en.oxforddictionaries.com/>
- Fattinnanzi E, Mondini G (2016) Valori e Valutazioni, n 17, pp 1–2
- Florida A (2007) La democrazia deliberativa, dalla teoria alle procedure. Il caso della legge regionale toscana sulla partecipazione, *Istituzioni del federalismo: Rivista di studi giuridici e politici*, n. 5:603–681
- Flyvbjerg B, Bruzelius N, Rothengatter W (2003) *Megaprojects and risk: an anatomy of ambition*. Cambridge University Press, Cambridge
- Geiselberger H (2017) Introduzione. In: Geiselberger H (ed) *La Grande Regressione*. Feltrinelli, Milano
- Hirschman AO (1967) *Development projects observed*. Twentieth Century Fund, New York
- Honneth A (2015) *Die Idee des sozialismus: Versuch einer aktualisierung*. Suhrkamp Verlag
- Källtorp O, Elander I, Ericsson O, Franzén M (1997) *Cities in transformation-transformation in cities. Social and Symbolic Change of Urban Space*, Avebury, Aldershot
- Paulré B (1998) *Les formes de la stratégie en économie*. Publications de la Sorbonne Paris, Épistémologie de la stratégie en économie
- Pellizzoni L (2003) Knowledge, uncertainty and the transformation of the public sphere. *Eur J Soc Theory* 6(3):327–355
- Saraceno C (2016) Periferie in Rivolta, intervista. In *Gli Stati Generali*, 2 Nov 2016)
- Secchi B (2011) La nuova questione urbana: ambiente, mobilità, disgregazione sociale. In *CRIOS*, 1 The on line free dictionary. <https://www.thefreedictionary.com/legitimation>
- Urbinati N (2016) Il disagio degli immigrati e le scelte da fare a sinistra. *La Repubblica*, 30 luglio 2016
- Vargas A, Lo A, Howes M, Rohde N (2016) The problem of inclusion in deliberative environmental valuation. *Environmental Values*. The White Horse Press
- Wacquant L (2009) Sustaining the city in the face of advanced marginality. In: Mustafavi M (ed) *Ecological urbanism*, MIT, Cambridge
- Wacquant L (2010) Designing urban seclusion in the twenty-first century: the 2009 Roth-Symonds lecture. *Perspecta* 43:164–175

Part I
Human Ecology: Values and Paradigms

Values and Paradigms for a Human Ecology



Francesco Rizzo

Abstract As a kind of “table of contents”, this *Introduction* proposes the main issues of the historical and conceptual development of the theory of value, as a possible perspective for a more general revolution of human civilization. The long and strenuous course of studies I have been developing for 50 years is consistent with the *Laudato si’* Encyclical by Pope Francis in several issues concerning human ecology and ecological economics. The starting point of this process is the natural foundation of the human capacity to develop its own ethical profile on the one hand and the divinity of the mystery of the creation of physical law, since the very beginning of the Universe, on the other hand. The descending “new-value theory” here summarized comprises and informs many of the novel evaluative approaches concerning the dialectic between social systems, “evolving in value” along a complex and “far-from-equilibrium” trajectory.

Incipit

In the beginning God created the heaven and the earth. Now the earth was formless and empty, darkness was over the surface of the deep, and the Spirit of God hovering over the waters and God said, “Let there be light.” And there was light (*Gen* 1, 1–3).

The result is the tras-in-form-a(c)tion process.

[«Carlo Rovelli says that gravity waves are different from the electromagnetic waves, so that we should reread or revise Genesis, replacing “Fiat lux” with “Fiat lux et gravitatis fluctus”; in fact, they are oscillations and ripples of space, comparable to those that occur on the surface of a lake; in addition, as I believe, they evoke the ripples of linguistic semiotics mentioned by Ferdinand de Saussure.

Rather, I do not understand why change verse 3 of the first chapter of Genesis in which—especially in the two preceding verses—the question of taking (in-training) or losing (de-formation) form (of the value or value of the form) is posed in line

F. Rizzo (✉)

Department of Civil Engineering and Architecture,
University of Catania, Via S. Sofia, 64, 95123 Catania, Italy
e-mail: 13francesco.rizzo@gmail.com

with the trans-information process, however motivated, and therefore compatible with both electromagnetic waves with both the gravitational. [...] The gravitational wave is the track of the encounter and merger that took place billions of light years ago, that is information—fast propagation—of a deformation of space»] (Rizzo 2017, pp. 49–56).

1 Introduction

1.1 Techno-science → eco-eco-nomics → politics → ethical or aesthetical values or principles → created or formed world (Laudato si', n. 67) → with or without God.

1.2 We can flip or reverse this basically platonic triangulation (ib., n. 67).

1.3 Ecology → with the intermediation or interface of → civil economy (Genovesi 2015; Zamagni 1978; Rizzo 1982, 1990, 1999, 2004, 2007; Putnam 1993) → integral, human and social ecology (Laudato si', nn. 16; 148 e 149).

1.3.1 Environmental ecology (natural, human and built environment) → economic and social ecology (ib., nn. 137–162);

(a) Natural, historical, artistic, archaeological and cultural legacy (Rizzo 1983, 1989, 1995; Rizzo et al. 2000, Trovato 2008);

(b) definition of cultural and/or common heritage;

(c) suburbs (Laudato si', n. 149) of the «disjointed cities» («città scosciate») (Rizzo 2017; Granata 2008);

(d) suburbs are the real energetic and propulsive (historical) urban center—(one month after the conclusion of this Seminar, Vittorio Gregotti released “That’s the challenge: building the historical centre of the suburbs” 2016);

(e) the city is a unity-difference: social community (divided into many autopoietic subsystems) ↔ environment (Luhmann 1990a, b);

(f) design according to Vittorio Ugo: will, power, duty (Laudato si', n. 150);

(g) sustainable development (Brundtland Report 1987) (limited by the carrying capacity of ecosystems);

(h) intra- and extra-generational relations (Laudato si', n. 159).

1.4 Value theory: (A) single-criterion theory; (B) multiple-criteria theory

(A) weak theories: value as ground; value as money; strong theories: value as work, value as utility etc.;

(B) theories: hexagonal value, complex value, bequest value, social value, total economic value etc.

1.5 *The value of values* of the variable measures is just their weight (Boscarino et al. 1994; La Rocca et al. 1995).

2 The New Value Theory and the Neuralgic, Nodal and Strategic Point of the *Laudato Si'* Encyclical Letter

2.1 Value theory of *new economics*: creative combination of energy and information.

2.1.1 *Information* as: (a) data, news, occurrence; (b) cross-disciplinary knowledge (with emo–ra–tionality in order to prevent us from indecision or immobility); (c) process of giving, getting, gaining or losing form (as value).

2.1.2 *Energy*: (a) physical: potential or kinetic; (b) human: workforce; (c) psychic, libidinal etc.; (d) intellectual, as human or inhuman capital etc.

2.2. Three main events concerning the new theory of value:

- lecture on «Theory of value and valuations» at the University of Florence on 17 April 1996, three years before the book *Valore e valutazioni* was published (Rizzo 2011a, b);

- *Valore e valutazioni* review by Patrizia Lombardi;
- presentation of *Valore e valutazioni* at the Faculty of Engineering of Naples, invited by Mario Raffa (2000).

2.2.1 The question of measurement.

(A)

- measuring information is complicated because of its various forms (natural or thermodynamic, genetic, mathematical, semantic);

- the cardinal measure of information that can be carried out as marginalism has been the utility, which is an ordinal variable;

- anyway, more and something better can be done for the former three types of information (entropy, genome, bit or fit);

- whereas, semantic (or semiotic-hermeneutic) information:

- depends on the s-code, chosen to organize and give meaning to information source; the S-code selects and reduces the information source in the mathematical-statistical sense; accordingly, the semantic information (that is, the significant content of an information source) is transmitted and received: the mathematical or initial information is defined as entropy, the semantic or final information (inversely proportional to the first) is defined as neg-entropy;

- therefore, semantic information can be measured basing on its desirability or artistic, musical, poetic etc. significance, assessed and quantified with reference to the monetary language of trading in the market (Rizzo 1983; Napoli 2007).

(B)

No problem for measuring:

- free energy (neg-entropy) o degraded energy (entropy);

- exergy = free energy – anergy.

2.2.2 Of course, the Serpieriian traditional paradigm for appraisals must be modified or overcome using an economic and ecological balance that takes into account:

- not only the *productivity* or *efficiency* in accordance with a partial or traditional economic approach;

- but also the *energy input-output* ratio, that is, the energy consumed per unit of output (energy issue);

- and the ratio between the input and output of neg-entropy and the entropy per unit of output (entropic issue) (Amata and Notarrigo 1987; Rizzo 1988–1990, 1999; Granata 2010).

2.2.3 The rise of the new approach to value (*Analisi critica della teoria delle valutazioni* (1^a ed., 1977) o *Economia della felicità o dell'infelicità* (2^a ed. 2011)—introduces the concept of entropic degradation (theoretical) or neg-entropic re-forming (practical);

2.2.4 in *Economia dei beni culturali* (1983) or *Economia del patrimonio architettonico–ambientale* (1989), we switch from the combination “matter–work” to:

2.2.5 the couple “neg-entropy (physics) and information”;

2.2.6 in *Sul valore dei beni economici* (degree thesis in politics in March 1990) the two neg-entropies (thermodynamic and cybernetic–semantic) become relevant (Rizzo 2004) and completed;

2.2.7 in *Il valore dei valori*: the three neg-entropies or entropies, connected with ethics and ethics denial, to natural information or dis-information, and with monetary-financial information or dis-information (Laudato si', nn. 22 and 139) (Rizzo and Giuffrida 2005) set the basis of the neuralgic, nodal and strategic point

2.2.8 of the integral, human, social economic ecology, which the encyclical, many of my works and this lecture are based on.

- the concept of entropic break leads to the awareness that quality of life depends on the law of entropy; the unavailable or dissipated energy is what is generally called pollution, including the diminishment and erosion of agricultural land;

- inflation and unemployment are two faces of the entropic process; inflation is the measure of the entropic state of the economic environment; money is a set aside energetic credit; higher inflation implies a decrease in the real value of this credit due to the exhaustion of non-renewable energy;

- the more quickly energy runs out, the bigger the number of unemployed or underemployed people: this causes stagflation;

- in a situation of stagnation-deflation, things do not change: it is not possible to apply, in a certain analogical fashion, Pauli exclusion principle;

- then, inflation, unemployment and pollution are phenomena caused by the increase of entropy.

- “the most representative characteristics of the critical and problematic situation of Earth can be summarized by the left triangle of Fig. 1, that can well be considered the mark of the *malaise* of humanity” (Rizzo 2010, p. 98) (Laudato si', nn. 56–57) (Fig. 1, left);

- The same question is represented in a broader and more complete way by the two triangles on the right side of Fig. 1: the effect (the one above, on the surface) and the cause (the one below, in depth) (Rizzo 2010).

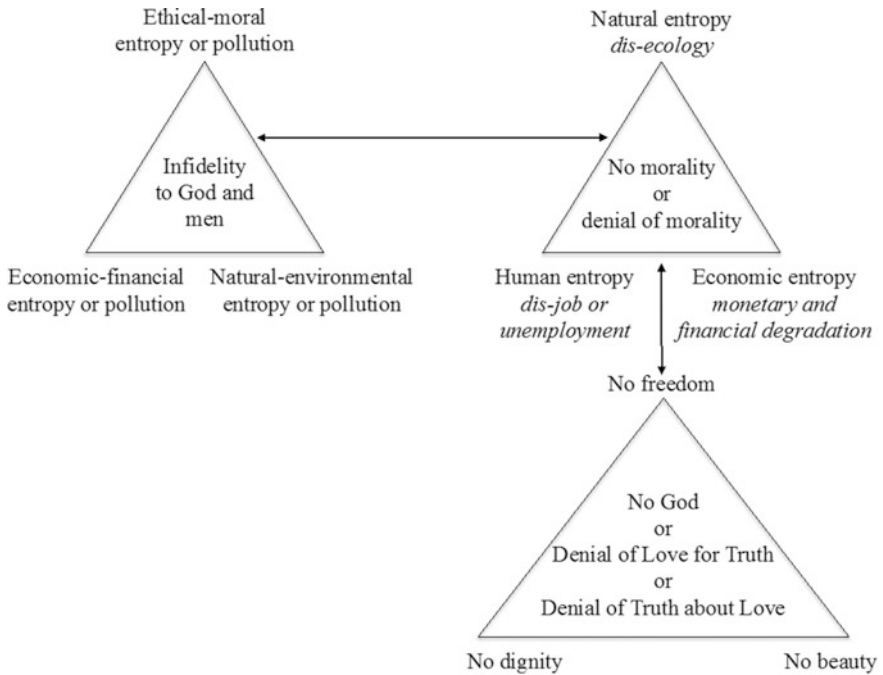


Fig. 1 *Malaise* of the human being (left); integration of the “malaise triangle” (right)

- As said, not after 57–58 a.C., Saint Paul wrote:

For the creation was subjected to futility, not willingly, but because of Him who subjected it, in hope that the creation itself also will be set free from its slavery to corruption into the freedom of the glory of the children of God. For we know that the whole creation groans and suffers the pains of childbirth together until now (Rm 8, 20–22).

The whole created world, united with the human being by divine disposition, is subject to no sense and to degradation caused by sin (*Gen 3, 17*). But under that solidarity or mercy, even the creation is waiting to be freed, or redeemed, to participate in the glory of God’s sons (*Laudato si’, n. 2*).

- Pope Paul VI said: «Due to an ill-considered exploitation of nature, humanity runs the risk of destroying it and becoming in turn a victim of this degradation». «Under the effective explosion of industrial civilization», he spoke about a real ecological catastrophe highlighting «the urgent need for a radical change in the conduct of humanity», inasmuch as “the most extraordinary scientific advances, the most amazing technical abilities, the most astonishing economic growth, unless they are accompanied by authentic social and moral progress, will definitely turn against man” (*ib.*).

- How is it that, despite the immense and irresistible techno-scientific development, “corruption” of nature, culture, economy, church, politics, society, families

and people rage, ravaging a civilization thrifty of ethical and aesthetical values and lacking love?

Reading and meditating on this narrative lesson, using the reason of the mind and the emotions of the heart, suspending any disbelief and establishing an empathic or intriguing connivance with it, sustained by the grace of God, we can understand and transform sick history and proclaim the Word, centering it with, for and in the encounter of the Christ of love or of love for Christ (Rizzo 2010).

3 The Three Surpluses and the “Trans-Information” Process: Integral Ecology and the Human City

3.1 Figure 2 shows the Triangle of the Three Surpluses or three neg-entropies (left) (Rizzo 1999, p. 231) and the integration of it in the tras-information process (right) (Rizzo 2004, p. 364).

This conceptual economic pattern overcomes the traditional and obsolete social-economic distinction of the input in *ground*, *work* and *capital* and assumes as input *matter*, *energy* and *information*. Also, the latter three terms are the output, although in a different state.

3.1.1 These schemes express, represent and symbolize the new science of valuations that is the beating and vibrating heart of the new economics political and ecological. In fact, with such a theoretical-methodological approach, it is possible and easier to perform the evaluation of natural capital, or to attribute economic value, to the eco-systems in terms of their physical, chemical and semio-biological roles.

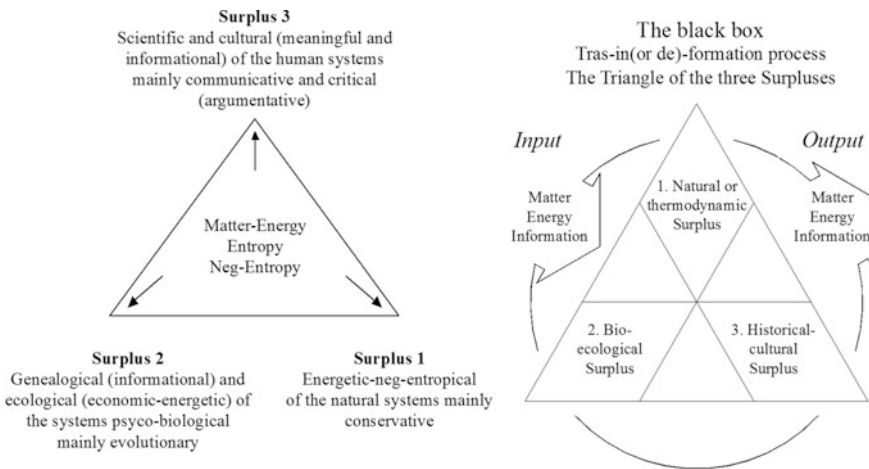


Fig. 2 The triangle of the three surpluses and the black box

In the same analytical and practical context, it includes:

- The valuation of cultural heritage in economic planning (Rizzo 1983, pp. 241–276) or the “internalization” of the cultural estate in the economic programming by means of the input-output Leontief pattern (Rizzo 1989, pp. 197–237);
- A model of the city based on an interactive matrix divided into three or five branches organized into criteria; I have been designing it from 1979 with the help of Benedetto Matarazzo. The model is remarkable in the field of urban planning and architectural design, economics and valuation, physics and mathematics. The proof of all, it is a mathematical expression explained in *Etica dei valori economici o economia dei valori etici* (Rizzo 2007, p. 112). The equation represents the theory of value in accounting language; it is also a symbolic-mathematical paraphrase of the “black box”, that is the trans-information process from the point of view of energy, entropy and neg-entropy.

3.2 Summarizing, the theory of the value of the *Nuova Economia* can be articulated in the theory of value-art, value-beauty value-love with increasing productivity:

How can it be, then, that a good that's shared
should make more owners richer with itself,
than if by but a few it be possessed?"

(Dante Alighieri, Purgatorio Canto XV, 61-63) (Alighieri 2005)

Although it is not (always) easy to measure or quantify the benefits of beauty, there are studies showing an inverse relationship between beauty (e.g., that of music) and the cortisol hormone. But this is not true for the beauty of the people who are recognized as appealing. It is proved that the relationship of a heterosexual man and an attractive woman decreases when cortisol level is lower than the physiological one, i.e., cortisol remains high along with stress: this indicates the ability to respond to exciting stimuli and cannot be considered a negative. Beauty, cortisol and stress would be linked by a direct correlation (Orlando 2016; Bencivelli 2016).

4 Science of Value and Valuation: Ontological Vision and the Operational Paradigm

4.1 The encyclical mentions several times the need to modify or convert the paradigm of economic evaluative science.

It is a charming, beautiful and intriguing issue, which due to lack of space and time I'll just outline, so as not to leave open the question of the epistemological features of economics and appraisals. In fact, according to Alessandro Antonietti, I deserve some credit for having spoken first in an informed manner about the need to overcome the “Serpieri's paradigm”. Surprisingly, Antonietti used to be a supporter

of the thought of A. Serpieri who in 1915–16 significantly revised the economic fundamentals of appraisals, although basing it on to the marginalist paradigm.

4.2 Some issues of this episteme (Rizzo 2013, 2016) are summarized in the first four pages of *(E)conomi(c)a* (Rizzo 2016) as follows.

[4.3 *Birth, life and death of a paradigm*. Traditional economic theory sails in a stormy sea. A large stormy tempest stirs the waves spilling over its paradigm leaky on all sides. The “normal” science cannot contain these waves rising up to the sky and falls into the abyss. To calm the storm and silence the waves [Job 38, 11; Psalm 107 (106), 25–26; 29]—metaphors of a chaotic reality, incomprehensible and unpredictable—it is necessary and urgent to have a conversion or a kind of epistemological metanoia of the scientific paradigm, which is inconsistent due to inherent faults and wrong choices.

First we need to prepare a sociology of the whole community of economists, where to sprout, grow and develop a *Nuova Economia*, recognizing and accepting the role played in scientific research by the “paradigms” that aren’t dogmas. In Greek, “paradigm” can have the following etymological root: [parà] “beyond”—[deiknyo] “to show” which means “model” (or project) and “example”. It is a conceptual framework with which scientists build a vision of the world. It also refers to an internal articulation of a theory, school or thought. T. S. Kuhn defines it as a set of universally recognized scientific achievements, which, for a certain period, provide a model of problems and satisfactory solutions to those who are part of a certain field of research (Kuhn 1969). However, the gradual accumulation of new discoveries has a limit, because at certain times of revolution, the continuity with the past is interrupted and the lovers of the discipline adopt a new course in the light of a paradigm different from the previous one.

Each scientific team performs a “pedagogical initiation” that educates (?) researchers and prepares them for their professional activities. Thus research is a “strenuous and devoted attempt” to force reality within the conceptual framework developed during the learning stage and training. Researchers themselves, not education, are responsible for any inadequacy regarding the problems to be solved because they have been unable to apply their scientific training received. The “normal” science returns to solve problems with the model assimilated and defended jealously, until strong anomalies appear and force revolutionary change that exceeds the traditional scientific practice. Experience shows that the achievement of a lasting and widespread scientific consensus is an achievement, not easy and or definitive. Sooner or later, some methodological and supporting “cracks” appear, shaking it from within and creating the right conditions to spawn scientific inventions.

Demolition and reconstruction of the paradigm mark the transition from the normal research to the extraordinary one; this transition is characterized by discussion of the fundamentals and the use of philosophy (of science) to assume the necessary logic and proceed to effective and persuasive communication within the scientific community. The hermeneutical dimension of the cognitive process involves the implementation of a new and different understanding and interpretation—free and conventional—of reality (Giuffrida 2017), which is never as it appears

and neither is it repetitive. A science must keep in mind the contribution of its founders, but it needs to overcome them; otherwise it does not go beyond its stale and—in the long run—obsolete normalcy.

4.4 From episteme to the paradigm: between the “already” and the “not yet”.

4.4.1 The canonical economic paradigm (neoclassical) estimate (by A. Serpieri) is still supported by bureaucratic pedantry or intellectual inertia, but it has long been out-dated. It is full of “shibboleths” (Paul Samuelson)—clichés and stock phrases (such as the principle of ordinariness, the most probable price, the uniformity of the capitalization rate etc.)—that have excluded serious analysis and models. Forty-five years ago, I started to demolish these beliefs based on fictitious and inconsistent arguments; in the end, they themselves unmask the “shibboleth” they use. Even Nino Zizzo proposed overcoming the traditional paradigm, although according to a reductionist and subjective perspective.

Since my first and fundamental analytical and creative engagement (Rizzo 1972, 2011a, b), I proposed the requirement or need to verify or introduce the epistemological-logical approach to economic estimation theory; this provoked laughter, derision and arrogant reactions intended to dismiss as useless, unnecessary and unrealistic my logical-cognitive approach to appraisal, a half science or technical methodology, based on accounting calculations and quantum-quantitative methods. For my part, however, since the early 1970s, I have raised the issue of the need to perform an epistemological revision of our pure and applied science. This has been encouraged by squinting or inconsistency between an old and abstract vision of economics—considering individuals as always rational beings co-existing (but not interacting) in markets that automatically adjust, and presupposing a conception of capitalism as a perfect system—and the economic reality definitely diverging because of the rise of phenomena that highlight the inadequacy of the dominant economic theory, especially during critical moments. Over the following decades, the same issue was raised by the Nobel economist Paul Krugman in a collection of essays published in the years 1995–97 (Krugman 2000).

4.4.2 The crisis of 1929–33 demolished—before the publication in 1936 of the *General Theory of Keynes (1978)*—the theoretical “castle of papier-mâché”, according to which, in the case of malfunctions or imperfection, the perfect markets would be able to self-correct. In fact, the real-estate bubble burst occurred in financial markets and brought about a “great crisis” similar to that which occurred in 2007 and continues to rage in the world, notwithstanding the economists who are at their wit’s end. This topic escapes economic orthodoxy, but its consistent interpretation—according to a special hermeneutics—confirms the “wealth effect” that I developed in 1979 (Rizzo 1979, 2011a, b) and will be recalled subsequently. Conversely, in 1930, Fisher (1974) and Keynes (1979)—not having full theoretical knowledge of this—believe, respectively, it is “erratic” and “strange” that the real (or natural) interest rate and the monetary (market) interest rate are linked by an inverse relationship; this “empirical phenomenon” and icon of the Wall Street crash was named “Gibson’s paradox” by the economist from Cambridge.

I. Fisher, more than J. M. Keynes, tried to force reality—which he considered murky and mysterious—by applying the conceptual framework of neoclassical theory, that had coalesced in his mind. By changing the epistemological approach, I have indicated the sense of the phenomena that were incomprehensible before, and I have been able to understand things that were hidden to those—including the two influential economists—who considered as paradoxical and wrong the “economic reality” and correct or unchangeable the “normal” science practiced at that time. Therefore, I found myself to be part of this process of illumination, shared by a few others, held up by a kind of scientific semiotics able to reveal some kind of reality that is beyond the level of everyday experiences] (2016, pp. 29–32).

4.5 Paradigm is an existential and cognitive pattern involving faith, philosophy and/or theosophy, science, conscience etc.

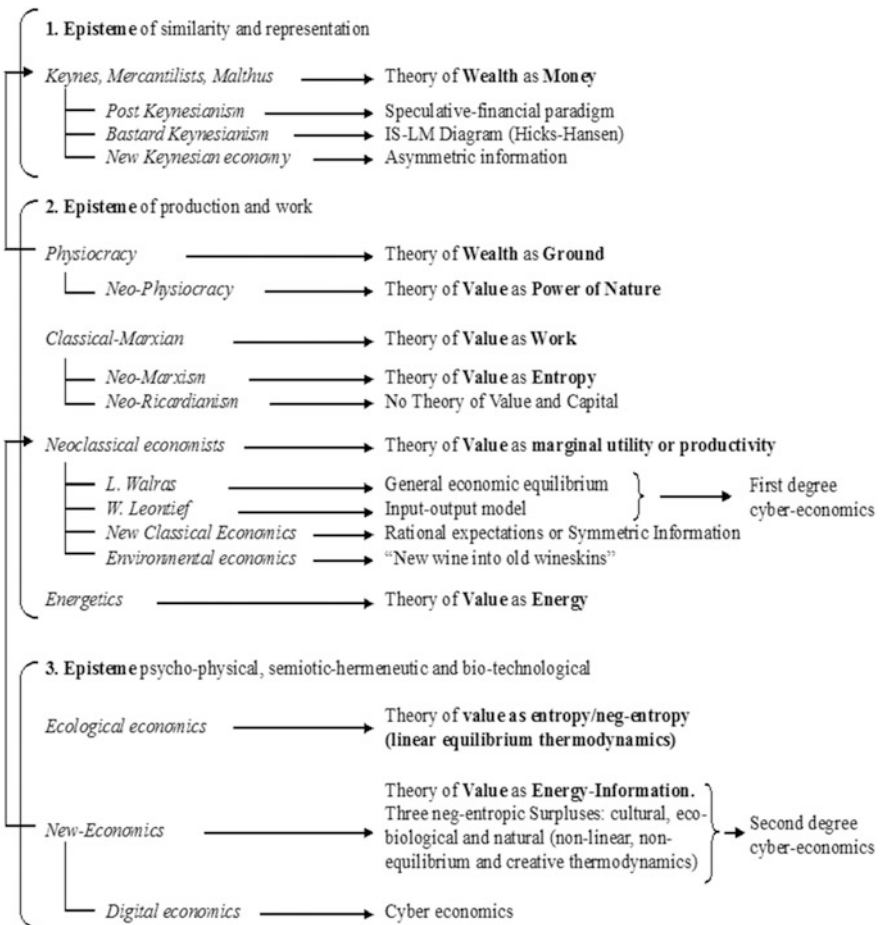


Fig. 3 Economic episteme and theories of value

4.5.1 In this sense and according to this reasoning, based on (and/or inspired by) Dante's poetry, it can be said that the soul is the source or the niche of love, or love is the source or the niche of the soul. The love of the soul, or the soul of love, is the communicative bridge between heaven and earth that turns people into citizens of a homeland, already begun, but not yet complete.

4.6 The main theories of value can be grouped and classified into three epistemes (Rizzo 2002) (Fig. 3). The third one, which I stated on the basis of Michel Foucault, includes eco-economists or ecological economists, New Economy and New economics (electronic and digital economy).

In some ways, it has a preparatory and revealing task or value, since it anticipates and prophesies—or embodies from the point of view of the new economic science—the encyclical of Pope Francis itself, even though I recognize myself to be an “exponential poor fellow”.

5 Conclusions

5.1 “Price is an outgrowth of value”: we need to move from the price-centered economy (and appraisal), to a new value-oriented economy (and appraisal); C. Forte even believed that appraisal is the continuation of the theory of value;

5.2 The theory of value that I propose aims to loosen or overcome the auto-poietic closure between the sub-systems, and between social communities and the environment; thus it is possible to form a singular “linguistic consensual domain” (Laudato si', n. 138) suitable to the ecological communication. According to N. Luhmann, it is difficult, if not impossible, because the voice of the environment and/or the of environmentalists, is too much or too low and redundant;

5.3 Everything is possible, for better or for worse, because the economy of the capitalist dynamic is based on a “uni-Triality”; it consists of *Wealth effect*, *Power law*, and *Capital theory* expressed by the triangle ‘d’ in Fig. 4 of the framework-triangles (Rizzo 2010, p. 321) of the *Nuova Economia*; this is crucial to understand the origin and the destination of capitalism, whose development must not ignore political leadership or influence;

5.4 Furthermore, anyone who thinks or fears that such an existential and cognitive turn loses sight of the methodological and pragmatic concreteness of valuation science should know that by assuming this new paradigm he will have available theoretical and practical changes that will highlight the temporal form, the monetary form and the risks of private and public investment; in addition, he will assume the multi-criteria approach as endogenous, essential and meaningful for micro or macro value judgments, in a general sense for the economic goods and in a specific sense, for natural and/or cultural resources;

5.5 It is necessary to review the concept of growth and development, going beyond the techno-scientific or technocratic paradigm (Laudato si', nn. 106–114) and to define technological innovation as a new value, or surplus value, consistent with (or respectful of) ethical principles and/or aesthetic criteria;

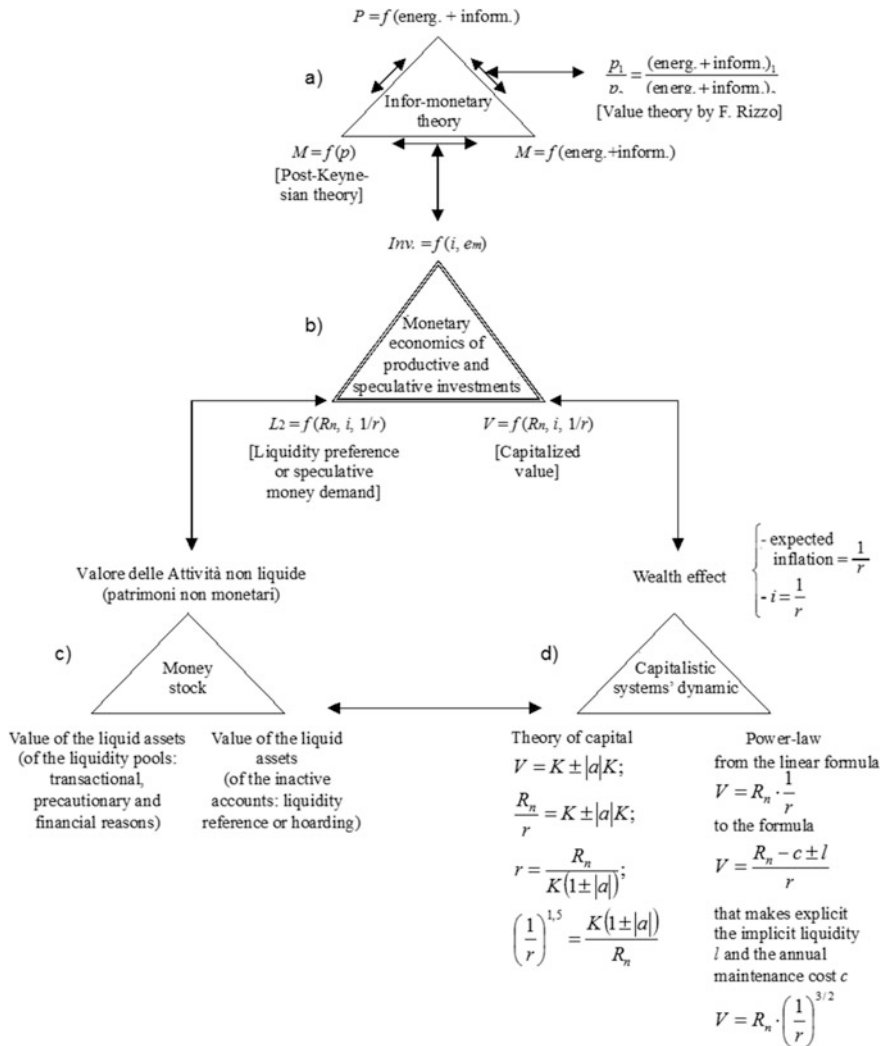


Fig. 4 The new paradigm of the theory of value and capital

5.6 The integral ecology, therefore, comes from the essential relationship between the human being and the moral law of which one cannot do without, otherwise the relationship between living beings and the global environment will become increasingly diminished, unsustainable and horrible or terrifying.

«Deep within his conscience man discovers a law which [...] ever calls him to love and to do good and to avoid evil [...]. Conscience is the most secret core and his sanctuary, where he is alone with God, whose voice echoes in his depths» (Paolo VI 1976, n. 16).

The Son love of the Father/is the image of the invisible God/, the firstborn over all creation,/ for in him all things were created:/things in heaven and on earth,/visible and invisible;/all things have been created/through him and for him./ He is before all things,/and in him all things hold together./In him, and through him/to reconcile to himself all things,/whether things on earth or things in heaven,/by making peace through his blood,/shed on the cross (Col 1, 13; 15–17; 20).

This letter can be dated not long after the year 60. It is a composition or a hymn that celebrates the universal greatness of Christ and takes the wonderful harmony that exists between creation and redemption wanted by God and realized by means of his *Son love* (v. 13). He is before all things that are under his rule. His death on the cross has pacified and reconciled both things of the earth and those of heaven. The redemption accomplished by the Son of Man renews the world, re-creates or gives birth to all things visible and invisible (v. 16) and also determines the rise of a spiritual or human ecology in which the man of nature or the nature of man plays such a significant role to make real its reality or its real reality, like that of Jesus Christ. Of course, not for man but for about the inexhaustible grace and mercy of the Father, the “economy of salvation” of the Son of God, and the testimony of the Holy Spirit. This is the perspective of regality acquired by baptism; it should be well understood by imitating the Son of God and a human; he is not a king in the manner of human history, he did not come to dominate or show his power, but to love, serve, forgive and save all people, who must in turn love, serve, forgive and care for each other. Only in this way, the truth of reality (or the reality of the truth) is truly and fully realized. It is the *reality* (“*realità*”) of creation and humans who inhabit it, as God’s sons and Jesus Christ’s brothers inspired by the Spirit and protected by the Mother of Mercy: Mary, our first Mother.

Thank you for my and your rebirth.

Catania, 6 April 2016.

Acknowledgements Many thanks to Salvatore Giuffrida for his cooperation in editing and translating the paper.

References

- Alighieri D (2005) *La Divina Commedia*. In: Sapegno N (ed) Riccardo Ricciardi editore, Milano-Napoli
- Amata G, Notarrigo S (1987) *Energia e ambiente*. Cuecm, Catania
- Bencivelli S (2016) Bertini: “Ma è difficile quantificare i benefici della bellezza”. Interview to Giuseppe Bertini, neuro-scientist at Università of Verona. *la Repubblica* 22 aprile
- Boscarino S, Federico A, Giuffrida S, Prescia R, Rizzo F (eds) (1994) *Petralia Soprana. Ipotesi di restauro urbano e studi di analisi multicriteriale*, Medina, Palermo
- Fisher I (1974) *Opere*. In: Pellanda A (ed) UTET, Torino
- Genovesi A (2015) *Lezioni di commercio o sia di economia civile (1765–1767)*. In: Perna ML (ed) Napoli
- Giuffrida S (2017) *The true value. On understanding something*. In: Stanghellini S, Morano P, Bottero M, Oppio A (eds) *Appraisal: From theory to practice*. Springer, Berlin, pp 1–14. ISBN: 978-3-319-49675-7. https://doi.org/10.1007/978-3-319-49676-4_1

- Granata MF (2008) *Economia eco-sistemica ed efficienza bio-architettonica della città*. Franco Angeli, Milano
- Granata MF (2010) *Economia dell'informazione energetica nella società capitalistica*. Franco Angeli, Milano
- Gregotti V (2016) *Ecco la sfida: costruire il centro storico delle periferie*. La lettura, Corriere della sera
- Keynes JM (1978) *Teoria generale dell'occupazione, dell'interesse e della moneta (1936) e altri scritti*. In: Campolongo A (ed) UTET, Torino
- Keynes JM (1979) *Trattato della moneta*. Giangiacomo Feltrinelli Editore, Milano
- Krugman P (2000) *Economisti per caso*. Garzanti, Milano
- Kuhn ST (1962) *The structure of scientific revolutions*. University of Chicago Press (Italian transl. (1969) *La struttura delle rivoluzioni scientifiche*. Einaudi, Torino)
- La Rocca T, Leonardi M, Napoli G (eds) (1995) *Gli indistinti confini. Osservazioni e progetti per l'isola di Favignana*, Medina, Palermo
- Luhmann N (1990a) *Sistemi sociali. Fondamenti di una teoria generale*, Il Mulino, Bologna
- Luhmann N (1990b) *Comunicazione ecologica. Può la società moderna adattarsi alle minacce ecologiche?* FrancoAngeli, Milano
- Napoli G (2007) *Teoria e pratica dei capitali urbani. La forma temporale e monetaria della città*. Franco Angeli, Milano
- Orlando R (2016) *Un'opera d'arte riduce lo stress'. Ora lo dice anche la scienza*, la Repubblica 22 aprile
- Paolo VI (1976) *Gaudium et spes. I documenti del Concilio Vaticano II*. Edizioni Paoline, Milano
- Papa Francesco (2015) *Laudato si'. Enciclica sulla cura della casa comune*. Edizioni San Paolo, Milano
- Putnam RD (1993) *La tradizione civica nelle regioni italiane*. Arnoldo Mondadori Editore, Milano
- Rizzo F (1972) *Il Giudizio di valore*, 1st edn. Seminario economico dell' Università di Catania, Catania
- Rizzo F (1979) *Il sistema fabbrica–mercato*, 1st edn. Tringale, Catania
- Rizzo F (1982) *Politica fiscale e sottosviluppo economico. Riforma tributaria e Catasto.*, Tringale, Catania
- Rizzo F (1983) *Economia dei beni culturali. Determinazione del valore d'uso sociale dei beni culturali immobiliari*. Fondazione Carlo Forte, Napoli
- Rizzo F (1988) *Analisi multicriteriale del bilancio economico–ecologico dell'attività agricola. Per una svolta epistemologica, teorica e metodologica*. In: Rizzo F (ed) XXV Convegno della Sidea: «Agricoltura e Ambiente». Il valore dei valori. FrancoAngeli, Milano, pp 219–233
- Rizzo F (1989) *Economia del patrimonio architettonico-ambiental*. Franco Angeli, Milano
- Rizzo F (1990) *Il valore dei valori*. Franco Angeli, Milano
- Rizzo F (1995) *Presentazione*. In: Gargagliano L, *Il segno del valore: la città. X-XVI secolo*. Aiello, Bagheria
- Rizzo F (1999) *Valore e valutazioni. La scienza dell'economia o l'economia della scienza*. Franco Angeli, Milano
- Rizzo F (2002) *Dalla rivoluzione keynesiana alla nuova economia. Dis-equilibrio, tras-informazione e co-efficiente di capitalizzazione*. Franco Angeli, Milano
- Rizzo F (2004) *Etica dei valori economici o economia di valori etici*. Franco Angeli, Milano
- Rizzo F (2007) *Un'economia della speranza per la città multi–etnica*. Franco Angeli, Milano
- Rizzo F (2010) *Questione meridionale o dis-unità nazionale: un ritorno al futuro*. Aracne editrice, Roma
- Rizzo F (2011a) *Il sistema fabbrica–mercato*, 2nd edn. Aracne editrice, Roma
- Rizzo F (2011b) *Il Giudizio di valore*, 2nd edn. Aracne editrice, Roma
- Rizzo F (2016) *La scienza non può non essere umana, civile, sociale, (E)conomi(c)a, enigmatica, nobile, profetica*. Aracne edizioni, Roma
- Rizzo F (2017) *Una nuova avventura tra l'idolatria del denaro e lo spirito dell'amore con compassione o viscerale emo-ra-zionalità. Com'esser puote ch'un ben distribuito in più possessor faccia più ricchi di sé, che se da pochi è posseduto (Dante)*. Aracne editrice, Roma

- Rizzo F, Giuffrida S (2005) "Il dis-valore ambientale: proposta di integrazione. Estimo e territorio
- Rizzo F, Napoli G, Giuffrida S, (2000) *Economia e politica archeologica. Genio Rurale-Estimo e territorio*
- Trovato MR (2008) *Il Val di Noto tra economia, finanza e gestione (E. F. G.). Un modello*. Phd Thesis in Land Analysis, Planning and Management, University of Catania, Tutor F. Rizzo
- Zamagni V (1978) *Industrializzazione e squilibri regionali in Italia: Bilancio dell'era giolittiana*. il Mulino, Bologna

“Moral” Purposes and Material “Knowledge” in the Encyclical “Laudato sí”



Giovanni Campeol, Sandra Carollo and Nicola Masotto

Abstract No doubts European culture has a Christian origin, although most European bureaucrats and politicians shamefully disregard this. The Christian origin can be recognized in the urban, linguistic and cultural characteristics that have contributed to produce the one of the broadest cultural heritage in the world, especially in Italy. The aim of this paper is to analyze the contents of the encyclical “*Laudato sí*” to verify whether it contains methodological and technical approaches that could be helpful for environmental evaluation. To this end, the paper analyzes and compares three encyclicals: the first, “*A Quo Primum*” by Pope Benedict XIV (14 June 1751) on the role of the Christians towards the Jews; the second, by Pope Benedict XVI “*Spe salvi*” (30 November 2007) on the role of faith/hope; and the third “*Laudato sí*” (24 May 2015) by Pope Francis, on the role of integral ecology. The encyclical “*Laudato sí*” is especially refuted for the improper, and sometimes incorrect, use of theories, methods and data concerning ecological, environmental and physical issues.

Keywords Ethics · Science · Environment · Territory

G. Campeol

Department of Design & Planning in Complex Environments,
University Iuav of Venice, Venice, Italy
e-mail: giovanni.campeol@iuav.it

S. Carollo

Land Economics and Environmental Evaluation, Studio ALIA, Treviso, Italy
e-mail: sandra.carollo@aliavalutazioni.it

N. Masotto (✉)

Department of Civil, Architectural and Environmental Engineering,
University of Padova, Padua, Italy
e-mail: nicola.masotto@dicea.unipd.it

1 Introduction

Investigating the contents of an encyclical for evaluation purposes could appear to be a purely academic exercise, almost a simulative game with no real practical impact on how to carry out an evaluation (in this case, environmental) of human transformations. Actually, the encyclical “*Laudato si*” introduces a set of theoretical, methodological and technical references into the field of so-called sustainable development.

Such a development is considered morally important by Pope Francis and, therefore, worth being utilized as a behavioural reference for the bishops and the Catholic community. This is a daring operation that tends to give a moral value to scientific and technical information that, in its own nature, is always subject to evolution because of the refutation process. Refutation is always at the basis of the evolution of scientific knowledge.

The paper is divided into three parts. The first analyses other encyclicals to verify whether they show some similarities with “*Laudato si*”. The second applies a refutation process to the scientific and technical statements contained in “*Laudato si*”, in order to verify their reliability. The third is about the impact of the information contained in “*Laudato si*” on the evaluation processes through the study of some “indicators”.

2 European Culture and Christianity

The Christian origin of European culture pervades the history of urban, territorial and social transformations, which can be read in the urban, agrarian, architectural, behavioural and linguistic forms. However, especially European bureaucrats and politicians, who have placed at the top of the EU objectives the management of finance, rather than the cultural, social and economic development, today shamefully disregard this origin. This strategic choice of the European Union has been carried out through an expropriation of national sovereignties by a very small lobby of politicians and economists (all connected with the big multinational banks). The former are prevalently victims whereas the latter are the perpetrators and the masterminds of a hegemonic design based on the construction of a protocol system of aggregate indicators, rigid and simplistic (balanced-budget, national debt-GDP ratio, etc. in the economic and financial fields), for the use and abuse of the economic system prevalently influenced by Germany. These indicators are totally unable to represent the diversity and the originality of the economies and cultures of the European countries, since they represent an evaluative reductionism¹ that

¹In order to understand the social and economic solidity of a country it would be much more meaningful to use the indicator “household savings” or the “value of the cultural heritage” rather than “public debt” or the “ratio GDP/public debt”.

cannot be understood or justified, and that has reduced the competitiveness and welfare of most EU countries. Nonetheless, the European Union was born with a superstructure deprived of freedom, and consequently of hope.

On the matter, Pope Benedict XVI’s thinking (2007) is meaningful, in “*Spe salvi*”, where he states

[...] since human affairs depend in each generation on the free decisions of those concerned. If this freedom were to be taken away, as a result of certain conditions or structures, then ultimately this world would not be good, since a world without freedom can by no means be a good world [...].

The issue of the freedom of European countries was not raised during the shift from the institutional legal system of the European Community to that of the European Union. As a matter of fact, this step, apparently a natural evolution of the affairs pertaining to the political class, has produced the worst European social, economic and cultural disaster since World War II, whose central knotting problem is definitely connected with the missing freedom of choice of the European populations.

Pope Benedict XVI’s analysis (2007) is also expressed in the following lines:

[...] Naturally, new generations can build on the knowledge and experience of those who went before, and they can draw upon the moral treasury of the whole humanity. But they can also reject it, because it can never be self-evident in the same way as material inventions. The moral treasury of humanity is not readily at hand like tools that we use; it is present as an appeal to freedom and a possibility for it. This, however, means that:

a) The right state of human affairs, the moral wellbeing of the world can never be guaranteed simply through structures alone, however good they are. Such structures are not only important, but necessary; yet they cannot and must not marginalize human freedom [...].

3 Cultural and Religious Isomorphism

Not only did the European populations lose their freedom of choice in entering the European Union, but they also developed a situation of serious loss of cultural identity because of a pervasive conviction that multiculturalism is unquestionably a value, and this fact is having an enormous impact also on the urban form and on its symbolic places. The proliferation of mosques in Europe, especially the large ones, is changing the image of important places of many European cities. A slow but powerful process of “lebanonisation” of urban territories can be clearly seen, for example, in Beirut and Sidon, where the presence of Christian architectural culture, especially Maronite, has been totally concealed by a redundancy of mosques, some of which are really huge and predominately built of reinforced concrete.

In this way, the European cities risk losing their cultural peculiarity, resulting from the urban and architectural layers of the various historical periods forged by Christian culture. This does not mean that in centuries the architectural forms of other religious cultures, such as, for example, the Jewish, have not developed;

however, they have always been integrated into the Christian culture as a continuous process and without deep fractures of urban pattern and forms.

Today the European urban phenomenon is characterised by the pressure of Muslim minorities who, through the “population bomb”, tend to impose the construction of an increasing number of mosques and the formation of self-referential and self-governing urban *enclaves*. These are urban places where the settled communities do not recognize the legal system of the hosting European countries. This strategy is widely supported by the radical-chic lobbies and large sectors of bureaucracy and the generally parasitic social states, very often dependent on the public administration.

Producing urban images in which the symbols of Christianity (St. Peter’s Basilica, Milan Cathedral, Notre-Dame Cathedral, Cologne Cathedral, Cathedral of Santa Maria del Fiore, St. Stephen’s Cathedral, Sevilla Cathedral, Rouen Cathedral, Cluny Abbey etc.) are placed side-by-side with the Islamic symbols of mosques, means triggering a loss of the European cultural references that are undeniably deeply Christian.

As a matter of fact, it is a process of “durkianian isomorphism” that, through the viewing of Muslim buildings, produces a loss of Western cultural values identified in Christian architecture.

The issue of anthropic pressure of the populations alien to European culture, in a general climate of decline for the latter, is not surely new; one example of this is given by the migration of the Goths² and their deep influence on the stability of the Roman Empire, at that time also experiencing a crisis.

Pope Benedict XVI (2007) reflects on these phenomena:

[...] At the time of Augustine, the incursions of new peoples were threatening the cohesion of the world, where hitherto there had been a certain guarantee of law and of living in a juridically ordered society; at that time, then, it was a matter of strengthening the basic foundations of this peaceful societal existence, in order to survive in a changed world [...] It was commonly thought that monasteries were places of flight from the world (*contemptus mundi*) and of withdrawal from responsibility for the world, in search of private salvation. Bernard of Clairvaux, who inspired a multitude of young people to enter the monasteries of his reformed Order, had quite a different perspective on this. In his view, monks perform a task for the whole Church and hence also for the world [...].

The call to one of the founding values of Christian civilisation, that is work, seems to be extraordinarily up-to-date.

Pope Benedict XVI (2007) goes on reflecting:

[...] Contemplatives—*contemplantes*—must become agricultural labourers—*laborantes*—says Bernard of Clairvaux. The nobility of work, which Christianity inherited from Judaism had already been expressed in the monastic rules of Augustine and Benedict. Bernard takes up this idea again. The young noblemen who flocked to his monasteries had to engage in manual labour [...].

²The Goths, pushed by the Huns coming from the East, penetrated the eastern borders of the Roman Empire after 166 AD.

In fact, nobody should forget that European culture has been undeniably forged by both the ethic and the moral values expressed by the Catholic Church, also visible in the territory design,³ and by the morale of the Protestant Church, which has remarkably influenced the design of the “company town” (Weber 1992).

Even more. The European Christian origin structurally shows itself in the urban, agrarian, architectural forms as well as in the behavioural, stylistic, pictorial, musical, etc. modes that have made of Italy the geographic place repository of the greatest “beauty” and the most important world artistic and cultural heritage.

4 The Encyclical “A Quo Primum” by Pope Benedict XIV: The Town as an Indicator

The first encyclical of the history of the Church, “*A Quo Primum*” by Pope Benedict XIV dating back to 14 June 1751, was written for the Polish Episcopate to guide the Christians’ behaviour towards the Jews, identifying the “urban degradation” as an indicator of the decadence of Christian culture. In fact:

[...] several places, towns and villages that, as their ruins show, were earlier appropriately protected by walls and that, as it appears from the ancient Tables or from the Regesta, were inhabited by a high number of Christians [...]. (Pope Benedict XIV 1751)

The metaphor of the bad quality of urban management and of the state of buildings is thus used to highlight the need for the “value” of Christian culture.

This subject is important as a basis for assessment since, even before knowing their religious sources, communities immediately perceive the forms of buildings to identify themselves with the reference culture. The town is the place that can be recognised by perceiving its uniqueness, it is the symbolic element with a psychological attractive force, and it is the place of the myth for its historical and cultural recognisability.

Therefore, Pope Benedict XIV uses the indicator of the town management as a simple element, which can be easily documented and is irrefutable to define the moral level of the populations. Today, the same indicator is utilised to define the more general environmental quality of a territory.

³Benedictine agrarian reform of the Early Middle Ages (St. Benedict of Nursia 534).

5 The Encyclical “Spe salvi” by Pope Benedict XVI: Faith/ Hope and the Undeniable Datum

The encyclical of Pope Benedict XVI of 30 November 2007 is issued to reflect on the role of hope in faith, but also on the role of technique and science. It is a text of a very high cultural profile, based on theological and philosophical essays:

[...] Redemption is offered to us in the sense that we have been given hope, trustworthy hope, by virtue of which we can face our present [...] Now the question immediately arises: what sort of hope could ever justify the statement that, on the basis of that hope and simply because it exists, we are redeemed? And what sort of certainty is involved here? [...]. (Pope Benedict XVI 2007)

So the issue of “certainty” is initiated: it is not based on the misleading and momentary interpretation of sometimes pseudo-scientific information, but on the power of hope contained in the Christian faith.

[...] Here too we see as a distinguishing mark of Christians the fact that they have a future: it is not that they know the details of what awaits them, but they know in general terms that their life will not end in emptiness. Only when the future is certain as a positive reality does it become possible to live the present as well [...]. (Pope Benedict XVI 2007)

Pope Benedict XVI’s reasoning, which reflects his deep philosophical knowledge, helps to understand how necessary it is to have faith in the future, which means to develop a positive view of human nature in spite of all its weaknesses. This future, although unknown, is fully pervaded with the faith in God (as the ancient Greeks would say, source of *eros*—“life instinct”, as opposed to *thanatos* “death instinct”).

[...] We can free our life and the world from the poisons and contaminations that could destroy the present and the future [...] This makes sense even if outwardly we achieve nothing or seem powerless in the face of overwhelming hostile forces. So on the one hand, our actions engender hope for us and for others; but at the same time, it is the great hope based upon God’s promises that gives us courage and directs our action in good times and bad [...]. (Pope Benedict XVI 2007)

Therefore, the need to find again Christian values (which are expressed in forms, rituals, sociality) and the hope deriving from faith become fundamental to imagine a possible future.

6 The Encyclical “Laudato sí” by Pope Francis

The encyclical “*Laudato sí*” by Pope Francis of 24 May 2015 addresses a moral message by making wide references to ecological, environmental, and physical (climate change) issues, entering into the field of science and technique that are

naturally subject to continuous methodological evolutions and informative modifications, as well as to real theoretical revolutions. In few words, they are entirely subject to continuous refutability.

6.1 *Uncertainty of the Datum, Conjectures and Refutations*

The moral guidelines of Pope Francis are justified also by using technical and scientific references based upon concepts that are sometimes questionable from a theoretical viewpoint and sometimes erroneous from a technical and methodological perspective.

These guidelines are strengthened by intriguing technical and scientific conjectures that are “hypotheses based on incomplete and uncertain clues, or on judgements based on intuition, probably considered as true, but unproven. This means that they are just hypotheses”,⁴ which need activate a refutation process to understand whether they are true.

The encyclical states that it is necessary to aspire to “[...] a circular model of production [...]” (Pope Francis 2015). This fact seems impossible as regards energies (the second principle of thermodynamics states that, in a thermally insulated system, entropy tends to increase irreversibly over time). On the other hand, it could be possible to aspire to a “helical economy”, which may increasingly improve the ability to re-use resources, knowing well that it is necessary to consume a part of non-renewable resources. Moreover, as regards municipal waste management, their total “recovery”, “recycling” and “re-use” can never be carried out since the market will never be able to absorb all the waste, and the technology for the treatment of waste, although innovative,⁵ cannot transform them thoroughly. In fact, the curbside collection, very widespread in Italy, engenders a real ecological and economic trickery⁶ in the waste-cycle system.

Moreover, the encyclical states that “[...] the quality of available water is constantly diminishing [...]” (Pope Francis 2015); as a matter of fact, the water quality is currently much better than in the previous decades, especially in advanced industrial societies. In this field, the construction of a high number of water purifiers together with the technological progress of industrial productions have restored a good, sometimes very good, water quality in hydrological basins.

Another statement that is questionable and easily refutable from the scientific viewpoint is that humans “[...] causing changes in its climate [...]” (Pope Francis 2015), putting on the same level natural and man-made phenomena.

⁴Cf. *Conjectures and Refutations: The Growth of Scientific Knowledge* (Popper 1963).

⁵In this technological field, the Western system has not particularly innovated.

⁶Issue discussed at UrbanPromo, in the session cured by Ennio Nonni and Gianni Biagi: “*Smart city e rifiuti urbani: siamo sicuri di percorrere la strada giusta?*”, held in Sala Lab, “La Triennale di Milano”, 18 November 2015 (<http://urbanpromo.it/2015/eventi/smart-city-e-rifiuti-urbani-siamo-sicuri-di-percorrere-la-strada-giusta>).

On this matter, it would be enough to observe the lack of statistical significance of data on the measurement of the earth's temperatures (which should in any case be homogenous in all the planet), to consider as "false" the conjecture that the industrial system—a product of capitalism—is the cause for all that. In fact, how is it possible to consider scientifically valid one century of temperature measurements compared with life on earth, equal to about 4 billion years! (Campeol 2014).⁷ Physicist Antonino Zichichi remembers that

[...] to describe in a mathematically rigorous way the climate evolution, three strongly paired non linear differential equations are necessary. Differential means that it is necessary to describe the evolution moment by moment in space and time (where and when). Non linear means that the evolution depends also on itself [...] Strongly paired means that the evolution described by each equation has remarkable effects also on the others. This three-equation system does not have an analytical solution; this means that nobody will ever be able to write the equation on climate evolution [...].⁸

Instead, the encyclical "*Laudato si'*" suggests three simple "hypotheses", which are supported by aggregate and simplified environmental indicators (that are captivating, totemic and ideological metadata, such as, for example, the increase of CO₂ responsible for the climate change).

All this aims to show the need for a change in the moral attitude of the humans toward the environment.

6.2 *Sobriety: Social Mythology*

The encyclical states that:

[...] If we approach nature and the environment without this openness to awe and wonder, if we no longer speak the language of fraternity and beauty in our relationship with the world, our attitude will be that of masters, consumers, ruthless exploiters, unable to set limits on their immediate needs. By contrast, if we feel intimately united with all that exists, then sobriety and care will well up spontaneously [...]. (Pope Francis 2015)

If, on one side the attention to the environment is thoroughly shared and is like a container to evaluate sustainable development (dynamic modality that considers the "ecological, economic and social issues"), on the other, it is not clear what exactly sobriety is and how it can be measured. Therefore, the faithful and the unfaithful attracted by the power of the encyclical will wonder what the "threshold of sobriety" is.

⁷Lack of datum representativeness.

⁸Interview published on the Italian daily newspaper "Il Giornale", of 5 December 2015.

There are no indicators for the above, except the one referred to the salary of a former (Italian) President⁹ of the Council of Ministers, who first introduced *sobriety* as a behavioural “value” in national economy.

Based upon the principle of non-contradiction, that is, nobody can advocate the sobriety of a nation without realising his/her own sobriety, this threshold should be approximately 32,000 euros/month/person (or the salary of the former President of the Council of Ministers). If this condition were diffused in the country, it would engender an extraordinary availability to pay (buy goods and commodities), thus obviously increasing the number of factories and the relevant jobs and incomes.

Instead, the encyclical encourages the control of waste by adopting a conscious behaviour toward the full utilisation of the goods owned: a pair of shoes, before being thrown away, shall be used to the end, or it is necessary to buy cheaper shoes. As a matter of fact, if “sobriety” were spread all over the world, it would be necessary to consider the shutdown of many factories with the subsequent loss of work and income for millions of people. It seems legitimate to wonder whether the encyclical pushes us towards degrowth.

If that were the case, “sobriety” could become a “lead lifebelt for the poor”! Does the encyclical foreshadow the construction of a new world of “equals” inside “ecological communitarianism”?

6.3 *Ideological Indicators Versus Effective Indicators*

Reading the encyclical “*Laudato si*”, anyway, helps us to reflect on the significance of some indicators used in the procedure of the Strategic Environmental Assessment (SEA) of urban plans, remembering that it is necessary not to use “deceitful idols” (Ruffolo 1985) to measure, for example, the environmental sustainability in planning processes.

The 15-year experience developed with the SEA has enabled the understanding of how some highly cited indicators are actually false or useless to evaluate the sustainability of a land-use plan (Campeol 2012). Here are some examples:

- *Ecologic footprint*. This indicator seems to be a primarily academic exercise, with a poor contribution to help to understand the environmental impacts of the territorial and urban-planning processes. On the other hand, in calculating the relationship between the natural resources needed by man and the Earth’s ability to regenerate these resources, it uses a theoretical and global ratio of soil consumption/resources, without geographically contextualising the environmental evaluation of plans (which must necessarily be specific to a site);

⁹Mario Monti, in his short term as President of the Council of Ministers of the Italian Republic (16 November 2011 to 28 April 2013), based all his “policy” on the search for sobriety.

- *CO₂*. It cannot be related to urban planning, as it is often linked with macro-climate conditions that depend on the geographic characteristics of the place and cannot be changed by urban-transformation interventions;
- *Curbside collection*. It is a prevalently ideological indicator and is not modulated on the existing waste-management technologies. In fact, the waste sorting is a necessary and a virtuous activity only if it substantially achieves the established target, that is, the collection and the selection of those materials that can reasonably be re-used “as such” or with modest interventions, and of those materials that, although without an economic value, would undermine the subsequent management of the remaining waste. Consequently, this indicator is meaningful only with consequent curbside collection management (still difficult to realise from a technical viewpoint);
- *PM10*. It is not always directly linked with the transformations produced by the land-use plan and is often misused to justify the decision for closing urban traffic roads and encourage citizens to ride bicycles, in an atmosphere which maintains for days, and even for weeks, the same pollution levels.

On the other hand, the objective indicators, easy to measure and free from ideologies, are really helpful to understand the environmental consequences of the territorial transformations (Campeol et al. 2011). The following examples can be explanatory:

- *Soil consumption*. It can be directly used to verify the correctness of the transformations expected by the urban and territorial planning. In fact, it evaluates the physical portion that is irreversibly transformed by the plan, and so the possibility (or the missed opportunity) that the system may produce further transformations in the future. Therefore, this indicator assesses in an aggregate way how much territory surface is transformed from the natural and/or agricultural state to urban functions (residences, services, units of production, infrastructures etc.), so that the restoration of the ex-ante state becomes improbable;
- *Square meters of roads in bad condition*. This is directly related to urban planning, since it may restore the level of urban quality in a simple way;
- *Percentage leakage in the water-supply system*. This indicator is indirectly connected to urban planning, since it shows significantly the capability of managing a fundamental resource for the survival of a human settlement;
- *Quality and quantity of drinking water*. It is indirectly connected with the plan choices, but it is directly referred to as a level of public health;
- *Travelling time to reach a hospital*. It is directly related to the plan strategy and the public health.

7 Conclusions

The intellectual fascination represented by the encyclical “*Laudato si’*” involves a many cultural and academic circles, mostly with an ideological attitude, without a real semantic analysis or any methodological approach of scientific refutability.

The interference of Pope Francis in the technical and scientific field to support a moral message seems to be a courageous action that nevertheless can engender the risk of losing the moral importance of the encyclical itself, once these technical and scientific references prove incorrect.

References

- Campeol G (ed) (2014) *Il delta del Po. Progetti e scenari sostenibili*. Il Poligrafo, Padova
- Campeol G (2012) La VAS dei piani urbanistici e il monitoraggio. In: *Il Monitoraggio nelle Valutazioni Ambientali*, proceedings of the workshop PON GAS 2007–2013 (Lamezia Terme, 17 July 2012), Ministry for the Environment and Protection of Land and Sea. Tiburtini, Rome
- Campeol G, Copiello S, Lioce R and Stanghellini S (2011) La valutazione integrata nel Piano Comunale della Legge Regionale n. 11/2004 del Veneto: il caso di Portogruaro. In V. Bentivegna and S.A. Miccoli (Eds.), *Valutazione progettazione urbanistica: metodologia e applicazioni* (pp. 75–106). DEI Tipografia del Genio Civile, Rome
- Pope Benedict XIV (1751) Encyclical “*A Quo Primum*”. Libreria Editrice Vaticana, Vatican City
- Pope Benedict XVI (2007) Encyclical Letter “*Spe salvi*”. Libreria Editrice Vaticana, Vatican City
- Pope Francis (2015) Encyclical Letter “*Laudato si’*”. Tipografia Vaticana, Vatican City
- Popper K (1963) *Conjectures and refutations: The growth of scientific knowledge*. Routledge & Kegan Paul, London
- Ruffolo G (1985) *La qualità sociale. Le vie dello sviluppo*. Laterza, Bari
- Saint Benedict of Nursia (534). *Regula Sancti Benedicti*
- Weber M (1992) *The protestant ethic and the spirit of capitalism*. Routledge, London

For an Ethics of Urban Regeneration



Marcello Capucci

Reuse something instead of discarding it rapidly, starting from important reasons, can be an act of love which expresses our dignity. (Encyclical letter “Laudato Si”, § 211).

Abstract Are we talking about urban regeneration by force or necessity? It is perhaps opportune a more careful reflection, which also concerns the ethics of the profession and its tasks.

1 What We Are Talking About?

One summer evening I went with my son and two of his friends to get an ice cream. I had a coffee, as usual without sugar: but it wasn't so good, and I try to sweeten it: but on the counter there was only sugar bags, no unpackaged sugar. I opened one of them and used just a little, so much of the remaining content ended up being thrown away. Children, once they had eaten their ice cream, asked for water, but there did not seem to be any tap water. So I needed to buy a bottle which was delivered with four plastic cups. Once we had consumed it, the remains end up in the trash (recycling bins, but only a sad consolation). In a little bit of time, these few daily gestures of three children and an adult produced food wastage and trash.

What has this to do with the regeneration? More than we can imagine, if we want to adopt the idea that the issue, long before it became technical and practical, is cultural in nature. To compare this occasion with the *Laudato Si* Encyclical is particularly interesting since it addresses the theme from unusual points of view, and allows us to extend our gaze to most important reflections, and in my opinion, essential too, which in daily practice appear almost absent from the context of any way of thinking.

The following considerations come from a completely laical observatory, i.e., that I would like to highlight to appreciate even more the way the Encyclical is able to deal reasonably with many issues involving—beyond one's religious beliefs—ecology, ethics and civil coexistence issues.

M. Capucci (✉)
Modena, Italy
e-mail: Marcello.capucci@gmail.com

At the same time, I can do nothing but apologize for my inadequacy to deal with such an accomplished and satisfying issue that is so delicate and difficult as that which I would like to allude to with the title of this contribution. The purpose, very modestly, is just to share any useful ideas that I think could help to reflect on the issue of regeneration, in a broader reference framework that finds several items of contact with the content of the Pope's encyclical.

I've been working for some years on city transformation. In the early 2000s, I began my professional practice at the height of the age of requalification programs; today I'm working on the more complex perspective of urban regeneration.

Therefore, I assume that the two terms—requalification and regeneration—are not interchangeable for the specific reasons that will be explained below.

Watching carefully the urban transformations of the last 20 years (we talk about requalification since the 1990s), that have been encoded by and in the urban development discipline, they have concerned in most the situations, “projects” of intervention, on the most significant parts of cities. These projects are often considered as a state of transition, decisive and clearly defined, and a more or less radical transformation, through a set of structurally related, dependent and consequential actions. Where attention to the topic of reuse was obvious, generally this has referred to the “container” (being that it either an historical or remarkable architecture building), and the effect was expressed, in practice, in maintaining its “image”: due to the historical, artistic, or testimony value of the container.

Today, in fact for a few years but so far without concrete and widespread demonstrations that able to be taught, the urban regeneration period can open very different views for reflection. First, I think it is appropriate once again to focus on how, through the millennial history of the city, adaptation strategies have always been practiced through continuous forms of reuse, modifications and alterations, which often took place with minimal interruption, even dependent—apart from cataclysms—from time to time of available technologies which, quite simply, would not allow substitutions or radical transformation of the existing city.

The intrinsic bond that until the beginning of the past century has connected urban form and performance to materials, techniques and technologies has produced ways of intervention based on a deep and natural inner ecology.

2 A Process, not a Project

There is no rule that—alone—can lead to symbiosis with the earth of Civita di Bagnoregio or Matera; rather than to the magic of Piazza dell'Anfiteatro in Lucca, or portions of Roman temples in medieval houses, just to mention some examples capable of illustrating this concept.

These processes have always been based on confrontation and enhancement of peculiarities: of the places and contexts, as well as of the architecture or even just of materials; an impedance, such as steep terrain or something built before was an opportunity—mandatory or not, it doesn't matter—to exploit the reuse and transformation system.

Therefore, we are thinking of procedural forms typically slow, sparsely programmable in detail over time, i.e., the very opposite of what we are expecting from a standard *project*. These are conditions and modalities that belong and have always complied with city life, and which seem to be forgotten, not without some guilt, with a certain superficiality.

The imminent and more difficult challenge is perhaps to frame a deeply urban ecological process. Success is difficult, yet it is a major challenge that requires a change of perspective and that must be addressed keeping in mind, maybe for the first time, the practices for the transformation of the territory, and above all the tools to implement and govern them, that are now confronting a kind “second half” of the urban fabric, of those—however—we feel daily and normal, and to which, maybe because of it, we do not give any particular value, except the functionality. The Encyclical itself sends a thought in this direction:

Together with the patrimony of nature, there is also an historic, artistic and cultural patrimony which is likewise under threat. This patrimony is a part of the shared identity of each place and a foundation upon which to build a habitable city. It is not a matter of tearing down and building new cities, supposedly more respectful of the environment yet not always more attractive to live in. Rather, there is a need to incorporate the history, culture and architecture of each place, thus preserving its original identity. Ecology, then, also involves protecting the cultural treasures of humanity in the broadest sense. More specifically, it calls for greater attention to local cultures when studying environmental problems, favouring a dialogue between scientific-technical language and the language of the people. Culture is more than what we have inherited from the past; it is also, and above all, a living, dynamic and participatory present reality, which cannot be excluded as we rethink the relationship between human beings and the environment. (§ 143)

3 Time Consumption? Another Possible Point of View

So, we should try to pay more attention to the fact that the intrinsic value of a city “to be regenerated” consists in the time settled upon it, that is the *past* that call us for a dialogue.

The general debate, which is now all (too much) focused on land consumption, could then begin to consider more carefully the danger linked to *time consumption* of the existing city, that many operations are likely to implement deleting tracks, past dispersing, filing the thickness and the time dimension that permeates it. And on closer inspection, time rather than the soil is the only real irreproducible dimension: reflection at which the urban planning is not at all accustomed, indeed.

The need to define the “time zero” for an initial period, a difference between a situation *ex ante* and *ex post* is typically one of its main preoccupations.

The non-consumption of time is also an option of active protection and regeneration of the collective memory. While in town it appears, and settles the incessant action of the community, which appropriates and re-appropriates unceasingly of the urban physicality, the time, or rather its sedimentation, is perhaps the largest and invisible heritage, and it is in fact the only real finite resource: if the soil is reused, the cancelled time is inevitably lost: and no technology can shorten the process of reconstruction.

Moreover, the passage of time produces incessant modifications, alterations, changes: the practice of urban regeneration, as never, is asked to be a place of production and regeneration of memory: beyond a mere “logic preservation” of objects and urban facts, to have rather the ability to continue and trigger processes.

The purpose to produce memory has also the sense to get out of a scheme to which the urban development discipline is very linked: that is the regulatory purposes. A very simple example just to understand: in our town centres, it is not generally possible to make changes to the facade of a simple house. But if to the windows of that house today, one wants to add a frame, to make it as beautiful as the windows of the house next door, why should not it be done? Yet it is precisely this the act of memory production, because it is inclusion and continuation of the normal process of adaptation and change that time has always deposited on our cities and that is the real wealth: today the discipline does not provide it any more, or does not admit it, or admits it with huge restrictions.

This happens perhaps because it is governed by a substantial mistrust in the outcomes of the actions of today: mistrust that in too many ways is understandable, not least because those results do not come from actions able of an organic sense of continuity with the past. In this sense, the regeneration may mean a high capacity of a comparison, and a regained confidence in dialectic comparison with the material that the existing city gives to us.

To deny the same training and modification of many urban facts, however, means to deny not only a production of memory, but also keeping away those facts from the feeling of membership of a *civitas* that are fewer and fewer recognized as their own and in them it identified itself. We should think more carefully to the oldest portions of our cities that today are also those with the greatest rates of immigration: that is, with the major communities’ presences that have very little to do with the story that created them and which still today can define roots and identity much less demagogic than those normally practiced. At the same time, however, those portions of the city will continue to be the most adaptive and resilient, giving for example answer—perhaps not optimal: but anyway, an answer—to urgent problems that otherwise couldn’t be coped and that, without that relief valve, would present themselves with a very different impact.

These survey profiles seem even more urgent if one thinks about the issue of regeneration, which now seems substantially addressed in technical terms: it is only a mere idea of the performance of a building, in energy or seismic terms; accompanied by the most, and basically right, economic or banking feasibility

assessments. This is not wrong, but I think one can share the observation that this approach cannot be considered exhaustive. Above all, here should not lie the priority criteria for intervention and work, against which set reflections, analysis, and above all the tools.

Almost never you hear of residents of those homes, or more generally, of those spaces and places of the city, consolidated from time with stories and the settled identities. The social dimension and more purely human dimension of regeneration does not seem to be structuring part in the on-going debate. Still, I think it would be quite useful and necessary to understand “for whom” it is important to regenerate as well as to understand “why” doing it. And understand if those involved in that process is still victim or worse hindrance, rather than an active and constructive part, and why not even the main beneficiary.

Because, and here lies another important point, the city to be rebuilt we face is a different city from the one we have always worked: it is not the city of real estate players or construction companies, as the growing city was; it is not anymore the city of large and small companies. Rather it is the most accomplished expression of the city “of the people”, which holds in itself not only real estate values, but real life stories, memories, roots; that now appears on the scene in an overbearing and compact way, without showing necessarily emergencies. Among other things, is the process working on the city made up of these “old houses”, of those ancient fabrics and maybe a bit battered, that today we all would agree to “regenerate”, but which Jane Jacobs reminded us for their social importance, approachable house and town for those who still can’t afford something better.

Even the Encyclical reminds us of the sense of human and social capital in the body of existing city:

Given the interrelationship between living space and human behaviour, those who design buildings, neighbourhoods, public spaces and cities, ought to draw on the various disciplines which help us to understand people’s thought processes, symbolic language and ways of acting. It is not enough to seek the beauty of design. More precious still is the service we offer to another kind of beauty: people’s quality of life, their adaptation to the environment, encounter and mutual assistance. Here too, we see how important it is that urban planning always take into consideration the views of those who will live in these areas. (§ 150)

To come to a greater depth of these reflections, and to try to redefine a working method where urban planning contributes only as one of the parties, it would be better to investigate how much this attention to regenerate is so alive and in response to a sincere conviction, arising from the intrinsic ecological value—in the fullest sense of the term—recognizing the paradigm of regeneration and reuse. Namely understand if this attention comes from a shared, convinced widespread acknowledgement on many criticizes in carrying on following that development model upon which the Western world growth is founded, this was aimed at a (over) production of objects and especially of needs, and as such was inherently averse to reuse, which can only remain marginal practice: radical-chic (for those who want to be different) rather than forced (for those who cannot do otherwise).

Because otherwise, this fervor in the debate is likely to be a foyer discussion, waiting the second half to restart with that same model of production and consumption that was interrupted many years ago, and that seems to have put all on hold: making the subject of urban regeneration almost an obligatory discussion, endured much more than practiced, if only for lack of real alternatives.

4 Why We Are Talking About?

In other words, without blinking neither to lower decrease happy, nor to vain hopes that everything returns as before, we must deal with a point: are we talking about (urban) regeneration by choice or necessity?

The question is not trivial, and being able to do some clarity could constitute a first important acknowledgement in defining, in a sincere and clear way, some possible job scenario that could even wait and that, beyond some happy but rare outcomes, may become more possible. The complexity is mentioned in several places of the Encyclical:

[...] If the present ecological crisis is one small sign of the ethical, cultural and spiritual crisis of modernity, we cannot presume to heal our relationship with nature and the environment without healing all fundamental human relationships. [...] (§ 119)

Personally, I have several doubts that the choice is so deliberate and convinced. That is, between the two opposites, I would place the bar a bit brutally towards the far end of the “talk about it for necessity”, because—at least—there is not much more else to do. A signal is given by the fact—for example—that in the building of the various control algorithms of land consumption many distinctions are carried out related to what falls in the calculation, excluding for example factories rather than infrastructural strategic systems. Which, in some ways it is understandable, for others it shows some residual and mistrust uncertainty.

Therefore, we should begin to reflect on the fact that if this cultural deficit in this respect is not reduced, there will be more serious risk: that’s to get, by necessity, to *have to practice* regeneration rather than just talking about it. That would mean, to have come to terms with much more difficult social and economic conditions. In other words, it would be better to try to stop before the point of no return, to understand how to practice these forms of regeneration for a deliberate and convinced choice, without being obliged, can lead to collective benefits broader, which certainly does not end in restricted technical and environmental constraints that the current debate is facing and which a superficial environmentalist certain demagoguery is giving us.

But for the condition to become such, there must develop cultural, social and appropriate economic settings. The choices of a community, in territorial terms, but not only, come from a dominant share of goals and interests that motivate collective benefits, and that more and more often appear to be short term, because it is cost

effective to act in a certain way, or yet because under certain conditions there is no convincing alternative and communicable solutions.

Choose the path of regeneration could mean to choose options that have not always immediate feedback, often asking for a necessary confrontation, inescapable, with the “other” (the necessary confrontation is something very different from institutionalized comparison), and the renunciation, even only partial, to certain forms of comfort that today shape our society as *homo comfort*, well described by Stefano Boni.

It is worth mentioning also a reflection still present that Michele Sernini, with great lucidity, already introduced at the beginning of the ‘90:

Even before the design for the new era of disorganized order and for the city of a future civilization and therefore not conceivable according to the known schemes, it would be useful to look after at the existing settlements according to a logic acceptance of chaotic order. If seen from above the town of speculation certainly will appear cluttered and ugly. What concerns however is to remedy first to any, indeed frequent, discomfort seen off the ground of the “City” built according to a pure speculative logic. But this does not necessarily mean fight against all forms that appears disorganized to the eye of the designer with his own personal idea limited to the order as symmetry, but only the one with real drawbacks in everyday life. In other cases, disorder corresponds to a practice of living, because the criteria of the fruition of the city are different from the criteria for evaluating the harmony of urban plant, especially for fringe areas.

If the order is much less rigorous than what was believed, and disordered forms exist and survive and work, maybe they are not so impossible and disordered. The same must be said for the social order, and for the necessary link between social and spatial aspects. Even if the peaceful order and the protective routine is natural and an inspiration for many people, there are those who not only support that in general the adult personality forms through experiences of disorder, but that the city, which is deliberately dense, disordered, difficult, getting used to the change, forms the personality and is a positive source of vital changes, even in rich countries, and that, contrary to widespread fear of crime events, a city with doses of disorder and therefore comparisons between everyday residents, permits the unleashing of aggression purely ritual doses rather than truly harmful manifestations of a completely repressed aggression. The old rules of the relief valve together with another old rule of the adversities of life form the character; by the way similar rules, very well known to pedagogues and police ministers at any time and arrangements, seem to be beautifully ignored by city planners and furnishings as well as by continuing oversight mechanisms.

Then, to try to practice deep into a regeneration, that will not be limited to built buildings, are we ready for a different fabric of solidarity and coexistence? Are we ready to some form of self-limitation, in favours of mutuality and share practices even if not strictly necessary? Richard Sennett, back in the ‘70, warned about:

The wellness need becomes clear when the need for such share disappears. [...] Therefore, the need for social interaction, the need to share, is no longer a driving force in the abundance community. [...] This means that community feeling, being in any way in relation to others, is cut off from an area that in the past provided common experiences. When you need to share a lot less, it remains a tight fund of experiences where individuals can try to test their mutual character. [...] Well-being, in other words, increases the power to create isolation in community contacts, and, at the same time, opens a way with which individuals can easily conceive their social relation in terms of resemblance rather than mutual need.

We must add to these considerations the power and pervasiveness of information technologies. It is not certain a case that in times of crisis, like the ones we're still crossing, return to the attention, strengthened sharing practices of web-based collaborative platforms: the sharing economy at co-housing, as well as *social street* and other various forms of mutual help and social interaction and exchange, bringing into play a lot more physical and spatial dimension of being together. Mutuality that basically our grandparents knew very well, as required form of survival, when exiting a crisis heavier than that of today, and from which, however, little by little, we franked.

Urban planning as we know it, struggles to practice streets of mutuality and share: rather it separates, simplifies, orders. Or at least it tries always and constantly to make it, suffering from self-organization forms or increasing entropy. Yet, the existing city to which we want to put hand, has the extraordinary potential to make us work on diversity and on the anomalies, which form that physical substrate for a repositioning action, social and cultural as well. In this regard, Sennett considers urban mix as:

Organized cities under these schemes would not be only places where the inhabitants could meet people different from them; the need for critical consists, for men, in comparison with the differences. The outside world is to be heard as important to touch the most intimate dreams of the individual. Therefore, the first problem in designing human communities of this type, is to push people in others' needs, without making them feel all identical.

Encyclical comes back, in many passages, on the need for cultural attention to wealth given by many visions and contributions:

Given the complexity of the ecological crisis and its multiple causes, we need to realize that the solutions will not emerge from just one way of interpreting and transforming reality. Respect must also be shown for the various cultural riches of different peoples, their art and poetry, their interior life and spirituality. [...] (§ 63)

Actions and regeneration practices, if can have as reference and confront with the entropy dimension of existing city, which is also that of the best balance between the parties, should then turn to the effects of continuous improvement and treatment, rather than adjustment or uncritical replacement, to which the regulatory system tends to refer, with the aim to achieve an expected the performance system that has never faced up with reuse problem.

And it is tragic how the entire normative system is completely unprepared in this respect: but that's another delicate chapter.

In conclusion, the present discussion is essentially due to the necessity: a structural crisis suggested the spread doubt that a seemingly indisputable model of development is in crisis: forever or not, who knows. But it is certain that doubt exists, and that the need has—as usual—sharpen the wits: we started practicing zero sales as, once interrupted credit, neither a one square meter was sold, we started to regenerate because tax incentives agreed thereto, we refreshed with more *cool* terms those social sharing and exchange practices little known only to that great part of society, wide in the western world, which for its lucky has not had the need to practice them.

But we started doing it, and above all to discuss it: and this is important.

We are at a possible turning point: with a future, still very uncertain and very little soothing, we must begin to ask ourselves how much choice there is, or we want there to be, from now onwards. Because if certain practices assume the dimension of awareness, potentialities become far more complex and profound, and will not exhausted their effects in a more performing earthquake-proof and energy-forming building.

If we begin to implement them by choice, perhaps it will be also a sign that different cultural conditions are maturing, which is a necessary step to change the reference system and to rewrite the paradigm of regeneration: social, economic, environmental. To be considered as a different way of seeing the world and to interpret the phenomena, to direct their evolution and development. Thus, questioning established viewpoints to which we are accustomed, and in the end even very fond of, with respect to which there were constructed systems of rules and tools that are turning to be more and more unsuitable, inadequate, and even counter-productive; and therefore they could and should be deeply reformulated.

Complex and delicate passage that must go through a deep reflection *based on ethics dimension* of the same regeneration.

So, probably, in the near future, when we'll be in a bar of a regenerated city, we will not be economically poorest, while we might hope to find ourselves culturally and humanly richer, and maybe we will trust to drink water directly from the tap.

References

- Arendt H (2002) Vita Activa. La condizione umana, Bompiani
 Boni S (2014) Homo Comfort. Il superamento tecnologico della fatica e le sue conseguenze, Eleuthera
 Porrino C (a cura di) (2015) Conversazioni sulla città plurale, Altralinea Edizioni
 Duhigg C (2014) Il potere delle abitudini, TEA Libri
 Kahneman D (2014) Pensieri lenti e veloci, Mondadori
 Lefebvre H (2014) Il diritto alla città, Ombre Corte
 Hirschman AO (2013) Felicità privata e felicità pubblica, il Mulino
 Jacobs J (1969) Vita e morte delle grandi città. Einaudi, Saggio sulle metropoli americane
 Sermini M (1994) La città disfatta, Franco Angeli
 Schön DA (1993) Il professionista riflessivo, Dedalo Edizioni
 Sennett R (1999) Usi del disordine. Costa & Nolan, Identità personale e vita nella metropoli

The Project “Places of Mediation”



Alberto Di Cintio

Abstract Analyzing and exploring new solutions for urban-space organization is fundamental in a modern multi-cultural society composed of active and participative citizens. We therefore have to adopt a new and innovative form of project processing, dedicated to the needs (both spatial and residential) of the new actors of society, in particular those belonging to the weak categories in contemporary Europe that should, in principle, be more and more open and integrated. Starting from the interaction and exchange between different points of view or cultural and religious backgrounds, it will be possible to construct a solid base and reference for the design of new urban spaces, as well as the restoration and requalification of existing ones, in a way to meet the expectations of the population, and suited to fostering the integration, and active and democratic participation of the citizens in the society, also taking into account the environmental sustainability. Adopting a well-defined mediation strategy is crucial in order to reach this aim. The elaboration of the concept of *places of mediation* will be the subject of this contribution.

1 Introduction

In the paragraph dedicated to “Politics and Economy in dialogue for human fulfilment”, reflecting on the issue of “sustainable development” in the Encyclical *Laudato si’* (2015), Pope Francis observes that

[...] the time has come for decreased growth in some parts of the world, in order to provide resources for other places to experience healthy growth. [...] (§ 193)

The Pope’s proposal aims to promote “sustainable and integral development” (Francis 2015, § 13) by explicitly requesting the more advanced countries to practise solidarity. The Pope’s request recalls what Paul VI had already stated in

A. Di Cintio (✉)
Dipartimento di Architettura (DiDA), Università di Firenze,
Via San Niccolò, 93 50125 Florence, Italy
e-mail: alberto.dicintio@unifi.it

“*Populorum progressio*”, using a similar expression to highlight “solidarity” as a basic social doctrine of the Church. Pope Francis disapproves of a kind of “technology, which, linked to business interests, is presented as the only way of solving these problems” (Francis 2015, § 20), of a market that is not capable of opposing “the throwaway culture” (Francis 2015, § 16) or of acknowledging “the intimate relationship between the poor and the fragility of the planet”, and “that everything in the world is connected”, of welcoming other ways of understanding economy and progress”, or appreciating “the value proper to each creature, the human meaning of ecology, the need for forthright and honest debate, the serious responsibility of international and local policy” (Francis 2015, Chap. 1 § 16). Following on in accord with the great Christian social vision, the Pope’s words represent a call to reform the model of social and global development and a warning that human development must be complete or otherwise it is not development.

Starting from this extraordinary reminder, both moral and civil, one of the themes to be analyzed for a sustainable development of our planet concerns the collective dimension of new urban spaces. We have to analyze and study in depth new spatial organizations for a new intercultural society made up of active citizens participating in a life of supportive, democratic relationships. We have to realise innovative visions dedicated to the new needs of spatial and residential organization for new “citizens”, in particular the “weakest ones” in a Europe that must be made more and more open and integrated.

The idea that entire urban spaces and their relationships, that is, their “system”, build, consolidate and characterise a city that significantly influences the quality of life of an urban community is becoming increasingly clearer and more concrete: a complex community that needs urban spaces where it can come together, get to know one another and develop. Material urban spaces are irreplaceable: existing virtual ones (TV, internet and social networks) favour isolation and too often spread—often in a veiled way—manipulated messages with various aims: the sign of personality decentralization, in a state of illusion of feeling more and more in contact with others. It deprives those spaces of the possibility to positively influence the quality of life. In order to guarantee freedom, democracy and solidarity, material urban spaces are still essential. According to Ugo Sasso:

What we desperately need and are not able to achieve at present is an urban fabric made of welcoming and connected places, an endless landscape where to live and be able to identify. (Sasso 2003)

Therefore it is fundamental to analyse and verify whether and how to use a new design and to build on available urban spaces, together with unused housing, i.e. urban regeneration, and so can contribute to welcoming and integrating into the community those people who live in the city informally, starting from the recent phenomenon of social housing. According to Massimo Pica Ciamarra:

The most pressing issue is to make a revolution, rid ourselves of the field’s view, avoid the dominance of the “terrible simplifiers” predicted by Jacob Burkhardt in the XIX century. Instead we should pursue deeper integrations, essential relations, systemic insight. Today we are under time pressure to increase, find new and appropriate forms of transport, build

networks of “social condensation” which could enable to design the future and re-civilize the urban environment. (Pica Ciamarra 2017)

Primarily, various personalities need to be brought together and enabled to freely discuss specific and concrete problems. This will result in a true comparison and, ultimately, an authentic meeting and a substantially joint, easier collaboration. According to Fritjof Capra:

The contradictions within a community are symptoms of its diversity and of its vitality and so they contribute to the viability of the system. However, diversity, which means various relations, different approaches to the same problem, represents some strategic advantage only in the presence of an integrated and vital community, supported by a web of relations. (Capra 2003)

Beginning with the meeting and exchange of different sensitivities, cultures, religions etc., it is possible to build a solid reference base for the design of both new and refurbished spaces, that are consistent with the expectations of the new population and also physically favour certain aspects of integration, interculturalism, and active and democratic participation in the greater and common good. As written by Federico Scarpelli:

The local difference is not received but at the most restored through a new urban population to a large extent unrelated to the past to which it ties. And this takes place via imaginative modalities of the present time by establishing ideal continuity within objective discontinuity. In other words we must say that everything actually happens “in the city” and in its recent history, not in some separate recess. (Scarpelli 2013)

2 Spontaneous Settlements

Among the various urban problems, there is that of metropolitan settlements, some of which are spontaneous and create problems of coexistence.

To properly address the issue of Spontaneous Metropolitan Settlements and their participation in urban life, it is necessary to clarify that, in Europe, their presence is not as massive and invasive as in Asia, Africa and South America. One cannot speak of real slums or favelas, but only of dimensionally contained aggregations of people in “spontaneous” settlements more or less temporary and more or less internal to the urban fabric. This does not mean that the phenomenon can be ignored or underestimated, both for humanitarian reasons and because it is in evolution with no effective control or check. Furthermore, it must be taken into consideration that spontaneous settlements have a significant impact on the overall quality of urban life. This specific problem can be solved by adopting a precise mediation strategy that needs to develop and take shape.

3 “Outlawed” Territory

The city is an imbalanced mix of distinct settlements of various people. Imbalanced because the inhabitants overpower the citizens, the tourists overpower the natives, the natives overpower the foreigners, the night people overpower the residents, and so on. The city was a place of habits, social connections and memories. Now it is increasingly a *non-place* (Augé 1995) where people are increasingly alone and transient. Be it the nightlife or groups of nomads, drunken tourists or illegal street sellers, we call it degradation, and we only address situations that are out of control with fences, closures, evictions, removal and calls for security and public order, which leads to the involvement of the police, repression and zero tolerance. Tourist colonization, the adaptation of urban spaces for the needs for mass tourism, has profoundly changed the aspects of some central areas of the city; these places, emptied of the functional activities of the inhabitants’ normal daily lives, are undergoing a gradual social impoverishment and loss of public space. Renzo Piano affirms that:

We can’t take credit for our country’s natural beauty. We can take credit for the improvement of the suburbs which constitute the frail part of the city and that can become beautiful. (Piano 2014)

The need for a balance between the public and private city is a theme that is becoming ever more central and urgent and is associated with the fact that it should be led and supported by fundamental ethical principles. While the public direction of the changes is confirmed, it is of paramount importance that administrators and citizens agree with the same need to realize those principles that could improve life, the environment, work, housing and urban mobility through concrete indications. This would give input and socioeconomic significance to town planning within a project and a common vision.

4 The Abusive City: Living Precariously

We must take into consideration the sacrosanct defence of the roots, history and identity of a neighbourhood, especially a working-class one: a form of civic resistance against the ongoing changes that endanger its original social fabric such as an increase in property value, building regeneration and changes of the original housing. This is the phenomenon of “gentrification” and concerns working class neighbourhoods close to the centre, which are losing more and more of their original residents. A conscious and intelligent protest capable of looking at the phenomena in progress is needed to create spaces for active citizenship with a continuous social defence ensured by its inhabitants whose nationality is not important. Indeed, the new residents are even more aware of the need to preserve the right of all social classes to live in the neighbourhood.

The city is losing its identity and with it the reasons for its configuration and above all the reasons for its survival, or rather, a vision of its future goals.

5 A Strategic and Unified Vision of the Future

At the basis of any society, there are clear and, above all shared, rules. First of all, however, redevelopment and a new design of the spaces of relationships and coexistence is often needed by offering places where people can socialize and share as a physical expression of the inalienable right of community. Giovanni Michelucci writes:

It is always increasingly difficult, in the contemporary city, to find spaces and financing resources, but above all cultural willingness, so that those who are regarded as second-rate citizens can live together in civil society without being subject to control measures and ghettoisation. (Michelucci 1986)

The theme of urban regeneration appears more and more central, together with the completion and improvement of the city without creating new expansion and more buildings in a city, for example Florence, which needs to be thought of as a post-industrial city. The positive example of “Le Murate” (“Le Murate” was in origin a monastery built in 1424) could certainly be repeated in many other urban areas.

Le Murate” is a memorial site and today also a site of the future and not only for the historical centre of Florence. Here, we turned memory into the future. We have worked on memory and have not finished yet. We still have a great deal of work to do, but all this effort is needed to turn it into a positive moment and a contribution for the next generations. (Di Cintio 2014)

6 Places of Mediation

We do not speak of generic spaces but of places, that is, urban structures with physical characteristics and cultural vocations that shape and characterize them in the “civitas”. “Mediation places” are those tangible and intangible places where, or through which, meetings or debates can be held that lead to the reaching of an agreement and an optimal coexistence among people who live in the various metropolitan settlements. Lucien Kroll writes:

We are the landscape made of ordinary people with our own culture, language and characteristics. It is the role of an architect to make it possible to build it by respecting and encouraging the creativity of the inhabitants. (Kroll 2003)

Furthermore, the recognition of individuals and groups as bearers of the right to be recognized and respected beyond the laws and rules issued by institutions is

becoming ever stronger. These rights cannot be prohibited or denied by force or by law. Everyone has the right to be an individual, that is, to remain the protagonist of his or her own life, aiming above all to create a free relationship with themselves rather than being integrated into a community. This need of the individual claims the right to exist, while respecting the image they have of themselves, their freedom and their responsibility. Then behavioural unity is no longer imposed by the particular features of a culture or of a community, but through the development of each person as a protagonist, a bearer of universal rights as an individual being. Alain Touraine writes:

Everywhere and in many forms, what we want more is the acknowledgement of individuals and groups as people possessing the right to be recognized and respected beyond all laws and rules issued by institutions. This demand often takes a “communitaristic” form but even more claims the right of an individual to exist with due regards to their self-image, freedom, responsibility. (Touraine 2009)

7 Mediation Strategy

We need to promote and encourage citizens to self-organize the redevelopment of the environments where they live and build up their relationships. Giandomenico Amendola states:

A new approach to planning whose main objective is to improve the habitability of places through the involvement, directly or indirectly, of the users in the design process. In other words the direct shared design is a method that urges not only the planner but also the very citizen to reflect. The citizen is asked to become more aware of their own perceptions and evaluations of the environment, and so to think in order to suggest or take decisions relative to the potential or ideal environments of real life. (Amendola 2009)

Then we need to activate innovative tools that promote solidarity and aim to make citizens true protagonists in the transformation of their city into a new form of future democracy, such as the maximum transparency and publicity of the acts of public administration, or as facilitating and deepening the dialogue between citizens and institutions. E. Cellini, A. C. Freschi and Vittorio Mete write:

Recent years have seen, also in Italy, an increase of local experiments to involve citizens in decision-making processes. The different methods are inspired by the theories of participatory-deliberative democracy and are often applied in an experimental form based on design and control of groups of researchers in accordance with institutional partners; they are aimed at giving voice to citizens, regardless of their past, political and associative affiliation. (Cellini et al. 2010)

By exchanging ideas, we can find a common synthesis. In this scenario, the meeting takes place between groups composed of both privileged and unprivileged people who deal with issues and problems but maintain—at least to a certain extent—their identity. The meeting is of a transcultural nature and does not go in search of integration or multiculturalism. Perhaps there can be some form of promotion

that proposes topics to be addressed and offers an opportunity or a venue for meetings. But these can only be developed if the people who are dealing with these problems and issues work together, have joint participation in the development of ideas and cooperation, resulting in common, shared choices, where everyone is involved, irrespective of privilege.

The general strategy is then identified: it is necessary to find a way to get individuals outside the group to meet in places of mediation in order to discuss concrete, real and immediate problems. Collaboration and mediation can originate from these meetings. This brings acceptance and integration.

This route will initially be based on “Comparison” and “Participation” techniques which bring together experts with various areas of expertise and concerned citizens in order to address the problems that are perceived as central to the quality of urban life. The aim of this methodology is to overcome the opposition of the confrontation that often ends with the provision of essential aspects of the problem in favour of a creative confrontation of interests in the search for possible long-term solutions because they are shared and therefore capable of preventing future conflicts.

Last but not least, it is also necessary to call upon “civic voluntary work”, which fashions good culture by educating people into thinking that the public good is also mine, and which turns degradation and abandonment of places into new points of reference and of meeting, solidarity, beauty and sharing.

8 Outcome of the Project

The project Places of Mediation was initially presented and discussed during the European Festival held in Florence in May 2013. The “Centro Internazionale di Studi sul Disegno Urbano—CISDU” (CISDU 2014) was present with a convention on the theme “Urban Meetings and Comparisons”. During the convention were presented ideas and experiences relative to the hospitality and inclusion of people with problems, such as lack of physical or economic self-sufficiency, homelessness, racial or religious social alienation, emergency situations, changes in status etc. The topic of the convention was linked to “diversity” in its various forms and how the urban, social and physical environment could and should be equipped to at least reduce these diversities within an urban community from which no one must be excluded, removed or ignored.

At a later stage, the project interconnected with the work done by Marco Bagnasacco (Bagnasacco 2013), namely a model of intervention on the issue of housing and temporary housing, with a project called “Progetto Luoghi comuni di Piazza della Repubblica a Torino”.¹ Since 2006 the Compagnia di San Paolo has addressed the issue of housing with a huge investment of financial resources

¹Please refer to: <http://www.luoghicomuni.org/portapalazzo/cose-luoghi-comuni>.

through the Housing Programme. The programme consists of an integrated set of innovative projects that share the aim of supporting access to housing by persons in fragile social situations. “Luoghi Comuni Porta Palazzo” is characterized by integrated approach and co-planning. The project is characterised by an interdisciplinary approach which combines architectural and urban aspects with social, cultural, economic and financial ones.

A further interconnection is represented by the work of Elisa Segoni (Segoni 2012) and her project called “SocialUp” which is a system of management of collective facilities for temporary residence and which is intended to simplify and improve the quality of the inhabitants’ everyday lives and foster greater social cohesion. The aim of the project “SocialUp” was to enable and optimize the management of the communications and the facilities offered to the various residents.

In fact, thanks to the implementation of new technologies in the city, it could be possible to promote the integration of these “further” individuals in urban spaces. Information Technology, for example, instead of being considered as an end in itself should be a means to create an urban environment, both digital and material, so that it could interpret and reinterpret qualities and new requirements for the people who live in it. Ideally, this would be a place where the “global” citizen of the contemporary city becomes an active subject in the construction of the urban community, or rather protagonist of the scenes of everyday life in the city. It is an experimental project meant to be presented as part of “Places of Mediation”, as an opportunity for proposals to overcome the challenges to the inclusion and participation of people in the life of a city.

The project Places of Mediation found a decisive test in the “Cittadella della Solidarietà”, a project for the Florence Diocesan Caritas by Gianluca Biscini e Laura Melosi.² This is an architectural project for the functional regeneration of a partly degraded and abandoned urban property complex in Florence. The total area of the lot is about 2900 m² and the covered area is about 1490 m². The site, which is located in a street called Via Corelli in Florence, is a thoroughly integrated area meant to welcome people in need. Following a donation that reserved the whole complex to support functions for people who are in difficulties, the project is intended to provide support in the various social fields, i.e. young women with or without children, children and elderly people. Given its structure and location, the area has a strong orientation to meeting social needs forming a relevant opportunity for the whole neighbourhood, which is the most densely populated of the city and the one with the highest concentration of elderly people living alone.

But the most relevant results produced by the project Places of Mediation have been attained thanks to the Percorso Partecipato per Piazza del Carmine,³ which

²Please refer to: <http://www.caritasfirenze.it/caritas-diocesana-di-firenze/progetti-in-corso-di-realizzazione.html>.

³All conceptual designs and information about the shared process called “*Carmine Partecipato*” which applied the vision of places of mediation can be consulted on https://issuu.com/carminepartecipato/docs/piazza_del_carmine_un_progetto_part.

was organized and activated in Florence. In June 2016, the Research Unit of “Paesaggio, Patrimonio Culturale, Progetto” of the Department of Architecture of the University of Florence with the collaboration of the citizens living on the left side of the river Arno, organized a cycle of meetings and then initiatives dedicated to the study and analysis of Piazza del Carmine in Florence. From this seed arose a shared-project process calling the citizens of the neighbourhood to collaborate and express their needs and ideas in order to achieve a kind of vision, as widely shared as possible, for the regeneration of the square with the view of a subsequent “rapport” with the institutions and the Municipality of Florence.

Our work is characterized both by a scientific framework and phenomenological analysis. Since knowing the evolution of the identity of places is the basis of our project, the preliminary part of the research focused on the analysis of the various parameters, that is, physical, historical, cultural, social and environmental of the San Frediano neighbourhood. This area was conceived of as a physical area and reference territorial element. The analysis was to be carried out from the year 2000 to the present day.

We highlighted and analyzed the critical points starting from analyses codified and shared by various working groups where the shared project became structured, taking into account both the individual needs and the physical characteristics of their backgrounds. For this reason, it seemed to us useful to put in mutual relation the classifications of the different degrees of urban centrality, of the systems of uses, of the groups of beneficiaries, of the central role of the existing and also expected needs, highlighting their prevalence and approval levels. In particular, for measures on the open spaces, the most critical relations were with historical architecture—often protagonist of the “vampire effect” on the urban scene—and that of the pressure phenomena of various uses, usually proper but frequently improper. In fact, the management of public open spaces almost always takes place through an imposition of the administrative authorities or an inexorable, progressive infiltration that take away areas from collective use, thus contributing to the detachment of the citizens from the idea of “polis” and the common good.

Also, in the case of Piazza del Carmine, such an approach occurred but here it found a precise and strong reaction from the resident citizens who at first contested and then stopped the realisation of a mega underground car park, and finally urged the realisation of a shared process for the definition of the new regeneration project of the square. Out of this input has grown our experience to address the basic point of prefiguring new political, technical and managerial measures for the use of the public open space of Piazza del Carmine.

We highlight in particular the important research on the most significant socioeconomic data, which we did on the field, namely in the area of the neighbourhood most directly interested in the use of the square. We continued then with the studies related to the detailed analysis of the state and functions of all the neighbourhoods overlooking the square, the collection of sensitive data about housing, sociability, economic activities, facilities, tourist flows, pedestrianisation schemes, and the need for private parking areas. And then we collected and systematically structured the contribution of ideas that came directly from the citizens.

Our aim was to improve the quality of life of the square in qualitative terms, of the life system and above all of the relationship system in a neighbourhood, San Frediano, where settlements and functions must be in balance. Our goal was a zero-impact and environmentally sustainable square that should become a model for a more general reconsideration of public urban spaces.

After years of misuse as a parking area, we created a square dedicated to sociability and human relations, with special attention to the most vulnerable individuals and with a large green area.

References

- Amendola (2009) *Giandomenico Il progettista riflessivo*, Laterza, Bari
- Augé M (1995) *Non-places: introduction to an anthropology of supermodernity*. Verso, London
- Bagnasacco M (2013) *Social housing e riqualificazione La residenza temporanea di Porta Palazzo a Torino*. Litograf, Torino
- Capra F (2003) *Educare al ciclo della vita*, in *Bioarchitettura forma e formazione*. Alinea, Firenze
- Cellini E, Freschi AC, Mete V (2010) *Chi delibera? Alla ricerca del significato politico di un'esperienza partecipativo—deliberativa*, *Rivista italiana di scienza politica*, Il Mulino, Bologna
- CISDU (2014) *Atti del Convegno Incontri e confronti urbani per nuovi spazi di cittadinanza*, Pontecorboli, Firenze
- Di Cintio A (2014) *Il quartiere di Santa Croce tra recupero e trasformazione*, in *Conoscere per progettare*. DIDA, Firenze
- Francis (2015) *Encyclical Letter Laudato si'* 24 May 2015. 18 June 2015 Web. Chap 5, §4, n. 193
- Kroll L (2003) *Superare la schizofrenia dell'architettura moderna*, in *Bioarchitettura forma e formazione*. Alinea, Firenze
- "Le Murate" was in origin a monastery built in 1424 and a men's prison from 1883 to 1985
- Michelucci G (1986) *Metropolis*, Article appeared in *Il Manifesto*, Roma
- Piano R (2014) Article appeared in *La Repubblica*, Roma
- Pica Ciamarra M (2017) *Sperimentare integrazioni*, *Bioarchitettura*, anno xxv, n. 101–102, Weger, Bolzano
- Sasso U (2003) *Bioarchitettura forma e formazione*. Alinea, Firenze
- Scarpelli F (2013) *La costruzione di un luogo che scompare*, in *Passare Ponte*, Carocci, Roma
- Segoni E (2012) *Design dei servizi collettivi per l'abitare. Strategie e strumenti per la progettazione di un sistema integrato di servizi collettivi per la residenza sociale*, 2012. Dottorato di Ricerca UNIFI, Firenze. <http://www.workingcapital.telecomitalia.it/2011/11/i-vincitori-del-tour-dei-mille-si-chiude-il-sipariosull%E2%80%99edizione-2011-di-working-capital-pni-appuntamento-al-2012/>, http://www.italiacamp.it/focus_idee/idea_view.php?id=60
- Touraine A (2009) *Il pensiero altro*. Armando, Roma

True, Fair and Beautiful: Evaluative Paradigms Between the Encyclical Letter *Laudato Sì* and Keynes



Leopoldo Sdino, Paolo Rosasco and Sara Magoni

Abstract Friedrich Schumacher, a pioneer of so-called “sustainable development”, called for an evolution of economic thinking and a departure from *laissez-faire*’s materialism (Friedrich Schumacher (1911–1977) was a philosopher and an economist who strongly criticized materialism, capitalism and agnosticism. Religions fascinated him, in particular, Buddhism, although also Catholicism had considerably influenced his thoughts. He highlighted the similarities between his economic thinking and the papal encyclicals that have deal with economic issues, such as Pope Leo XIII’s *Rerum Novarum* and Pope John XXIII’s *Mater et Magistra*. Keynes himself was fascinated by his theories, enough to recommend him for a position at the University of Oxford). According to these assumptions, a man, in order to achieve self-affirmation, must aim at satisfying his own needs through the fair use of resources. He has to shift the goal from the maximization of consumption and profit, typical of the traditional economy, to the achievement of people’s well-being. This theory shares many similarities with the introduction, in Bhutan, of the Gross National Happiness Index, which integrates the traditional Gross Domestic Product in the assessment of the country. When Bhutan is ranked only in accordance to the Gross Domestic Product, it underachieves; but when the Gross National Happiness Index is used, it reaches the highest positions on a global scale. Several institutional researches proposed other alternative indexes that assess the “well-being” of a nation, such as the UN’s *Human Development Index* (1990), the New Economic Foundation’s *Happy Planet Index* (2006) and the more recent *Stiglitz-Sen-Fitoussi Report*, drawn up in 2009 (AAVV in Human development report 2015—Work for human development, United Nations Development

L. Sdino (✉) · S. Magoni
Department of Building Environment Science and Technology,
Polytechnic of Milan, Milan, Italy
e-mail: leo.sdino@polimi.it

S. Magoni
e-mail: sara.magoni@polimi.it

P. Rosasco
Department of Architectural and Design (DAD), University of Genoa, Genoa, Italy
e-mail: rosasco@arch.unige.it

Programme, New York, 2015). Along with this willingness to change, this contribution starts with the acceptance of the inadequacy of the GPD index for the appraisal of “fairness”, in consistency with the famous quote stated by Kennedy in (Speech at Kansas University, 8 May 1968) “*Yet the gross national product does not allow for the health of our children, the quality of their education, or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages; the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage; neither our wisdom nor our learning; neither our compassion nor our devotion to our country; it measures everything, in short, except that which makes life worthwhile*”; then it investigates the relationship that occurs between economics and religion, focusing on the content of Pope Francis’s encyclical “*Laudato Si*”. Finally, it proposes a resemantization of the paradigm of sustainability based on Pope Francis’ thought expressed in his encyclical “*Laudato Si*” for the valuation of interventions on buildings, infrastructures, cities and territories. This latter aims at reducing the large number of techniques developed by the scientific community to a more structured vision and, mostly, at translating them into a common language, in consistency with the content of the encyclical.

Keywords Social • Economic and environmental sustainability
Valuation models • Economy

1 Introduction

Over the last decades, there have been two conflicting visions of what economic and political priorities should be within a civil society. One of them, materialistic, was closer to the traditional economy, while the other was connected to the concept of “sustainability”. The key representative of the first view is John Maynard Keynes, a British economist, founder in 1936 of contemporary macroeconomics (Keynes 1936), who questioned the idea, originally theorized by Adam Smith, of a free market left to itself. According to his vision, the long-term period would have been a fallacious guide for investments since the only moment that actually matters is the present. He also believed that anyone, in order to produce profit, could be obliged to hurt someone and feel justified for it.¹ It was, apparently, a vision without any ethical, social or environmental principles, aimed only at accomplishing several clear objectives: the maximization of consumption, the circulation of currency and full employment as an antidote to the crisis.

¹The historical period in which Keynes developed his theories should also be considered: when the main objectives were the economic revival and full employment. In this short-term context, natural resources were considered unlimited. Furthermore, the author, in his 1930’s essay, “*Economic Possibilities for Our Grandchildren*” (Keynes 1930), addressed the issue of the ability of money to actually satisfy human needs in the long term.

This short-term materialistic thought has been opposed by the concept of “sustainable development”. The latter has been structurally described for the first time in 1978 in the Brundtland Report (AAVV 1978).² From that moment on, many experts have studied the complex relationship between economy and sustainability, while considering the rights owned by future generations (Easterline 1974; Frey 2010; Stiglitz et al. 2009). Pope Francis’ encyclical “*Laudato Si*” deals with this contrast saying that the principle of maximization of profit, isolated from any other considerations, is actually a conceptual distortion of the economy itself. It invokes a radical change of paradigm, calling on the population to adopt an ethical behavior according to which “*the economic and social costs of using up shared environmental resources are recognized with transparency and fully borne by those who incur them, not by other peoples or future generations (§ 195)*”.

This is, therefore, a sustainable vision according to which the growth and the purely economic welfare cannot exclude care for the social environment in which they exists. Consequently, the Pope’s aim consists of placing the human being at the center of global macroeconomic considerations, highlighting the concept of sustainability when we choose how to use economic resources.

In this historical context, as the economic system is evolving, the evaluative approaches are unavoidably considered from a semantic point of view. In fact, an actual conceptual evolution of the meaning of the valuation’s goals should be pursued.

2 From the Limits of Economy to the Economy of the Limit

Because of the global economy and the policies pursued by industrialized countries, after World War II the distribution of wealth has taken the form of a “champagne glass”. Data analysis carried out in 1989 show that the richest 20% of worldwide population possessed 82.7% of total wealth, leaving to the poorest 20% only 1.4% of wealth³ (United Nation Development Programme 1992). According to an

²In 1983, the UN General Assembly asked its World Commission on Environment and Development (WCED) to draw up a report on the global condition of the environment and development, the Brundtland Report. From UN Conference in Rio de Janeiro in 1992, that process was characterized by the need to reconcile economic development and social and environmental protection. Some, moreover, consider Silvio Gesell (1862–1930) (Gesell 1929) as the forerunner of “sustainable development”.

³That distribution has been anticipated by Vilfredo Pareto (1848–1923) who was among the main representatives of the “marginal approach”; along with him were Heinrich von Thünen, Heinrich Gossen, Carl Menger and William Jevons and Léon Walras.

OXFAM report,⁴ in 2016 almost 1% of the population possesses more wealth than the remaining 99%.

Recently, this gap between rich and poor has been increasing steadily; one of the reasons is the deep economic crisis that has affected the whole world during the last decade. Estimates indicate that in 2015 the wealth of the poorest 50% has decreased by around 38% points (OXFAM 2016). This progressive reduction was already clearly recorded in a study carried out on the global distribution of wealth, drawn up in 2014. According to that, the poorest 70% possessed only the 2.9% of global wealth (it is worth highlighting that in 1989 the poorest 60% possessed 5.6% of wealth) (Davies et al. 2014).

By looking at such figures, the economic mechanism appears inadequate to ensure a fair distribution of wealth and the satisfaction of basic needs.⁵

Consequently, especially in a globalized society where imbalances between the possibilities to satisfy needs on different levels are evident, tensions can easily arise within the society itself, among societies and, in a certain way, among civilizations. The exasperation of the so-called “short-term commodity economy”, combined with the mentioned inequalities in the distribution of wealth, has led to significant impacts on the current society, with hardly controllable consequences, such as: fewer resources available for future generations; a financial economy that is independent from the real one; social and actual conflicts; and migration to find a “better” economy.

One of the breaking points of commodity economy has undoubtedly been the crisis of 2008, whose consequences are still evident. This has created the even more obvious need to find new development models.

However, in the previous years, signals of an imminent crisis were already clear. The economist Nouriel Roubini,⁶ in 2004, foresaw in detail the bursting of the property bubble, the oil shock and the beginning of a long and deep recession.

With the beginning of the crisis, limitations in the economy and in the role of Gross Domestic Product became clear, especially where there weren't rules applied

⁴OXFAM is an international confederation of 17 organizations that work in more than 90 countries. Its aim is to reduce poverty and injustice on a global scale.

⁵Here is where economic theories about the satisfaction of secondary needs are applied. Those needs are mainly induced by the interaction with other subjects or societies. See, in this respect, Maslow's classification of needs (Maslow 1954) in “basic” and “superior”. Usually, but with several exceptions, in modern society the non-satisfaction of basic needs, also defined as “elementary”, lead to the non-satisfaction of superior ones, named “secondary”. A similar distinction can be found in Keynes. He classifies human needs in two main categories: *absolute needs*, that are the ones that we feel independently from the others, and *relative needs*, that are the ones that satisfy our desire to be superior to the others. While the second ones are potentially unsatisfiable, *absolute needs* are not. This is why it is predictable that, once they have reached a certain degree of wealth, people would prefer to dedicate themselves to non-economic activities.

⁶Roubini (2008) is a professor at New York University and in his essay “*The Perfect Storm of Global Recession*” he made predictions that were negative enough to be regarded as “The Crow”. This was also due to the lack of mathematical models that should have explained its claims.

for the compensation of market's negative externalities.⁷ This situation has led to the development of an economic line of thought that proposed a new paradigm. This theory has abandoned the laws of self-regulation of supply and demand,⁸ has orientated itself toward the economy of the limit.

According to this vision, as Thoreau⁹ said, "*a man is rich in proportion to the number of things which he can afford to let alone*". With these words, he has encouraged everyone to deal with sacrifices as opportunities to get rid of actually false needs.

3 The End of an Era: From the Money-Driven Society to the Happiness-Driven Society

Richard Easterlin in, (1974) with his "happiness paradox", made the first structured observation on the relationship between money and happiness using the metaphor of the "treadmill" (Easterline 1974). This, in 1976, has been taken up by Scitovsky in his essay (2010) where he has completed the theory of the paradox with the following statement: "*The clearest explanation is that an individual's happiness depends on his relation with its neighbors' happiness and not in his absolute standard of living*".

Some economists have also theorized a model of development for "happy degrowth". This has been anticipated by the report, "*The Limits to Growth*" (1972), commissioned by the Club of Rome, and, then, taken up by the studies of Latouche and Georgescu-Reogen where the concept of entropy within economic systems was introduced.¹⁰

⁷When the externalities are not being compensated by the ones who produces them, the so-called "free-riding" happens. This is the use of a public resource without the payment of any price. See, with regard to this, the studies of Pigou (1932) on the welfare economy.

⁸According to Say's law (1803), under free-trade arrangements, the advent of a crisis is impossible because it is the demand that triggers the offer. This vision has also been criticized by Keynes because, he said, that the owner of the money, when there are low profit rates, might also be motivated to keep the money for himself instead of moving it into the market.

⁹Thoreau (1988) was an American philosopher and poet. He is also known for his extreme opinions contained in his essay "*Civil Disobedience*" in which he affirmed that it is acceptable not to follow the rules when they are against conscience and human rights.

¹⁰The program for happy degrowth consisted in nine steps: going back to an ecological impact that would be sustainable for the planet, namely to a production that is equal to what it was during the 1960s and 1970s; internalizing cost for transportation; relocating activities; recovering rural agriculture; transforming the increase of production into a reduction of time worked and job creation until the problem of unemployment is solved; encouraging the production of relational goods; cutting by three quarters the current waste of energy, strongly penalizing marketing expenses; ensuring the end of a moratorium on technological innovation by orientating scientific and technical research in accordance to new aspirations.

With these ideas, the traditional economic model has openly cracked and, with that, the concept of Pareto's efficiency itself. That is to say, the possibility to make changes that would increase someone's satisfaction without making someone else's satisfaction worse. Adam Smith's "invisible hand" and Keynes's public interventionism also has started to show their limits too.¹¹

Starting from this vision, some economic principles have been reviewed. According to them, the main aim of public policies should have been the achievement of "well-being" through effective and fair criteria of wealth distribution. They state that non-quantitative factors, such as safety, stability, full employment, effective health services, peaceful relationships, good legislation and access to housing were far more important than the mere monetary income.

From an operational point of view, within the last 25 years, there have been numerous attempts to redefine criteria to assess a country's development. All of them, despite their differences, shared the awareness of the inadequacy of GDP as the only and undoubtable index able to assess the welfare of a country (Bruni and Porta 2004). Among the most influential developed indexes, there are: the Human Development Index, proposed by the UN in 1990 (AAVV 2015); the Genuine Progress Indicator, proposed by Daly, Cob, Lawn and Tobin in 1994 (Talberth et al. 2006); the Happy Planed Index, created by the New Economics Foundation in 2006 (AAVV 2012); the Stiglitz Report, drafted in 2011 (2009); and the UrBes Report in Italy, drafted by ISTAT and CNEL in 2015 (AAVV 2015).

In HDI, GPI and in the Stiglitz-Sen-Fitoussi Report, indicators concerning the individual well-being in relation to the state of social relationships, education, life expectancy and health have been considered in addition to traditional economic indicators, such as GDP and income distribution. In UrBes, economic factors are not considered at all (Table 1).

The shared purpose of those indexes was anticipated by the ideas of a German economist, Fritz Schumacher, who called for an evolution of economics in his book "*Small is beautiful*" (Schumacher 1973). According to his ideas, the new economy should move away from the materialism of modern economics and acquire the typical traits of Buddhism by getting inspiration from the theory of the Noble Eightfold Path. In his following book¹² (Schumacher 2007), Schumacher discusses the idea of a "Buddhist economy", which should be an actual spiritual path, neither

¹¹Keynes revolutionized the traditional economy through his theories on the instability of the capitalistic system, on the insufficiency of the market, on the stable level of unemployment, on the increase of the aggregate demand through the reduction of taxes on labor and on the higher public expenditure (fiscal-multiplier theory). Those expansive policies have led, as Milton Friedman wrote in 1962 (2010), to the creation of large public debts and to the indiscriminate adoption of an ineffective and unfair welfare system. See, in this regard, the proposal for the so-called "negative tax".

¹²The text starts with the observation of the triple crisis of the economic system: the crisis of resources, the ecological crisis and the social crisis. About that, he said "*The current situation, I'm sure, doesn't have anything in common with any of the previous "recessions" or depressions, except, of course, some symptoms such as the unemployment. It isn't a part of a cycle, nor a correction or an adjustment: none of these things: it is the end of an era*".

linear nor ordinary, whose final aim is the achievement of wisdom, through the right view and the right resolve, the achievement of virtue, through the right speech, the right action and the right livelihood, the achievement of meditation through the right effort, the right mindfulness and the right concentration.

Therefore, the final aim of every economic activity should no longer be the maximization of consumption, typical of the traditional economy, but the achievement of personal well-being.¹³ By introducing this principle in the real-estate context, a new evaluative paradigm, described in the following section, finds its place.

4 The Valuation of the “True, Fair and Beautiful”

The American Nobel Prize winner for economics, Joseph Stiglitz, by saying “*If you don’t measure the right thing, you don’t do the right thing*” (Stiglitz et al. 2009), enhanced the focus on the righteousness of the valuation within political and economic dynamics. Taking up Stiglitz’s idea, without starting a philosophic or sociological debate, within the evaluative systems the “right” object of an assessment should be the “righteousness” of an operation, otherwise defined as its “sustainability”; that is to say the combination of the “truth” of an operation, its “fairness” and its “beauty”.¹⁴ This intention would not differ much from what has been called for by Pope Francis in his encyclical.¹⁵

The “truth” of an operation is the possibility to reach the objective and manage it over time. In other words, it is the economic and financial feasibility of the whole operation.

¹³This alternate way to consider labor is interesting. In Western economics, it is considered as a cost for the owner of the business, to be reduced, and a disutility for the operator, to be compensated by a wage or a salary. In the Buddhist economy, labor has a triple function: allowing man to use and develop his own abilities, overcoming his egocentrism by joining others towards a common aim and producing goods and services needed for a decent life. This idea can also be found in the Benedictine vision “*ora et labora*”.

¹⁴Bodei (1995) said: “in Western society, since its inception, especially since the Pythagorean school in *Magna Grecia* in the VI–IV century before Christ, the concept of beauty has been specified and connected with the concept of truth and fairness, creating what we can define “a trinity”.

¹⁵In his encyclical “*Laudato Si*”, Pope Francis requests that: “because of the relation between urban spaces and human behaviors, those who design buildings, districts, public spaces and cities, need to be aided by different subjects in order to understand processes, symbolism, and people’s attitude. The pursuit of beauty in the project is not enough, because it is even more valuable to serve another kind of beauty: the quality of life of people, their harmony with the environment, as well as mutual help. This is one of the reasons why it is so important that the inhabitants’ point of view on the location should always contribute to the urban analysis and planning”. These words including the concept of “true, fair and beautiful”, were cited by Pope Francis during the mass held in the Vatican Basilica on the feast of the Solemnity of the Epiphany of the Lord in 2014.

It can be determined using a methodological protocol that has already been widely experienced within the appraisal field. It is the Cost-Revenues Analysis, obtained through a Discounted Cash Flow Analysis. Its purpose is to evaluate whether the economic profile of the operation actually satisfies every financial prerequisite, such as the positivity of the Net Present Value (NPV) and the acceptability of the Internal Rate or Return (IRR).

A real-estate operation can be defined “fair” when it takes into consideration and pays attention to environmental, social and individual issues that its existence implies.

The themes that need to be considered in its assessment are the users’ health protection, the creation and promotion of social interactions, the actual and perceived safety, the presence and accessibility to public services and the heterogeneity of users’ incomes.

Finally, “beauty”, as its definition suggests, is what makes an aesthetically pleasing impression in our soul. In the case of a building or a landscape transformation, in order to be “beautiful”, its existence needs to raise a positive emotion in the end user’s perception.

Analysis of the already existent indexes created as an alternative to GDP show the advantages of the use of a particularly immediate evaluative method for this criterion. Operatively, it involves self-declaration, and in that specific case it was aimed at the assessment of people’s happiness. It has been proved, that reliable and descriptive statistics of a condition otherwise hardly assessable would be produced from answers given to simplistic questions. In this context, this method can be used, too. Therefore, questions to users and buyers should be asked, such as “on a scale from one to ten, how beautiful is the building?”.¹⁶ Apart from being simple and immediate in its determination, self-declaration is also very intuitive and essential in the comprehension and interpretation of its results.

A perfectly successful transformation is the one that satisfies, simultaneously, the needs of “truth”, “fairness” and “beauty” (Fig. 1 and Table 2). However, this is not usually possible, and it is necessary to identify the main need among these three.

Nevertheless, it must be considered that the “truth” is an essential characteristic of any transformation: without that, the whole operation could not exist. Conversely, “fairness” and “beauty” are optional. However, the renunciation would imply, in the first case, a worsening of the context (physical, social, relational etc.) and, in the second case, a transformation that would not be appreciated by the end user.

¹⁶Within aesthetics, criteria for the “beauty” assessment can be detected. Those can be: harmony, compliance with the standards, correspondence to the truth, light and shade, theological conformity, perfection, perspective, adherence to Vitruvian proportions, symbolism, symmetry, adherence to the chosen style, critical response, controlled asymmetry, abstract art, contrast, deformity, hyperrealism, partial imperfection, social message, innovation, oneirism, provocation, stylization and surrealism. Those criteria, are also subject to change over time. According to that, the concept of “willingness to pay” can also be reintroduced and, along with that, the market value.

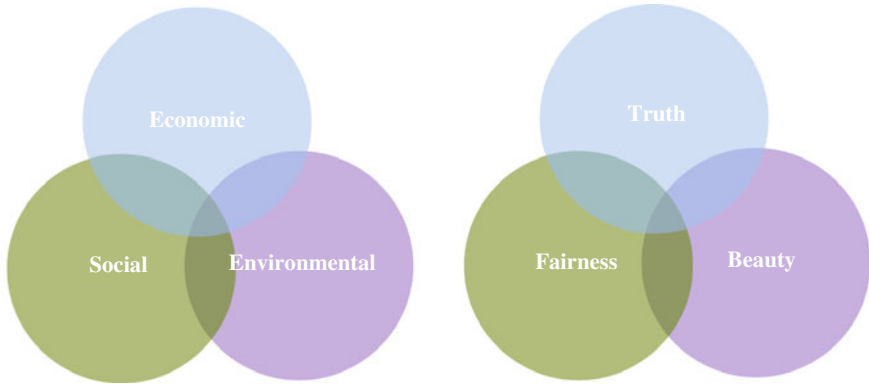


Fig. 1 Comparison between the traditional paradigm of sustainability and the new semantic meaning based on Pope Francis’s thought

Table 2 Possible combinations of indexes

Characteristic/need	Judgment	
Truth	✓	Economic feasibility
Fairness		Social improvement
Beauty		Environmental improvement
Truth + fairness	✓	Economic feasibility + social improvement
Truth + beauty	✓	Economic feasibility and + environmental improvement
Fairness + beauty		Social and environmental improvement
Truth + fairness + beauty	✓	Sustainability

Having said that, the task of the appraisal consists in providing tools and not in making decisions. What matters is that the choice is informed and, as economists would say, that it is justified by a superior aim connected to specific social and economic contingencies.

5 Conclusions: Encyclical Letter Paradigm Starting from Keynes

This new resemantization of the evaluation paradigm should can be applied for the verification of every real-estate transformation, at all levels.

Actually, their ultimate goal should be the achievement of their own full sustainability, obtained through the compliance with the “Truth”, “Fairness” and “Beauty” criteria.

For this reason it’s not a new paradigm but a resemantization of the traditional one reported in the literature (Bottero and Mondini 2009, 2017; Bottero et al. 2014;

Oppio et al. 2016; Napoli et al. 2016; Ventura 2016; FEEM 2011) on the evaluation of the sustainability of an intervention.

Specifically, the purpose of this work was not the structural change of the already existing evaluative models, but rather their resemantization through the analysis of those historical, philosophical and social paths that have led to this widespread change in the evaluative approach. As a result, a new definition and a new attitude have been developed regarding criteria for real-estate assessment. Those are now aligned with the contemporaneous “revolution” in economic thinking and, thus, they are nearer to the comprehension and sensitivity of ordinary people since their aim is the assessment of the satisfaction of their actual needs.

Though Keynes’ thought has embraced many fields of the economy, often with controversial interpretation of phenomena, we can find an analogy with Pope Francis’s words in the encyclical “*Laudato Si*”. However, that vision is perfectly aligned with the methodological measurements of the pines illustrated in the Paragraph 3.

Finally, in Pope Francis’ encyclical lies the proposal of the “True”, “Good” and “Beautiful” evaluative paradigm. However, by reaffirming that every historical period has its own economic vision and its own “right” criterion as Keynes himself way to evaluate, it is fair to ask ourselves if, actually, there is such a big difference with Keynes thought (Keynes 2011); he alleged that: “*Capitalism is not intelligent, not beautiful, not fair, nor virtuous and doesn’t create goods needed. Briefly, we do not like it and we are starting to hate it. But when we ask ourselves what to replace it with, we are perplexed*”. And: “*But beware! The time for all this is not yet. For at least another hundred years, we must pretend to ourselves and to everyone that fair is foul and foul is fair; for foul is useful and fair is not. Avarice and usury and precaution must be our gods for a little longer still. For only they can lead us out of the tunnel of economic necessity into daylight*”. Then again, in 2031, it will be a hundred years since the first publication of “*Essay in Persuasion*” and, on this occasion, perhaps we can now start over right with Keynes himself (Penza 2016).

References

- AAVV (1978) Brundtland report, WCED, ONU, New York
- AAVV (2012) The happy planet index: 2012 report—A global index of sustainable well-being, New Economics Foundation
- AAVV (2015) Human development report 2015—Work for human development, United Nations Development Programme, New York
- AAVV (2015) UrBes—Il benessere equo e sostenibile nelle città, Istat e Cnel
- Bodei R (1995) Le forme del bello, Il Mulino, Bologna
- Bottero M, Mondini G (2009) Valutazione e sostenibilità. Piani, Programmi e Progetti, Torino, Celid
- Bottero M, Mondini G (2017) Assessing socio-economic sustainability of urban regeneration programs: an integrated approach. In: Bisello A et al (eds) Smart and sustainable planning for cities and regions, green energy and technology. Springer International Publishing, Switzerland, pp 165–184

- Bottero M, Ferretti V, Mondini G (2014) Towards smart and sustainability communities. *New Metrop Perspect* 11:131–135
- Bruni L, Porta P (a cura di) (2004) *Felicità ed Economia*, Edizioni Guerini, Milano
- Davies J, Lluberas R, Shorrocks A (2014) *Credit suisse global wealth report*
- Easterline R (1974) Does economic growth improve the human lot? In: David PA, Melvin W (eds) *Reeder, nations and households in economic growth: essays in honor of Moses Abramovitz*. Academic Press, New York
- FEEM (2011) Sustainability Index. Methodological Report. Retrieved 6 Nov 2011. http://www.feemsi.org/documents/methodological_report2011.pdf
- Frey B (2010) *Happiness—a revolution in economics*. MIT Press, Cambridge
- Friedman M (2010) *Capitalismo e libertà*. IBL libri, Milano
- Gesell S (1929) *Natural economic order*, TGS (historical reprint). Frankstone, Texas
- Kennedy B (1968) Speech at Kansas University, 8 May 1968
- Keynes J (1930) Economic possibilities for our Grandchildren, in “*Essays in Persuasion*”. W.W. Norton & Co, New York
- Keynes JM (1936) *The general theory of employment, interest and money*. Macmillan, London
- Keynes JM (2011) *Esortazioni e profezie*, Il Saggiatore, Milano.
- Maslow A (1954) *Motivation and personality*. Harper & Row, London
- Napoli G, Giuffrida S, Trovato MR (2016) Fair planning and affordability housing in urban policy. The case of Syracuse (Italy). In: *Lecture notes in computer science (including subseries lecture notes in artificial intelligence and lecture notes in bioinformatics)*, vol 9789, pp 46–62
- Oppio A, Bottero M, Giordano G, Arcidiacono A (2016) A multi-methodological evaluation approach for assessing the impact of neighborhood quality on public health. *Epidemiol Prev* 40 (3–4):249–256
- OXFAM (2016) *An economy for the 1%*, OXFAM Briefing Paper (available on site: https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/bp210-economy-one-percent-tax-havens-180116-en_0.pdf)
- Penza G (2016) Pope Francis: The Laudato si’ encyclical and the urban issue. *Valore e Valutazioni* 17:5–8
- Pigou A (1932) *The Economics of Welfare*. Macmillan and C, London
- Roubini N (2008) The perfect storm of a global recession, published on project syndicate, August 13, 2008 (available on: <https://www.project-syndicate.org/commentary/the-perfect-storm-of-a-global-recession?barrier=accessreg>)
- Say JB (1803) *Traité d’économie politique*. Istitut Coppet, Paris
- Schumacher EF (1973) *Small is beautiful: Economics as if People Mattered*. Blond & Briggs, London
- Schumacher EF (2007) *La misura della felicità*. Fiorigialli edizioni, Roma
- Scitovsky T (2010) *L’economia senza gioia*. Citta nuova, Roma
- Stiglitz JE, Sen A, Fitoussi J (2009) The measurement of economic performance and social progress revisited, In: *Commission on the measurement of economic performance and social progress*
- Talberth J, Cobb C, Slattery N (2006) *The genuine progress indicator 2006*. Redefining progress, Oakland, CA
- Thoreau HD (1988) *Walden, ovvero la vita nei boschi*. BUR, Milano
- United Nation Development Programme (1992) *Human development report*. Oxford University Press, New York (USA)
- Spina LD, Ventura, C, Viglianisi A (2016) A multicriteria assessment model for selecting strategic projects in urban areas, In: *Lecture notes in computer science (including subseries lecture notes in artificial intelligence and lecture notes in bioinformatics)*, vol 9788, pp 414–427

The Integration of Agriculture in the Politics of Social Regeneration of Degraded Urban Areas



Vera Teresa Foti, Alessandro Scuderi, Giuseppe Stella, Luisa Sturiale, Giuseppe Timpanaro and Maria Rosa Trovato

Abstract Starting out from the admonitions of the encyclical letter by pope Francis, this contribution aims to define the value of social agriculture as an instrument of integrated development of the territory able to foster, just for its own peculiarities, the creation of dense systems of relationships among the various stakeholders that operate in synergy for the local development of the territory and the creation, therefore, of shared capital. The analysis, through the first results of a case study involving various social agricultural enterprises that operate in the metropolitan area of Catania, has enables the quantitative and qualitative evaluation of the relationships that are generated between the various subjects that interact at the territorial level (network), using the methodology of Social Network Analysis (SNA).

1 Introduction

In the last few years, many cities have implemented innovative policies that point to a radical paradigm shift in the lifestyle and the food habits of their citizens. Cities of the future will be increasingly based on management policies for the territorial, social and environmental resources centering on the city, that are aimed at promoting new models of integral and sustainable development for the territory and its population.

V. T. Foti · A. Scuderi · G. Stella · G. Timpanaro · M. R. Trovato (✉)
Department of Agriculture, Food and Environment,
Università Degli Studi Di Catania, Catania, Italy
e-mail: mrtrovato@dica.unict.it

L. Sturiale
Department of Civil Engineering and Architecture,
Università Degli Studi Di Catania, Catania, Italy
e-mail: luisa.sturiale@unict.it

Territory here is understood as the relational space that attracts resources and capabilities within it and metabolizes them for the benefit of the actors who are part of it and who, by their actions, fuel a social and collective process of evolution, generating a “context of social capital” (Gavinelli and Cantu 2008). The collaboration between public and private actors in local development evidence shows that a good network of relations between the two types of institution can encourage the improvement of the territorial system.

In this context, an increasingly important role can be played by agriculture, which, according to the latest guidelines for rural development policies,¹ is attributed not only the role of traditional producer of agricultural goods but of “producer” of a whole series of “services” (environmental, social, landscape etc.), which act at different levels, for the territory and for the community. In urban and/or peri-urban areas, especially those most degraded, it feels increasingly necessary to promote development routes that support certain activities, such as social farming, that employ the tangible and intangible resources of agriculture to foster actions of inclusion, both social and work, that are therapeutic and rehabilitative for disadvantaged subjects (Timpanaro et al. 2014).

Even the encyclical “*Laudato Si*”—On Caring for Our Common Home—(Pope Francis 2015) emphasizes the importance of the search for sustainable and integral development (§ 13; 18), and offers the new paradigm of an “*integral ecology, one which clearly respects its human and social dimensions*” (§ 137) inextricably linked with environmental issues, recognizing agriculture’s human and social function, especially in urban areas with social difficulties. Underlined, in addition, is the importance of social capital, namely of the set of relations of trust, reliability and respect for the rules, which are indispensable to all civil coexistence, whose erosion is caused by heavy social damage (§ 104).

Starting out from the admonitions of the encyclical of Pope Francis (regarding instruments for achieving an integral development of urban and peri-urban areas and the importance of social capital), the study aims to define the value of social agriculture as an instrument of integrated development of the territory able to foster, just for its own peculiarities, the creation of dense systems of relationships among the various stakeholders that operate in synergy for the local development of the territory and the creation, therefore, of shared capital. The analysis, through the first results of a case study involving various social agricultural enterprises that operate in the metropolitan area of Catania, has enabled the quantitative and qualitative evaluation of the relationships that are generated between the various subjects that interact at the territorial level (network), using the methodology of Social Network Analysis (SNA) (Timpanaro et al. 2015).

¹Regg, EU nn. 1305/2013 and 1306/2013.

2 The Encyclical “*Laudato si*”, Points of Reflection on the Relationship Between Urban Areas, Agriculture and Social Inclusion

Pope Francis, with the drafting and dissemination of his holy Encyclical “*Laudato si*” (“*Praised yes*”), launched a strong message to the world community in its entirety, without any distinction of religion, regarding the urgency and the necessity “*to protect our common home*”² (§ 13), according to a vision that the Holy Father does not define only as “*sustainable*”, since it affirms the importance of environmental conservation in both an intra-generational and inter-generational vision (as stated in the famous Burtland declaration of 1987, which launched the concept of sustainable development), but above all as “*integral*”.³ Clearly, the Holy Father’s message goes far beyond, tracing a clear path that starts from the evidence of an ecological crisis, suggests some hypothesis solutions, considers as fundamental the contributions and results of the scientific research and identifies the underlying cause of such problems in the current model of economic development. The direct effects of this model are the following:

- condition of isolation of the individual;
- continual erosion of interpersonal relationships.

Moreover, in various passages, it underlines the difference, well known to economists, between “*growth*” and “*development*”, the valuation of which are performed through consolidated indicators, but what is interesting is the emphasis placed on the “*moral character*” that *authentic human development* must assume, recognizing the open nature of the economic system, as a “*mutual connection in an ordered system*”⁴ (§ 5).

It suggests the proposing (Chap. 4) of a new paradigm of “*integral ecology*”, one which clearly respects its “*human and social dimensions*” (§137), inextricably tied to environmental issues, and attributing to agriculture its human and social function, particularly in urban environments with social difficulties. The changes in lifestyles suggested for implementing this new paradigm are not new in the sense that they are in part already encountered in reality, but it certainly can be considered

²The “*common home*” implies the meaning of true public good that the environment assumes for all humanity, and going further with the reading, the encyclical recognizes the value of the environment as a set of values of use and non use. In fact, picking up on what was stated by John Paul II, it reports that (5) “... it has followed this issue with a growing interest. In his first Encyclical, he remarked that the human being seems not to perceive any other significance in its natural environment, but solely those that serve the purpose of immediate use and consumption. Subsequently, he urged a global ecological conversion ...”.

³The appeal of Francis is to “... to bring the whole human family together to seek a sustainable and integral development ...” (§ 13).

⁴... *Authentic human development has a moral character. It presumes full respect for the human person, but it must also be concerned for the world around us and “take into account the nature of each being and of its mutual connection in an ordered system”.* (§ 5) ...”.

innovative compared to the current paradigm, such as, for instance, the “*prosumer*” (consumers that are also producers) and the “*sharing economy*”, that are widespread in the new generation (Heirichs 2013; Schor 2016). The encyclical points towards the transition from an *ecological* to a *social vision*, based on an approach that considers the *valuation of the effects of a process on the environment, the excluded, and the poor of the world*. It recognizes that today: “... *a true ecological approach always becomes a social approach; it must integrate questions of justice in debates on the environment, so as to hear both the cry of the earth and the cry of the poor.*” (§ 49), highlighting the connection between “... *environmental deterioration and human and ethical degradation ...*” (§ 56). Furthermore, along with the well-known failures of the market identified by economic theory, the encyclical adds another, namely the lack of guarantee of an “... *integral human development and social inclusion ...*” (§ 109).

Focusing attention on the urban environment, the encyclical considers cities as “*inefficient structures*”... “*unhealthy to live*”... “*lacking in sufficient green space*”... with little attention to *actions of social inclusion*. It stressed: “... *the disproportionate and unruly growth of many cities, which have become unhealthy to live in ...*” (§ 44), due to the various forms of pollution (not only by toxic emissions, but also for the urban chaos, transport problems and the visual and acoustic pollution). Cities are described as “... *huge, inefficient structures, excessively wasteful of energy and water ...*”, with neighborhoods that, although newly built, do not have “... *sufficient green spaces. We were not meant to be inundated by cement, asphalt, glass and metal, and deprived of physical contact with nature.*” (§ 44), green spaces should be provided especially in the less visible areas of the city, where the rejected of society live.

The social aspect is fundamental in the vision of integral development, at the core of the encyclical, with which we need to reconsider all the economic, environmental, and territorial processes. The result, then, is a new *systemic conception of the territory*, as a space of interaction between economic, social, cultural, and environmental elements that characterize a determined area. Among the various subsystems that can be found in the territory, it ranks agriculture, which is characterized, by now for many decades, by the presence of “*multifunctional*” *agricultural enterprises* participating in the local development (Sturiale and Scuderi 2014, 2016). The multi-functionality⁵ is now enhanced with other functions, among which is the *social*. It contributes, in this way, to regenerate the *social capital versus relational capital* (a collective resource linked to the structure of the networks of relationships and to the territorial context in which they are generated). In this new territorial system, the *city–agriculture* relationship assumes a strategic role, intended as a design for connection based on a targeted reconstruction of the relationships between natural, rural, and urban resources in an articulated vision of

⁵The concept of “*multi-functionality of agriculture*” is recognized under the law of the European Union (EU) and of the Italian legislature (Legislative Decree no. 228 of 2001), and is attributable to the following principal functions: production of goods; recreation; landscape; environment; social; and protection and defence of the territory.

complex landscapes (Sharp and Smith 2003; Sturiale and Trovato 2013a, b; Scuderi et al. 2016).

The encyclical, in fact, also recognizes and promotes multi-functionality and, above all, the *social function*. In fact, focusing attention on the problem of employment,⁶ maintains that it is “... *imperative to promote an economy which favours productive diversity and business creativity ...*”; moreover, “... Civil authorities have the right and duty to adopt clear and firm measures in support of small producers and differentiated production ...” (§ 129).

Actually, a vibrant and growing synergy already exists between agricultural enterprises and the city, with the delivery of various services, including social activities, in the pursuit of multiple objectives. Among these, the most important are:

- delivery of social services to the community as a whole;
- response to the demand for multifunctionality and socioeconomic-environmental “sustainability”.
- construction of a *relational system* that is capable of engaging those involved in the complex process of dispensing these social services, contributing proactively to the local development of the territory.

The new relationships between cities and agriculture that are being developed in Italy (and for many years in other European countries and in the USA as well) point towards a new model of *agro-urban planning*. Regeneration projects are becoming increasingly common in which urban and peri-urban agriculture are seen as opportunities for the city (Heimlich and Brooks 1989; Simon-Rojo et al. 2015; Timpe et al. 2015).

This is the case with agricultural parks as strategic projects of interaction between the demands of urban and open territory and of urban planning that provides for pilot development projects that enhance agricultural enterprises in peri-urban areas. In this regard, we cite some experiences in progress in both urban and peri-urban environments, some of which have by now been present for many years, and are well-consolidated and disciplined:

- Urban environment: farmers markets, urban allotments (for gardening and environmental activities), and community allotments (for social activities).
- Peri-urban environment: agricultural parks; social farms.
- Pilot experiences of agricultural enterprises that deal with: *agro-ecosystemic services* (maintenance of drains and drainage channels; management of habitats to a high level of naturalistic value, management of structures and cultivations for the wild fauna etc.); *landscape* (conservation of traditional agro-forestry

⁶“... *The loss of jobs also has a negative impact on the economy “through the progressive erosion of social capital: the network of relationships of trust, dependability, and respect for rules, all of which are indispensable for any form of civil coexistence”. [104] In other words, “human costs always include economic costs, and economic dysfunctions always involve human costs...”* (§ 128).

matrices; management of spaces to a high level of aesthetic-perceptive value etc.; *custody agreements about the territory*, between one territorial entity and one or more enterprises for environmentally significant measures of collective interest.

3 The Contribution of Urban and Social Agriculture to Urban Sustainability

The change in relationships between the urban and rural worlds is attracting growing interest from the institutional and scientific worlds. At the international level, for several years now, in fact, a new form of “urban rurality”, better known by the term “urban agriculture” (Mather et al. 2006; Mougeot 2000) seems to be finding space which, in all its declinations, represents a mode of agricultural enhancement of city green spaces that is able to offer social, alimentary, environmental and cultural responses to people’s growing demand for conceiving of their city as an integrated space of buildings, recreation and landscape. The recovery and development of urban and peri-urban agriculture (Pascucci 2008; Zasada 2011) implies a radical change of direction of territorial governance, among whose effects is the programming of rural development policies that take into account the needs of agricultural areas with high urban incidence and planning (agro-urban planning) that protects and enhances the residual agricultural areas of the urban belt. In the last few years, in fact, territorial and urban research has been considering new settlement models following the ever-increasing importance that agriculture and rurality are assuming in urban and peri-urban environments, leading to the spread of regeneration projects in which urban and peri-urban agriculture areas are seen as opportunities for the city (Branduini et al. 2015, 2016; Cerreta and De Toro 2010; Scuderi et al. 2015; Sturiale et al. 2010; Vandermeulen et al. 2006).

Among the various forms of urban agriculture (agricultural parks, urban farms, children’s farms, river parks, local products markets, areas of constructed wetlands, alternative energy farms, nature conservation areas etc.) those of a social agricultural type seem to represent an interesting model that is capable of pulling together the multiple social, economic and environmental needs of the territories and the citizens in terms of sustainability and participatory democracy (Foti et al. 2013; Sturiale et al. 2013a, b; Tempesta 2015).

In urban and peri-urban areas, in fact, alongside the criticalities is a social demand that encompasses a number of requirements related to the quality of life, the proximity and quality of agriculture, the blocking of soil consumption, the care of places, the leisure opportunities linked to the territory, the air quality, the relational and social needs of the community, the recreational facilities etc. Agriculture is configured, therefore, as an activity capable of responding to the social demand

and to the necessity of public institutions to manage the city according to an “*integral*” and sustainable model, in all its economic, environmental and social dimensions.

4 Methodology

The work aims to evaluate the system of relationships of the network that have formed around the actions of social agriculture in the area falling in the metropolitan area of Catania, through a case study that involved certain social agriculture enterprises that operate in this territorial context. The choice of agri-social enterprises to submit to analysis was made by virtue of their location (greater proximity to urban centres) and of the role that they assume within the scope of agri-social activities realized in that area. These endeavors were administered with a questionnaire designed to acquire useful information for the characterization of the network. Data were acquired by presenting the agri-social companies with a list of subjects that participate, in various capacities, in social agriculture initiatives organized in the territory covered by the network and asking those who have connections to specify the direction (incoming or outgoing) (Foti et al. 2014).

From a close examination of the data, it emerged that there were 64 participating actors to social-agriculture actions in the territory, comprising five promoting enterprises. These were grouped into categories by the type of group to which they belonged: social farms (5); associations (18); agricultural enterprises (9); consortiums (1); organizations (2); social cooperatives (6); public entities (15); and non-profit organizations (3).

All of the actors operating around social agriculture activities form a network where each of them assumes the role of node and the link between each node is represented by the flow of information that runs between them.

The study of this relational network becomes thus a fundamental point of the work, in that it is pivotal for the generation of social capital in the territory. In fact, the “classical” sociological studies frame Bourdieu (1980, 1983) and Coleman (1988, 1990) on one side, and Putnam (1993, 2001), on the other, as the promoters of two important models of “relations” generating social capital, based, respectively, on an individualistic and a collectivist approach. But, despite the fact that the two theories have given inspiration to lines of opposing sociological research, a common point that can be found is the shared opinion that social capital is a resource established on the existence of some type of social relationship.

The analytical-scientific method utilized for the characterization of the identified network was that of Social Network Analysis (Scott 2000; Hanneman and Riddle 2005) which consists of the application of matrix-calculus techniques able to

measure the relationship that arises from bonds of a different nature and between different actors through certain indicators explicative of the relational behavior of these actors.⁷

This specific case started with the construction of square matrices, called adjacency matrices, where each element of the matrix is the value of the relationship between the two actors. Obviously, in such a matrix, the elements of the diagonal represent the values of the relationships of each actor with himself and are therefore considered negligible. Each element of the matrix can assume a value of one if a link exists, or a zero value if one does not exist, and in this case we are dealing with a *dichotomized* matrix. In the event that the intensity of links is also considered, then it is called *valued*. By means of dedicated software, in this specific case through UCINET 6 (Borgatti et al. 2002), it is possible to elicit both the graph of the network and certain characteristics, such as the level of cohesion or of centrality. The graph follows the theory of graphs in which the links between the nodes are described by a line, the extreme tip of the arrow indicating the direction and thickness of intensity. As regards the level of cohesion of the network, in this specific case, it is measured through the parameters of density and geodetic distance.

The density, extracted from the dichotomized matrix, is the ratio between the number of effective links and the number of dyads (pairs), or of all the possible dyadic links theoretically existing. In the case that the matrix has a value of one, then we have the maximum density. That is, each node is connected with all the others in all directions (incoming and outgoing). If the density value is zero, then all the nodes of the network are disconnected.

The centrality of a network, on the other hand, is quantified through the measurement of degree, closeness, and betweenness. The degree of a node is the overall number of bonds that it possesses, understood as in-degree and out-degree, namely, the number of links that arrive or depart from a given node. It is useful, for the purposes of comparison between networks, to normalize the absolute value and compare it to the total number of possible links (i.e., to $k-1$, where k is the number of actors in the network). The measures of in- and out-degree have great importance in sociological terms, expressing the role played by the actors involved, in that the more links one actor has, the more power he possesses, conferring therefore, a greater opportunity for choice. This autonomy makes it less dependent on the other actors, and therefore more powerful. The direction of centrality poses the nodes as emitters or receivers of information and therefore distinguishes a role that is dynamic or is one of reference.

Closeness indicates to what extent a node is “close” to all the other nodes of the network. According to the sociological vision, the node with a high value of closeness is attributed the power to act as a “point of reference” for all the others, and its ideas are taken into consideration by more subjects.

⁷The Social Network Analysis could be integrated into the Stakeholder Analysis (Dente 2014; Prell et al. 2009).

Betweenness measures the level of intermediation of a node. The idea is that a node or actor who acts as intermediary between two others that are not directly connected to each other enjoys a position of advantage. This is considered an important indicator of the capacity of a node to control the exchange of information or flows of resources within a network. This concept indicates the frequency with which a node is the shortest path (geodetically) between all the pairs of nodes in the network (Trobina and Milia 2011).

5 Results

The Fig. 1 depicts the network formed by the actions of social-farming projects established in the metropolitan area of Catania. In particular, each color corresponds to a different category; the arrows indicate the direction of the bond; and the thickness of the bonds indicates the intensity of the exchange of information between the nodes of the network.

It reveals that agricultural enterprise number one has a great capacity to attract links with the other actors in the network compared to the other social enterprises that promote social agriculture projects in the territory.

Another aspect of the network that is highlighted is that the five enterprises are very dynamic. Communications between the participating actors, on the other hand, operate on a low level. In fact we are moving towards an overlapping network of stars, where each central element is represented by five social enterprises.

The density value expressed by the dichotomized matrix (0.0371), indicates a wide-mesh network that exploits only 3.7% of the possible links. The social farms are connected between themselves through a few actors that interface with more social farms. Communications between the other categories is almost absent. There is a heterogeneous distribution of the intensity of the links within the network, surely due to the centralization of relations with the nodes by just five companies.

Table 1 reports the average values of degree, closeness, and betweenness for each category and the absolute value for each social-farming enterprise.

The social farm number one is the one that expresses the highest degree of centrality, both in terms of degree and in that it attracts more intense links within the network both of proximity (closeness) and intermediation (betweenness). Certainly it is the actor that has a crucial role in the passage of information. If from a certain point of view the work done is appreciable, in terms of the efficiency of the network, this configuration places the internal communications within the network.

It would be enough to disconnect social farm number one from the network to find that about 45% of the actors would be disconnected and unable to communicate.

Table 1 Values of degree, closeness and betweenness for each category^a

Categorie	Degree	Closeness	Betweenness
<i>Social farms (values per single farm)</i>			
Social farm 1	0.542	0.897	0.302
Social farm 2	0.119	0.660	0.040
Social farm 3	0.102	0.837	0.040
Social farm 4	0.102	0.854	0.049
Social farm 5	0.051	0.641	0.006
<i>Other categories (average values)</i>			
Onlus	0.028	0.694	0.003
Associations	0.026	0.564	0.005
Organizations	0.025	0.601	0.000
Social cooperatives	0.023	0.568	0.003
Public authority	0.020	0.532	0.002
Farms	0.019	0.428	0.001
Consortium	0.017	0.566	0.000

^aOur elaborations on directly collected data

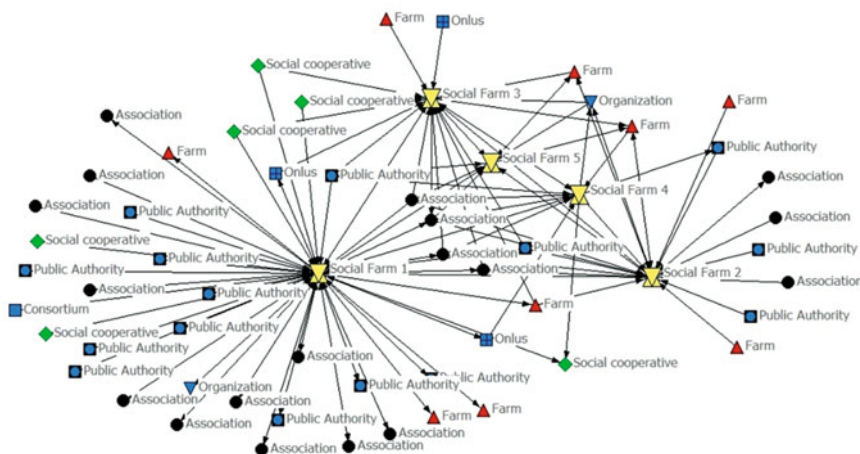


Fig. 1 The network originated from social-agriculture projects in the metropolitan area of Catania

6 Conclusions

The transformations taking place in the lifestyles of citizens, the new needs of the community related to contemporary living and the new perspectives for “*multi-functional*” rural development, favoured by the Common Agricultural Policy (CAP), open innovative spaces of integration between agriculture and urban and peri-urban activities, as well as those of a rural nature. This has determined the elaboration of models of development and planning coherent with the expectations

of the local population and of the territory, in a perspective of renewed integration and complementarity.

The so-called “rururban” areas are those in which those processes of integration between governance and development of the territory must be realized, and in which the links between the various stakeholders of the urban and rural components must be consolidated. At the same time, in the city, the agricultural dimension has been reinforced, with diverse functions and various types of integration with the urban fabric, which allow for a response to the objective of public planning and management entities of the city according to the sustainable model in its three dimensions (economic, environmental and social).

The network identified with the proposed case study seems to assume still greater significance for the metropolitan area of Catania, in which the needs of the urban and the rural contexts meet. The model of integration studied presents the following characteristics: dynamicity, reciprocity and relationality. Such a structure will foster coordination among the various dimensions of sustainable development, by increasing the flow of information, the sharing of experiences and the creation of knowledge and of trust, making reference also to the new paradigm of an “*integral ecology*, one which clearly respects its human and social dimensions” (§ 137).

This enables the transition from a one-dimensional vision to a multi-dimensional and/or systemic one that, in the premise of reconciling the economic welfare of society with the productive and environmental capacity of the ecosystems, favoring the synergistic use of the endogenous resources (human, economic, environmental and technological) of rural and urban territories, in a climate of mutual trust between the actors (networking, partnership) (Timpanaro et al. 2014). This process, however, needs the support of adequate instruments of *agro-urban planning* that in our country are, from the research conducted, in some cases designed and operationally effective, while, in other cases, only in the design phase and, in many other urban realities, unfortunately still absent. It would be desirable, at the invitation of *Laudato si*, to find recourse to models of urban governance in which the human and social function of agriculture is recognized and that reinforces its role as an instrument for the re-conquest of social, economic and environmental values in urban and peri-urban areas, above all in areas with social difficulties.

References

- Borgatti SP, Everett MG, Freeman LC (2002) UCINET 6 for Windows. Harvard Analytic Technologies 185
- Bourdieu P (1983) Forms of capital. In: Richards JC (ed) Handbook of theory and research for the sociology of education. Greenwood Press, New York
- Bourdieu P (1980) Le capital social. Notes provisoires. Actes de la Recherche en Sciences Sociales 3:2–3
- Branduini P, Giacchè G, Laviscio R, Scazzoli L, Torquati B (2016) Per una lettura sistemica delle agricolture urbane. Tipologie, politiche, modelli imprenditoriali, spazialità e metabolismo. *Agriregione* 12(44)

- Branduini P, Laviscio R, Scazzosi L, Supuka J, Toth A (2015) Urban agriculture and cultural heritage: an historical and spatial relationship. In: Lohrberg F, Licka L, Scazzosi L, Timpe A (eds) *Urban agriculture Europe*. Jovis, Berlin, pp 138–147
- Cerreta M, De Toro P (2010) Integrated spatial assessment for a creative decision-making process: a combined methodological approach to strategic environmental assessment. *Int J Sustain Dev* 13(1–2):17–30
- Coleman JS (1988) Social capital and the creation of human capital. *Am J Sociol* 94:95–120
- Coleman JS (1990) *Foundation of social theory*. Cambridge. Harvard University Press, MA
- Dente B (2014) *Understanding policy decision*. Springer, Berlin
- Foti VT, Scuderi A, Timpanaro G (2013) Organic social agriculture: a tool for rural development. *Calitatea-Access la Succes* 14(S1):266–271
- Foti VT, Giudice VL, Rizzo M (2014) Relationship system analysis in social farming: the role of “Sicilian social farm network”. *Calitatea* 15(S1):62
- Gavinelli L, Cantu’ CL (2008) Reti di territorio: la valorizzazione delle risorse intangibili in un orizzonte internazionale. In: *Proceedings of AIDEA Conference*, Macerata, 25–26 Jan 2008, Aidea giovani, Macerata, pp 1–30. <http://hdl.handle.net/10807/19604>
- Hanneman RA, Riddle M (2005) *Introduction to social network methods*. University of California, Riverside, CA. Riverside (published in digital form at <http://faculty.ucr.edu/~hanneman/>)
- Heimlich RE, Brooks DH (1989) Metropolitan growth and agriculture: farming in the city’s shadow. *Economic Research Service—USDA, Agricultural Economic Report* 619
- Heinrichs H (2013) Sharing economy: a potential new pathway to sustainability. *GAIA Ecol Perspect Sci Soc* 22(4):228
- Mather AS, Hill G, Nijnik M (2006) Post-productivism and rural land use: cul de sac or challenge for theorization? *J Rural Stud* 22(4):441–455
- Mougeot LJ (2000) Urban agriculture: definition, presence, potentials and risks. *Growing cities, growing food: urban agriculture on the policy agenda*, pp 1–42
- Pope Francis (2015) *Lettera Enciclica Laudato si’ del Santo Padre Francesco sulla cura della casa comune*. Tipografia Vaticana, Roma, Stato del Vaticano
- Pascucci S (2008) Agricoltura periurbana e strategie di sviluppo rurale: una riflessione. *QA-Rivista dell’Associazione Rossi-Doria* 2:127–151
- Prell C, Hubacek K, Reed M (2009) Stakeholder analysis and social network analysis in natural resource management. *Soc Nat Resour* 22(6):501–518
- Putnam RD (1993) *Making democracy work*. Princeton University Press, Princeton, New Jersey
- Putnam RD (2001) *Bowling Alone: the collapse and revival of American community*. Paperback Edition
- Schor J (2016) Debating the sharing economy. *J Self Gov Manage Econ* 4(3):7–22
- Scott J (2000) *Social network analysis. A Handbook*, London, Sage
- Scuderi A, Sturiale L, Bellia C, Foti VT, Timpanaro G (2016) The redefinition of the role of agricultural areas in the city of Catania. *Rivista di Studi sulla Sostenibilità* 2:237–247
- Scuderi A, Foti VT, Lo Giudice (2015) Economic analysis of education farms in Sicily. *Quality Access Success* 16(suppl. 1): 252–259
- Sharp JS, Smith MB (2003) Social capital and farming at the rural-urban interface: the importance of non farmer and farmer relations. *Agric Syst* 76(3):913–927
- Simon-Rojo M, Recasens X, Callau S, Vejre H (2015) From urban food gardening to urban farming. In: Lohrberg F, Licka L, Scazzosi L, Timpe A (eds) *Urban agriculture Europe*. Jovis, Berlin, pp 22–28
- Sturiale L, Calabrò F, Della Spina L (2010) Un programma complesso per la valorizzazione e la promozione del mosaico paesistico-culturale del SIC “Collina di Pentimele” (RC). *Architettura del Paesaggio*, gennaio/giugno: 69–85
- Sturiale L, Scuderi A (2014) The creation of itineraries of “slow travel” in Sicily: the case of “the ways of the Zagara”. In: *Proceedings of the XVIII IPSAPA interdisciplinary scientific conference*. Special Issue 2, pp 257–268

- Sturiale L, Scuderi A (2016) Le nuove forme del verde nel mosaico urbano: verso una pianificazione agro-urbana per riattivazione di spazi e funzioni. In: Proceedings of the XX IPSAPA interdisciplinary scientific conference, Reggio Calabria (Italia), 7–8 Luglio 2016, Special issue (in press)
- Sturiale L, Trovato MR (2013a) The enhancing of the environmental landscape and the cultural heritage by a project of agricultural park. In: Society, integration, education, proceedings of the international scientific conference, Udine, 27/28 June 2013, III, pp 201–212
- Sturiale L, Trovato MR (2013b) The agricultural park as a tool to enhance the agricultural landscape of the SIC “Timpa di Acireale” (CT). In: Crescimanno M, Casini L, Galati A (eds) *Evoluzione dei valori fondiari e politiche agricole*. Bologna, Medimond Monduzzi Editore International Proceeding Division, pp 185–210
- Tempesta T (2015) Benefits and costs of urban parks: a review. *AESTIMUM* 67(dicembre 2015):127–143
- Timpanaro G, Scuderi A, Cacciola S (2014) Development policies for social farming in the EU-2020 strategy. *Quality Access Success* 15(139)
- Timpanaro G, Scuderi A, Foti VT, Lo Giudice V (2015) The social relationships’ effectiveness of “agrisocial” farms: a model of sustainable local development. *Rivista di Studi sulla Sostenibilità* 1:99–116
- Timpe A, Cieszewska A, Supuka J, Toth A (2015) Urban agriculture goes green infrastructure. In: Lohrberg F, Licka L, Scazzosi L, Timpe A (eds) *Urban agriculture Europe*. Jovis, Berlin, pp 126–137
- Trobia A, Milia V (2011) *Social network analysis. Approcci, tecniche e nuove applicazioni*, Carocci, Roma
- Vandermeulen V, Verspecht A, Van Huylenbroeck G, Meert H, Boulangerc A, Van Eecke E (2006) The importance of the institutional environment on multifunctional farming systems in the peri-urban area of Brussels. *Land Use Policy* 23(4):486–501
- Zasada I (2011) Multifunctional peri-urban agriculture—a review of societal demands and the provision of goods and services by farming. *Land Use Policy* 28(4):639–648

Territorial Vulnerability and Local Conflicts



Stefano Corsi, Giordano Ruggeri and Alessandra Oppio

Abstract In the last years the number and the magnitude of the oppositions to new public (and private) works have increased all over the World, but the reasons of the op-position are difficult to identify. There are several international examples of conflicts originating from environ-mental oppositions as the mobilization in Istanbul in defense of Gezi park, the toppling of the government in Madagascar over land-grabbing, and the aboriginal ‘Idle No More’ movement in Canada against fracking activities. In Italy the most famous environmental conflict is the opposition to High Speed Rail in Val di Susa, but recently the referendum on the drilling in the Mediterranean sea has seen a very huge opposition front which includes also influential member of Catholic Clergy. But at the same time similar works didn’t face any (or so hard) opposition in different areas and periods. So we can hypnotize that the conflict is site specific but what are the determinants of the conflict? Can we explain the relevance of the conflict with the territorial vulnerability? How can the vulnerability be measured? What are the main dimensions of vulnerability? Several scientists analysed the relationships between the oppositions, which can degenerate in conflict, even violent, and the vulnerability of the territories where the public works are planned. The aim of the present paper is to provide a comprehensive analysis of the recent ad most relevant scientific papers which study the relationship between vulnerability and conflict by means of a bibliographic approach. Bibliometric approaches analyze scholarly publications and scientific production through various quantitative techniques, with the main goal of revealing how different research topic and specific scientific domains are conceptually and intellectually structured. Bibliometrics borrows the information it needs directly from the bibliographic description of scientific documents, available for download on several databases. The bibliographical data gathered in this study was collected from 682

S. Corsi (✉) · G. Ruggeri

Dipartimento di Scienze Agrarie e Ambientali—Produzione, Territorio, Agroenergia, Università degli Studi di Milano, via Celoria, 2, 20133 Milan, Italy
e-mail: stefano.corsi@unimi.it

A. Oppio

Department of Architecture and Urban Studies, Politecnico of Milano,
via Bonardi 3, 20133 Milan, Italy

articles from a wide range of journals available in the Thomson Reuters' ISI Web of Knowledge; the search criteria included the joint appearance of the terms "vulnerability" and "conflict". For the purpose of this research different methods have been employed to map the scientific production and to gather information about this research topic. The results of the analysis show an increasing interest in studying the relationship between conflict and vulnerability and the extension of the semantic context including several scientific fields.

Keywords Territorial vulnerability · Local conflicts · Literature review

1 Introduction

The notion of vulnerability has been studied in several fields, each one focusing on peculiar features, but all converging on the idea that it is a multidimensional issue Adger (2006), Garfield and Sher (1993), Homer-Dixon (1994, 2010), Wisner et al. (2004), Turner et al. (2003), Barnett and Adger (2007), Smit and Wandel (2006), O'Brien et al. (2007), Cutter et al. (2003a, b), Elinor (1990) as it regards not only the environmental and physical dimensions of the development but also the social, institutional and economic ones as well as their mutual relationships (Cutter et al. 2003; Menoni et al. 2012; Oppio et al. 2015, 2017). Despite the concern for the negative externalities of human activity on environment is not new (Pigou 1948; Mishan 1965; Barde and Gerelli 1980; Roegen 1971), in the last 15 years it has much increased as it has been proved by the growing number and magnitude of local oppositions to new public and private works.

As reported by the Atlas of Environmental Justice (ejatlas.org) all over the world almost 2320 are the conflicts due to the exploitation of natural resources, the generation of wastes and the degradation and commodification/privatization of environmental goods. In these cases local communities feel threatened by the distribution of economic, health, socio-cultural or environmental impacts and for these reasons they start to oppose in order to bring the attention of governments not only on the distribution of costs and benefits but also on participation and recognition instances. Furthermore, the dominant utilitarian approach has used monetary valuation in order to internalize and to trade off gains and losses of environmental change, thus running the risk of too often simplified descriptions about environmental values (Spash 2000; Söderholm 2001). How to deal with this value pluralism is still an unsolved issues for conventional economists (Martinez-Alier et al. 2010).

A cross answer on this topic can be envisaged in the notion of Integral Ecology, that is inseparable from the notion of the common good and a central and unifying principle of social ethics (Encyclical Letter 2015). The call for the protection of the "common home" by Pope Francis represents an effort to open an honest debate among experts, that starting from divergent views might point out a reasonable solution. In this context, the assessment and valuation activities play a crucial role, if part of the process from the beginning and carried out according to an a

interdisciplinary, transparent and independent (from economic and political pressure) approach (Borrelli and Citterio 2016).

With respect to the claim of a broad dialogue among researchers, scientists and experts, the paper provides a comprehensive analysis of the recent and most relevant scientific papers which deal with the relationship between vulnerability and conflict by means of a bibliographic approach.

2 Method

The methods followed in this paper are rooted in Bibliometrics (De Solla Price 1965; Garfield 1955; Small 1973), a set of techniques that can be employed to evaluate research through statistical analysis of bibliographic data. Bibliometric methods are commonly used in research performance assessment to provide quantitative analysis of academic literature, but they can be also used as tools to explore a specific topic or field of research. Commonly focusing on information about authors, papers and references of research outputs and publications, bibliometric comprehends two main categories of analysis: performance analysis and science mapping (Moed et al. 2005; Noyons et al. 1999; VanEck and Waltman 2014). The first category aims at evaluating actors (mainly authors, institutes, journals and countries) on the basis of bibliographic data and it does so in several ways: from identifying top performing actors to evaluating the impact of a particular paper, author, country or journal. The second category, science mapping, is a spatial representation of bibliometric networks to explore the interrelation between disciplines, fields, specialties, individual papers or authors. In bibliometric, citation counts are assumed to generally reflect the resonance of a paper in the scholarly community by an objective and measurable way. Bibliometric analysis is receiving increasing attention by the scientific community, especially because of the fast development of internet and online subscription-based scientific citation indexing services.

The bibliographical data gathered in this study was collected from Thomson Reuters' ISI Web of Science Core Collection, through the search of the terms "vulnerability" and "conflict" in the Topic field, which includes title, abstract and keywords. The WOS database contains more than 15,000 journals and 50,000,000 papers classified in 251 subject categories and 151 subject areas. In order to check for coherence with the subject matter of the resulting 729 portfolio of papers, the titles and in some cases the abstract has been read first. Through this process, 52 documents have been removed from the database, leading to a final dataset of 677 documents.

Documents skimming, the extraction of information about the papers and about cited literature and the creation of the networks have been computed through the software Bibexcel. A further analysis of the publications determined as core was conducted in order to outline the different subfields in research.

3 Results

Figure 1 presents several characteristics of the publications between 1991 and 2015. The study of the number of publications and authors reveals the growing interest on this topic, which is increasingly confronted by a growing number of researchers. In particular, starting from 2005, the annual number of publications has been constantly growing. Along with this trend, there was also an increase of the mean number of authors per document and of research collaboration among authors. Despite the absolute number of publications is still low, there are reasons to refer to this as an emerging trend.

Table 1 describes the dataset according to the type of documents. The dataset is mainly composed of articles (88.3% of the sample) and proceeding papers (8.9%), the remaining part are reviews, editorial material and book chapters.

The 10 most productive countries are displayed in Table 2. Since 1991–2015, institutions from 35 countries have contributed to research related to the two terms vulnerability and conflict: the USA have always played a dominant role with more

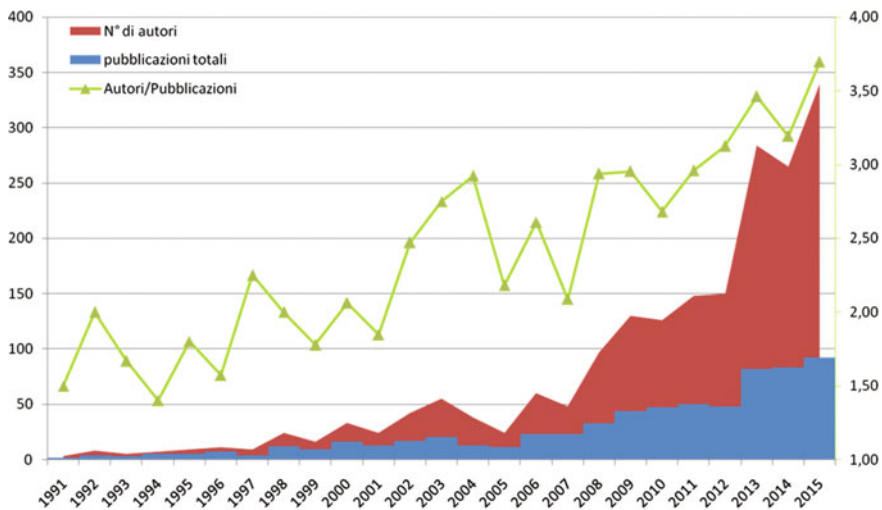


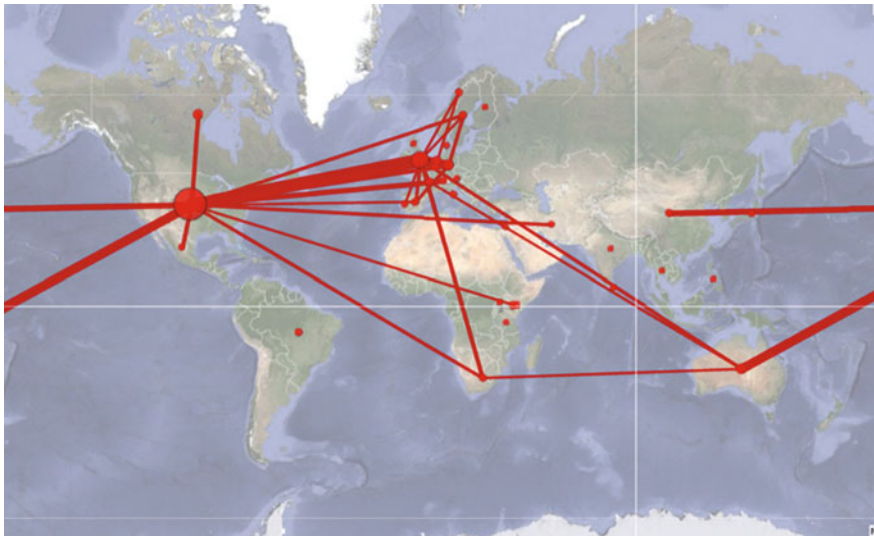
Fig. 1 The growth trends of publications, mean number of authors and citations

Table 1 Typologies of documents of the database

Document type	Records	% of the total
Article	598	88.3
Proceedings paper	60	8.9
Review	32	4.7
Editorial material	6	0.9
Book chapter	4	0.6

Table 2 Ranking of the most productive countries

Country	Total publications	% of the total
USA	252	37
England	107	15
Germany	49	7
Australia	46	7
Canada	43	6
Netherlands	33	5
Sweden	28	4
France	23	3
Spain	20	3
South Africa	18	2

**Fig. 2** Network of collaborations between authors

than 35% of the total publications, followed by UK (15%), Germany (7%), Australia (7%), Canada (6%), Netherlands (5%) and Sweden (4%). Not surprisingly, English is widely the most frequently used language representing 96% of the total publication, the second most used languages are German (2%) and French (2%), the rest of the documents are in Portuguese, Spanish or Dutch.

Figure 2 shows the cooperative relationships among the top productive countries from 1991 to 2015. The thickness of connecting line between any two countries indicates the strength of collaboration. Collaborations between countries and institutions are mostly between countries of the so-called Global North, being USA and UK those with the higher number of collaborations.

Table 3 Ranking of the most productive authors

Author	Record count	%
Adger WN	5	0.62
Scheffran J	5	0.62
Barnett J	4	0.50
Schilling J	4	0.50
Strathdee SA	4	0.50
Wolf AT	4	0.50
Birkmann	3	0.38
Bozorg-Haddad O	3	0.38
Carey M	3	0.38
Diniz JAF	3	0.38
Fernandes LFS	3	0.38
Gleick PH	3	0.38
Laidre ME	3	0.38
Le Billon P	3	0.38
Liotta PH	3	0.38

Many authors have made fundamental contributions to the development of this field of research. Table 3 shows the top 24 most productive authors in terms of number of publications. Unlike other research fields, it is not possible in this case to identify one or more highest exponents, since there are no authors who are distinguished by the high number of publications. Instead, there are many researchers, but all of them have only few works published on the subject. However, the authors with the largest number of publications are Adger W. N. and Scheffran J., with 5 publications each. Adger is also the author of the most cited paper.

Table 4 lists the most cited documents of the database.

The analysis of the subject categories reveals that there is a substantial number of studies inspecting the topic of vulnerability and conflicts, from many different perspectives and with different tools and objectives. The topic has been addressed especially by researchers in the field of environmental sciences and ecology, but there are also several disciplines which suggest both the wide interest and the complexity of the phenomenon. The most common subject categories of the data are environmental sciences and ecology; public, environmental and occupational health; and government and law (Fig. 3).

Figures 4 and 5 show a cloud of words composed of the most recurring author keywords in the documents of the database. Figure 4 has been created including the two terms of research, namely Vulnerability and Conflict, while they have been excluded in Fig. 5. Sizes of the words are proportional to their frequency. This figure allows for a definition of some general key features and the highest highly popular issues of the research. When vulnerability and conflict are included (Fig. 4), the former one is by large the most represented keyword in the database. When the two terms are excluded, the most recurrent keywords are climate change, management, policy, war, adaptation, risk.

Table 4 Ranking of the most cited publications

Author	Year	Journal	Title	N. Cit.
Adger WN	2006	Global environmental change	Vulnerability	26
Homer-Dixon T	1999	Book	Environment, scarcity, and violence	25
Wisner B	2004	Book	At Risk: natural hazards, people’s vulnerability and disasters	22
Turner BL	2003	Proceedings of the national academy of sciences	A framework for vulnerability analysis in sustainability science	20
Barnett J	2007	Political geography	Climate change, human security and violent conflict’	20
Smit B	2006	Global environmental change	Adaptation, adaptive capacity and vulnerability	19
O’Brien K	2007	Climate policy	Why different interpretations of vulnerability matter in climate change discourses	19
Homerdixon TF	1994	International security	Environmental scarcities and violent conflict: evidence from cases	16
Cutter SL	2003	Social science quarterly	Social vulnerability to environmental hazards	16
Ostrom E	1990	Book	Governing the commons: the evolution of institutions for collective action	15

Barde and Gerelli (1980), Roegen (1971), Spash (2000), Söderholm (2001), Martinez-Alier et al. (2010), Encyclical Letter (2015), Borrelli and Citterio (2016), De Solla Price (1965), Garfield (1955), Small (1973)

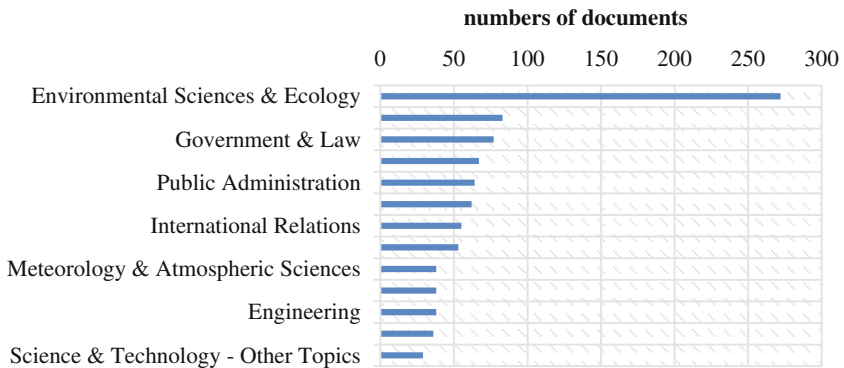


Fig. 3 Ranking of the top subject categories

paradigm of decisions, based on the mere economic calculation, towards open processes able to include the wealth of contradictory visions and preferences of the different actors interested in development of territories according to the idea of a dynamic and democratic society (Pham and Torre 2012). The occurrence of local oppositions emphasizes the importance of taking into consideration software values in addition to the hardware ones and to support decisions by the use of Multicriteria Decision Aid techniques, more adequate to legitimate complex decisions, as they consider multiple rationalities and qualitative issues, rather than the Cost-Benefit Analysis based on the old idea of community as a monolithic block of identical and perfectly rational individuals (Damart and Roy 2009; Bottero 2014).

References

- Adger WN (2006) Vulnerability. *Global environmental change* 16(3):268–281
- Barde JP, Gerelli E (1980) *Economia e Politica dell'ambiente*. Il Mulino, Bologna
- Barnett J, Adger WN (2007) Climate change, human security and violent conflict. *Political Geogr* 26(6):639–655
- Borrelli G, Citterio M (2016) Environmental sustainability: from theory to practice. The contribution of the *Laudato si'* encyclical. *Valori e Valutazioni* 17:9–12
- Bottero M (2014) L'Analisi Multicriteri. Intervista a Bernard Roy, *Valori e valutazioni* 13:7–23
- Cutter S, Boruff B, Shirley W (2003a) Social vulnerability to environmental hazards. *Soc Sci Quart* 84:242–261
- Cutter SL, Boruff BJ, Shirley WL (2003b) Social vulnerability to environmental hazards. *Soc Sci Q* 84(2):242–261
- Damart S, Roy B (2009) The uses of cost–benefit analysis in public transportation decision-making in France. *Trans Policy* 16:200–212
- De Solla Price DJ (1965) Networks of scientific papers. *Science* 149(3683):510 LP-515. Retrieved from <http://science.sciencemag.org/content/149/3683/510.abstract>
- Elinor O (1990) *Governing the commons: the evolution of institutions for collective action*
- Encyclical Letter (2015) *Laudato Si'* of the Holy Father Francis on care for our common home
- Garfield E (1955) Citation indexes for science: a new dimension in documentation through association of ideas. *Science* 122(3159):108 LP-111. Retrieved from <http://science.sciencemag.org/content/122/3159/108.abstract>
- Garfield E, Sher IH (1993) Keywords plus™—algorithmic derivative indexing. *J Am Soc Inf Sci* 44(5):298
- Homer-Dixon TF (1994) Environmental scarcities and violent conflict: evidence from cases. *Int Secur* 19(1):5–40
- Homer-Dixon TF (2010) *Environment, scarcity, and violence*. University Press, Princeton
- Martinez-Alier J, Kallis Giorgos, Veuthey S, Walter M, Temper L (2010) Social metabolism, ecological distribution conflicts, and valuation languages. *Ecol Econ* 20(1):58–87
- Menoni S, Molinari D, Parker D, Ballio F, Tapsell S (2012) Assessing multi faceted vulnerability and resilience in order to design risk-mitigation strategies. *Nat Hazards* 64:2057–2082
- Mishan E (1965) Relections on a recent development in the concept of external effects. *Can J Political Econ* 31:3–34
- Moed HF, Glänzel W, Schmoch U (2005) *Handbook of quantitative science and technology research*. Springer, Netherlands, Netherlands
- Mondini G (2016) Integrated assessment for the mangement of new social challenges. *Valori e Valutazioni* 17:15–18

- Noyons ECM, Moed HF, Luwel M (1999) Combining mapping and citation analysis for evaluative bibliometric purposes: a bibliometric study. *J Am Soc Inf Sci* 50(2):115–131
- O'Brien K, Eriksen S, Nygaard LP, Schjolden A (2007) Why different interpretations of vulnerability matter in climate change discourses. *Clim Policy* 7(1):73–88
- Oppio A, Corsi S, Mattia S, Tosini A (2015) Exploring the relationship among local conflicts and territorial vulnerability: the case study of Lombardy Region. *Land Use Policy* 43:239–247
- Oppio A, Corsi S, Torrieri F, Mattia S (2017) Infrastructure development and territorial vulnerability, the role of composite indicators for addressing siting decisions. *Green Energy Technol Issue* 9783319496757:277–290
- Pham HV, Torre A (2012) La décision publique à l'épreuve des conflits. Un cadre d'analyse des processus décisionnels au regard de l'expression des oppositions, *Revue d'économie industrielle* 138:93–126
- Pigou AC (1948) *The Economics of welfare*. McMillan, London
- Roegen G (1971) *The entropy law and the economic process*. Harvard University Press, Cambridge
- Small HG (1973) Co-citation in the scientific literature: a new measure of the relationship between two documents. *J Am Soc Inf Sci* 24(4):265–269
- Smit B, Wandel J (2006) Adaptation, adaptive capacity and vulnerability. *Global Environ Change* 16(3):282–292
- Söderholm P (2001) the deliberative approach in environmental valuation. *J Econ Issues* 35(2): 487–495
- Spash CL (2000) Multiple value expression in contingent valuation: economics and ethics. *Environ Sci Technol* 34(8):1433–1438
- Turner BL, Kasperson RE, Matson PA, McCarthy JJ, Corell RW, Christensen L, Eckley N, Kasperson JX, Luers A, Martello ML, Polsky C (2003) A framework for vulnerability analysis in sustainability science. *Proc National Acad Sci* 100(14):8074–8079
- Van Eck NJ, Waltman L (2014) Measuring scholarly impact. In: Ding Y et al (eds) *measuring scholarly impact: methods and practice*, pp 285–320. Retrieved from <http://link.springer.com/10.1007/978-3-319-10377-8>
- Wisner B, Blaikie P, Cannon T, Davis I (2004) *At risk: natural hazards, people's vulnerability and disasters*

Risk Management and Goal Programming for Feasible Territorial Investments



Francesco Tajani and Pierluigi Morano

Abstract Urban rehabilitation through the redevelopment of public properties in disuse is among the main issues of urban policies in the Euro area. However, since 2008, mainly due to the economic downturn, the enhancement of public properties has been characterized by an impasse. At this time, the tendency in all European countries is to entrust the valorization of public buildings in disuse to new special entities, in terms of sales to third parties as well as rationalization for the economic management of the property. In this framework, this research aims to propose a decision-support methodology for public and private subjects involved in the valorization of public properties. In particular, the model enables the assessment of the financial feasibility of the initiatives, in relation to the investment risks.

Keywords Risk management · Public buildings · Territorial valorization
Public-private partnership · Goal programming

1 Introduction

In European countries, until 2007, the enhancement of public buildings was mainly conducted in terms of its “alienation”, i.e., the transfer of the property to another (public or private) entity. The idea was that this strategy of valorization, on the one

This paper is the initial version presented in 2016 at the SIEV conference “The Influence on Evaluation Paths of Encyclical *Laudato si’*” of the paper Tajani F, Morano P (2017) ‘Evaluation of vacant and redundant public properties and risk control: A model for the definition of the optimal mix of eligible functions’, published later in a revised and expanded version in the Journal of Property Investment and Finance 35(1):75–100.

F. Tajani (✉) · P. Morano
Department of Civil Engineering Sciences and Architecture,
Polytechnic University of Bari, Bari, Italy
e-mail: francescotajani@yahoo.it

P. Morano
e-mail: pierluigi.morano@poliba.it

hand, would operate to reduce the national debt, thus respecting the constraints of the European Stability Pact; on the other, it would transfer to private stakeholders, provided with financial resources and qualified expertise, the risks related to the renovation and the management of the properties.

However, since 2008, mainly due to the economic downturn, the alienation of public properties has been characterized by an impasse (Guarini 2016). The worsening of the economic stagnation, the credit crunch, the current slowdown in the housing market and the fright of a “fire sale” of public assets have been leading all stakeholders to adopt a waiting attitude and to develop the idea of public assets as resources to be used to achieve strategic objectives.

Currently, in all European countries, the tendency is to entrust to new special entities the development of public properties in disuse, in terms of sale to third parties.

In Italy, several regulations were issued, aimed at rationalizing the divestment of public properties. In particular, in order to facilitate the alienation of public assets through the Decree Law No. 133/2013, the mechanism of direct sales, already provided for assets owned by the state, has been extended to properties owned by local authorities. Therefore, the State Property Agency is authorized to sell by private contract a series of public assets. The sale transaction generates the abolition of the government, existing concessions and any rights of first refusal that could belong to third parties in the event of resale. With the art. 26, par. 1, Law No. 164/2014, a regulation aimed at the reuse of public buildings in disuse was enacted: in order to promote initiatives of valorization for the economic, social and urban redevelopment, the negotiated agreement (Decree No. 267/2000) between the Public Administration and the private investor, concerning the recovery of public buildings in disuse, directly constitutes an urban variant. In this way, the procedure for the change of intended uses of properties to be valorized is simplified, resulting in reduction of bureaucratic delays and risks of the investments.

2 Aim

In this paper, a decision-support model for public and private subjects involved in the enhancement of the property is developed and tested (Tajani and Morano 2017). The model allows the *ex-ante* verification of the financial feasibility in relation to the risks related to the initiative.

The model is developed in relation to Italy, where there are numerous public properties to be valorized and, in recent years, several regulations aimed at rationalizing the development of public properties have been enacted. The framework is represented by the cases in which the public asset in disuse can be sold and the range of functions that define the highest and best use of the conversion has been identified.

The decision to consider the Italian context for the implementation of the model is also correlated to the features of the Italian public properties in disuse, in

particular: their important size; their location, usually in central areas and/or in zones characterized by cultural and environmental values; the identity-relevant and social function played along the time for the local communities (Capolongo et al. 2015). In these cases, the bilateral monopoly-market form is normally verified. In this situation the exchange price—i.e., the *fair value* of the property, that represents “the estimated price for the transfer of an asset or liability between identified knowledgeable and willing parties that reflects the respective interests of those parties” (RICS 2015)—is not defined a priori, but only a range of values of the equilibrium price can be determined, depending on various variables, that represent the negotiating skills of the parties involved.

With the model, the profit of the private investor is estimated by defining, for each function included in the highest and best use of the property, the volatility of the time series of annual revaluation rates recorded, for each intended use, in the reference market. The basis of the model is the hypothesis that the highest risks are related to the intended uses characterized by the highest selling prices: it is evident that, otherwise, the investor would have no interest in carrying out the riskiest functions.

This paper is divided into three parts. In the first part, the model is explained. In the second part, the model is applied to a case study concerning the enhancement of a public property in disuse located in a city in the southern Italy, in order to realize a mix of private functions (residential units, commercial units and offices). Finally, the conclusions of the work are summarized.

3 The Model

The model uses the logics of the goal programming techniques (Courtney et al. 1972; Lee and Keown 1979; Manganelli et al. 2016; Tan et al. 2008). The steps that contribute to the definition of the model are specified as follows: the methodological approach implemented to estimate the profit of the private investor is illustrated, the financial aims of the parties involved (public administration and private investor) are specified, the limits and the variables of the model are described and the respective procedure is codified.

3.1 *The Profit of the Private Investor*

Expressing the expected profit as a percentage of the returns generated by the investment, the annual yield (s) expected by an investor who engages in risky activity can be divided into three components. The first is the minimum rate of return (s_{min}) that the investor expects in a theoretical risk-free situation, to compensate for (i) the opportunity cost of low-risk investments, (ii) the expected inflation and (iii) the coordination of the productive factors. The second component

identifies the premium ($s_{premium}$) expected by the investor for the risk to support the investment in analysis. The third factor (s_{equity}) is the recompense for the equity required for the execution of the initiative. Therefore:

$$s = s_{min} + s_{premium} + s_{equity} \quad (1)$$

In the reference literature, there are various approaches for quantifying the premium for the investment risk. These procedures are characterized by the limit connected to the uncertainty of the exogenous definition of the amount to be assigned to each of the factors involved in the definition of the investment risk of the initiative (Hughes 1995; Byrne and Lee 2004; Johnson et al. 2006; French and Gabrielli 2006). The model proposed in this paper overcomes this limitation through the endogenous quantification of the risk.

Assuming that the sums required for the purchase of the public property in disuse and for the implementation of the initiative are fully covered from external sources, the uncertainty for the private entrepreneur related to the financial structure of the investment is nullified ($s_{equity} = 0$). In these conditions, the investment risk is primarily represented by the volatility associated with the combination of intended uses to be realized: a mix of riskier functions will result in a higher profit expected by the private investor.

For the purposes of the implementation of the model, it is assumed that the risk related to each intended use is represented by the volatility of the time series of the real (i.e., adjusted for inflation) annual revaluation rates of the sale prices detected for that intended use, in a significant time period and in the area in which the property to be valorized is located.

Taking into account that in a specific area the distribution of the real annual revaluation rates of the sale prices can be reasonably approximated by a Gaussian model (Manganelli et al. 2014), the risk associated to each intended use can be quantified through the standard deviation (σ) of the determined rates, calculated with respect to the mean value (Bienert and Brunauer 2007).

In the assumption that a mix of functions (e.g., residential, commercial, office etc.) identifies the highest and best use of the public property to be valorized, the annual yield expected from the conversion of the property in disuse related to the investment risk can be determined by Eq. (2), as the mean value of the volatilities of the intended uses detected in the area of the reference market, weighted by the amounts of the corresponding gross floor surfaces (GFS). In Eq. (2), the subscript i indicates the generic eligible function in the property to be enhanced, n is the number of eligible functions, GFS_{TOT} represents the total gross floor surface of the property.

$$s_{premium} = \frac{\sum_i^n \sigma_i \cdot GFS_i}{GFS_{TOT}} \quad (2)$$

The total profit expected by the private investor, as a percentage (β) of total returns, can be determined through Eq. (3), in which t constitutes the number of years needed to realize the entire renovation of the public property to be enhanced.

$$\beta = s \cdot t = (s_{\min} + s_{\text{premium}}) \cdot t = \left(s_{\min} + \frac{\sum_i^n \sigma_i \cdot GFS_i}{GFS_{TOT}} \right) \cdot t \quad (3)$$

3.2 Financial Objectives of the Parties Involved

In the hypothesis that the enhancement of a public building provides for the alienation of the property to a private investor, aimed at the realization of functions for sale on the free market, the financial objective of the public administration is mainly represented by the maximization of the amount to be collected from the sale of the property in disuse and purchased by the private investor (C_{sale}).

The private investor is driven by the hedonistic principle of maximum profit at minimum cost. Usually, the private profit (T) is calculated as a percentage (β) of total revenues (R) generated by the sale of the gross floor surfaces realized through the property transformation. In the case of the redevelopment of a public property in disuse, the total achievable volumes are influenced by the size of the property, so the combination of intended uses in which the total gross floor surface of the property can be divided is the only factor on which the private investor can act to maximize the profit. Since the functions denoted by the highest selling prices are characterized not only by the highest returns, but also by the highest risks, and, considering that the investment risk is a cost to the investor, the private subject aims at two mutually conflicting objectives: (i) maximization of total revenues (R), objective pursued realizing the intended uses characterized by the highest selling prices; and (ii) minimization of the investment risk (s_{premium}), objective viable pointing to the intended uses which correspond to the lowest volatilities of the returns.

Taking into account that in mathematical programming the maximization of a goal is equivalent to the minimization of its opposite, the total objective function of the model, in which both interests of the generic private investor and those of the public administration are involved, can be written as follows:

$$\max (R - s_{\text{premium}} + C_{\text{sale}}) \quad (4)$$

3.3 Constraints of the Model

The first constraint of the model is due to the maximum achievable gross floor surfaces, which are conditioned by the total size (GFS_{TOT}) of the public property to be valorized. Equation (5) identifies the first constraint.

$$\sum_i^n GFS_i = GFS_{TOT} \quad (5)$$

The second constraint regards the convenience of the initiative for the private investor: the purchase and the transformation of the public property will be profitable if the difference between the total revenues (R), the cost for the purchase of the public property (C_{sale}) and the total transformation costs (C_{transf}) is higher than the expected profit ($T = \beta \cdot R$). This constraint is expressed in Eq. (6) in mathematical symbols.

$$R - (C_{transf} + C_{sale}) \geq \beta \cdot R \quad (6)$$

Equation (7) explained the terms that constitute the revenues (R), taking into account the unit sale prices of the considered intended uses (V_i).

$$R = \sum_i^n V_i \cdot GFS_i \quad (7)$$

The third constraint relates to the non-negativity of the gross floor surfaces and the purchase price of the public property to be enhanced, and it is summarized in Eq. (8). However, it must be highlighted that, in specific cases, this constraint could translate in mathematical terms the condition that some sizes must be equal or not lower than predetermined amounts, established for design reasons, for reasons due to the technical characteristics of the property to be valorized or for agreements between the parties involved.

$$\begin{cases} GFS_i \geq 0 \\ C_{sale} \geq 0 \end{cases} \quad (8)$$

3.4 The Algorithm of the Model

According to the defined constraints and the objectives of the parties involved in the transformation of a public property in disuse, the model can be codified in Table 1.

Table 1 Algorithm of the model

Variables	GFS_i, C_{sale}
Objective function	$max (R - s_{premium} + C_{sale})$
Constraints	$R - (C_{transf} + C_{sale}) \geq \beta \cdot R$ $\sum_i^n GFS_i = GFS_{TOT}$ $\begin{cases} GFS_i \geq 0 \\ C_{sale} \geq 0 \end{cases}$

4 Application of the Model

The model is applied to the actual case of a public property in disuse located in a city in the Province of Bari, in the southern Italy.

The hypothesis of enhancement of the property provided for the sale of the building and its transformation in private functions (residential, commercial and office units) is, for $GFS_{TOT} = 12,000 \text{ m}^2$.

The application of the model enables the determination of the *fair value* of the building (C_{sale}) for the parties involved, taking into account the functional mix of the three intended uses considered.

According to market surveys, the amounts of exogenous parameters needed for the implementation of the model are defined (see Table 2). The minimum rate of return expected by the investor (s_{min}), fixed at 4%, is determined considering the annual rate of return of risk-free investments (e.g., Italian government bonds at June 2016), with a duration equal to the analysis period of the transformation of the building ($t = 3$), increased through the expected inflation rate and the remuneration of the private investor for the activity of coordination of productive factors.

The time series of the real annual revaluation rate of sale prices for the various intended uses, necessary for the assessment of the investment risk in terms of standard deviation, are obtained considering the average annual market values—for statistically significant periods—published by the Observatory of the Real Estate

Table 2 Parameter values for the implementation of the model

t	3
s_{min}	4.00%
σ_{res}	4.53%
σ_{comm}	9.17%
σ_{off}	2.50%
GFS_{TOT}	12,000 m^2
V_{res}	2400 $\text{€}/\text{m}^2$
V_{comm}	2500 $\text{€}/\text{m}^2$
V_{off}	2200 $\text{€}/\text{m}^2$
c_{res}	780 $\text{€}/\text{m}^2$
c_{comm}	650 $\text{€}/\text{m}^2$
c_{off}	600 $\text{€}/\text{m}^2$

Agency Market (Italian Revenue Agency) for the “Microzone” of the city in which the property to be enhanced is located. In fact, the Italian real-estate market has a geographical segmentation in “Microzones”, defined according to the Presidential Decree 138/1998 and pursuant to the Regulation issued by the Economy and Finance Ministry. For the Italian regulation, the “Microzone” is a part of the urban area that must be on a city-wide basis homogeneous and at the same time must constitute a homogeneous real-estate market segment.

In Table 2, the unit market values (V_{res} , V_{comm} , V_{off}) and the unit costs for restructuring (C_{res} , C_{comm} , C_{off}) of gross floor surfaces for the various intended uses are reported, detected through surveys to local operators in the territory in analysis.

In Table 3, the components of the transformation cost are explained. In particular: C_{res} is the cost for restructuring of the gross floor surfaces intended for “residential” function; C_{comm} is the cost for restructuring of the gross floor surfaces intended for “commercial” function; C_{off} is the cost for restructuring of the gross floor surfaces intended for “office” function; C_{tech} represents the technical expenses; C_{manage} are the operating expenses for the management of the transformation activities; C_{market} are the commercialization expenses for the marketing activities of the finished product and the brokerage of real estate agencies; C_{loan} constitutes the financial charges, i.e., the interest on the capital borrowed for the realization of the transformation project.

The outputs of the model are reported in Table 4. It should be noted that the algorithm tends to prefer the least risky intended use, that is the “office” one ($GFS_{off} = 5584 \text{ m}^2$), characterized by the lowest unit selling price and also the lowest unit cost for restructuring, whereas 3768 m^2 are allocated for the riskiest function (that is the “commercial” one) and 2648 m^2 are intended for the

Table 3 Components of the transformation cost (C_{transf})

C_{res}	$780 \cdot GFS_{res}$
C_{comm}	$650 \cdot GFS_{comm}$
C_{off}	$600 \cdot GFS_{off}$
C_{tech}	$6\% \cdot (C_{res} + C_{comm} + C_{off})$
C_{manage}	$3\% \cdot (C_{res} + C_{comm} + C_{off})$
C_{market}	$2\% \cdot R = 2\% \cdot (V_{res} \cdot GFS_{res} + V_{comm} \cdot GFS_{comm} + V_{off} \cdot GFS_{off})$
C_{loan}	$5\% \cdot (C_{res} + C_{comm} + C_{off} + C_{tech} + C_{manage} + C_{market} + C_{sale})$

Table 4 Outputs of the model

GFS_{res}	2648 m ²
GFS_{comm}	3768 m ²
GFS_{off}	5584 m ²
C_{sale}	10,340,100 €
R	28,060,000 €
β	27.127%
T	7,611,836 €

“residential” use. The earnings of the investment for the parties involved are both interesting: the profit of the private investor is equal to 7,611,836 €, that is 27.127% of the total revenues of the initiative ($R = 28,060,000$ €), whereas the fair value of the property (C_{sale}) is equal to 10,340,100 €, that is 36.85% of the total revenues of the investment.

5 Conclusions

The model developed and tested in the present research enables the valuation the financial viability of the transformation of public assets in disuse, whenever their alienation is planned and the opportunity to realize salable buildings units is allowed.

The model proposes a rational method for the appraisal of the profit of the private investor in the initiative. By borrowing the mathematical logics of the goal programming, it enables the determination of: (i) the optimal mix of intended uses to be realized in the public property in analysis; and (ii) the *fair value* of the public property for the parties involved in the initiative.

The model developed constitutes a decision support tool for public entity and private investor involved in the enhancement of the property. Public administrations will use it to simulate the costs/revenues’ balance of the initiative, in order to assess the financial feasibility and the selling price of the property for various combinations of eligible intended uses. On the other hand, the private investor will use the model to expand the vision of the issues related to the initiative, highlighting its strengths and weaknesses. In this sense, the research contributes both to the achievement of European objectives of Horizon 2020 that, in the initiative “Smart Cities and Communities”, deals with urban themes and social issues, and to the current needs of an *integral ecology* (economic, social and cultural) (§ 137) expressed by the “Laudato si” Encyclical, by constituting a valid scientific reference for the new national and local policies.

References

- Bienert S, Brunauer W (2007) The mortgage lending value: prospects for development within Europe. *J Prop Invest Financ* 25(6):542–578
- Byrne P, Lee S (2004) Different risk measures different portfolio compositions. *J Prop Invest Financ* 22(6):501–511
- Capolongo S, Buffoli M, Oppio A (2015) How to assess the effects of urban plans on environment and health. *Territorio* 73:145–151
- Courtney JF Jr, Klastorin TD, Ruefli TW (1972) A goal programming approach to urban-suburban location preferences. *Manage Sci* 18(6):B-258
- French N, Gabrielli L (2006) Uncertainty and feasibility studies: an Italian case study. *J Prop Invest Financ* 24(1):49–67

- Guarini M (2016) Self-renovation in Rome: Ex Ante, in Itinere and Ex Post Evaluation. In: International conference on computational science and its applications, LNCS, vol 9789, pp 204–218
- Hughes WT (1995) Risk analysis and asset valuation: a Monte Carlo simulation using stochastic rents. *J Real Estate Financ Econ* 11(2):177–187
- Johnson R, Lizieri CM, Soenen L, Worzala EM (2006) Simulating currency risk on private investments in real estate. *J Real Estate Portf Manage* 12(9):91–102
- Lee SM, Keown AJ (1979) Integer goal programming model for urban renewal planning. *Urban Syst* 4(1):17–26
- Manganelli B, Morano P, Tajani F (2014) Risk assessment in estimating the capitalization rate. *WSEAS Trans Bus Econ* 11:199–208
- Manganelli B, De Paola P, Del Giudice V (2016) Linear programming in a multi-criteria model for real estate appraisal. In: International conference on computational science and its applications, LNCS, vol 9786, pp 182–192
- RICS (2015) RICS valuation—professional standards, London
- Tajani F, Morano P (2017) Evaluation of vacant and redundant public properties and risk control: A model for the definition of the optimal mix of eligible functions. *J Prop Invest Financ* 35 (1):75–100
- Tan Y, Shen L, Lu W, Shen Q (2008) Multiple-objective bidding strategy using goal programming technique. *Manag Decis* 46(4):656–672

An Embedded Mixed-Methods Approach to Evaluating Regeneration Strategies for the Historic Center of Trieste



Mauro Crescenzo, Sara De Matteis, Marta Bottero, Mauro Berta and Valentina Ferretti

Abstract This paper proposes an integrated evaluation approach as a support tool for the design of urban regeneration operations in historic centers, and it highlights the need for innovative assessment and design strategies useful for generating greater involvement and community awareness. In particular, the study proposes an Embedded Mixed-Methods Approach focusing on the case study of Trieste (northern Italy). The evaluation framework is based on the integration of the Multi Attribute Value Theory (MAVT) with various other methods, such as SWOT Analysis, Stakeholder Analysis, the Public Space Quality Protocol and the NAIADE technique. The results illustrate the ability of the proposed methodology to promote a successful network of actions and strategies for the regeneration of historic centers.

Keywords Multicriteria analysis · Urban regeneration · Trade-offs Stakeholders · Historic center

M. Crescenzo
Architect, Trieste, Italy
e-mail: mauro.crescenzo@gmail.com

S. De Matteis
Architect, Turin, Italy
e-mail: saradematteis@outlook.it

M. Bottero (✉)
Department of Regional and Urban Studies and Planning,
Politecnico Di Torino, Turin, Italy
e-mail: marta.bottero@polito.it

M. Berta
Department of Architecture and Design, Politecnico Di Torino, Turin, Italy
e-mail: mauro.bera@polito.it

V. Ferretti
Department of Management, London School of Economics
and Political Sciences, London, UK
e-mail: V.Ferretti@lse.ac.uk

1 Introduction and Overview

This paper investigates an integrated evaluation framework that is able to support the decision-making process for the definition of innovative and more sustainable planning strategies. In particular, the study focuses on the analysis of regeneration processes of historic centers, which are characterized by multiple dimensions and high levels of complexity. As the Encyclical letter *Laudato si'* of the Holy Father Francis (2015) recalls, when dealing with urban planning and cities, it is in fact very important to adopt integral approaches that enable that the various ecological, social and economic aspects are included in the project. Moreover, the Encyclical letter highlights the necessity of embracing transparent and participative decision processes in order to permit the needs of the social actors involved and the analysis of alternative options of intervention to be considered.

The article develops a real-world application of the proposed methodology for the historic center of Trieste (northern Italy) (Crescenzo and De Matteis 2016): a city pervaded by history and its ancient Roman origins. In particular, the historic center, which is called Cittavecchia, experienced a large depopulation at the end of the 1700s due to the development of new parts of the city and it was then repopulated with the poorest class of society (Tamaro 1964). In the early 20th century, the plan to demolish large parts of its buildings and an extensive abandonment of the area caused collapses, poor sanitary conditions (Maggi et al. 2009) and its walling-up until the early 1990s. The increasing awareness of the emergency led to the first recovery plans and legislative initiatives in 1986. In 1998, European Union funds were obtained for the renovation of Cittavecchia within the Urban II program, which can be considered a success because large parts of the area were recovered and archaeological discoveries were made (Morselli 2007). However, over the years, several incomplete interventions offered only a partial solution for the urban environment; for this reason, new interventions and projects for a proper regeneration of the area are required. The objective of this study is thus to investigate the role of an integrated evaluation approach in the definition of intervention strategies for the regeneration of the historic center of Trieste.

2 The Appraisal Framework for the Evaluation

The study proposes, as a support tool for complex urban-regeneration processes, the application of an Embedded Mixed-Methods Design that is useful because various data sets can better be exploited and can deal with various types of questions (Creswell 2003; Creswell and Plano Clark 2011). This advanced Mixed-Methods Procedure integrates quantitative and qualitative data with various approaches, increasing their resulting meaning, nesting the databases and providing a supportive role in the decision processes (Creswell 2003; Roscelli 2014; Mondini 2016).

2.1 Phases of the Evaluation

Various techniques and phases simplify and enhance the flexibility of the evaluation process, obtaining a clear result that can support the design phase of the regeneration interventions (Fig. 1). In the present application, the existing conditions of the area have been systematized through various analyses that have been performed at different scales (urban, neighbourhood, single building) to structure the large amount of data, to highlight the possible synergies and to better define a regeneration strategy.

2.2 SWOT and Stakeholders Analyses

The first phase of the evaluation considers the development of the SWOT analysis as it permits urban development processes to be supported by collecting information and focusing on the aspects involved. For this study, each key category of the SWOT analysis (namely Strengths, Weakness, Opportunities and Threats) has been articulated in six sub-categories that comprise the Structural, Architectural and Cultural, Functional, Environmental, Social, Economic and Regulatory aspects in order to better investigate the complexity of the decision problem under examination.

The second phase of the evaluation involves the application of the Stakeholders Analysis (SA). In fact, people play a central part in a regeneration process, acting on various levels through different roles and resources (Berta et al. 2016). This methodology is useful to clarify the position of the various Stakeholders—i.e., individuals or organizations that are capable of influencing a decision-making process and are interested in achieving a possible solution (Dente 2014)—and their possible conflicting interests from the first phases of a strategic planning.

Among the various methodologies for the implementation of the SA (Yung 2014), the Stakeholders Circle methodology (Bourne and Walke 2008) has been applied in the present study. This methodology identifies stakeholders' values and objectives to better consider the complex existing network of social relationships (Bottero et al. 2016), and it represents graphically stakeholder relationships with the project by means of a pattern where the area and the arc dimension correspond to the stakeholder's influence, while the distance from the center defines the stakeholder's power to exert control on the project (Fig. 2).

2.3 Multi-attribute Value Theory (MAVT)

Multi-Attribute Value Theory (Keeney and Raiffa 1976) is a multicriteria analysis methodology (Figueira et al. 2005) useful to address problems involving a finite and

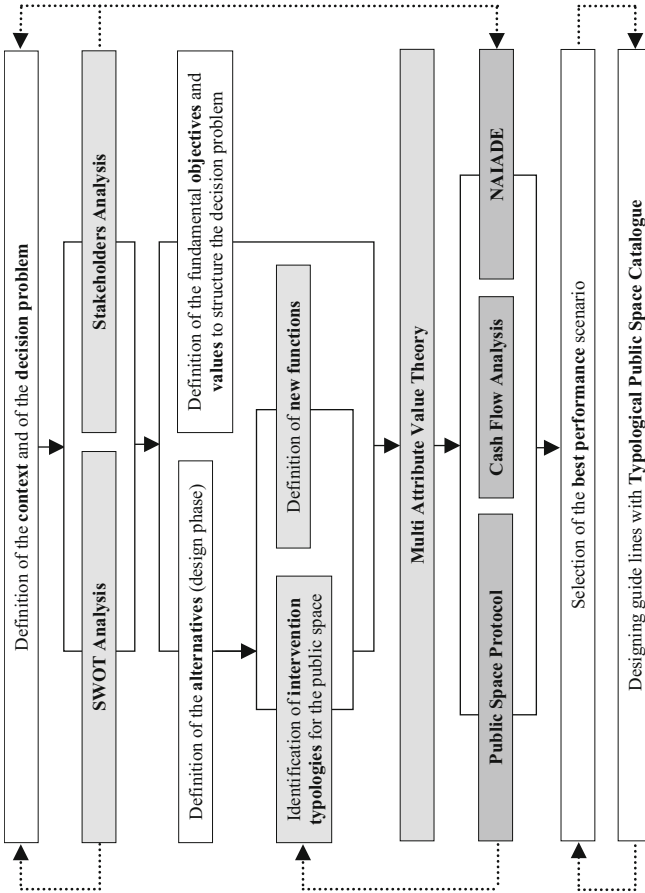


Fig. 1 Steps of the evaluation and of the design process with their influences on other phases

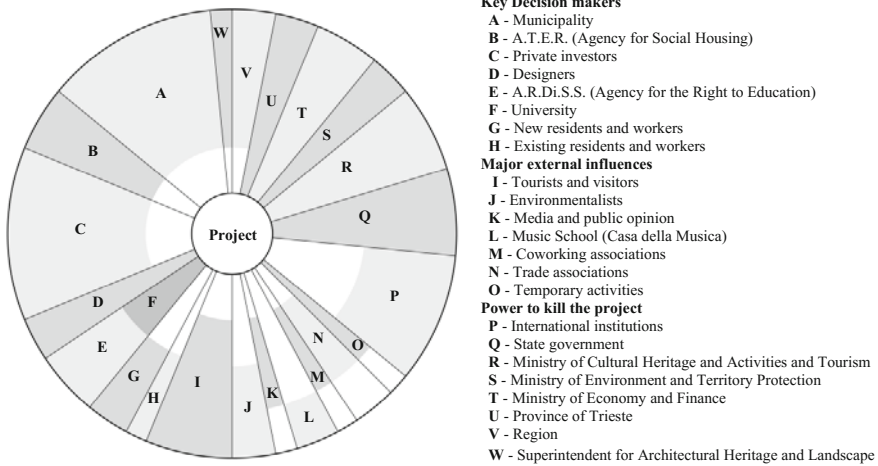


Fig. 2 Stakeholder circle methodology developed for the case study of Trieste



Fig. 3 Shared dimension of the design process (left), suggestion for the tourism strategy (right)

discrete set of alternative options that have to be evaluated on the basis of conflicting objectives. By being able to handle quantitative, as well as qualitative data, MAVT plays a very crucial role in the field of urban and territorial decision-making where many aspects are often intangible. The MAVT enables comparisons of the performances of predefined alternatives using a multidisciplinary approach to help identify the best performing one (Bottero et al. 2014).

2.3.1 Alternative Strategies

The evaluation process is closely related to envisaging various strategies for unused, underused, built and empty spaces that differ for public-space design and functional-mix solutions (Table 1). Each strategy intends to re-center Cittavecchia

Table 1 Proposed alternative strategies for the regeneration of the Cittavecchia historic center

Strategy	Description
1. Working setting	Most of the buildings host offices, co-working areas, ateliers, laboratories, hotels, a big market, other small shops and a conference center. In this strategy, public spaces become ideal places to take a break or to work outside during the day
2. Tourism environment	Public spaces are designed as an outdoor museum enhancing historic traces and archaeological remains, defining areas and paths. Moreover, existing and new tourist attractions are systematized thanks to a tourist office
3. Residential location	Existing spaces are converted for residential purposes and services creating a more liveable urban environment and reducing the gentrification process with various housing solutions. The cooperative use of the public spaces is also enhanced: a Neighbourhood Community House in Piazza Cavana unites various associations, becoming the lung of Cittavecchia, where citizens are the oxygen of regeneration

and build a more liveable city (Fig. 3) improving the quality of the urban environment based on preservation and reusing principles, solving the existing fragmentation of values and aspects, and encouraging the future generations' understanding and awareness of traces and dynamics evolved through past, present and future. The alternatives refer also to the suggestions and solutions proposed by the Typological Public Space Catalogue: a design tool that collects and organizes data and experiences of various case studies in six design themes (Figs. 4 and 5).

2.3.2 Structuring the Decision-Making Problem

The MAVT methodology simplifies the evaluation process by breaking down values and objectives problems and reassembles them in a flexible evaluation structure. The identification of the fundamental and instrumental objectives is the central part of the process as they are the aspects upon which the decision is based. Figure 6 illustrates the MAVT structure for the case under examination. In particular, four fundamental objectives and the respective four instrumental ones—also called attributes—have been thus identified considering the broad spectrum of aspects involved in the regeneration process of Cittavecchia.

2.3.3 Definition of Value Functions

Thanks to the multidisciplinary approach of the MAVT, it is possible to consider attributes that differ in quantification techniques and measurement units. Each attribute is then described by a value function that allows to scale the attributes between 0 and 1 in order to compare non-commensurable items (Beinat 1997; Ferretti 2012). Some attributes require complex quantification processes; this is the

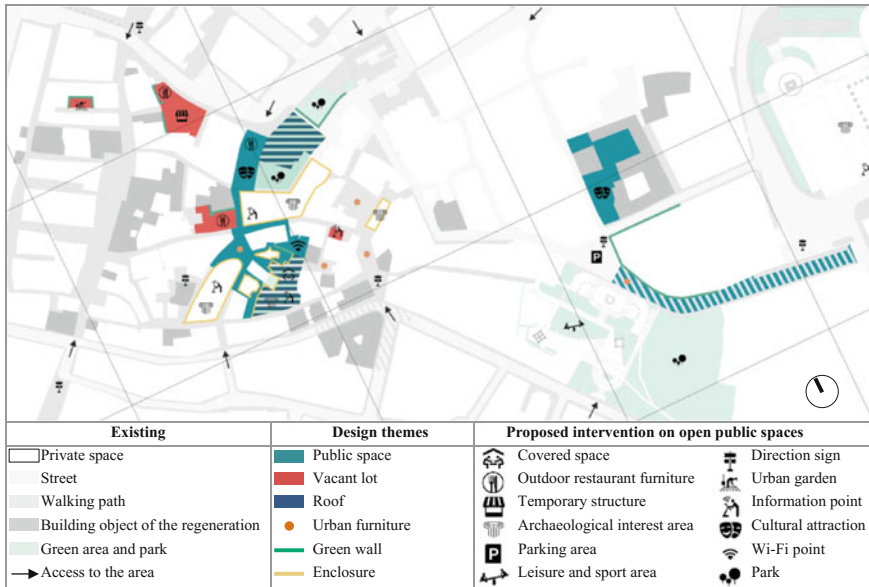


Fig. 4 Examples of proposed design themes for the tourism environment strategy

case of the “Public and Private Convenience” attribute, which has been evaluated with the development of a specific Discounted Cash Flow Analysis (Manganelli 2015). Also, for the “Public Space Quality Index” and “Coalition Index” attributes, specific innovative techniques have been proposed in this study. These techniques are described in the following paragraphs.

Public-Space Quality Protocol

An original protocol has been developed for the evaluation of the “public-space quality” attribute. In particular, the protocol concerns a multidimensional evaluation framework that considers six categories of public-spaces quality (Table 2). According to the results of this evaluation, the highest score is obtained by strategy 2 (*tourism environment*: 44/53), followed by strategy 3 (*residential location*: 40/53), and then by strategy 1 (*working setting*: 34/53). It has to be noted that the score obtained by the “Doing nothing” option (16/53) is very low compared to the proposed strategies, meaning that the alternative options considered in the evaluation are able to provide a significant improvement to the public-space quality.

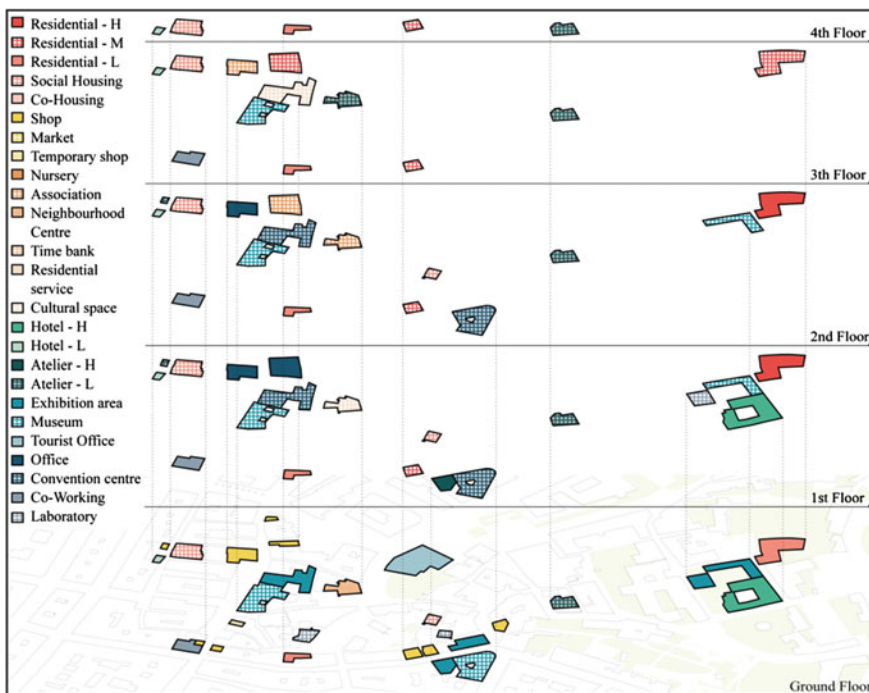


Fig. 5 Proposed functions for the tourism strategy (H = High price; M = Medium price; L = Low price)

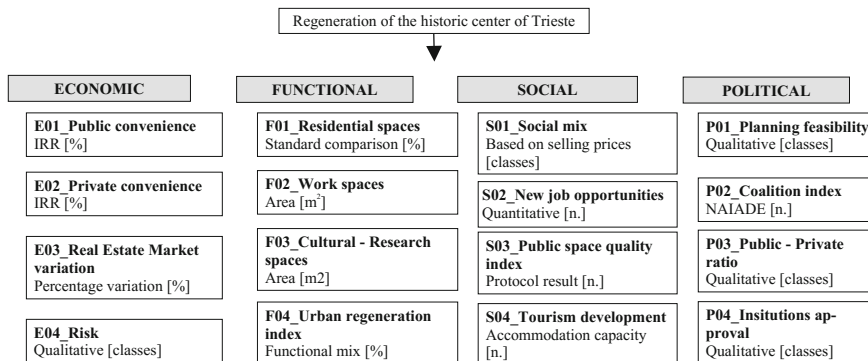


Fig. 6 MAVT structure with the various objectives, type of data and unit of measurement

Application of NAIADE Method

NAIADE (Novel Approach to Imprecise Assessment and Decision Environments) (Munda 1995; JRC 1996) is based on the Social Multicriteria Evaluation approach that was developed by Munda (1995) as a useful framework for the application of

Table 2 Evaluation of the alternative strategies using the Public-Space Quality Protocol

Aspect	Description	Range	Scores			
			Strategy1	Strategy 2	Strategy 3	Doing nothing
<i>Structure</i> 8/53	Centrality	[0;1;2] ^a	2	2	2	2
	Accessibility	[0;1;2] ^b	2	2	2	2
	Walkability (Blecic et al. 2014)	[0;1;2] ^b	1	1	1	1
	Slope of the ground	[0;1;2] ^b	1	1	1	1
<i>Function</i> 15/53	Functional mix	[0;1;2] ^b	2	2	2	1
	Public access to the ground floors	[0;1;2] ^b	2	2	1	1
	Active-citizenship areas	[0;1;2] ^b	1	1	2	1
	Thematic links between spaces	[0;1] ^c	0	1	1	0
	Shaded outdoor areas	[0;1;2] ^c	2	1	1	0
	SMART technologies	[0;1;2] ^b	1	2	1	0
	Percentage of space used	[0;1;2] ^b	1	2	1	0
	Street-furniture comfort grade	[0;1;2] ^b	1	1	2	0
<i>Society</i> 9/53	Social mixed-use of spaces	[0;1;2] ^b	1	2	2	1
	Relaxation/ aggregation areas	[0;1;2] ^c	1	1	2	1
	New working opportunities	[0;1;2] ^c	2	2	1	0
	Security perception	[0;1] ^c	1	1	1	1
	Sport/leisure areas	[0;1;2] ^c	1	1	2	0
<i>Culture</i> 8/53	Space identity	[0;1;2] ^b	1	2	1	0
	Conservation of cultural heritage	[0;1;2] ^b	2	2	2	1
	Valorization of cultural heritage	[0;1;2] ^b	0	2	1	0
	Presence of orientation points	[0;1;2] ^c	1	2	1	0
<i>Environment</i> 5/53	Green areas	[0;1;2] ^c	1	1	2	1
	Urban gardens	[0;1;2] ^f	1	1	2	0
	Innovative energy systems	[0;1] ^d	1	1	1	0

(continued)

Table 2 (continued)

Aspect	Description	Range	Scores			
			Strategy1	Strategy 2	Strategy 3	Doing nothing
<i>Time factor</i> 8/53	Continuous fruition of spaces	[0;1;2] ^b	1	1	1	1
	Flexibility/modularity	[0;1;2] ^b	2	2	2	0
	Permanent urban events	[0;1;2] ^c	1	2	1	0
	Temporary events potential	[0;1;2] ^b	1	2	1	1

^a[0 = Periphery; 1 = Semi-Periphery; 2 = Centre]

^b[0 = Low; 1 = Medium; 2 = High]

^c[0 = Few; 1 = Medium; 2 = Many]

^d[0 = No; 1 = Yes]

^e[0 = Low; 1 = Good]

^f[0 = None; 1 = Medium; 2 = High]

social choice to complex political problems with the aim of introducing political constraints, interest groups and collusion effects. In particular, the NAIADÉ method is based on the development of two different evaluations: a technical one that aims at defining the performances of the considered alternatives by means of a set of criteria and an equity-and-conflict analysis that aims at identifying those alternatives that could reach a certain degree of consensus among the various interest groups. This study proposes an innovative application of the NAIADÉ Equity Matrix to quantify the “*Coalition Index*” attribute: a numerical value that identifies the strength of coalitions among the stakeholders for the considered alternatives. For this purpose, for each alternative strategy, an equity matrix has been created, which contains the evaluation of specific groups of social actors for each option (Table 3). The result obtained for each Equity Matrix is a dendrogram (Fig. 7) that symbolizes (in a range from 0 to 1, for the weakest and strongest coalition possible, respectively) the strength of each potential coalition. The final score of each strategy is the sum of the dendrogram’s partial values: the highest score is obtained by strategy 2 (*Tourism Environment*: 5,44/7), followed by strategy 1 (*Working Setting*: 5,26/7) and by strategy 3 (*Residential Location*: 3,49/7).

2.3.4 Weight Assessment and Results Aggregation

Once the alternatives have been evaluated, the importance of the various attributes on the decision-making problem is defined according to the Swing Method, which explicitly incorporates the attribute ranges in the elicitation question (Montibeller and Franco 2007). A panel of experts with expertise in various fields (Table 4) rated the improvement of each attribute from the lowest to the highest level using a

Table 3 Equity Matrix for the application of the NAIADE method

Stakeholders groups	Equity matrix values		Stakeholders groups	Equity matrix values		Stakeholders groups	Equity matrix values	
	Strategy 1	Existing		Strategy 2	Existing		Strategy 3	Existing
(1) Workers	6	1	(1) Workers	8	1	(1) Workers	5	1
(2) A + B	6	1	(2) A + B	7	1	(2) A + B	8	1
(3) W	4	1	(3) W	8	1	(3) W	5	1
(4) E + F	7	1	(4) E + F	6	1	(4) E + F	8	1
(5) C	6	1	(5) C	7	1	(5) C	9	1
(6) K	5	1	(6) K	8	1	(6) K	6	1
(7) Residents	7	1	(7) Residents	5	1	(7) Residents	9	1

Stakeholders with letters refer to the stakeholders' circle methodology (Fig. 2)

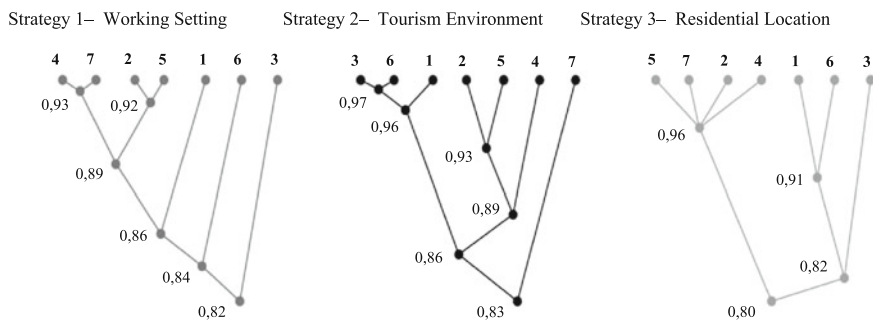


Fig. 7 Elaboration of the NAIADE coalition dendrograms. The numbers at the top refer to the stakeholders groups as in the Stakeholders equity matrix (Table 3)

Table 4 Panel of experts for the evaluation of the objectives trade-offs

Level	Objective	Expert name	Expert role in the decision-making process
Instrumental	Economic	Luigi Buzzacchi	Professor of Management at Politecnico di Torino
Instrumental	Functional	Francesco Pavanello	Architect of Trieste urban programme
Instrumental	Social	Laura Famulari	Councillor for Social Policies and services for disabled people
Instrumental	Political	Giulio Gregori	Former Head of the Municipal Building Permission Service
Fundamental	All	Andrea Dapretto	Councillor for State Property, municipal assets, public works
Fundamental	All	Sergio Ashiku	Former Councillor for State Property, municipal assets, public works

reference state in which all attributes are at their lowest level. The interviewee is asked to assign points (e.g., in the range 0–100) to various states in which one attribute at a time is advanced to the best state. From the elicitation procedure, the overall set of weights is obtained (Fig. 8), while the total value of each alternative is calculated with the aggregation of the single-attribute value functions with additive assumptions and the obtained set of weights. The best performing strategy for Trieste resulting from the MAVT is the number 2 Tourism Environment (Fig. 9).

The sensitivity analysis identifies the stability of the result with the variation of the considered set of weights: it enhances one by one the weight of each fundamental objective while reducing the others. It is then possible to confirm that the *Tourism Environment* strategy obtains the best global performance (Fig. 10).

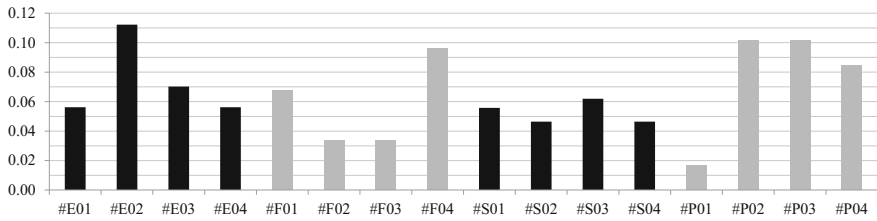


Fig. 8 Weights of the attributes as defined by the panel of expert

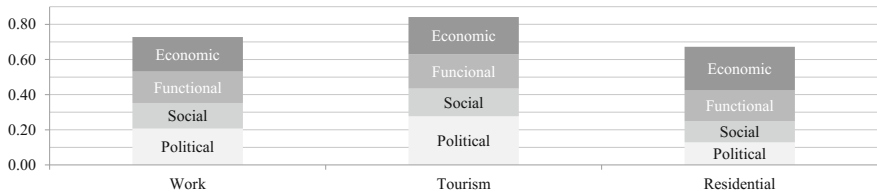


Fig. 9 Performances of each alternative and impact on the result of the fundamental objectives

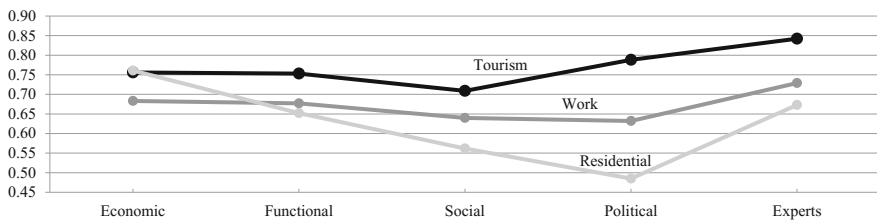


Fig. 10 Sensitivity analysis results

3 Discussion of the Results and Conclusions

The increasing importance of the social dimension is one of the major challenges of decision-making processes in the context of urban and historic centers regeneration processes (Giuffrida et al. 2017). The proposed Embedded Method can better guide and further simplify these complex processes for an “economic ecology” of the regeneration—as defined by the Encyclical letter—aiding both decision makers and designers and offering a more inclusive and shared planning strategy. This method, in fact, proved to be able of considering the broad spectrum of points of view and knowledge, better involving stakeholders and the whole community within the process and encouraging the debate and the awareness of problems (Blecic et al. 2014). Each contribution to the evaluation is based on a different perspective, which shares with the governance itself communitarian and equality ideologies (NAIADE), or more individualistic visions and principles as regards the

weight-assessment process. The mental abstraction approach of breaking down objectives and themes, upon which the MAVT evaluation is based, permits us to identify, sort and redefine the existing complexity and can also be proposed again in other phases such as for the Public-Space Quality Protocol or for the Typological Public-Space Catalogue, which links design and evaluation phases breaking down case studies in design themes. The evaluation framework can be also easily adapted and re-applied for further developments in order to cope with change in conditions and needs. Despite the coherence and the utility of the results obtained in the present study, a number of future developments would be required. First, it would be of scientific interest to feed the MAVT model with the results of a Cost Benefit Analysis, including within the evaluation not only the financial effects (as in the DFCA) but also the economic ones. Second, future work could be done in the context of the NAIAD application with the development of specific protocols and ad hoc questionnaires for the completion of the equity matrix.

References

- Beinat E (1997) Value functions for environmental management. Kluwer Academic Publishers, Dordrecht
- Berta M, Bottero M, Ferretti V (2016) A mixed methods approach for the integration of urban design and economic evaluation: Industrial heritage and urban regeneration in China. *Environ Plan B Urban Anal City Sci* 45(2):208–232
- Blecic I et al (2014) Walkability explorer: an evaluation and design support tool for walkability. Computational science and its applications—ICCSA 2014. Springer International Publishing Switzerland, Berlin, pp 511–521
- Bottero M et al (2016) A hybrid evaluation approach for designing complex urban scenarios: application for the T.I.T. area (China). *Procedia Soc Behav Sci* 223:931–935
- Bottero M, Ferretti V, Mondini G (2014) Constructing multi-attribute value functions for sustainability assessment of urban projects. In: Computational science and its applications—ICCSA 2014, Springer International Publishing, Switzerland, Berlin, p 57
- Bourne L, Walke D (2008) Project relationship management and the stakeholder circle. *Int J Manag Proj Bus* 1(1):125–130
- Crescenzo M, De Matteis S (2016) Ri-centro: valutazione di scenari di riqualificazione urbana per il centro storico di Trieste attraverso l'Analisi Multicriteri. MS thesis, Politecnico di Torino
- Creswell JW (2003) Research design. Qualitative, quantitative and mixed methods approaches. Sage, London
- Creswell JW, Plano Clark VL (2011) Designing and conducting mixed methods research. Sage Publications Inc, Thousand Oaks, CA
- Dente B (2014) Understanding policy decisions. Polimi Springer briefs in applied sciences and technology. Springer, New York
- Ferretti V (2012) Verso la valutazione integrata di scenari strategici in ambito spaziale. *Celid, Turin, I modelli MC-SDSS*, p 65
- Figueira R et al (eds) (2005) Multiple criteria decision analysis: state of the art surveys. Springer, New York
- Francis (2015) Encyclical letter of the Holy Father Francis on care for our common home. Vatican Press, Vatican City
- Giuffrida S, Ventura V, Trovato MR, Napoli G (2017) Axiology of the historical city and the cap rate. The case of the old town of Ragusa Superiore. *Valori e Valutazioni* 18:41–56

- JRC—Ispra site (1996) NAIADe manual and tutorial, version 1.0. ENG. Joint Research Centre of the European Commission—Ispra site, Ispra
- Keeney R, Raiffa H (1976) Decisions with multiple objectives: preferences and values trade-offs. Wiley, New York
- Maggi P, Merlatti R, Petrucci G (a cura di) (2009) Sotto Trieste. Percorsi nella città tra storia e archeologia. Tipografia Villaggio del Fanciullo Opicina, Trieste
- Manganelli B (2015) Real estate investing. Springer, Berlin
- Mondini G (2016) Integrated assessment for the management of new social challenges. Valori e Valutazioni 17:15–17
- Morselli C (a cura di) (2007) Trieste antica. Lo scavo di Crosada, Editreg, Trieste
- Montibeller G, Franco A (2007) Decision and risk analysis for the evaluation of strategic options. In: O'Brien FA, Dyson RG (eds) Supporting strategy: frameworks, methods, and models. Wiley, Chichester
- Munda G (1995) Multicriteria evaluation in a fuzzy environment—theory and applications. In: Ecological economics. Physica-Verlag, Heidelberg
- Roscelli R (ed) (2014) Manuale di Estimo. Valutazioni Economiche ed esercizio della professione. De Agostini—UTET università, Novara, p 228
- Tamaro A (1964) Storia di Trieste, vol 1–2, Edizioni Stock, Roma
- Yung RJ (2014) An investigation of stakeholder analysis in urban development projects: empirical or rationalistic perspectives. Int J Proj Manage 32(5):838–849

To Plan, Design and Evaluate “Urban Mending”



Marta Berni, Riccardo Renzi and Rossella Rossi

Abstract Pope Francis’s encyclical provides researchers concerned with the problem of the urban periphery with three suggestions. The first is to renounce any specialized approach that is based on an acritical confidence in the power of science and technology to solve the complex problems of today’s world, particularly those that concern the environment and the poor. The second is to adopt an approach based on a “culture of care” for nature and for the most vulnerable people, and third approach is to include people (especially those who are weakest) in transparent decision-making processes that affect the quality of their lives. Starting from these suggestions, and from Renzo Piano’s statement that, at present and in the future, “the mission of architecture is to save the outskirts” through “a huge work of mending”, we believe that researchers should, with humility, make use of the ‘urban-mending’ approach when dealing with the complexity of regeneration projects. At the levels of both the architectural project and urban planning, they should adopt an integrated, interdisciplinary approach that is lighter and more sensitive than those used in the past. This will help them to face up to the multi-dimensionality and complexity of redeveloping peripheral areas. All stakeholders, especially the weakest people in society, should be empowered and involved in public decision making and planning implementation. Finally, genuine participation of the marginalized, excluded and disaffected inhabitants of peripheral areas (i.e., the outcasts) can be achieved using a “deliberative-democratic” approach.

Keywords Urban distressed areas · Urban mending · Inclusion
Empowerment · Evaluation · Urban regeneration project

M. Berni (✉) · R. Renzi · R. Rossi
Department of Architecture (DIDA), University of Florence, Florence, Italy
e-mail: marta.berni@unifi.it

R. Renzi
e-mail: riccardo.renzi@unifi.it

R. Rossi
e-mail: rossella.rossi@unifi.it

1 Introduction

The urban theme is central to Pope Francis's encyclical letter *Laudato si'* on caring for our common home (Penza 2016). The Pope devotes special attention to the most distressed, alienated and bleak outskirts of cities, where the excluded people, "the disposable of society", live (§ 45). Among the many stimuli that the encyclical provides, three different but related points are especially challenging to researchers who are interested in urban issues. The first suggestion is methodological in character. It warns against an approach based on a "blind confidence in technical solutions" (§ 14), something that is common among professional experts and scholars. Francis warns that blind faith in technology tends to encourage excessive specialization and thus to impede the sort of holistic vision that is needed to solve the complex problems of poverty and environment in the modern world (§ 110). His second suggestion has an ethical bent. He encourages us to build a "culture of care" for nature (§ 231), and in it to devote special attention to the weakest and most vulnerable people (§ 64). The third suggestion is political. Francis draws attention to the need for decision-making processes to be transparent and to include people, especially those who are weakest, in decisions that affect the quality of their lives. He writes as follows:

«A consensus should always be reached between the different stakeholders, who can offer a variety of approaches, solutions and alternatives. The local population should have a special place at the table; they are concerned about their own future and that of their children, and can consider goals transcending immediate economic interest» (§ 182; 188). A whole chapter, entitled "Dialogue and Transparency in Decision Making", is devoted to this issue.

The authors of this work are researchers in urban planning, architectural design and project and plan evaluation. We work mainly with physical change in the urban landscape. Francis's encyclical inspired us to write this article with the following agenda: first, we develop a joint interdisciplinary reflection on the complex issue of marginalized peripheries; second, we discuss how urban-mending projects can be used to include the weakest inhabitants on the periphery in transparent decision-making processes; third, without any desire to propose new evaluation tools, we outline a participatory evaluation approach that enables people to "think evaluatively". This limits our focus to the question of how the evaluator's role and responsibilities should change in this context. Finally, we offer a brief set of conclusions. We trust that our agenda will conform to Francis's entreaty to seek to understand urban problems in an appropriate spirit of humility.

2 The Concept of Periphery

According to its etymological roots, the term periphery means “to bring something around”. In urban studies, ‘periphery’ presupposes that there is a center, or a central area, from which a constant process of enlargement occurs. In Western culture, the relationship between center and periphery is afflicted by both positive and negative prejudices. On the one hand, ‘center’ has a positive value based on centrality, importance, power, heart, soul and other such notions. On the other hand, ‘periphery’ means border, margin, limits and the external world, which collectively have negative resonance. ‘Peripheral’ becomes synonymous with subsidiary, confined and disadvantaged. Thus the periphery derives its significance as an alienated or alienating place, somewhere that is structurally and culturally poor. The periphery can be thought of as the frame (from the Green *perí*, ‘around’) of a valuable place, namely the center.

In Italy, starting immediately after the Second World War, the city began to be divided into two poles: the historical center, which remains the functional heart, and a series of mono-functional areas around it, which are residential, industrial, commercial and so on. During the period 1949–1963, the most significant characteristic of planning was its tendency to combine the residential areas with support functions that were intended to make them autonomous (Renzi 2013). Unfortunately, in some cases a lack of adequate infrastructure made these areas relatively inaccessible.

The Ina CASA project was inspired by the urban planning of the 1940s in northern Europe and was sensitive to issues of landscape protection. Together with contemporary architectural practice, which was influenced by the theories of Libera, it deliberately made the settlements independent of the city centers and endowed them with the usual mixture of basic functions: the neighborhood street-market, a church, a newsagent’s, a minimal collection of shops and, where possible, schools and sports centers. The choice of an autonomous form, instead of one based on continuity with the historical urban fabric, was dictated by a policy of aggregating the new rural-to-urban migrant populations in social nuclei which imitated the form of the rural village in which basic services fulfilled essential needs. The houses may have been small according to people’s expectations, but, in recompense, the communal green spaces were intended to be large, and many of them were successfully created in this manner. Less satisfactory were the results of attempts to create social cohesion and collective identity. Failure to complete all the planned buildings and an adequate network of services led to an inconvenient dependency on the city center which in many cases was far away and difficult to reach.

Between the city and its periphery, these unfinished projects produced a discrepancy that was not only spatial but also social. The arrival of new waves of migrants with diverse cultures and identities added a further layer of problems to the settlements. Milan, Rome, Naples and Palermo were cities in which growing disadvantage fuelled illegal activities that flourished in the “absence of the state”. The lack of adequate government intervention was clearly manifest in the partial or total

absence of essential services that characterized many peripheral neighborhoods that were built as satellites of the main urban centers.

Between the end of the 1960s and the beginning of the 1970s, the urban peripheries became ideological places in which urban workers' culture grew to maturity. Social inclusion and community spirit developed in ways that gave the new suburbs a certain dignity. However, the great transformation of industry that began at the end of the 1980s led the urban workers' culture to weaken. The ensuing process of deindustrialization caused by globalization led to the disintegration of the social fabric, a process that was aggravated by the arrival of people of various different ethnicities.

Today, the appearance of the city has been transformed, in part by the proliferation of uncontrolled forms of high-density development that occupy the interstices between the city and the surrounding countryside. In addition, rents and holes in the urban fabric have been caused by the abandonment of industrial sites and their progressive decay.

The relationship between center and periphery has also changed. In the ancient city centers, areas characterized by total anonymity have appeared. Vice versa, some peripheral areas have become consolidated and have given rise to active, participatory forms of urban life.

The cities have become progressively more complex, changing their mixes of inhabitants, their ways of life and rationale for living there, the nature of urban spaces and the ways of viewing and using the urban landscape. In order to understand the whole and its constituent parts, a major effort of interpretation is required: of the renowned parts, the early suburbs that by now have become full-scale cities, and the degraded neighborhoods with their lack of harmony and their fragmentation. If this process of interpretation is successful, it may become clear how to start a process of regeneration that will endow the periphery with new ideas, new visions and overall plans.

In line with Pope Francis's vision, the problem of the periphery is mainly one of urban inequality. More than a spatial question, it is a sociological one. According to a sociological approach, exclusion, marginalization and poverty are often associated with the concept of "periphery", which may be regarded as the result of a multi-dimensional process that includes «economic (deindustrialization, restructuring), social (impoverishment, discrimination, stigmatization) and political (exclusion from decision making, dependence) phenomena» (Berndt and Colini 2013). At the same time, the periphery mainly refers to lower-class districts that are characterized by dependency, disconnection, poverty and intrinsic, endemic and functional exclusion. The last of these involves failure to generate a collective social or cultural identity among their inhabitants, which stops them from acting on the political stage. It also involves marginalization, which produces power inequalities by preventing inhabitants from participating in political processes and integrating into mainstream society. There are spatial expressions of social disintegration, defined by segregation, deprivation, high densities of bleak, obsolete social housing, failing institutions, vulnerable households, migrants and the presence of crime

and violence (Wacquant 2013). These characteristics are linked to “territorial fixation and stigmatisation” (Berndt and Colini 2013).

Following Wacquant (2013), we define the periphery as any “neighbourhood of relegation”, regardless of its geographical place in the urban system, where the “post-industrial precariat” of an advanced society develops. Although there are superficial similarities, these zones of urban deprivation are not US-style ghettos. They represent the «emergence of a new regime of urban marginality» and specifically “advanced marginality”; in other words, a marginality that «is not residual, cyclical, or transitional, but rooted in the deep structure of financialized capitalism» (Wacquant 2013). This means that the development of the advanced, post-Fordian type of capitalism structurally causes the de-socialization of wage-labor and social fragmentation that, in turn, gives rise to the new social marginalism: the precariat with neither class connotation, nor a teleological vision of the future to bind its members together (Maloutas 2009). Moreover, a deep feeling of social insecurity is widespread among, respectively, the post-industrial proletariat threatened by the inexorable, unrelenting diffusion of fragmented wage-labor and the impoverished middle class, which fears for the present and its children’s future social status (Wacquant 2013).

The inhabitants of the marginalized periphery sometimes have difficulty in knowing where they are. It becomes impossible to measure where one lives, or to understand the language of place and the composition of the city. One cannot benefit from visual points of reference, whether they are real or merely symbolic, that help one to locate oneself and gain a sense of feeling at home and belonging. Not knowing where one is gives a sense of discomfort and insecurity, and on the periphery of our big cities this feeling can be extremely strong (Jacobs 1961; Hall 1971). It is not merely a matter of losing one’s way, it is a question of losing one’s sense of orientation, of giving way to fear. Fear not only paralyzes, it also makes it impossible to recognize beauty, even when one encounters it. This represents the negation of the founding values of the city, which are based on hospitality, security and communal living. Parts of the city need to be the subject of projects designed to enhance quality and beauty, in which the first step is to recognize the dimensions of the problem, difficult though they are to comprehend. A fundamental ingredient of such projects should be to observe the present-day reality, which is composed of many voices.

3 Urban Mending: A Culture of Care Versus an Autocratic Approach

The contemporary city is consuming itself, its spatial relationships, its functions, its shape and its image. This process erodes both its inner and outer relationships with the surrounding territory. The decline of many part of the city, transformed into marginalized peripheries, testifies to the failure of both the market mechanism and

the traditional welfare state to cope with new problems that stem from globalization and economic crisis. Relying on town planning and land management policies has failed.

In the face of such complex situations, public institutions,¹ researchers and experts who work in the field of urban regeneration traditionally tend to focus largely on the visible, material effects of exclusion in urban spaces. Rather than devoting their attention to the causal chains of various forms of inequality, they focus on derelict buildings, abandoned urban areas, lack of spaces for the public to meet, obstacles to mobility and fragmentation of infrastructure. This influences the way public policies are shaped. The traditional response is that of “urban renewal”, which results in a policy of investment in physical regeneration programs for deprived urban areas (Berndt and Colini 2013).²

This approach to the “periphery issue” follows the technological, autocratic vision of experts, such as architects and urban planners, whose rationale tends to involve a cause-effect relationship. According to this, the physical characteristic of the deprived districts on the periphery, such as distance from the center, degradation of buildings and lack of public spaces, determine the low quality of life and high level of disadvantage of the inhabitants. According to this vision, architects and planners equipped with their technical knowledge and tools, have the skills, capacities, opportunities and power to solve the problem of deprivation at the periphery. They may increase the quality of the physical spaces and thus enhance the living conditions of the inhabitants so that the regenerated districts are no longer deprived places, but become regular parts of the urban fabric in which the periphery problem has been eliminated.

As much evidence and scientific research demonstrates, this traditional, sectoral approach to urban regeneration «characterised by programmes and investments in the physical aspects of distress is now widely considered to be insufficient to solve the social, economic, environmental and ethical problems of these areas, which appear as an ever more inextricable, unmanageable tangle. There is a need for an innovative cross-cutting strategic approach to large urban distressed areas (LUDAs), which can face up to the highly complex social, economic, environmental and cultural nature of the problem» (Bentivegna 2006).

We believe that the traditional approach to the ‘periphery issue’ has failed. The first reason for this is the error of putting faith in a specialized, mono-sectoral approach. The second is a mistaken assumption about the direction of the causal relationship. Any solution of the periphery question requires both a multidisciplinary, integrated approach that can cope with complexity and an inversion of the

¹Note the regeneration programs promoted by the Italian regional governments through the publication of competitions for funding for urban renewal schemes aimed at social housing estates.

²With the introduction of middle-class families, urban renewal programs aim to rebalance the social composition of areas that have high concentrations of poverty. The most prominent and typical example is the French “Politique de la Ville”, which was started in the 1970s.

causal relationship which recognizes that the inequality of power determines people’s social and spatial marginality, which, in turn, give rise to the low quality of their urban environment.

To face up to the marginalized periphery question, we should endeavor to prevent its causes. At the local level, this means fostering a process of inclusion based on citizenship and rights and involving people in projects that affect their living conditions and basic interests. In this vision, experts such as planners, designers and evaluators can play a relevant role that is different from their traditional function. Within a participatory framework, experts should assume a ‘humble’ attitude³ marked by a culture of care, and they should adopt an integrated, interdisciplinary and holistic approach to the question.

Regarding the culture of care, the concept of urban mending promoted by Renzo Piano has great appeal.⁴ According to the urban-mending approach, architectural design and urban planning should not aim to produce squares, avenues and civic centers that are aesthetically and functionally better. In effect, cities are full of empty squares and amphitheatres, unused boulevards, and spectral social centers where there is no involvement of the inhabitants (Di Blasi 2014). Urban mending should empower residents. This objective requires the dissemination of lightweight construction projects, which act as catalysts by creating new jobs, micro-businesses and start-ups, and by promoting inhabitants’ crafts and skills. This in turn increases marginalized people’s feeling of self-esteem, identity and pride in belonging to a community. As Piano says, to trigger the regeneration process “requires love, even in the form of anger. It requires identity, it takes pride to be an outcast» (Piano 2014). Indeed, «Of course, repairing a roof, arranging a yard or taking a garden and cleaning it up [...] fire up the sense of identity and, in the form of anger, the pride of being suburban that ... the architect as the physician of the territory, should stimulate» (Merlo 2014). In a similar way to a district doctor, the architect who deals with the regeneration of the periphery should adopt a modest approach and should involve the inhabitants in the process of rehabilitating buildings. This means «involving the inhabitants in do-it-yourself construction, because they can make

³A truly wise person is modest. As humans, we must recognize our smallness in relation to the Earth and Mother Nature. Our humility should enable us to respect the vastness of the universe and of Creation and to strive to conserve nature, as its stewards. This means to protect, enhance, preserve, conserve and monitor. It implies that there is a reciprocal relationship between human beings and nature.

⁴As Piano has stated in many conferences, writings and newspaper interviews, his present fight is to save the often desolate urban outskirts. This is testified by his current projects, such as that at Columbia University in Harlem, New York City, the new courthouse in a Paris banlieue, and the Hospital Centre in the formerly industrial Falck Area at Sesto San Giovanni. This is a difficult challenge because these peripheries are not beautiful and neither are they photogenic. As they were built without love and affection, they have been ill-treated. Nevertheless, they are at the same time the future of the city, or rather, the city of the future, the place where human energies will concentrate for better or worse.

many improvements by themselves, or almost by themselves, in the simplest form of a company. I am talking about lightweight construction sites that do not imply the displacement of the inhabitants from their homes but rather make them actively participate in the work» (Piano 2014). Under a participatory approach, the architect should «search for physical trigger points; ones that are marginal but sensitive, such as a school, a barracks, an old cinema, an oratory, an abandoned railway or a sports field. These should be considered in terms of their ability to extend the value of regeneration. [...] Minor situations are important,⁵ meaning specific places where architectural mending can generate a spark and disseminate the effect across the widest possible area» (Abis 2014). The “G124 Working Group” experience successfully demonstrated this.⁶

In the vocabulary of the modern city, words like re-join, re-stitch and reweave have become popular, and very often this is so in the context of the periphery. The prefix ‘re-’ invites one to try again and the concept of mending conjures up something comfortingly domestic that reminds one of keeping accounts and taking care in the ancient manner. Even though they can boast very little history, these new peripheries of ours clamor to have their recent evolution accepted. They urgently need the recognition of an urbanism that in some cases they have only very recently acceded to. They beg one to acknowledge the emerging character of a life that is slowly being constructed and consolidated.

To sew up rips, put back together fragments and snippets and rediscover relationships, or make new ones, bestows a role upon those buildings and urban spaces that have been left to an uncertain destiny. At last, they can gain a sense of place. This is a very difficult task, but undertaking it enables one to rediscover the meaning of the word ‘city’ in terms of its earliest interpretation as a place for meeting.

The contemporary city needs a project of quality and beauty that cannot be left entirely in the hands of architects but must involve the creation of relationships between buildings. As Pope Francis says, we should use «the language of fraternity and beauty in our relationships» (§ 11). This means to understand again and to embrace mentally the concept of periphery, giving oneself the role of the listener but also including it in a new kind of plan that rediscovers the measure of the city. We can thus think of the beauty of the city as a matter of having a recognizable measure and design. We must have the courage to think of a new form of perimeter and redesign the limits and margins of the city.

⁵Spontaneous opportunities or micro-communities may already exist in the area: perhaps a sports club, a community center cultural centers, the parish church or any other traditional place of assembly.

⁶The ‘G124 working group’ is a group of six young architects who are involved in the Urban Mending Project financed by Renzo Piano. They are committed to three small ‘mending projects’ located respectively on the peripheries of Rome, Turin and Catania.

4 Marginalized People’s Participation in Public Decision Making

Participation is not promoted only by the encyclical. Indeed, all democratic societies recognize citizens’ right to take part in decisions concerning their own future and that of their children. Rhetorically this «is considered an important step forward in the construction of economically and socially efficient projects, and a method to deal with complexity» (Bentivegna 2016). In recent years, the participation of inhabitants of the deprived periphery in public decision making, planning and design has become a topic of relevance to the governance of the city. However, in order to avoid undesirable negative effects and, more importantly, actually to include the outcasts, at the operational level, participation needs to be implemented correctly and carefully. Regrettably, actual participation processes usually include only ‘insiders’, that is, actors who have some kind of decisional power, such as local policy makers, public administrators and professional experts, and actors with a stake in the project, such as pressure groups, environmental organizations and spontaneous committees of citizens. Those, such as the disaffected, who have no interest in participating or who have no leverage on the project yet suffer its effects, remain outside (Berni 2015). At best, these outsiders are represented by ‘influential actors’ such as political parties, trade unions and religious institutions. Their interests are anticipated and chosen by public institutions (Bentivegna 2016).

Authentic participation «places great demands upon citizens’ abilities and willingness to express their reasons publicly and to consider the public reasons of others» (Bohman 1997) because, as Murray (2002) affirmed, the discourse theory of democracy requires «‘a common mode of reasoning’—rational and impartial—to which all affected and their representatives will be committed [...]. Through such reasoning, ‘democracy revolves around the transformation rather than simply the aggregation of preferences’». As a consequence, the main challenge is how to reengage the disaffected outcasts, who are the absolute majority of the inhabitants of the periphery, in effective participation. The process must overcome feelings of apathy, isolation and powerlessness. It must also fight the bias against effective participation in public decision-making due, first, to the lack of confidence in the institutions that are deemed to use participation as a means of gaining consensus, and second, to the belief that the destiny of the periphery depends on higher-level decisions taken by external people.

This means that any urban-mending project that aims to regenerate an area should be evaluated against its true objective, which is not the creation of physical objects such as refurbished buildings, rebuilt gardens and restored public spaces, but rather how those objects have been produced. What matters is whether the projects have been able «to create through “practices” a community of citizens» (Quick and Feldman 2011). In other words, the central question is whether urban-mending projects represent inclusive practices that build «the capacity of the community to implement the decisions and tackle related issues» (Quick and Feldman 2011).

As a consequence, we should not use a ‘traditional’ evaluation of outcomes or results, but rather perform a process evaluation using the democratic evaluation approach (House and Howe 2000) that is open to the civil society and especially the weakest, most disaffected of the outcasts.

Democratic evaluation is based on the three principles of ‘genuine democracy’: inclusion, dialogue and deliberation (House and Howe 2000), which correspond to the three stages of the implementation of the evaluation process proposed by Floc’hlay and Plottu (1998): empowerment evaluation, participatory evaluation and multi-criteria evaluation. As we are concerned to promote the transformation of ‘outcasts’ into citizens, we concentrate on two interconnected issues only, namely, inclusion and the evaluation of empowerment.

Within an evaluation exercise, «inclusion means working with under-represented and powerless groups as key stakeholders in the evaluation process, not just sponsors and well-organised groups» (Floc’hlay and Plottu 1998). In this respect, inclusion counteracts exclusion from within, or in other words the «lack [of an] effective opportunity to influence the thinking of others» (Vargas et al. 2016). It would encourage the expression of the points of view of all the actors involved in decision making. This is made possible through a process of training and organization of citizens that, in the literature on democratic evaluation, usually goes under the heading of ‘empowerment evaluation’.⁷ In fact, the empowerment process provides citizens, especially disaffected outcasts, with the capacity to understand and influence decision making with a minimum amount of organization. Thus they can take charge of the process and ‘speak with a single voice’ (Plottu and Plottu 2009). Community empowerment «occurs when many members of marginalized communities are psychologically empowered and gain the sets of skills to control their environments and participate in decision making and policy setting to build their community» (Worthington 1999). Empowerment evaluation is mainly directed to «making people aware of the existence of common interests and bringing them together around a collective view» (Floc’hlay and Plottu 1998). According to Fetterman (1996), it can be defined as «the use of evaluation concepts, techniques and findings to foster improvement and self-determination».

It is essential to note that empowerment should not be understood in the legal sense of giving decision-making power to participants but rather as an increase in their ability to analyze and process data and information, to conceive new solutions and to influence decision making (Bobbio and Pomatto 2007). In fact, empowerment evaluation mainly consists of learning about the evaluation experiment that helps people to think and reason “evaluatively”. “Thinking evaluatively” is not an instinctive or automatic process; rather, it involves learning. Simply having trust-worthy and accurate information is not enough. People should also be able to use it, to consider evidence, discover contradictions and inconsistencies, express values, interpret findings and examine assumptions (Quinn Patton 2002). In this

⁷Of course, we do not intend to analyze empowerment evaluation tools. We will merely explain how the evaluator’s role and responsibilities change in this context.

way, through the supervision and training of the evaluators, participants learn to appraise their progress critically and to develop evaluation skills that enable achievement of the fundamental outcome of empowerment, namely self-determination (Sherriff and Porter 2012; Plottu and Plottu 2009).

Finally, we should note that «individuals, organisations or communities are not “empowered” by an external agent, but must experience the developmental process of empowerment themselves» (Worthington 1999). This point requires some consideration about the experts’ role, and especially that of the evaluators, and their professional attitudes to the empowerment and to democratic evaluation.

Participation and empowerment are distinctive features of any urban-mending project and their evaluation with particular effects on the experts’ roles. Architects, urban planners and economists are endowed with specialized knowledge and technical skills and are used to advancing rational arguments based on the common model of scientific reasoning that proceeds from premises to conclusions in a connected manner. On the other hand, ordinary people, who are neither specialized nor skilled, and marginalized people are used to arguing through more informal, emotional forms of expression based on different kinds of logic. In order to avoid communication problems in a participatory setting, experts should renounce their attitude of superiority and, with modesty, engage in open dialogue with ordinary people and so listen to their interests, understand their goals and values and recognise the legitimacy of their means of communication, such as rhetoric and narrative.

Participation of disaffected and marginalized people in project evaluation places great demands on the evaluator, especially in terms of energy expenditure and time commitments. In inclusive, deliberative frameworks, he or she has a different and more challenging role than that is normally played in a conventional evaluation process. As a participant in project decision making «is fundamentally a political issue, a matter of power and authority» (Mason 2002), the evaluator should be particularly sensitive to issues of power throughout the evaluation process and should carefully foster the empowerment of participants, so that his or her role is determined ideologically (Worthington 1999). The evaluator is no longer a neutral, external judge of worth, who gives evaluation away to participants, but one who acts instead as a trainer, facilitator, coach and perhaps advocate. As Plottu and Plottu (2009) noted, the evaluator «is not the agent of an external appraisal, but on the contrary, is a part of the assessment resource, engaged in the process. He can be by turn a ‘facilitator’, a term used in ‘empowerment evaluation’ [...] or ‘maieutician’ because he should clarify players’ questions». As a facilitator, the «evaluator aims to coach, guide and supervise stakeholders in evaluation techniques and teach them evaluation processes [...]. The main motivation is to empower individuals and organizations so that they can begin to utilize evaluation in the long run especially with respect to important program decisions» (Sherriff and Porter 2012). The evaluator «should explain social stakes and values and be clear about which criteria are useable. He should engage players in a process of analysis and understanding of the situation. He does not represent the stakes of the participants but favors democracy by giving voice to these groups of participants and by making sure that

the widest possible range of perspectives and values is represented. He has also a role in helping disagreements and conflicts in a community to be articulated. In order to better understand the logic behind each group of participants, the evaluator has fully to understand the communities represented by these groups» (Plottu and Plottu 2009). As a consequence, we may also consider the evaluator to be an information broker who provides the participants with information and knowledge about each other and about the evaluation methods and techniques that are accessible to non-specialists. Moreover, faced with contrasting positions, in the analysis of the benefits and disadvantages of various solutions, the evaluator should help to arrive at a shared answer by adopting a sympathetic, even-handed attitude, rather than one based on neutrality (Bobbio 2006).

5 Conclusions and Further Steps

The paper presents a historical framework for the development of Italian urban peripheries from the end of the Second World War to the present. In a manner that is consistent with Pope Francis's vision in the *Laudato si'* encyclical, it provides spatial and sociological interpretations of the deprived urban periphery as the place to which outcasts are relegated. Next, the paper questions the traditional approach to the periphery issue, which has always involved programs and investments that aim to reduce the physical aspects of distress as a means of remedying the low quality of life of excluded and marginalized people. We hold that it is people's economic, social, political and spatial marginality that results in the low quality of the sites. To solve the deprived periphery question, it is necessary to tackle its real causes by fostering the inclusion of disaffected, excluded and marginalized inhabitants in public decision making. This paper recommends adopting the 'urban-mending' approach, based on the diffusion of lightweight, self-produced construction projects to involve people in decisions that affect their lives and, in so doing, promote active citizenry.

Following the Pope's call for participation of the weakest and most disaffected people in public decision making, the final part of the paper deals with inclusion, participation and empowerment processes and illustrates how they can change the role of experts, especially that of evaluators, in urban-regeneration processes.

Acknowledgments This paper is the result of the three authors' joint reflections. However, Riccardo Renzi contributed the historical descriptions of the development of urban peripheries in Italy and the mending approach; Rossella Rossi contributed the parts on urban issues, included the concept of urban periphery; and Marta Berni contributed the part on social concept of periphery and wrote the section on participation in public decision making and empowerment evaluation. The introduction and the conclusion are joint products.

References

- Abis M (2014) Cambia la periferia, cambiano i modi per capirla. Periferie. Diario del rammendo delle nostre città. <http://www.bellissimo1998.com/media/PERIFERIE.pdf>
- Bentivegna V (2006) LUDA large urban distressed areas: a difficult challenge for European cities Policy paper n. 3, unpublished
- Bentivegna V (2016) Dialogue and transparency in decision-making. *Valori e Valutazioni* 17:25–28
- Bergoglio J (2015) Laudato Si’—encyclical letter. Vatican Press, Vatican
- Berndt M, Colini L (2013) Exclusion, marginalization and peripheralization. Working paper, Leibniz-Institut für Regionalentwicklung und Strukturplanung. <http://d-nb.info/1035196859/34>
- Berni M (2015) Democratic evaluation of architectural heritage. In: XIII International Forum Le vie dei Mercanti, Heritage and Technology. La Scuola di Pitagora
- Bobbio L (2006) Dilemmi della democrazia partecipativa. *Democrazia e diritto* 4:11–27 2006
- Bobbio L, Pomatto G (2007) Il coinvolgimento dei cittadini nelle scelte pubbliche. In: Meridiana (ed) vol 58. pp 45–67
- Bohman J (1997) Deliberative democracy and effective social freedom. In: Bohman J, Rehg W (eds) *Deliberative democracy*. The MIT Press Cambridge, Massachusetts London, England, pp 321–348
- Di Blasi O (2014) L’impresa di Ponte Lambro. Periferie. Diario del rammendo delle nostre città. <http://www.bellissimo1998.com/media/PERIFERIE.pdf>
- Fetterman DM (1996) Empowerment evaluation: an introduction to theory and practice. In: Fetterman DM, Kaftarian SJ, Wandersman A (eds) *Empowerment evaluation: knowledge and tools for self-assessment and accountability*. Sage, Thousand Oaks, CA, pp 3–46
- Floc’hlay B, Plottu E (1998) Democratic evaluation, from empowerment evaluation to public decision-making. *Evaluation* 4(3):261–277
- Florida A (2007) La democrazia deliberativa, dalla teoria alle procedure. Il caso della legge regionale Toscana sulla partecipazione. *Istituzioni del federalismo: Rivista di studi giuridici e politici* 5:603–681
- Florida A (2013) Participatory democracy versus deliberative democracy: elements for a possible theoretical genealogy. Two histories, some intersections. In: 7th ECPR General Conference, Bordeaux
- Hall ET (1971) *The hidden dimension*. Garden City. Doubleday, N.Y
- House ER, Howe KR (2000) Deliberative democratic evaluation. In: Ryan K De Stefano L (eds) *Evaluation as a democratic process: promoting inclusion, dialogue, and deliberation new directions for evaluation*, vol 85. Jossey-Bass, San Francisco, pp 3–12
- Jacobs J (1961) *The death and life of great. American cities*. Vintage Books, N.Y
- Maloutas T (2009) Urban outcasts: a contextualized outlook on advanced marginality. *Int J Urban Reg Res* 33(3):828–834
- Mason R (2002) Assessing values in conservation planning: methodological issues and choices. De La Torre M assessing the values of cultural heritage. The J Paul Getty Trust, Los Angeles, pp 5–30
- Merlo F (2014) Chi scommette sul Periferia Pride. Periferie. Diario del rammendo delle nostre città. <http://www.bellissimo1998.com/media/PERIFERIE.pdf>
- Murray R (2002) Citizens’ control of evaluations: formulating and assessing alternatives. *Evaluation* 8(1):81–100
- Penza G (2016) Pope Francis: the Laudato si’ encyclical and the urban issue. *Valori e Valutazioni* 17:5–8
- Piano R (2014) Diversamente politico. Periferie. Diario del rammendo delle nostre città. <http://www.bellissimo1998.com/media/PERIFERIE.pdf>
- Plottu B, Plottu E (2009) Approaches to participation in evaluation some conditions for implementation. *Evaluation* 15(3):343–359
- Quick KS, Feldman MS (2011) Distinguishing participation and inclusion. *J Plan Educ Res* 31(3): 272–290

- Quinn Patton M (2002) A vision of evaluation that strengthens democracy. *Evaluation* 8(1):125–139
- Renzi R (2013) *Abitare Sociale*. Edifir, Firenze, pp 5–71
- Sherriff B, Porter S (2012) An introduction to empowerment evaluation: teaching materials. Saatavissa. <http://www.mrc.ac.za/crime/evaluation.pdf>
- Vargas A, Lo A, Howes M, Rohde N (2016) The problem of inclusion in deliberative environmental valuation. *Environmental Values*, the White Horse Press
- Wacquant L (2013) Class, ethnicity and state in the making of marginality: revisiting ‘urban outcasts’. *Dansk Sociologi*, pp 33–47
- Worthington C (1999) Empowerment evaluation: understanding the theory behind the framework. *Can J Prog Eval* 14(1):1

Promotion and Evaluation of the Creative Industry in Inclusive Urban-Ecology Strategies. The Turin Case Study



Rossella Maspoli

Abstract After the third industrial age, knowledge sharing into creative practices has emerged—in line with the concept of creative city expressed by C. Landry in the late 1990s—as a significant option for re-development. A changing vision towards new economic models of activities fostering creativity and social inclusion has emerged in recent studies, from the suburbs of European cities as well as those of Third World countries. Therefore, the first reference to the Encyclical Letter *Laudato Si* regards the concept of “cultural ecology” and attention to the patrimony, such as “a part of the shared identity of each place and a foundation upon which to build a habitable city” (§ 143) together with the concept of “economic ecology”, such as “a humanism capable of bringing together the different fields of knowledge, including economics, in the service of a more integral and integrating vision” (§ 141). Furthermore, the creative city relates to the potential of shared human and organizational resources in critical neighborhoods, which can be promoted and supported by forms of public-private partnership. The paper analyzes the potential evolution of a shared economy through the idea of the creative industry, conducted on the local community level, and describes the feasibility analysis and creative experimentation conducted in the city of Turin. It compares the case study and a range of international interventions aimed at fostering inclusive processes, in reference to:

- Cultural mapping of public space, in relation to perception and social interaction aspects;
- Creative and social activities of co-design and self-construction to improve the inclusive use of outdoor public spaces in the suburbs;
- Training and experimentation activities providing an introduction to the creative industry, through independent production and informal economy centers.

Finally, the scenario concerns new forms of convergence among professional figures involved in social innovation.

R. Maspoli (✉)

Dipartimento di Architettura e Design, Politecnico di Torino, Turin, Italy
e-mail: rossella.maspoli@polito.it

1 Introduction

Applying creative thinking becomes a way of getting rid of rigid preconceptions and opening up to complex phenomena. It represents a way of opening previously unseen possibilities, such as training initiatives for skills enhancement of immigrant people integrating into the community, starting up new tools for active participation of inhabitants in the management and improvement of their neighbourhoods and promoting co-design teams to develop socially innovative networks and products.

In these perspectives, the first phase of research concerns the survey of perception that residents and city-users have of neighborhood spaces. This phase serves to understand how public spaces can be the subject of new creative practices in order to launch inclusion and contamination laboratories.

1.1 *The Role of Cultural Mapping*

Expressions of the culture of a place include a variety of tangible and intangible aspects belonging to its past, present and future. In general, cultural mapping is a process of collecting, recording and analyzing aimed at describing the cultural resources of a given community, the perception it has of itself and potential partners in project planning (Moore and Borrup 2009; Eskelinen et al. 2015). Mapping projects aim at recognizing the value and use of urban spaces and heritage by the plurality of local communities (different in culture, origin and ethnicity). Heritage becomes *personal*; stories can be connected to any corner of the neighborhood.

The research project starts from the approach of “image-ability” in the mental maps developed by Kevin Lynch and takes as principal references the Common Ground’s “Parish Maps”, a methodology developed by Sue Clifford in England and then introduced in several English and in Italian small towns (Clifford 1996).

Another cultural mapping approach regards the Territorialist School, in order to foster the promotion of reflexive relations with local identity and development of the “consciousness of a place” (Magnaghi 2005). The community mapping process favors reflection on the surrounding environment, the re-elaboration of cultural components and boosts the sense of self-awareness of potential community resources. According to this approach, a key role for a sustainable local re-development is played by the multidisciplinary co-design of community services, objects and spaces responding to specific needs and helping to create a new “place branding”, based on the visual and behavioral expression of a place (Zenker 2010).

A critical phase of this process is providing the background information necessary to identify issues that are relevant and important to inhabitants and technicians, establishing a meaningful dialogue. The “Community Outreach” methodology—“taking consultation to the people rather than expecting them to come to you” (Parker 1995)—through neighborhood walks, dialogues and mapping activities, helps to bring out more subjective perceptions, setting the stage for

creative practices and supporting the construction of “emotional maps”. This methodology has been tested for the cultural mapping process in the district of *Barriera di Milano* in Turin.

2 Methodology and Experimentation

The “Mapping Making Social Space *Barriera*—MMB” project is aimed at promoting community and collaborative design, highlighting values and criticalities of the neighborhood and outlining elements of bottom-up interventions for the regeneration of marginal public spaces.

The MMB project is led by the *Accademia Albertina* and *Politecnico di Torino*, co-funded by the *Compagnia di San Paolo* and sponsored by the City of Turin, together with the support of various organizations and associations. The project is divided into two parts: “Mapping social space” and “Making social space”.

2.1 “Mapping Social Space”

MMB is developed through three preparatory stages. The first step is “Map and laboratory of creative experimentation around places, the neighbourhood and the territory” hosted at two junior high school (2011–2012), one in *Barriera di Milano*, Turin, and the other in the city of *Carignano*. The second step is the development (2012–2013) of micro-community maps, which has enabled us to identify needs, preferences and behaviors of small groups of citizens and associations, in order to share and compare different visions and perceptions of the neighborhood (Maspoli, Murta, Saccomandi 2014). The third step is the experience regarding individual emotional maps, a serial artwork which was informed by the contribution of 200 people, based on a project by graphic artist *Nella Caffaratti*.

The “Digital Map Laboratory” is activated, after these preparatory phases, on the premises of local associations and during public events and exhibitions. Residents, city users and visitors with various skills are invited to build the online map, with the support of a cultural facilitator and a digital cartographer. Each person can put data and observations into the online and open access geographic map (based on *OpenStreetMap*), following a simple procedure: choose a marker button, localize a spot on the map, explain why it is relevant to you and (optionally) upload a photo. The construction phase of the map lasted for about 20 months (Fig. 1).

The database of community map outlined the profiles of use of the public space. The results have perhaps identified certain sites as critical, based on scarcity of furnishings, maintenance and insufficient safety. Affection for historical spaces and buildings, places for outdoor meetings, leisure and creative activities—different ones being relevant for different people or social groups—are between the data highlighted in the virtual map.

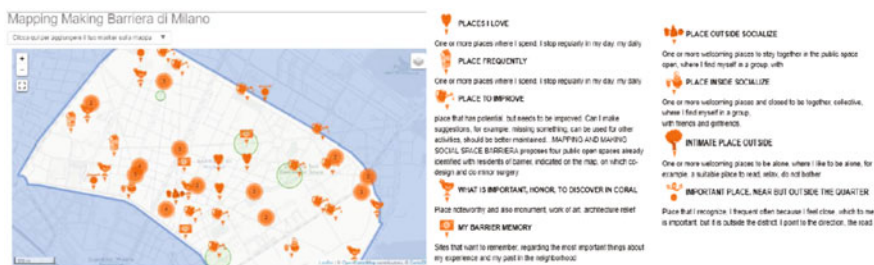


Fig. 1 Cultural mapping social space Barriera

The cultural mapping process has promoted within local communities a sense of identity attachment and produced specific knowledge about the neighborhood, which can be used as input for creative co-design processes taking place at local level. The research also collected the results of various sociological analyses (Ciampolini 2007; Mela 2014) and of sociocultural practices developed under the European Program “Urban Barriera” (Città di Torino 2017).

The subsequent design process was developed in two distinct parts:

- Collaborative design and place-making to improve the use of marginal public spaces that are identified in the neighborhood;
- Promotion and development of pre-economic creative activities, especially for young and low-income residents, fostering social inclusion and strengthening the role of social associations and community centers.

The map has, therefore, allowed made possible the development of creative activities in the public space and within a sociocultural production center.

2.2 “Making Social Space”

The design proposals are elaborated with the participation of students, experts, residents and community facilitators and have identified development axes and intervention goals for local marginal areas. The research analyzed various methodological approaches and involved multidisciplinary and international teams working on bottom-up design interventions for community inclusion, in agreement with local governments. The experiences of the Public Urban Planning Agency of Saint-Étienne and of the City of Zaragoza were illustrated and discussed with the authors in the MMB project.

In the case study of Barriera di Milano, the areas requiring intervention and excluded from public reclamation (European Plan Urban Barriera, 2011–5) are selected through a preparatory meeting and workshop. Four public spaces are shown on the community map, presented in a public exhibition and proposed for co-design, with the aim of performing “minor surgery” interventions.

Bottom-up projects are limited to specific situations, where the completion of work can be contained within a defined time frame. Underused spaces are rehabilitated with a limited budget, manual skills and DIY interventions, adopting materials found in municipal warehouses (street signs, metal barriers etc.), recycled and rebuilt with a new purpose. Two of the four chosen areas are equipped with tables and seats, a safe path crosses the lawn, fitness equipment and “narrative signs” encouraging new uses and preventing vandalism.

In addition to sharing an experience of conviviality, we have considered local inhabitants as councillors and co-producers, acting within the boundaries set by the Italian law on activities conducted by non-professional operators. Local communities can manage shared public spaces: this difficult philosophy is based on confidence, common learning and research on self-reliance. Essential actions, in fact, involve communication and events organization, the transmission of creativity and know-how, “making together” and promoting co-design, self-construction and self-management. In this perspective, craftsmen and service providers in the neighborhood are invited to present their work and contribute to the project activities of public art, green arrangement of outdoor spaces, craft production (pottery, resin, metal and wood) and stimulating the configuration of a creative social community.

3 Results and Discussion

3.1 Places of the Creative Neighbourhoods

Regenerating the city through culture, art and research is a philosophy that relocates the significance of design to a real and living dimension, paying particular attention to the potentialities of the people that live in the suburbs. Creative re-development policies, also, are related to reuse strategies of abandoned buildings and outdoor residual areas.

Therefore, it is essential to support the local construction of activity centers, which can encourage social interactions and guarantee continuity of activity and management. In many initiatives of design for social innovation and inclusion, the problem is, in fact, the occasional nature of interventions, with no ability to build an organizational system capable of renewing and maintaining activities over time (Chapain 2010).

In the described experiences, the positivity of the results is linked to the construction of a place for interaction and organization, by developing stable partnerships and—at the same time—stimulating the participation of various social actors. In addition, the significant obstacles are discontinuous funding and the lack of flexible and appropriate forms of authorization, in order not to increase costs and delays and to favor DIY and self-management.

The presence of active, stable and independent centers emerges as essential for ecological and creative regeneration in disadvantaged neighbourhoods, so as to guarantee continuity in a design-driven approach and to start incubators of productive and economic diversity.

In the Turin case study, the “Neighbourhood Houses” have emerged as potential places for Creative Neighborhoods. They have grown since the year 2000, as a combination of local community initiatives and social activism, with support from the Municipality. They are non-traditional “community centers” and stimulate aggregation and socialization, enabling people, ideas and projects to meet and develop (Roman 2014). The “Houses” and their “Network”—set up in 2012—may be the intermediate structure to encourage sustainable and peripheral development of social and creative industry.

The ongoing research project follows the same perspective of the Encyclical Letter *Laudato Si* and of the UNESCO guidelines for environmentally, economically and socially sustainable development, in the peripheries of the world. The recent “creative economy report” of UNESCO, in fact, asserts: “Human creativity and innovation, both individually and as a group, they are the key factors of creative industries, and they have become the real wealth of nations in the 21st century” (UNESCO 2013).

The potential of the creative economy grows if it is promoted and supported in the local society, affirming the distinctive identity of places where creativity can flourish, strengthening the resources for imagining diverse new futures. The relationships between economic and non-economic benefits are focused on local settings of disadvantaged suburbs.

The creative economy is a cross-cutting sector—“the leading edges of growth and innovation in the contemporary economy are made up of sectors, such as high-technology industry, neo-artisanal manufacturing, ... cultural-products industries including the media ...” (UNESCO 2013).

Similarly, the *Laudato si* highlights that “... it is imperative to promote an economy which favours productive diversity and business creativity” (§ 129) and that “at the same time, creativity should be shown in integrating rundown neighbourhoods into a welcoming city” (§ 152). According to this approach, the local creative industries are applied to a much wider productive set: they have become key elements of the innovation system of the entire economy.

The design methodology emerges as an essential human expression to facilitate the transition towards a more sustainable future. The various methodological approaches include “Service Design”, “Inclusive Design” (standard BS 7000-6:2005), “Design Activism” by Fuad Lukas and “Open Design” by Marleen Stikker. The pioneers of our time see the world “as something you can pry open, something you can tinker” (Stikker 2011).

Therefore, in line with the encyclical, the ongoing research aims to identify typologies, organization and methodological approach for the Places of the Creative Neighborhoods.

3.2 *Policies for Creative Clusters*

In the research project, case studies are examined concerning programs and places to support the creative services sector through networking, brokerage and management of innovative activities. Several creative clusters are being promoted in Europe, as part of new spatial re-development strategies, such as Cultural Industries Quarter in Sheffield, Amsterdam NDSM Wharf, La Friche la Belle de Mai in Marseilles at district level, the Creative Dublin Alliance, Fab-lab Madrid Network and the Creative Wallonia Program at territorial level.

The research “From Creative Industries to the Creative Place” aligns with the perspective of industrial-oriented processes in a context of territorial crisis. It identifies a mix of actions that could foster the creation of a cluster combining new technological competences, entrepreneurial spirit and cultural/artistic sensitivity, to promote a “local creative ecosystem” in small and medium-sized towns (Rivas 2011). The idea of a “creative cluster” is a time-space articulation at the local level, between creatively-driven micro strategies in the fields of economy and culture, urban planning and design, place branding and communication and education and governance.

In Italy, significant measures are proposed to promote creative activities: setting up Local Agencies for Creativity, to coordinate the efforts and investments of public and private stakeholders in socioeconomic initiatives; and strengthening interactive information system. Furthermore, it aims to encourage multidisciplinary collaboration between entrepreneurs, researchers and potential creative workers; to open special programs aimed at enhancing the attractiveness of the cities and their liveability (Santagata 2009).

The MMB project with the session “Craftsmen and creative barrier” has confirmed the interest of young people and neighborhood artisans to actions enhancing local craft skills and forming a creative community. A first model of local and social network of creative industry has been developed as a result of the Workshop “Torino Creative City. Design ideas workshop” of the Politecnico di Torino, in “Torino City of Design 2015” (Figs. 2 and 3).

In this view, a significant initiative is “Incredibil!—Bologna’s Creative Innovation”, a project promoted by the Municipality of Bologna, in order to support innovative professionals in the cultural and creative fields. The structure offers a toolkit to support business ideas and opportunities for spaces, services and funding, experimenting a more active, less formal and international approach. A strong push to the policies supporting creativity of the City of Bologna is its nomination in 2005 to UNESCO Creative City.

A model of Social Creative Cluster was proposed for Turin, which was also nominated UNESCO Creative City in 2014. There are focal points in order to make Turin competitive in the fields of design and creativity:

- Presence of several important design schools, associations, independent production centers; an important tradition of car design;

Fig. 2 Current spatial model of creative industry network in Turin

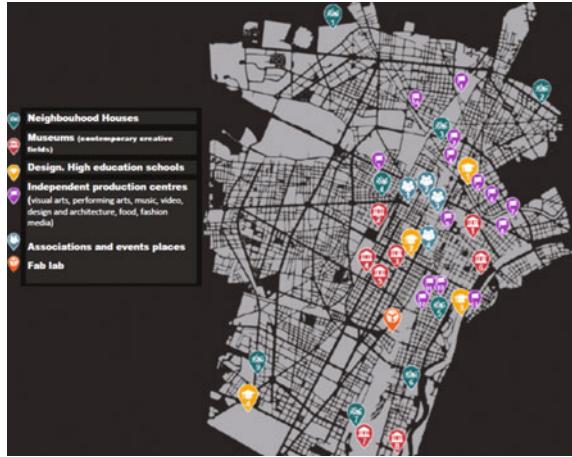


Fig. 3 Spatial model of neighbourhood creative industry network, Turin



- Development of social design, web service, digital makers and eco-design teams;

The city already has significant experiences in design-driven innovation and social inclusion:

- The first Italian Fab-Labs, offering digital 3D print and prototype resources, and Arduino, providing access to open tools for digital fabrication;
- A virtuous ecosystem, engaging collaborative knowledge and supporting new business ideas and start-ups in the field of social innovation;
- Brokerage events aimed at selecting local craftsmanship quality and increasing the collaboration between designers and small manufacturing companies;
- The organization of exhibitions and workshops for the enhancement of innovation specifically linked to the design field.

Moreover, the city is ranked “European Capital of Innovation Award—iCapital 2016” for “its open innovation models supporting social innovation start-ups and creating new market opportunities for urban innovations”. Strategies for the creative industry and social inclusion can be successful on the condition that they:

- Map the perception of cultural spaces and make the inhabitants aware of their potential;
- Communicate, properly and widely, innovation strategies into all social communities of disadvantaged neighborhoods;
- Integrate strategies and policies within a common vision;
- Stimulate a change in habits (*creative disruption*);
- Spread creativity and design-driven education at various levels;
- Promote the design approach to address needs of the public sector;
- Take into account local resources (talents, cultural institutions, creative industries, no-used spaces);
- Use creativity and culture to mitigate critical outcomes caused by inactivity and social isolation;
- Support the development of creative industries to generate new economic activities;
- Establish evaluation methods to monitor impact of policies on the peripheral ecosystems; and
- Use public funding and tendering processes to motivate interdisciplinary collaborations through various projects and institutions (Fig. 4).

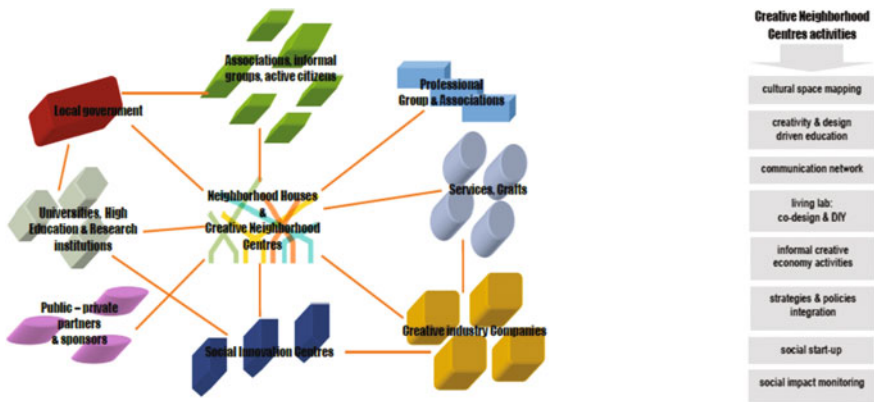


Fig. 4 Creative neighborhood centers. Network and activities

4 Conclusions: Proposal for Creative Neighborhood Centers

In the case study of Turin, the current feasibility study concerns the involvement of cultural aggregation and work spaces as public libraries, the neighborhood houses and other independent cultural production centers in peripheral areas. The research “Creative Torino” has already highlighted the presence of independent places active in visual and performing arts, music, cinema and video, design and architecture, food, fashion and new media, too. They are born in relation to some major events and the availability shown by the city administration to promote initiatives for urban regeneration (Bertacchini and Pazzola 2015). The goal is to increase the presence of independent, self-managed centers, fully establishing a virtuous model of the *city as experimentation laboratory* of social inclusion and entrepreneurship.

The multidisciplinary nature of experience within cultural production is essential, with strong social cross-over and opportunities for dialogue and inclusion, the exchange of knowledge, contamination and involvement of various stakeholders (active citizens, associations, professionals, institutions for higher education and research, innovation and start-up centres, etc.).

Each neighborhood creative center can specialize for training, planning and self-construction in a creative sector. The entire real/digital network can provide various services for production, at various technological levels, accessible to young professionals, as much as to citizens.

The social network of design, art, craft, digital craft and DIY aims to achieve real growth at the local level, but holds the potential to extend up to a global scale. There is a high presence of young professionals and possibilities to engage design-led creativity with other skills, such as manufacturing and engineering. The goal is to recover and enhance the traditional art and craft, by mixing and hybridizing innovative technologies, to make new products of craft, public art, design and social media design; to spread philosophy and share the work methods of the creative industry all over the neighborhoods.

Another goal is enhancing existing abandoned spaces, exploring how local manufacturing can work more with creative skills, connecting social education and incubation programs and funding through public–private partnerships.

Quality in communication, perception of accessibility, attractiveness, inclusivity and sustainability of spaces have emerged as other essential factors. “The spill-over benefits” of arts, culture and creative industries are in increasing visibility, tolerance and cultural exchange between communities (Fleming 2015). The development of a creative industry can be integral part of any attempt to redress inequality.

The objectives are integrating the social dimension into entrepreneurial activities that provide a bridge between formal and informal creative economy environments.

The reference is to a real/virtual network in the peripheral dissemination of creative industries. The new creative centers must mix spaces for social inclusion services and for ethical, sustainable training and production, in public-private

partnership and according to a spatial multilocation model for creative and inclusive economy, in line with the “economic ecology” and “regenerative ability” proposed by the Encyclical Letter *Laudato Si*.

References

- Bertacchini E, Pazzola G (2015) Torino Creativa. I Centri Indipendenti di Produzione Culturale sul territorio torinese. GAI, Torino
- Chapain C (2010) Creative clusters and innovation. Putting creativity on the map. NESTA, London
- Ciampolini T (2007) Barriera Fragile. IDOS, Torino
- Città di Torino (2017) Urban Barriera Di Milano 2011/15, Report, Torino
- Clifford S, King A (eds) (1996) From place to place—maps and Parish maps. Common Ground, London
- Eskelinen J, Robles AG, Lindy I, Marsh J, Munte-Kunigami A (2015) Citizen-driven innovation. A guidebook for city mayors and public administrators. International Bank for Reconstruction and Development, Washington
- Fleming T (2015) Cultural and creative spillovers in Europe: report on a preliminary evidence review. European Creative Business Network
- Magnaghi A (2005) The urban village: a charter for democracy and local self-sustainable development. Zed Books, London and New York
- Maspoli R, Murtas D, Saccomandi M (2014) Mappe di comunità. Riconoscimento del patrimonio e valorizzazione locale / Community maps. Recognition of heritage and local valorisation. In: Trisciuglio M, Barosio M, Ramello M, (eds) ARCHITECTURE AND PLACES. Progetto culturale e memoria dei luoghi / cultural design and site's memory, Celid, Torino
- Mela A (2014) La città condivisa. Lo spazio pubblico a Torino. FrancoAngeli, Milano
- Moore S, Borrup T (2009) Cultural mapping toolkit: a partnership between 2010 legacies now and creative city network of Canada. Creative City Network of Canada, Vancouver
- Parker M (1995) Good practice. Guide to community planning and development. London Planning Advisor Committee, London
- Rivas M (2011) From creative industries to the creative place. Final Report, URBACT Creative Clusters
- Stikker S (2011) Introduction. In: van Abel B, Evers L, Klaassen R, Troxler P (eds) Open design now—why design cannot remain exclusive. BIS, Amsterdam
- Santagata W (2009) White paper on creativity. Towards an Italian model of development. Università Bocconi Editore, Milano
- UNESCO (2013) Creative economy report: Widening local development pathways, Unesco/United Nations Development Programme, France/U.S
- Zenker S, Braun E (2010) Branding a city. A conceptual approach for place branding and place brand management. In: 39th European marketing conference, 2010

Part II
Integral Ecology and Natural
Resources Management

Valuation of Historical, Cultural and Environmental Resources, Between Traditional Approaches and Future Perspectives



Vincenzo Del Giudice, Pierfrancesco De Paola and Fabiana Forte

Abstract In the field of economics, assessments involve the consideration of the complex market relationships that directly affect economic goods, often having to consider also the possibilities of recovery, reuse, or land transformation. Financial and economic assessments mainly concern investment decisions finalized to the allocation of private and public resources. Multidimensional assessments rationalize the choices driven by conflicting criteria and objectives. The aim of the paper is to highlight the specificities of various types of assessments that have as object HCERs and, at the same time, we want to identify some correspondences between these aspects of the past and the future perspectives highlighted by the encyclical letter “Praise Be to You” of the Holy Father Francis “on care for our common home”. First, the characteristics of HCERs and the purposes that motivate their assessment are examined. Finally, a brief critical analysis about the various types of HCERs assessment was presented.

Keywords Historical, cultural and environmental resources · Economic and financial assessments · Multidimensional assessments

1 Introduction

With these words Holy Father Francis open his encyclical letter “Laudato sii”—“Praise be to you”:

V. Del Giudice · P. De Paola (✉)
Department of Industrial Engineering, University of Naples “Federico II”, Naples, Italy
e-mail: pierfrancesco.depaola@unina.it

V. Del Giudice
e-mail: vincenzo.delgiudice@unina.it

F. Forte
Department of Architecture and Industrial Design, University of Campania “L. Vanvitelli”,
Aversa, Italy
e-mail: fabiana.forte@unicampania.it

“Praise be to you, my Lord”. In the words of this beautiful canticle, Saint Francis of Assisi reminds us that our common home is like a sister with whom we share our life and a beautiful mother who opens her arms to embrace us. “Praise be to you, my Lord, through our Sister, Mother Earth, who sustains and governs us, and who produces various fruit with coloured flowers and herbs” (§ 1) (Encyclical Letter 2015).

The attention of the encyclical letter is therefore immediately addressed to Earth and environmental goods.

Cultural heritage and environmental goods have an anthropogenic or natural origin. As such, they may consist of artificial or natural resources. In the case of artificial resources, they may be real-estate goods (monuments, historic buildings, museums etc.) or chattels (such as archaeological finds, works arts etc.). On the other hand, natural resources (such as landscape, gardens, rivers, parks etc.) are immovable goods. Artificial and natural resources are able to satisfy individual and collective needs, both economic and non-economic (such as housing needs, recreational, aesthetic etc.). The satisfaction level for economic needs can be measured through the utility attributable to historical, cultural and environmental resources (HCERs), translated into money. Conversely, the satisfaction level for non-economic needs can be measured by the efficacy of the considered good in order to satisfy community needs (Bohm 1984).

In the economic field, an evaluation process may apply to a single cultural and environmental resource, or its parts, or also services and functions provided by the good, or again rights and constraints imposed on the resource. Valuation may also concerns projects, quantitative and qualitative aspects of projects, plans and investment programs, the modalities of protection/integrated rehabilitation/preservation of goods, non-economic valorization processes, historical components, or cultural, architectural, symbolic etc., individual goods or their aggregates also (Cles 1989).

In this context, Pope Francis appeals, then, “*for a new dialogue about how we are shaping the future of our planet. We need a conversation which includes everyone, since the environmental challenge we are undergoing, and its human roots, concern and affect us all*” (§ 14) (Encyclical Letter 2015).

HCERs exert social functions also. If the holder of the property right is a private or a public entity, HCERs also perform private functions. However, almost all HCERs belong to collectivity, and so they fall into the category of natural resources. HCERs whose ownership is private or public are mostly of anthropogenic origin and, regarding typology, artificial. If the owner is a private entity, a HCER is classifiable as a “mixed” asset, because it exerts social functions (e.g., historic buildings used for social housing or collective cultural needs). Similarly, at the same time, mixed assets that belonging to a public entity are able to carry out private functions.

There are HCERs classified as “pure public assets” that are intended only for social functions and belong to the entire collectivity. They are subject to changes over time due to natural events (e.g., changes of the course of a river due to erosion and sedimentation), as well as anthropogenic events (e.g., landscape changes for building activities). Furthermore, pure public HCERs are carriers of values related

to subjective perception (direct and indirect, actual, potential and future) of the attributes that characterize them. Mixed HCERs, private and public, may constitute objects of assessment affecting mercantile perspectives and satisfy the “price postulate”. Public and pure HCERs are outside every market and, thus, they are subject to assessments that usually are independent of commercial purposes.

The aim of the paper is to highlight the specificities of various types of assessments that have as their object HCERs and, at the same time, we want to provide some correspondences between these aspects of the past and the future perspectives highlighted by the encyclical letter “Praise Be to You” of the Holy Father Francis “on care for our common home”. First, the characteristics of HCERs and the purposes that motivate their assessment were examined. Finally, a brief critical analysis about the various types of HCERs assessment was presented.

2 Aims of HCERs Valuation

In some cases, valuation of cultural heritage and environmental goods can be performed for sales purposes, i.e., trying to express in monetary terms a value that derives from functions performed by the same asset.

Often valuation processes satisfy hereditary-division targets (e.g. on historic buildings), computation of damages (with reference to museums, churches, art galleries etc. that were affected by fire, for example), for public expropriation interest (natural oasis, urban gardens, building products with significant architectural features etc.), whose property belongs to private individuals), pricing for use of concessions or contractual or tax values (Del Giudice et al. 2014a, b; Del Giudice and De Paola 2016; Tajani and Morano 2014, 2015). However, today “*the earth is essentially a shared inheritance, whose fruits are meant to benefit everyone. For believers, this becomes a question of fidelity to the Creator, since God created the world for everyone*” (§ 93) (Encyclical Letter 2015). But this is not always the case, unfortunately.

For purposes of intervention on cultural and environmental assets, the valuation can be designed to test the financial and economic feasibility of plans or investment projects in the fields of protection, enhancement and transformation of resources at the local, metropolitan and regional level. It can also pursue objectives of determining the cost of assistance and management systems designed, the changes in value of HCERs affected by the project, the monetary values related to economic and environmental externalities caused by execution of building interventions (Del Giudice et al. 2014c; Del Giudice and De Paola 2014).

For purposes of sustainable land development, the valuation can be carried out to ensure the environmental compatibility of the projects for transformation of HCERs, the aesthetic and visual quality of the assets and their parts or sets, the quality of technical components of a project and the effectiveness of the ways of development and conservation strategies. For the same purposes, valuation can also be performed to determine the economic and non-economic values of HCERs, the

optimum mode of management plans and the results of technical analysis for to develop appropriate laws in order to conservation of artistic, historical, architectural and cultural heritage (Heilbrun 1974).

In any case, *“an assessment of the environmental impact of business ventures and projects demands transparent political processes involving a free exchange of views”*. And *“the analysis of environmental problems cannot be separated from the analysis of human, family, work-related and urban contexts, nor from how individuals relate to themselves, which leads in turn to how they relate to others and to the environment. There is an interrelation between ecosystems and between the various spheres of social interaction, demonstrating yet again that the whole is greater than the part”* (§ 182) (Encyclical Letter 2015).

3 Market Value of Cultural and Environmental Heritage

The following analysis focuses on the valuations that deal to the market value of cultural and environmental heritage.

Preliminarily, the categories of HCERs that may have a market appreciation can be defined. HCERs classified as pure public assets don't have mercantile references because their consumption by definition does not generate conflicts between economic actors (Weisbrod 1964). This occurs almost entirely for natural assets and particularly for landscape resources. Exceptions are natural assets whose use is due to rivalry between the individuals of the collectivity: in urban areas, parks or public or private gardens for which there are certain restrictions on their use, e.g., from regulations imposed for the conduct of visitors. About this, what is the nature of the goods, Pope Francis claims that *“in some places, rural and urban alike, the privatization of certain spaces has restricted people's access to places of particular beauty. In others, “ecological” neighbourhoods have been created which are closed to outsiders in order to ensure an artificial tranquillity”*. However, *“the principle of the subordination of private property to the universal destination of goods, and thus the right of everyone to their use, is a golden rule of social conduct and “the first principle of the whole ethical and social order”* (§ 93) (Encyclical Letter 2015).

The market appreciation can be more targeted to HCERs with anthropogenic origin, for which usage restrictions are often the result of “limits of capacity” of their physical and spatial characteristics. In the consumption of natural and anthropogenic resources, the emergence of rivalry between economic actors closely affects the private component of the resource (e.g., residential services provided by a monumental historic building); similar “conflicts”, concerning public functions explicate from the assets, should be brought back to the restrictions on the forms of practicable use (Weisbrod 1964; Johansson 1987).

Rivalry or conflicts in the HCERs consumption activities determine the genesis of the profitability of these assets, for their ability to generate an income for the use—by economic actors—related to private and public functions. Under the methodological

aspect, it is clear that the assessment of HCERs that do not produce any income must necessarily be carried out according to the general principles of value estimation. According with these principles, the comparison assets must to be found by approximations that lead, progressively, to dissimilar assets (with respect to asset to be evaluated), until reaching a level of unequal assets. Decreasing the degree of similarity between the assets increases the irregularity of a “grid” that includes the comparables assets (known market prices and characteristics of comparison assets). These circumstances are evident in HCERs that show signs of uniqueness (as may happen for various historic buildings that highlight different and specific traits in able to define their historical position).

The determination of market value requires “incorporation” of the effects caused by cultural and environmental characters of the asset to be evaluated. The most recent appraisal methodologies for these purposes are based on quantitative analysis. In today’s state of the estimative discipline, however, this can take place only in the context of assessments conducted simultaneously with reference to a plurality of properties (mass appraisal), with the aim to identify the market price variables (Del Giudice et al. 2015, 2016a, b, 2017a, b, c, d, e; Manganelli et al. 2016). The concrete applicability of described approach depends on the availability of real-estate data necessary for the assessment. If, in the assessment of historic buildings often there is a significant availability of real-estate data, when the HCER to be evaluated is very atypical, useful data does not exist (e.g., a monument, an archaeological find, etc.).

In the absence of comparable data, the assessment can evidently be carried out through appropriate adjustments based on the prices of comparison assets, obviously the adjustments must be performed considering the degree of dissimilarity or inequality that the comparables have with respect to the resource to evaluate. Great influence has the “bargaining power” of those involved in the valuation process, because the market structure in which the resource will be placed usually is a monopolistic form, where there is a lack of appropriate methodologies (Cles 1989). Normally, it derives from the need to define innovative assessment models, which pursue objectives of deepening, in able to provide a critical review of conventional principles and processes, to be adapted to the purposes of assessment.

4 Financial and Economic Valuations

Financial and economic valuations applied to HCERs have assumed a major role from the beginning of the ‘80s. The reasons are connected to the economic and social situations that in those years affected our country (Italy), and the consequent urgent need for actions in able to stimulate effective exploitation policies and land development (Blaug 1977; FORMEZ 1992).

Financial and economic assessments and typically the benefit-cost analysis technique (ACB) are used to test the feasibility (financial and economic) of individual projects in each sector (or program) with predetermined spending limits.

ACB analysis, applied ex-post, is also used to track the implementation and management phases of the public selected initiatives, in order to ascertain the existence of the effects predicted in the feasibility study, and to realize—when possible—appropriate corrective actions (Tajani and Morano 2014, 2015; Del Giudice et al. 2014c). Applied to cultural and environmental heritage, valuations conducted with ACB analysis may show specific characteristics due to the purpose of financial analysis use or to the operating difficulties of the economic analysis principles.

The specificity of ACB analysis, in the application of economic assessment principles, concerns the identification of various demand components of services given by HCERs and also the quantification of benefits that these assets can generate. The first issue is obviously prior to the second, being in fact necessary to identify the demand components in order to define the various groups of resource users and, consequently, the categories of the benefits to which they relate (Dasgupta et al. 1972; Pearce 1974; Wallis 1984).

About “transparency in decision-making”, the encyclical letter highlights the risks on “*the forms of corruption which conceal the actual environmental impact of a given project, in exchange for favours, usually produce specious agreements which fail to inform adequately and to allow for full debate. [...] Environmental impact assessment should not come after the drawing up of a business proposition or the proposal of a particular policy, plan or programme. It should be part of the process from the beginning, and be carried out in a way which is interdisciplinary, transparent and free of all economic or political pressure. It should be linked to a study of working conditions and possible effects on people’s physical and mental health, on the local economy and on public safety. [...] In the face of possible risks to the environment which may affect the common good now and in the future, decisions must be made based on a comparison of the risks and benefits foreseen for the various possible alternatives*” (Encyclical Letter 2015).

5 Multidimensional Valuation

Any cultural or environmental asset is a complex resource. In fact, these resources are capable of providing, at the same time, various types of services (historical, artistic, recreational, productive, educational, aesthetic etc.), targeted to different categories of users. For example, the real-estate industry frequently provides residential services with individual advantages or also social functions (Lemaire 1984). These latter translate into collective activities, aesthetic enjoyment, recreation and the cultural activities of assets. Such activities are beyond of mercantile sphere and are exercised mostly by “external” actors to the residential functions derived from the asset. The extra residential services provided by HCERs, to the extent that they satisfy the interests of a general category, are considered socially “meritorious”.

The private or public services, provided by HCERs, correspond to the various values attributed by their collective nature. These values reflect social safeguard

issues, protection and enhancement of the HCERs, and they are of greater importance than in the past as a result of the increased “environmental sensibility” due to the improvement of the living conditions of people (increase of income, education level etc.). The cited values correspond to components external to the market, of a qualitative nature, the quantification of which cannot therefore be carried out according to traditional principles.

An overall assessment of HCERs cannot regardless be separated from the qualitative aspects. This entails the need to use multiple and various criteria that take into account qualitative, as well as quantitative, characteristics presented by the resource, the various functions provided from the resource and the different categories of users in the several social groups (direct, indirect, current, potential, future). The objective is ultimately to determine a value that reflects the multiple and various functions simultaneously deployable from the resource and able to express the overall capacity of the HCERs to satisfy the several needs of people with regard to various “dimensions” (cultural, recreational, aesthetic, economic, social etc.).

The various components of resource’s total value, depending on their nature (mercantile or not), should be expressed in monetary terms or linguistic diagnosis (in the last case, linguistic diagnosis should be converted to cardinal measures, ordinal scales and scores). A corresponding logic of this valuation should be identified in the formation process so-called “Total Economic Value” (VET), and, although VET components are all expressed in monetary terms, their “weights” can be added between them and translated into a single final value.

In economic thinking, the introduction of VET for HCERs is inspired by the knowledge that the valuation of such assets must be carried out according to viewpoints or criteria adapted to the relative scarcity and irreproducibility of resources. From this derives a need for a recognition of several categories of innovative and diversified values (see Fig. 1) that sometimes differ from the traditional economic principles (Wallis 1984; Lemaire 1984). From this perspective, the common approach towards the economic value incorporated into cultural assets has to the “holistic” one that recognizes that cultural or environmental assets possess not only economic values, categorized according to their use and non-use characteristics. In Fig. 1, several typologies of values are schematized, based on the studies provided by various authors, but not exhaustive, with there being many different interpretations on the overall value of HCERs.

About values of HCERs, the non-use value constitutes is the component most difficult to assess, and the corresponding valuation methods refer to the ‘willingness to pay’ concept (under both the conditions of existence or not of a market). What is problematic, however, is in this respect is: what are representations to take in account for qualitative components of HCERs, as well as to objectify their measure, and how to homogenize the values of the components that have different nature—these are just some of various unanswered questions.

About the considerations just posed, we can find some correspondences in the encyclical letter where it appeals to the protection of biodiversity, because “*the earth’s resources are also being plundered because of short-sighted approaches to*

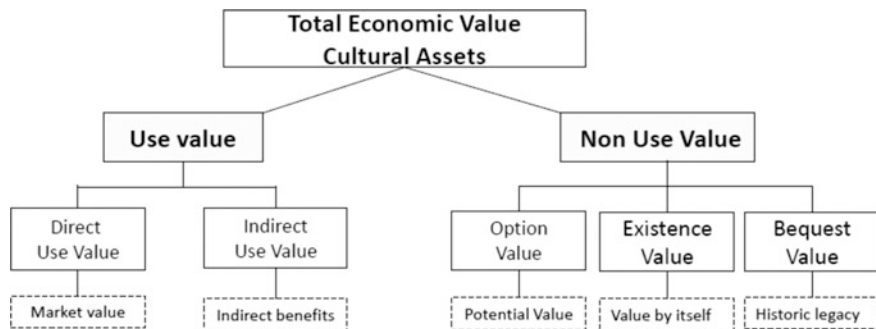


Fig. 1 Values of HCERs

the economy, commerce and production. (§ 32) [...] In assessing the environmental impact of any project, concern is usually shown for its effects on soil, water and air, yet few careful studies are made of its impact on biodiversity, as if the loss of species or animals and plant groups were of little importance. (§ 35) [...] Greater investment needs to be made in research aimed at understanding more fully the functioning of ecosystems and adequately analyzing the different variables associated with any significant modification of the environment” (§ 42) (Encyclical Letter 2015).

6 Conclusions

Various types of HCERs assessment were presented.

Estimation judgments oriented to market values may relate to the cultural and environmental heritage, whose fruition involves the occurrence of personal conflicts depending on the operating limitations of these resources due to their physical and spatial characteristics. The profitability of a cultural and environmental asset is an appropriate methodological reference for the determination of resource’s market value and particularly in cases of residential functions provided by historical real-estate heritage. For non-residential functions provided by cultural or historical real-estate heritage, the market rules may not be satisfied because superior social objectives lead to the genesis of administered or conventional prices or fees.

Financial and economic assessments (typically cost-benefit analysis) may also pursue nonfinancial preordained targets for specific interventions on resources, as well as they may discriminate the components of the resource’s demand, or implement the procedures inside particular institutional and administrative frameworks. These specificities may generate conflicts with the use of cost-benefit analysis for the projects evaluation on HCERs because analysis may be aleatory and there is the possibility to orient the results toward extra-mercantile objectives.

While the multi-dimensional techniques should be more capable, nevertheless there are concerns about the possibility that they lead, effectively, to results with real reliability. These techniques should improve the methods of data processing and the objectification of qualitative information.

With respect to these brief critical considerations, the encyclical letter makes some final reflections, i.e.: *“self-improvement on the part of individuals will not by itself remedy the extremely complex situation facing our world today. Isolated individuals can lose their ability and freedom to escape the utilitarian mindset, and end up prey to an unethical consumerism bereft of social or ecological awareness. Social problems must be addressed by community networks and not simply by the sum of individual good deeds. [...] The ecological conversion needed to bring about lasting change is also a community conversion”* (§ 219) (Encyclical Letter 2015).

References

- Blaug M (1977) Rationalising social expenditure: the arts. Public Expenditure Allocation, Cambridge
- Bohm P (1984) Revealing demand for an actual public good. J Pub Econ 24:135–151
- Cles (1989) Il bene culturale come risorsa economica, Roma
- Dasgupta P, Sen A, Marglin S (1972) Guidelines for project evaluation. UNIDO, Wien
- Del Giudice V, De Paola P (2014) The effects of noise pollution produced by road traffic of Naples Beltway on residential real estate values. Appl Mech Mater Trans Tech Publ 587–589:2176–2182
- Del Giudice V, De Paola P (2016) The contingent valuation method for evaluating historical and cultural ruined properties. In: Procedia—social and behavioral sciences, vol 223C. Elsevier, pp 595–600
- Del Giudice V, De Paola P, Torrieri F (2014a) The assessment of damages to scientific building: the case of the “Science Centre” museum in Naples, Italy. Adv Mater Res Trans Tech Publ 1030–1032:889–895
- Del Giudice V, De Paola P, Torrieri F (2014b) An integrated choice model for the evaluation of urban sustainable renewal scenarios. Adv Mater Res Trans Tech Publ 1030–1032:2399–2406
- Del Giudice V, De Paola P, Passeri A, Torrieri F (2014c) Risk analysis within feasibility studies: an application to cost-benefit analysis for the construction of a new road. Appl Mech Mater Trans Tech Publ 651–653:1249–1254
- Del Giudice V, De Paola P, Manganelli B (2015) Spline smoothing for estimating hedonic housing price models, ICCSA 2015, Part III, Lecture Notes in Computer Science, 9157, Springer, pp 210–219
- Del Giudice V, De Paola P, Forte F (2016a) The appraisal of office towers in bilateral monopoly’s market: evidence from application of Newton’s physical laws to the Directional Centre of Naples. Int J Appl Eng Res 11(18):9455–9459; R.I.P
- Del Giudice V, Manganelli B, De Paola P (2016b) Depreciation methods for firm’s assets, ICCSA 2016, Part III, Lecture Notes in Computer Science, 9788, Springer, pp 214–227. https://doi.org/10.1007/978-3-319-42111-7_17
- Del Giudice V, De Paola P, Manganelli B, Forte F (2017a) The monetary valuation of environmental externalities through the analysis of real estate prices, sustainability. MDPI Switz 9(2):229

- Del Giudice V, De Paola P, Cantisani GB (2017b) Rough set theory for real estate appraisals: an application to Directional District of Naples, buildings. *MDPI Switz* 7(1):12
- Del Giudice V, De Paola P, Cantisani GB (2017c) Valuation of real estate investments through fuzzy logic. buildings. *MDPI* 7(1):26
- Del Giudice V, De Paola P, Forte F (2017d) Using genetic algorithms for real estate appraisal, buildings. *MDPI* 7(2):31
- Del Giudice V, Manganelli B, De Paola P (2017e) Hedonic analysis of housing sales prices with semiparametric methods. *Int J Agric Environ Inf Syst* 8(2):65–77
- Encyclical Letter (2015) “Laudato si”—of the Holy Father Francis on care for our common home, 24 May 2015
- FORMEZ (1992) *Economia dei beni culturali, Programmazione e valutazione dell'intervento pubblico per progetti*, Napoli
- Heilbrun J (1974) *Urban economic policy*. St. Martin's Press, New York
- Johansson PO (1987) *The economic theory and measurement of environmental benefits*. Cambridge University Press, Cambridge
- Lemaire RM (1984) *Evaluation Economique du Patrimoine Monumental*. GEE, Bruxelles
- Manganelli B, Del Giudice V, De Paola P (2016) Linear programming in a multi-criteria model for real estate appraisal, ICCSA 2016, Part I, Lecture Notes in Computer Science, 9786, Springer, pp 182–192
- Pearce DW (1974) *Cost benefit analysis*. McMillan, London
- Tajani F, Morano P (2014) Concession and lease or sale? A model for the enhancement of public properties in disuse or underutilized. *WSEAS Trans Bus Econ* 11(74):787–800 ISSN: 1109-9526
- Tajani F, Morano P (2015) An evaluation model of the financial feasibility of social housing in urban redevelopment. *Prop Manag* 33(2):133–151 ISSN: 0263-7472
- Wallis J (1984) *Aspects of project appraisal*. World Bank, EDI Training Materials
- Weisbrod BA (1964) Collective consumption services of individual consumption goods. *Q J Econ* 78(3):471–477

The Complexity of Value and the Evaluation of Complexity: *Social Use Value* and Multi-criteria Analysis



Grazia Napoli

Abstract The “challenge of complexity” is one of the many points of convergence between the Encyclical *Laudato si’* and the evolution of post-modern scientific thought. This study aims to analyze how complexity represents the essential element of the profound renewal in the scientific paradigm of the discipline of evaluation, particularly in regard to *the theory of value, the categories of value, and the instruments of multi-criteria evaluation*. Some contemporary theories of value propose, in fact, a complex source of value, such as *surpluses of energy and of information* (Ecological Economics) or as the creative and synergistic combination of three *surpluses*, namely *energetic and non-entropic, genealogical-ecological, and scientific-cultural* (the “Nuova Economia” of Francesco Rizzo). These theories derive from a new interpretative key founded on the alliance between the natural sciences and the humanities. The creation of new categories of value, the *social use value* and the *total economic value*, constitute, moreover, the response of the science of evaluation to the social and disciplinary need to express a *complex value* that goes beyond both the *private use value* and the (*normal and speculative*) *exchange value*, and which include the multiplicity of values (ethical, aesthetic, economic, cultural, scientific, political, juridical, and equitable) that express the human being as a whole, no longer reduced merely to the *homo economicus*. The demand for the resolution of complex problems involving public and private territorial assets has led to the elaboration of models of multi-criteria evaluation through which to recompose the conflicting dualities of equity/efficiency, quality/quantity, and local/global into a uni-duality. In these models, the absence of a monetary unit of measurement constitutes an opportunity for re-founding a system of common social values and for allowing the participation of local communities in decision-making processes (Bentivegna 2016). The evaluation discipline, furthermore, may continue to participate directly in the great cultural, spiritual, and educational challenges contained in the Encyclical, to change the style of life and the patterns of production and consumption, making its own contribution in three spheres: *scientific-cultural*, through studies and research orientated towards the

G. Napoli (✉)

Department of Architecture, University of Palermo, Palermo, Italy
e-mail: grazia.napoli@unipa.it

promotion of the culture of complexity, of multidisciplinary, and of environmental protection; *social-territorial*, through collaboration with public institutions to elaborate operative instruments (models) of social participation in local decision-making processes; and *educational*, through the qualification and training of architects and engineers.

Keywords Complexity · Theory of value · Social use value · Multi-criteria evaluation

1 The Challenge of Complexity

The complexity is a real challenge. It is an ambivalent challenge with two faces, like Janus. On one side it is the irruption of the irreducible uncertainty into our certainty, it is the crumbling of the myths of certainty, of completeness, and of exhaustiveness (...) But on the other side it is not only an indication of an order that is not, it is, also and above all, the need and inevitability of a “deepening of the adventure of knowledge”, (...) even of a “new conception of knowledge”, of an aesthetic change, of a “dialogue between our minds and what they have produced in the form of ideas and of systems of ideas” (Bocchi and Ceruti 1985, pp. 7–8).

Complexity is the most arduous and compelling challenge with which the scientific-cultural paradigms of the post-modern society continues to be confronted after having overcome positivist thought, whose deterministic and reductionist approach had been extended from the study of the natural (*hard*) sciences to that of the social (*soft*) sciences under the pretense that this was the only way to make them “scientific”.

The scientific paradigm of the evaluation discipline, subjected to the process of renewal, has to be understood in its dual sense (Kuhn 1962) of “disciplinary matrix” and “exemplar”. In the sense of “disciplinary matrix”, the renewal of the paradigm concerns the symbolic generalizations, the models, the epistemological values, and the solutions of scientific problems, whilst in the sense of “exemplar” it concerns the application of symbolic generalizations to various case studies that, through their iterative ostensions, indicate the lines of research and new directions towards which the evaluation is oriented, modifying its own theoretical borders, as well as its operative scope.

The economic value is complex. This is inevitable in that it is an expression of the economic (sub)-system part of the social system. Despite the tendency of self-referential closure of every (sub)-system that generates its own code of internal communication (Luhmann 1995), it is necessary to construct a consensual linguistic dominion (Maturana and Varela 1980) that constitutes a communicative axis with other autopoietic systems and between the economic system and the natural and human environments. The alliance between the natural and human sciences (Prigogine and Stengers 1979) allows for the overall phenomena to be understood in its entirety, and for the antitheses in the unity of the complementary opposites to

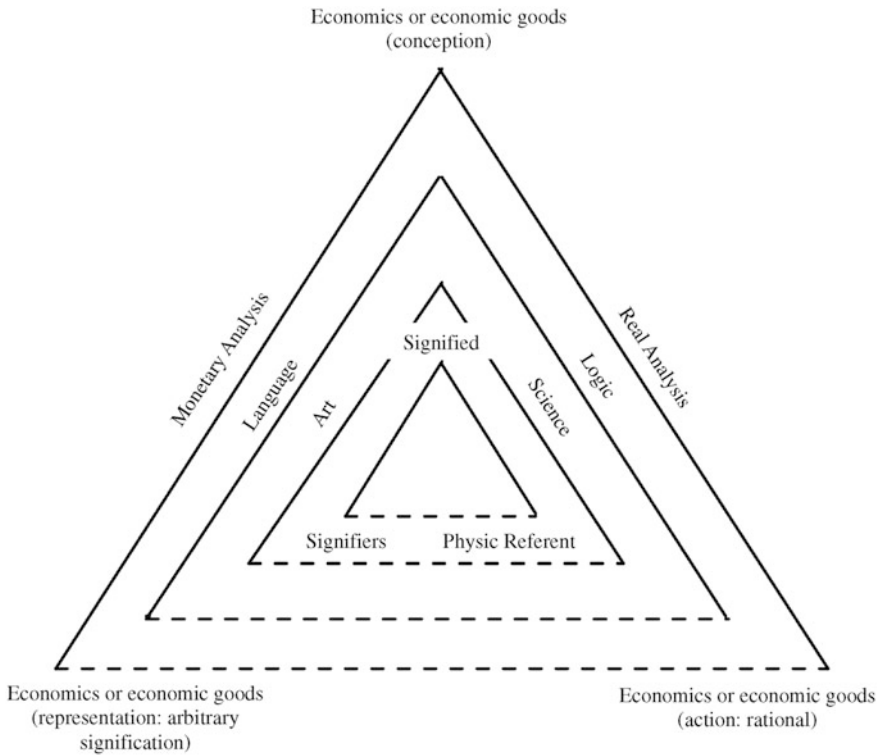


Fig. 1 The “matryoshka” of semiotic triangles: the unity of complementarily opposites (Rizzo 1999)

be resolved. In the “matryoshka”, or Russian nesting doll, of Francesco Rizzo’s semiotic triangles (1999) (Fig. 1), the elements on the left side are all those related to semiotic inference (monetary analysis, language, art, and significance or meaning) that form a unity of complementary opposites with the elements on the right side, which are related to the “scientific” inference (respectively, real analysis, logic, science, and physical reference). This uni-duality is functional, above all, with the recognition of the dual nature of economic goods as the rational expression of objective characteristics and as a representation of value as an object of the economic signification of arbitrary processes.

The encyclical (Holy Father Francis 2015) also promotes the overcoming of the sectorial nature of scientific knowledge and the alliance between various sciences:

The fragmentation of knowledge (...) often leads to a loss of appreciation for the whole, for the relationships between things, and for the broader horizon (...) A science which would offer solutions to the great issues would necessarily have to take into account the data generated by other fields of knowledge, including philosophy and social ethics. (§ 110)

2 The Complexity of Value

To understand the complexity of value and to provide a theoretical and epistemological basis for the expression of value judgments, the evaluation discipline adopts a theory of value that, traditionally, has been elaborated by the schools of economic thought. In the evolution of economic thought (Roll 1942), the economic schools that have questioned the nature of value have proposed a *theory of value* based on epistemes of a different nature (Rizzo 1999). Since any theory of value, of whatever scientific paradigm, is not absolute and unique but is historically determined, it follows that the theories reflect not only the economic but also the cultural, political, ethical, aesthetic, and religious systems of the society in which they were developed (Mangialardo and Micelli 2017).

The principal epistemes that classify the theories of value of the major economic schools of thought, according to Rizzo's analysis (2002), are: the *Episteme of similarity and representation*, the *Episteme of production and labour*, and the *Episteme of semiotics-hermeneutics and biotechnology* (Table 1).

Many of the previous theories argue that the source of value is a single, even if not necessarily a "simple", one, whilst other economic schools, which participate in the renewal of the scientific paradigm, advance the idea that there is a complex source of value. The school of Ecological Economics, in particular, proposes a theory of value based on the *surpluses of energy and of information* (Bresso 1993). In Rizzo's "Nuova Economia" (1990, 1999) on the other hand, value is generated by the creative and synergistic combination of *cultural (scientific-cultural)*, *eco-biological (genealogical-ecological)*, and *natural (energetic and non-entropic) surpluses* (Fig. 2).

The complexity of the source of value is related to the complexity of the elements, to which the social system recognizes a significant role in the creation of value. With reference to Rizzo's theory of value, the adherence to the principles of sustainable development and of intra-generational and inter-generational equity,

Table 1 Schools of economic thought, epistemes, and theories of value (Rizzo 2002)

Episteme of similarity and representation	
Keynes (post-Keynesians), Mercantilists, Malthus	Theory of <i>wealth-money</i>
Episteme of production and labor	
Physiocrats	Theory of <i>wealth-land</i>
Classical-Marxian economics	Theory of <i>value-labor</i>
Neoclassical economics	Theory of <i>value-marginal utility or productivity</i>
Energetic economics	Theory of <i>value-energy</i>
Episteme of semiotics-hermeneutics and biotechnology	
Ecological economics	Theory of <i>energy/information value-surplus</i>
Nuova Economia	Theory of <i>cultural/eco-biological/natural value-surplus</i>

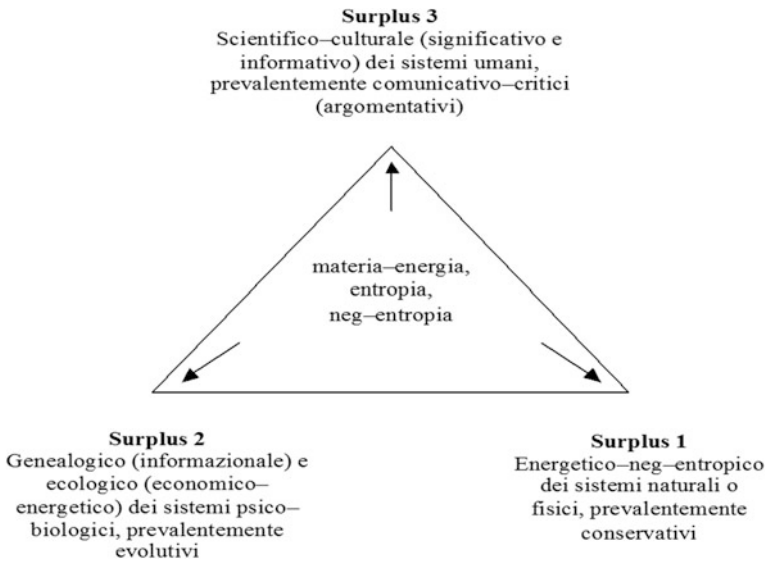


Fig. 2 Triangle of natural, biological, and cultural surpluses (Rizzo 1999)

in relation both to the attention paid to the use of renewable and non-renewable resources and to the recognition of the importance of all forms of life, contributes to the recognition of value, in terms of both *energetic and non-entropic surplus* and *eco-biological surplus*, for those goods that are able to decrease the growing entropy [the degradation of both energy and matter according to Georgescu-Roegen (1971)] and to preserve the ecological systems, the biodiversity, and the information contained in the genetic heritage of all living beings (Giuffrida et al. 2015). *Cultural surplus* recognizes the importance of communication and of signification, which are peculiar to critical-argumentative human systems (Rizzo 1999; Eco 1975), which produce, exchange, and elaborate information and significance that are then incorporated and transmitted by material and immaterial goods. The creation of value as a result of the creative and synergistic combination between the three *surpluses* expresses the overcoming of common oppositions, hierarchies, or the presumed supremacy of some conceptual categories over others, and the assertion that all the surpluses together contribute to the formation of value and that, indeed, synergistic (multiplicative) positive or negative processes are activated by their interaction.

3 Complex Values

Within the scope of hermeneutic economics and values, one must recognize the existence of a plurality of economic levels that correspond to a plurality of values (Rizzo 1990):

- *Non-Economy or auto-consumption*, in which *private use value* prevails, considered as a means for the satisfaction of needs and as a material precondition for exchange value.
- *Natural or market economy*, characterized by *normal exchange values* (from a subjective point of view) and by money.
- *Artificial or capitalistic economy*, characterized by *speculative values* that allow processes of auto-exploitation of capital goods.
- *Social or public economy*, which revolve around *social use values*. *Social use value* is a complex value that takes into account many aspects, such as accounting-monetary, economic-financial, juridical-administrative, sociopolitical, ethical-moral, aesthetic, scientific-cultural, and environmental aspects.

The levels of economy and the corresponding values (or dis-values) are not necessarily placed along a unidirectional evolutionary line of economic growth but, on the contrary, coexist and interact with each other in time and space, taking various forms and giving rise to various results.

The introduction of the new category of *social use value* (Forte 1978; Rizzo 1983; Mattia 1983; Fusco Girard 1986) or *total economic value* (Pearce et al. 1989; Kopp 1992; Pearce 1993; Shechter and Freeman 1994; Stellin and Rosato 1998) constitutes the disciplinary response to the demand for a social value that goes beyond both the *private use value* and the (*normal and speculative*) *exchange value*, even if we should not disregard the fact that, in any case, “*Purchasing is always a moral—and not simply economic—act*” (§ 206, Holy Father Francis 2015).

Money is the preferred code of the economic (sub)-system and is a deeply rooted and common language of the social system that, in a continuous process of economic-estimative semiotics, endorses or negates the attribution of value to a commodity (which becomes a sign of value or dis-value) and translates it into money. Despite the custom and the preponderance of the use of this kind of language, several criticisms emerge, with various declinations, when it is applied to the evaluation of complex values, but also to the estimation (in monetary terms) of the market value of housing, which is one of the most traditional cases of appraisal.

The analysis of the real-estate market (Napoli et al. 2017), in fact, has to take into account the dual nature (real and monetary) of property, which requires that it constitutes not only a consumer good (habitation demand) but also an investment good (speculative demand). The estimation of the market value (exchange value) of real estate must move its references from factual analysis to value-driven analysis, from statistical analysis, which observes values, to hermeneutics, which interprets them by applying a Keynesian speculative financial paradigm (Rizzo 1990, 1999; Giuffrida 2011, 2017). The appraisal, indeed, has to confront the divergence trend

between *asking price*, *market value*, and *bid price*, which correspond, respectively, to the signification of “intentional”, “conventional”, and “real” (Giuffrida 2017).

The *Total Economic Value (TEV)* is a composite value consisting of *direct use value* (consumptive or non-consumptive), *indirect value*, *option* and *quasi option value*, *bequest* (and *altruistic*) *value*, and *existence value*. The *TEV* is therefore related to the utility on which the *direct use value*, *indirect use value*, and *option value* are based, to the inter-intra-generational equity expressed through the *bequest and altruistic value*, to ethical significances expressed through the *existence value*. The expression in monetary terms of the *TEV* of goods that have an elevated *social use value*, however, collides with the incommensurability and intangibility constraints related to many goods such as, for instance, environmental goods.

There is a variety of valuation approaches for estimating the *TEV* that may be founded on: stated preferences, revealed preferences, production based, cost based, and benefits transfer (Gomez-Baggethun and de Groot 2010). The techniques predominantly used for the evaluation of the *TEV* belonging to such approaches are: *Travel Cost Method TCM* (Clawson 1959; Clawson and Knetsch 1966; Randall 1994), *Hedonic Pricing* (Rosen 1974), *Contingent Valuation Method CVM* (Randall et al. 1974; Cummings et al. 1986; Boyle and Bishop 1988; Mitchell and Carson 1989; Bateman and Turner 1993; Randall 1994; Mattia et al. 2013), *Choice Modelling Approach* (Bergland 1997; Louviere et al. 2000), *Opportunity Cost* (Howard 1997), and *Protection/Restoration/Replacement Cost* (Dwyer et al. 1992; Adger et al. 1995). All of the methods, however, present many operational problems (related to data collection, mathematical and statistical difficulties, correlations between variables, economic and market assumptions, etc.), and are only able to partially and uncertainly “capture” the values composing the *TEV* (as is summarized in Table 2), thus reducing the efficacy of monetary valuation.

Social use value, according to the definition proposed by Rizzo’s theory (1983, 1990, 1999), is more a complex value than a composite value and includes multiple meanings, namely ethical, aesthetic, economic, cultural, scientific, political, juridical, and equitable, which are an expression of the human being as a whole rather than as a reduction to a mere *homo economicus*, and that refer, therefore, to a multi-criteria methodological and procedural approach of a qualitative-quantitative type, rather than to a mono-criterion approach in exclusively monetary or physical terms.

4 Complexity in Multi-criteria Evaluation

It is essential to seek comprehensive solutions which consider the interactions within natural systems themselves and with social systems. We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis which is both social and environmental. (§ 139, Holy Father Francis 2015)

Table 2 *Methods for the evaluation of the TEV (elaboration on: Stellin and Rosato 1998; Pascual et al. 2012)*

Preferences	Technique	Use value			Non-use value	
		Direct use value	Indirect use value	Option and quasi option value	Bequest and altruistic value	Existence value
Revealed	Travel cost	✓		×	×	×
	Hedonic pricing	✓ ^a		^b	^b	^b
Stated	Choice modelling	✓	✓		✓	✓
	Contingent valuation (WTP and WTA)	✓		✓	✓	✓
Cost based	Protection cost	✓		✓		
	Restoration cost	✓		✓		
	Opportunity cost	✓		✓		
Benefits transfer		✓	✓	✓	✓	✓

^aby default; ^bnot definable a priori

The demand to solve complex problems in which public and private territorial goods are involved (such as plans/projects for the transformation, use, management, and exploitation of the city, territory, or natural resources, as well as of historical architectural and landscape heritage) (Napoli et al. 2016; Giuffrida et al. 2016) and in which it is desired that the point of view of the community is expressed, has led to the elaboration of models of multi-criteria evaluation through which it is possible to represent and try to reconcile the conflicting dualities of equity/efficiency, quality/quantity, and local/global in a uni-duality.

In this context, numerous “exemplars” have been produced (cf. §1), considered as applications of multi-criteria models to particular case studies that have delineated new lines of research, modified the operative field of interest, and constructed new practices to tackle concrete and specific problems of evaluation. The results of a recent conference of the Italian Society of Property Evaluation and Investment Decision (SIEV) (Fattinanzi and Mondini 2015), for example, have revealed the wealth of scientific studies and the variety of case studies that now exist.

The decision-making processes to which multicriteria analysis can be applied can, of course, be very different, in terms of:

- *purpose*. Solving, ranking, sorting, and designing;
- *type*. Programmatic, strategic, management, etc.;

- *system*. Hierarchical and decentralized, participatory and decentralized;
- *timing phase*. Ex ante, in progress, ex post;
- *scale of intervention*. Single work, micro-urban, urban, territorial, environmental;
- *technique of analysis*. Multi-criteria, or multiple objectives (Figueira et al. 2005);
- *category of object*. Landscape heritage, real estate, architectural and cultural heritage, etc. (Bottero and D’Alpaos 2012; Bottero et al. 2013, 2014; Cerreta et al. 2016; Napoli and Schilleci 2014; Oppio et al. 2015; Trovato and Giuffrida 2014).

Beyond the peculiarities of each case, one of the most interesting aspects of these models is the absence (or renouncement) of a monetary unit of measure. This constitutes a challenge to the construction and explication of a new system of conventional values for the socio-territorial system concerned. As in the semiotic process (which is the arbitrary assignment of meaning to a sign that draws its strength and validity from social convention), the value system on which multi-criteria analysis is based has validity, contingent and not universal, if it expresses the relationship between the local social system and the natural system, and if it manages to achieve consensus and co-involvement. In this sense, the participation of local communities in the decision-making process is essential to achieve such a validation. The construction of the evaluation model implies, moreover, the reduction of complexity through the selectivity of the relationships between the elements of the system (it is not necessarily useful to connect everything to everything else), to obtain a complexity that is selected contingently (Rizzo 1999). The multi-criteria analyses are able, furthermore, to assume morphogenetic connotations (Napoli 2015) when they are able to produce knowledge that can be introduced in the process of constructing alternatives, modifying them in order to reach the best possible solution.

Within the vast body of scientific works of the evaluation discipline, it is possible to observe an internal tension moving toward a theoretical systematization of the numerous case studies into a common scientific paradigm, which has not yet been fully realized.

5 Conclusions and Remarks

Political and institutional frameworks do not exist simply to avoid bad practice, but also to promote best practice, to stimulate creativity in seeking new solutions and to encourage individual or group initiatives. (§ 177).

In the encyclical (Holy Father Francis 2015), there is a strong call both for ecological and community conversion in response to the great cultural, spiritual, and educational challenge to change the style of life and the patterns of production and consumption (Rizzo 2000, 2004). The evaluation discipline is also called on to participate in this process of renewal by making its own contribution, which may

be: *scientific-cultural*, through studies and research oriented to the promotion of the culture of complexity, multidisciplinary, and environmental protection; *socio-territorial*, collaborating with public institutions to elaborate operative instruments (models) of social inclusion in local decision-making processes; and *education*, through the qualification and training of architects and engineers.

References

- Adger WN, Brown K, Cervigni R, Moran D (1995) Total economic value of forests in Mexico. *Ambio* 24(5):286–296
- Bateman IJ, Turner RK (1993) Valuation of the environment, methods and techniques: the contingent valuation method. In: Turner RK (ed) *Sustainable environmental economics and management. Principles and practice*. Belhaven Press, London, pp 120–191
- Bentivegna V (2016) Dialogue and transparency in decision-making. *Valori e Valutazioni* 17:25–28
- Bergland O (1997) Valuation of landscape elements using a contingent choice method. In: 1997 EAERE conference, Tilburg, June
- Bocchi G, Ceruti M (eds) (1985) *La sfida della complessità*. Feltrinelli, Milano
- Bottero M, D’Alpaos C (2012) Evaluating under uncertainty—a MCDA approach for assessing the sustainability of urban transformations. In: Fabris LM (ed) *MIAW.2/forests—The Catalogue*. Maggioli Editore, Milan, pp 77–85
- Bottero M, Comino E, Duriavig M, Ferretti V, Pomarico S (2013) The application of a Multicriteria Spatial Decision Support System (MCSDSS) for the assessment of biodiversity conservation in the Province of Varese (Italy). *Land Use Policy* 30(1):730–738
- Bottero M, Ferretti V, Mondini G (2014) Constructing multi-attribute value functions for sustainability assessment of urban projects. In: Murgante B et al (eds) *Computational science and its applications*, vol 8581. Springer International Publishing, pp 51–64
- Boyle KJ, Bishop RC (1988) Welfare measurement using contingent valuation: a comparison of techniques. *Am J Agr Econ* 70:20–28
- Bresso M (1993) *Per un’economia ecologia*. NIS, Roma
- Cerreta M, Panaro S, Poli G (2016) A knowledge-based approach for the implementation of a SDSS in the Partenio Regional Park (Italy). In: Gervasi O et al (eds) *Computational science and its applications*, vol 9789. Springer International Publishing, pp 111–124 https://doi.org/10.1007/978-3-319-42089-9_8
- Clawson M (1959) *Method of measuring the demand for, and value of, outdoor recreation. Resources for the Future*, 10, Washington
- Clawson M, Knetsch J (1966) *Economics of outdoor recreation*. The Johns Hopkins University Press for Resources for the Future, Baltimore
- Cummings RG, Brookshire DS, Schulze WD (1986) *Valuing public goods. The contingent valuation method*. Rowman & Allanheld Publishers, Totowa
- Dwyer JF, McPherson EG, Schroeder HW, Rowntree RA (1992) Assessing the benefits and costs of the urban forest. *J Arboric* 18(5):227–234
- Eco U (1975) *Trattato di semiotica generale*. Bompiani, Milano
- Faber M, Manstetten R, Proops J (1996) *Ecological economics. Concepts and methods*. Edward Elgar, Cheltenham
- Fattinanzi E, Mondini G (2015) *Multicriteria analysis between evaluation and decision*. DEI, Roma

- Ferretti V, Bottero M, Mondini G (2014) Decision making and cultural heritage: an application of the multi-attribute value theory for the reuse of historical buildings. *J Cult Heritage* 15(6):644–655
- Figueira J, Greco S, Ehrgott M (eds) (2005) Multiple criteria decision analysis. State of the art survey. Springer, New York
- Forté C (1978) *Valore di scambio e valore d'uso sociale dei beni immobiliari*. Restauro, 35
- Fusco Girard L (1986) The complex social value of cultural heritage. *Icomos Inf* 1:19–22
- Georgescu-Roegen N (1971) The entropy law and the economic process. Harvard University Press, Cambridge
- Giuffrida S (2011) Elogio dell'imperfezione dei mercati immobiliari urbani: metafora naturale, metonimia economica, autonomia estimativa. *Valori e Valutazioni* 6:113–128
- Giuffrida S (2017) The true value. On understanding something. In: Stanghellini S, Morano P, Bottero M, Oppio A (eds) *Appraisal: from theory to practice*. Springer, Berlin, pp 1–14 https://doi.org/10.1007/978-3-319-49676-4_1
- Giuffrida S, Gagliano F, Napoli G (2015) Agriculture and sustainability: a GIS based model to appraise incentive policy. In: Proceedings of the 7th international conference on information and communication technologies in agriculture, food and environment (HAICTA 2015), Kavala, Greece, 17–20 Sept 2015, CEUR Workshop Proceedings vol 1498, pp 912–921 http://ceur-ws.org/Vol-1498/HAICTA_2015_paper100.pdf
- Giuffrida S, Napoli G, Trovato MR (2016) Industrial areas and the city. Equalization and compensation in a value-oriented allocation pattern. In: Gervasi O et al (eds) *Computational science and its applications*, vol 9789. Springer International Publishing, pp 79–89 https://doi.org/10.1007/978-3-319-42089-9_6
- Gomez-Baggethun E, de Groot R (2010) Natural capital and ecosystem services: the ecological foundation of human society. In: Hester RE, Harrison RM (eds) *Ecosystem services: issues in environmental science and technology*, vol 30, Royal Society of Chemistry, Cambridge, pp 118–145
- Holy Father Francis (2015) *On care for our common home*. Vatican Press, Vatican City
- Howard JL (1997) An estimation of opportunity cost for sustainable ecosystems. In: Proceedings of the XI world forestry congress. Ministry of Forestry, Turkey
- Kopp RJ (1992) Why existence value should be used in cost-benefit analysis. *J Policy Anal Manage* 11:123–130
- Kuhn TS (1962) *The structure of scientific revolution*. The University of Chicago Press, London
- Louvière J, Hensher D, Swait J (2000) *Stated choice methods-analysis and application*. Cambridge University Press, Cambridge
- Luhmann N (1995) *Social systems*. Stanford University Press, Stanford
- Mangialardo A, Micelli E (2017) The grass roots participation create new value? Simulation models for bottom-up enhancement processes of public real-estate properties. *Valori e Valutazioni* 19:41–52
- Mattia S (1983) *Appunti sulla stima del valore sociale dei beni culturali immobiliari*. CO.S.A, Milano
- Mattia S, Oppio A, Pandolfi A (2013) Testing the use of contingent valuation method in real market value: first results of an experiment in the city of Milan. In: XLI meetings proceedings (Rome), Aestimium, pp 721–734
- Maturana HR, Varela FJ (1980) *Autopoiesis and cognition. The realization of the living*. Reidel Publishing Company, Dordrecht
- Mitchell RC, Carson RT (1989) *Using surveys to value public goods: the contingent valuation method*. Resources for the Future, Washington
- Napoli G (2015) Financial sustainability and morphogenesis of urban transformation project. In: Gervasi O et al (eds) *Computational science and its applications*, vol 9157. Springer International Publishing, pp 178–193 <https://doi.org/10.1007/978-3-319-21470-2>
- Napoli G, Schilleci F (2014) An application of analytic network process in the planning process: the case of an urban transformation in Palermo (Italy). In: Murgante B et al. (eds) *Computational science and its applications*, vol 8581. Springer International Publishing, pp 300–314 <https://doi.org/10.1007/978-3-319-09150-1>

- Napoli G, Guffrida S, Trovato MR (2016) Fair planning and affordability housing in urban policy. The case of Syracuse (Italy). In: Gervasi O et al (eds) *Computational science and its applications*, vol 9789. Springer International Publishing, pp 46–62 https://doi.org/10.1007/978-3-319-42089-9_4
- Napoli G, Giuffrida S, Valenti A (2017) Forms and functions of the real estate market of Palermo. Science and knowledge in the cluster analysis approach. In: Stanghellini S et al (eds) *Appraisal: from theory to practice*. Series: green energy and technology. Springer International Publishing, pp 191–202 https://doi.org/10.1007/978-3-319-49676-4_14
- Oppio A, Bottero M, Ferretti V, Fratani U, Ponzini D, Pracchi V (2015) Giving space to multicriteria analysis for complex cultural heritage systems: the case of the castles in the Valle d'Aosta Region, Italy. *J Cult Heritage* 16(6):779–789
- Pascual U, Muradian R, Brander L, Gómez-Baggethun E, Martín-López B, Verma M (2012) The economics of valuing ecosystem services and biodiversity. In: *The economics of ecosystems and biodiversity: ecological and economic foundations*. Taylor and Francis, pp 183–256
- Pearce DW (1993) *Economic values and the natural world*. Earthscan Publications, London
- Pearce DW, Markandya A, Barbier EB (1989) *Blueprint for a green economy*. Earthscan Publications, London
- Prigogine I, Stengers I (1979) *La Nouvelle Alliance. Métamorphose de la science*. Gallimard
- Randall A (1994) A difficulty with the travel cost method. *Land Econ* 70–1:88–96
- Randall A, Ives B, Eastman C (1974) Bidding games for valuation of aesthetic environmental improvements. *J Environ Econ Manage* 1:132–149
- Rizzo F (1983) *Economia dei beni culturali. Metodologia di stima del valore d'uso sociale dei beni culturali immobiliari*. Fondazione Carlo Forte, Napoli
- Rizzo F (1990) *Il valore dei valori*. FrancoAngeli, Milano
- Rizzo F (1999) *Valori e valutazioni. La scienza dell'economia o l'economia della scienza*. FrancoAngeli, Milano
- Rizzo F (2000) *Un'economia della speranza per una città multi-etnica*. FrancoAngeli, Milano
- Rizzo F (2002) *Dalla rivoluzione keynesiana alla nuova economia. Dis-equilibrio, tras-in-formazione e co-efficiente di capitalizzazione*. FrancoAngeli, Milano
- Rizzo F (2004) *Etica dei valori economici o economia dei valori etici*. FrancoAngeli, Milano
- Roll E (1942) *A History of Economic Thought*. Prentice-Hall, New York
- Rosen S (1974) Hedonic price and implicit market: product differentiation in pure completion. *J Polit Econ* 82:34–55
- Shechter M, Freeman S (1994) Nonuse value: reflections on the definition and measurement. In: Pethig R (ed) *Valuing the environment: methodological and measurement issues*. Kluwer, Dordrecht, pp 171–194
- Stellin G, Rosato P (1998) *La valutazione economica dei beni ambientali*. CittàStudiEdizioni, Torino
- Trovato MR, Giuffrida S (2014) A DSS to assess and manage the urban performances in the regeneration plan: the case study of Pachino. In: Murgante B et al (eds) *Computational science and its applications*, vol 8581. Springer International Publishing, pp 224–239

Towards the Circular Economy Paradigm: The Response from Agriculture



Donatella Banzato

Abstract World economic growth has been made possible by the ability to harness the energy of fossil fuels. From the Industrial Revolution to the present, the atmospheric concentration of carbon dioxide has increased by about 30% (IPCC in Changes in atmospheric carbon dioxide, methane and nitrous oxide. 2016), and these environmental changes have led to significant climate change effects, such as rising temperatures, water shortages, soil loss and the ‘intensification of the process of desertification. Western societies are characterized by high energy consumption and, with the population growth and economic growth in emerging countries, the effects will tend to be increase more and more. Current patterns of production and consumption have proven unsustainable, and we need radical changes to escape this vicious circle affecting humanity. But, it is necessary first of all to realize that constant economic growth and the indiscriminate use of the energy sector are physically impossible on a planet of finite size and limited resources. In the encyclical, *Laudato Si’*, Pope Francis fully embraced the message of environmental economists defining the environment as a “*good that the market mechanisms are not able to defend*” (paragraph 190). The Pope appears to be in tune with what has been stated by the scientific literature about the possible roads to take to resolve the problem: “*the consumption of fossil fuels must decrease without delay*” (165), simultaneously, “*the transition from the use thereof to renewable energy sources should not be hindered, but accelerated*” (26). It is necessary to adopt a circular pattern of production to ensure resources for everyone by using, in particular, renewable energy progressively, thus reducing dependency on fossil fuels. In this sense, the agricultural world, thanks to renewable resources and the adoption of advanced practices such as anaerobic digestion, could play a role of fundamental importance to an economy based on sustainable use of resources and circularity. The chain of biogas, in fact, is based on a natural biological process which, starting from the residues of agricultural activities, can produce electricity, heat or bio-methane, in addition to the digestate, a byproduct of the anaerobic digestion process, which can be used in agriculture to improve soil fertility through the

D. Banzato (✉)
via Venezia 1, 35131 Padova, Italy
e-mail: donatella.banzato@gmail.com

continuous recycling of organic substances. This paper aims to show how the creation of an anaerobic digestion plant on a farm might be the answer for the attainment of an advanced agricultural model, competitive and sustainable, both in environmental and economic-tale: the perfect example of a circular economy.

Keywords Biogas · Circular economy · Digestat · Increase of soil fertility
Back to earth · Anaerobic digestion

1 Introduction

The encyclical *Laudato Si'*, was presented in Rome in June 2015 at an internationally critical point in time. It reached the audience before the United Nations Sustainable Development Summit (New York, September 2015) and UN-COP 21 (Paris, December 2015) and while the Universal Expo (Milan, May–October 2015) was taking place (Orioli 2016).

It was a time when the potential risk of failure of the international agreement on climate change was an interest of the Catholic Church in general, which made it a goal to arouse world awareness and reaction to the dramatic environmental challenges on Earth (Orioli 2016). In April 2016, in New York, on the World Earth Day celebration, 171 countries ratified the Paris Climate Agreement (CPA), exceeding the set threshold of 55 countries accounting for 55% of total greenhouse gas emissions all over the world. Although these conditions were necessary for the CPA to go into effect, it does not mean that the climate crisis will be solved in the near future. In fact, a calculation based on the single Intended Nationally Determined Contributions (INDC) for all countries participating in the COP21 reveals that target emissions will be reached only after almost a dozen years, in 2030, at which time the temperature will already have increased by 2.7 °C, more than the maximum threshold, which was fixed at 2 °C (Greening et al. 2000).

The aim of this work is to analyze what may be the solutions “suggested” by the encyclical of Pope Francis and to identify any solutions that may arrive from the agricultural sector.

2 The Encyclical *Laudato Si'* and the New World Ecology

Energy consumption and carbon emissions cannot be controlled in a short time, but, in the face of climate change, all nations must confront it by urgent pressures to reduce the carbon emissions.

Economic growth, as well as corporate growth, are the driving force behind world capitalism, the real economic system that governs our world today. In this system, the irrational belief in perpetual growth relentlessly promotes an

overabundant consumption and a spendthrift economy, generating waste and pollution and eroding Earth's natural resources.

In addition to this, the environmental problems of recent years, now known to all, are aggravated by climate change caused by the abuse of technologies and sources of information (Capra 2017).

In the words of Pope Francis, one understands how to condemn the lifestyle of perpetual growth, using strong words and comparing it to a lie, rather than an illusion:

We are the ones to lay our hands on things, attempting to extract everything possible from them while frequently ignoring or forgetting the reality in front of us. ... This has made it easy to accept the idea of infinite or unlimited growth, which proves so attractive to economists, financiers and experts in technology. It is based on the lie that there is an infinite supply of the earth's goods, and this leads to the planet being squeezed dry beyond every limit. (106)

Climate change is discussed in paragraphs 23–26 and in paragraphs 165 and 169 of the text in a way that accurately reflects the broad scientific consensus existing today. This should not be surprising since Pope Francis, at the time of encyclical writing, wanted to be one of the top experts in climate change at the time, Hans Joachim Schellnhuber.

The section on climate change begins with the moral exhortation that “*the climate is a common good, belonging to all and meant for all.*” This is followed by brief discussions of global warming, “*due to the great concentration of greenhouse gases (carbon dioxide, methane, nitrogen oxides and others) released mainly as a result of human activity.*” (23). Deforestation for agricultural purposes and the intensive use of fossil fuels are mentioned in the pages as the two principal sources of greenhouse gases (Capra 2017).

This analysis is followed by the pope's appeal to reduce greenhouse-gas emissions and, eventually to phase out gradually fossil fuels: “*There is an urgent need to develop policies so that, in the next few years, the emission of carbon dioxide and other highly polluting gases can be drastically reduced, for example, substituting for fossil fuels and developing sources of renewable energy. Worldwide there is minimal access to clean and renewable energy.*” (26).

One of the sectors called into question in the context of air pollution is the primary sector: agriculture.

Inadequate management of animal manure and other agricultural wastes has been identified as a major cause of environmental issues at global (climate change, ozone depletion) and regional scales (soil acidification, aquatic eutrophication, particle matter formation). Agricultural waste management is the largest source of the atmospheric ammonia (NH₃) emissions from terrestrial sources (Bouwman et al. 1997), and it is also estimated to contribute substantially to methane (CH₄) and nitrous oxide (N₂O) emissions from agriculture, accounting for about 12–40 and 30–50%, respectively (Oenema et al. 2004). In addition to these environmental problems, many farms are going through economically disadvantageous periods or, at worst, not being able to meet their operating costs, many businesses close.

Is it possible to solve, or at least reduce, these problems arising from the agricultural sector? The answer is yes, by moving from a linear economy to a circular economy.

3 The Circular Economy

Circular economy (CE) is a term that exists since the 1970s and has acquired greater importance in the past few years, partly due to the scarcity of natural resources available in the environment and changes in consumer behavior (Nobre and Tavares 2017a), but also as a result of demographic growth of the planet: the world population in 1950 was 2.5 billion people. As of August 2016, it was estimated as 7.4 billion. By 2050 it will be nearly 9.8 billion, an increase of 392% in 100 years (United Nations 2015). Natural resources' consumption is also significantly growing, as a consequence of the currently observed positive correlation with a country's per capita GDP (World Bank 2014; SERI and Dittrich 2014), which indicates that a country's wealth has a direct influence on its natural-resources consumption. Proportionally, but in the opposite direction, we find natural resources availability to support this economic growth (Nobre and Tavares 2017b). For example, assuming no changes occurring in global economic growth tendencies and no actions taken, oil reserves will end by 2057 and natural gas by 2070 (Guardian 2011). Moreover, resource consumption results in waste generation that returns to the environment. Despite known market and government regulatory actions in order to promote recycling initiatives, only a very small part of recyclable wastes are actually recycled (Ellen MacArthur Foundation 2016). Currently, there are nearly 150 million tons of plastic in the oceans, and by 2050 there will be more plastic than fish (World Economic Forum 2016). One of the main causes of this situation is the current linear economic model ("take, make, use, dispose/waste"), which is the basis of the world economy since the industrial revolution, is too often considered as the only viable economic model. For this reason, a new economic model is required; alternatively, the circular economy (CE) has long been seen as the solution (Andrews 2015).

The CE model consists in a continuous and positive development model focused on preserving and enhancing natural capital, optimizing resource yields and minimizing system risks, by managing finite stocks and renewable flows, and keeping products, components and materials at their highest utility and value at all times (Ellen MacArthur Foundation 2016). CE with its 3R principles of reducing, reusing and recycling material clearly illustrates the strong linkages between the environment and economics.

Despite the concept existence for decades and the benefits of the model being clear, the acceptance of CE business models is still modest, as the key lever for change relies not only on rational but also on the non-rational motives of consumer behavior, which includes habits and routines of individuals (Planing 2014).

In recent years, the European Union has developed concepts and mechanisms for a common environmental policy for its members and regions. These cover all aspects including production, consumption, waste management and environmental policies. It is not necessarily called a circular economy, but the patterns are closely in line with the circular economy's principles. *The European resource efficiency platform (EREP): Manifesto and policy recommendations* (European Commission 2012) is a call for labor, business and civil society leaders to support resource efficiency and to move to a circular economy. The document presents a manifesto for a resource-efficient Europe, lists actions for a resource efficient Europe and suggests ways towards a resource efficient and circular economy. This effort is a result of the growing pressure on resources and on the environment to embark on a transition to a resource-efficient and ultimately regenerative circular economy.

CE is seen as offering a viable alternative development strategy to ease tensions between desired, national, economic development and environmental concerns. It also helps address existing resource scarcity and pollution problems and enables enterprises and industries to improve their competitiveness by removing green barriers in their international trade relations.

In the same way, one of the strongest points of the encyclical is the need to review the mechanisms of growth to start with the decision of circular economy solutions can reduce aggression to natural resources. The Pope associates the illusion of unlimited growth with the linear, one-dimensional notion of progress:

Put simply, it is a matter of redefining our notion of progress. A technological and economic development which does not leave in its wake a better world and an integrally higher quality of life cannot be considered progress. (194)

The challenge we have to do is to move from a linear economic system, based on unlimited growth, to a circular system, centered on environmental sustainability and also socially justice. We must remember that growth goals are just, but the “nature system” is not unlimited. While certain parts of organisms or ecosystems grow, others decline, releasing and recycling their components which become resources for new growth (Capra 2017).

Pope Francis wants to point to an ecology-inspired economy and set to “copy” natural cycles:

Our industrial system, at the end of its cycle of production and consumption, has not developed the capacity to absorb and reuse waste and by-products. We have not yet managed to adopt a circular model of production capable of preserving resources for present and future generations, while limiting as much as possible the use of nonrenewable resources, moderating their consumption, maximizing their efficient use, reusing and recycling them. (22)

Somehow, the concept of CE, appears several times in the encyclical as one of the answers to the problems of the planet.

4 The Biogas Plant for a Circular Economy in Agriculture

Agriculture is a critical sector of the EU economy, providing the food, feed and bioresources that help sustain society. This sector, in particular, is at the center of the challenges associated with population growth, food security, climate change and resource scarcity. In the last 50 years, agriculture has become more resource-intensive, relying heavily on the availability of fossil inputs in the form of synthetic nitrogen and phosphorus fertilizers, oil derived agrochemicals and fossil fuels. ‘Circular economy’ principles can offer many opportunities for agriculture in general, and livestock production in particular, to become more resource efficient (Ward et al. 2016).

‘Circular economy’ in agriculture centers on the production of agricultural commodities using a minimal amount of external inputs, closing nutrient loops and reducing negative discharges to the environment (in the form of wastes and emissions). Many agricultural wastes are ideal raw materials for biological processes to create new products or existing products by innovative processes, providing a major innovation opportunity for European industry (Ward et al. 2016).

In this respect, the construction of an anaerobic digestion plant, inside of a farm, makes it possible to move from a linear economy, with production of waste, and the need to manage them, to a circular economy.

Anaerobic Digestion (AD) has been recognized as an effective solution to reduce greenhouses gases (GHG) and to produce renewable energy, especially when secondary feedstock and/or wastes are digested (Messagie et al. 2014). In fact, AD plants can be fed with a wide range of feedstock. The AD of the agricultural and agro-industry sectors the suitable feedstock are several: besides energy crops (e.g., cereals, grass, miscanthus, switchgrass and sunflowers) specifically cultivated, animal slurry and manure, as well as waste (e.g., pomace, vegetable residues, tomato peel and skin, slaughterhouse waste) and by-products (from winery and distilleries, biodiesel production, cereal mills) of the main agro-industries can be digested (Zheng et al. 2015; Fusi et al. 2016).

In this context, in recent years, thanks also to a favorable public subsidy framework, several agricultural AD plants have been built, in particular, in Europe (Hijazi et al. 2016). In Italy, the electricity produced by AD plants smaller than 1 MW and built before the 2013 is earns 280 € per MW h (Negri et al. 2014, 2016). In Italy, the total installed electric capacity (IEC) increased from 1075 to 1171 MW between 2012 and 2015 (EBA 2016). The contribution made by each type of plant to the total IEC reflects the number of biogas plants using each feedstock. In 2015, the IEC was overwhelmingly drawn from agricultural plants (74%) because agricultural plants represent 80% of the total number of plants in the country. Nineteen percent of the IEC in 2015 came from landfill-based plants, which constitute 12% of the total number of plants in Italy. Italian agricultural plants in 2015 generated an average IEC of 700 kW per plant, while landfill-based plants produced an average of 1.3 MW. The electricity generated is accordingly mainly derived from

agricultural feedstock, with a production of 6904 GWh last year (74% of the total electricity generated (EBA 2016).

Biogas technology offers a wide range of environmental benefits.

- It reduces the land-use problem associated with disposing organic waste.
- It provides sustainable source of energy and soil enriching bio-slurry as a by-product;
- It gives an opportunity to treat and re-utilize variety of organic wastes;
- It minimizes environmental impacts of greenhouse-gas emissions (Aggarangsi et al. 2013).

Anaerobic digestion today is one of the most advanced technologies that one can hope to will provide a solution to the various environmental problems associated with fossil fuels. According to Arthur et al. (2011), the rampant exhaustion of wood-fuel supplies will be caused by the predicted increase in wood-fuel demand in the future, and the resulting social and environmental effects drives the need to look for alternative sources of cooking fuel in developing countries. Consequently, biogas technology has been identified as one of the promising options to reverse the problem of deforestation and related problems. Goldemberg and Lucon (1996) also indicated that heavy dependence on wood-fuel in less developed countries is a source of local air pollution and deforestation that it accounts for a considerable portion of the greenhouse-gas emissions. To reduce the problems associated with the excessive use of energy from fossil fuels, it is necessary to focus on improving energy efficiency and using new technologies, such as biogas (Mengiustu et al. 2015).

The use of biogas technology could assist in resolving various problems that are associated with the utilization of solid biomass fuels. It helps to manage animal dung and night soil effectively. The effluents from a biogas digester are a high-grade organic fertilizer and thus increase productivity and reduce the need to expand croplands to forested areas (Banzato 2016).

The process of anaerobic fermentation that changes manure to methane-rich biogas reduces greenhouse-gas emissions from manures considerably. It reduces the consumption of environmentally unfriendly fossil fuels like coal for electricity generation. Similarly, Arthur et al. (2011) contended that biogas minimizes greenhouse-gas emissions and hence assists climate- change mitigation efforts by capturing methane and reducing the use of fossil fuels. Thus, the use of biogas replaces two important greenhouse-gas sources, namely, manure and coal combustion (Cu'ellar and Webber 2008).

AD processes offer high adaptability to process a range of feedstocks, which leads to generation of by-products with varying physico-chemical characteristics (Abubaker and Risberg 2012; Enders et al. 2012). The fertilizer potentials of digestates from pig manure (Garfi et al. 2011), farm agro-industrial residues (Albuquerque et al. 2012), cow dung and chicken droppings (Alfa et al. 2014), maize silage (Nabel et al. 2014; Westphal et al. 2016; García Sanchez et al. 2015) have been shown to be a function of feedstock. These studies discussed various

chemical and biological (macro and micro nutrient, heavy metal, organic content, pH, cation-exchange capacity, chemical and biochemical oxygen demand, electrical conductivity, microbial mass, pathogenic content, phyto-toxicity) and physical indicators (dry matter, suspended solid, odour, dissolved solid) to evaluate the quality of digestate as fertilizer. In general, digestates are reported to contain nutrients with enhanced bio-availability (60–80% of total nitrogen in mineralized form, along with bioavailable phosphorus and potassium), making these a suitable consideration as soil applicants (Tambone et al. 2009; Garfi et al. 2011; Makadi et al. 2012).

Yet, electricity generated from biogas could be useful for local pumping, lighting, communication, refrigeration etc. When methane, the combustible component of biogas, is enriched, it can be used as a transportation fuel (Larson and Kartha 2000; Murphy et al. 2004). It is known that biogas can also play a key role in transport (Kapdi et al. 2005), and it should be pointed out that, after eliminating from raw biogas various pollutants, such as carbon dioxide, the resulting bio-methane is comparable to natural gas and consequently can be used in all applications of the same. All these features of AD systems enable a transformation of traditional agriculture, in a “circular agriculture” in the spirit of the advice given by Pope Francis in his encyclical.

5 Conclusions

With the publication of his encyclical, Pope Francis succeeded in bringing the Catholic Church into the pole position in the ecological movement, as well as being a world leader in the vein of figures such as Václav Havel, Jimmy Carter and the Dalai Lama. This paper has sought to emphasize how, in the ecological vision recorded in the *Laudato si'*, even the agricultural world has a key role, for which we need to rethink traditional agriculture, thanks to the use of renewable energies.

The realization of an anaerobic digestion plant, thanks to its ability to integrate with traditional agriculture, can greatly improve the economics of the farm and make it independent from the use of fertilizers and fossil fuels.

Use of the digestate from biogas production in the field proved, thanks to several studies, an effective tool to recycle nutrients (Banzato 2016).

Land cover, with double harvesting, may contribute to the increase of its fertility, reducing both the dispersion of nutrients and carbon erosion.

In other words, the benefits resulting from a biogas plant include the following:

- Biogas can be used for electricity production in co-generation or combined heat and power (CHP).
- In biogas upgrading, methane in biogas can be concentrated to the same standards as natural gas.
- Mitigation of greenhouse-gas emissions, linked to modern management of the farm and livestock.

- Utilization of digestate as an organic fertilizer on arable land has been shown to increase agricultural productivity in numerous studies.
- Use of digestate on arable land can provide both N, P and other nutrients and thereby recycle nutrient, which is consistent with the aim of developing a circular economy. This can also contribute to maintaining the concentration of soil organic carbon (SOC).

References

- Abubaker J, Risberg K (2012) Biogas residues as fertilisers—effects on wheat growth and soil microbial activity. *Appl Energy* 99:126–134
- Aggarangsi P, Tippayawong N, Moran JC, Rerkkriangkrai P (2013) Overview of livestock biogas technology development and implementation in Thailand. *Energy Sustain* 17:371–377
- Alburquerque JA, De la Fuente C, Ferrer-Costa F, Carrasco L, Cegarra J, Abad M, Bernal MP (2012) Assessment of the fertiliser potential of digestates from farm and agroindustrial residues. *Biomass Bioenergy* 40:181–189
- Alfa MI, Adie DB, Igboro SB, Oranusi US, Dahunsi SO, Akali DM (2014) Assessment of biofertilizer quality and health implications of anaerobic effluent of cow dung and chicken droppings. *Renew Energy* 63:681–686
- Andrews D (2015) The circular economy, design thinking and education for sustainability. *Local Econ* 30(3):305–315
- Arthur R, Baidoo MF, Antwi E (2011) Biogas as a potential renewable energy source: a Ghanaian case study. *Renew Energy* 36:1510–1516
- Banzato D (2016) The use of the digestate from anaerobic digestion: a comparison with the EU countries. *Valori e Valutazioni* n. 17:2016
- Bouwman AF, Lee DS, Asman WAH, Dentener FJ, Van Der Hoek KW, Olivier JGJ (1997) A global high-resolution emission inventory for ammonia. *Glob Biogeochem Cycles* 11:561–587
- Capra F (2017) Laudato si: the pope's ecoliterate challenge to climate change. <https://www.ecoliteracy.org>
- Cu'ellar AD, Webber ME (2008) Cow power: the energy and emissions benefits of converting manure to biogas. *Environ Resour Lett* 3(034002):8
- EBA (2016) Statistical report 2016, Annual statistical report of the European Biogas Association. Brussels, EBA. Accessed at <http://www.european-biogas.eu> 18 Apr 2017
- Ellen MacArthur Foundation (2016) Intelligent assets: unlocking the circular economy. <https://www.ellenmacarthurfoundation.org/publications/intelligent-assets>. Accessed April 2017
- Enders A, Hanley K, Whitman T, Joseph S, Lehmann J (2012) Characterization of biochars to evaluate recalcitrance and agronomic performance. *Bioresour Technol* 114:644–653
- European Commission (2012) European resource efficiency platform (EREP): Manifesto and policy recommendations
- Fusi A, Bacenetti J, Fiala M, Azapagic A (2016) Life cycle environmental impacts of electricity from biogas produced by anaerobic digestion. *Front Bioeng Biotechnol* 4:26
- García-Sánchez M, Siles JA, Cajthaml T, García-Romera I, Tlustos P, Szakova J (2015) Effect of digestate and fly ash applications on soil functional properties and microbial communities. *Eur J Soil Biol* 71:1–12
- Garfi M, Gelman P, Comas J, Carrasco W, Ferrier I (2011) Agricultural reuse of the digestate from low-cost tubular digestates in rural Andean communities. *Waste Manag* 31:2584–2589
- Goldemberg J, Lucon O (1996) Energy, environment and development. Earthscan, London
- Greening LA, Greene DL, Dfiglio C (2000) Energy efficiency and consumption: the rebound effect: a survey. *Energy Policy* 28(6):389–401

- Guardian T (2011) The six natural resources most drained by our 7 billion people. Environment. <http://www.theguardian.com/environment/blog/2011/oct/31/six-natural-resources-population>. Accessed April 2016
- Hijazi O, Munro S, Zerhusen B, Effenberger M (2016) Review of life cycle assessment for biogas production in Europe. *Renew Sustain Energy Rev* 54:1291–1300
- IPCC (2016) Changes in atmospheric carbon dioxide, methane and nitrous oxide. https://www.ipcc.ch/publications_and_data/ar4/wg1/en/tssts-2-1-1.html. Accessed April 2016
- Kapdi SS, Vijay VK, Rajesh SK, Prasad R (2005) Biogas scrubbing, compression and storage: perspective and prospectus in Indian context. *Renew Energy* 30:1195–1202
- Larson ED, Kartha S (2000) Expanding roles for modernized biomass energy. *Energy Sustain* 4 (3):15–25
- Makadi et al (2012) Digestate new nutrient: biogas. In: Sunil Kumar, ISBN 978-953-51-0204-5. InTech
- Mengistu MG, Simane B, Eshete G, Workneh TS (2015) A review on biogas technology and its contributions to sustainable rural livelihood in Ethiopia. *Renew Sustain Energy Rev* 48:306–316
- Messagie M, Mertens J, Oliveira L, Rangaraju S, Sanfeliu J, Coosemans T (2014) The hourly life cycle carbon footprint of electricity generation in Belgium, bringing a temporal resolution in life cycle assessment. *Appl Energy* 134:469–476
- Murphy JD, McKeogh E, Kiely G (2004) Technical/economic/environmental analysis of biogas utilization. *Appl Energy* 77:407–427
- Nabel M, Barbosa DBP, Horsch D, Jablonowski ND (2014) Energy crop (*Sida hermaphrodita*) fertilization using digestate under marginal soil conditions: a dose-response experiment. *Energy Procedia* 59:127–133
- Negri M, Bacenetti J, Brambilla M, Manfredini A, Cantore C, Bocchi S (2014) Biomethane production from different crop systems of cereals in Northern Italy. *Biomass Bioenergy* 63:321–329
- Negri M, Bacenetti J, Fiala M, Bocchi S (2016) Evaluation of anaerobic degradation, biogas and digestate production of cereal silages using nylon-bags. *Bioresour Technol* 209:40–49
- Nobre GC, Tavares E (2017a) Scientific literature analysis on big data and internet of things applications on circular economy: a bibliometric study. *Scientometrics* 111(1):463–492
- Nobre GC, Tavares E (2017b) Scientific literature analysis on big data and internet of things applications on circular economy: a bibliometric study. *Scientometrics* 111(1):463–492
- Oenema O, Wrage N, Velthof GL et al (2004) Trends in global nitrous oxide emissions from animal production systems. *Nutr Cycl Agroecosyst* 72:51
- Orioli L (2016) Laudato sì and the new paradigm of catholic environmental ethics: reflections on environmentalist ethics: reflections on environmentalist movements in Italy. *J Agric Environ Eth* 29:931–934
- Planing P (2014) Business model innovation in a circular economy reasons for non-acceptance of circular business models. *Open J Bus Model Innov*
- SERI, Dittrich M (2014) Global material flow database
- Tambone F, Genevini P, D'Imporzano G, Adani F (2009) Assessing amendment properties of digestate by studying the organic matter composition and the degree of biological stability during the anaerobic digestion of the organic fraction of MSW. *Bioresour Technol* 100: 3140–3142
- United Nations (2015) World population prospects, the 2015 revision. From <https://esa.un.org/>. Accessed April 2017
- Ward SM, Holden NM, White EP, Oldfield TL (2016) The “circular economy” applied to the agriculture (livestock production) sector—discussion paper. Presented at workshop on the sustainability of the EU’s livestock production systems. 14–15 Sept 2016
- Westphal A, Kucke M, Heuer H (2016) Soil amendment with digestate from bio-energy fermenters for mitigating damage to *Beta vulgaris* subspp. By *eterodera schachtii*. *Appl Soil Ecol* 99: 129–136
- World Bank (2014) GDP per capita. From <http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>. Accessed March 2017

- World Economic Forum (2016) The new plastics economy—rethinking the future of plastics, pp 1–120. <http://www.ellenmacarthurfoundation.org/publications>. Accessed April 2016
- Zheng Z, Liu J, Yuan X, Wang X, Zhu W, Yang F (2015) Effect of dairy manure to switchgrass co-digestion ratio on methane production and the bacterial community in batch anaerobic digestion. *Appl Energy* 151:249–257

Towards a Cultural Ecology in Urban Environments: New Challenges for Environmental Impact Assessment



Federica Appendino and Francesca Giliberto

Abstract Over the last decades, sustainability concerns have been at the heart of the debate on the future development of cities worldwide. These challenges are key issues in the Pope’s Encyclical Letter *Laudato Si* of 2015, where an integral vision of ecology is proposed. In this framework, the article focuses on cultural ecology, defined as the interaction between culture, man, and environment, providing a parallelism between the encyclical letter and the *Recommendation on the Historic Urban Landscape*, adopted by UNESCO in 2011. Both documents stress the relevance of cultural heritage for urban sustainable development, the need for a comprehensive approach and the contribution that impact assessment tools could give to achieve this objective. Discussing the case of Liverpool (UK), this paper highlights the limits of Environmental Impact Assessments (EIAs) for an adequate consideration of cultural heritage and outlines the potentialities of Heritage Impact Assessments (HIAs) toward an “integral ecology” in urban contexts.

1 Urban Crisis and the Need of a “Global Ecological Conversion”

Cities are today the real protagonists of a crisis without precedent (Newman and Jennings 2008), involving environment, economy and society. They suffer from large transformations and pressures, which make the adoption of sustainable poli-

F. Appendino · F. Giliberto (✉)
Politecnico di Torino, Turin, Italy
e-mail: francesca.giliberto@polito.it

F. Appendino
e-mail: federica.appendino@polito.it

F. Appendino
Université Paris-Sorbonne, Paris, France

F. Giliberto
University of Kent, Canterbury, UK

cies and tools a matter of urgency: unsustainable consumption and production patterns, loss of biodiversity, pressure on ecosystems, pollution, natural and man-made disasters and climate change (UN-HABITAT 2016). In addition, with the beginning of the 21st century and for the first time in history, cities host more than half of the world population, and urbanization is expected to increase considerably on a global scale (Liotta and Miskel 2012).

Over recent years, the application of unsustainable development models has increased the international interest and debate on sustainability, recognized as “the issue of twenty-first century” (Longstreth 2011), and a “global ecological conversion” (Pope John Paul II 1991) has been advocated. This means not only efforts to protect and improve our world, but also profound changes in “lifestyles, models of production and consumption, and the established structures of power which today govern societies” (Pope John Paul II 1991).

This urgent challenge is also at the heart of the most recent Encyclical Letter *Laudato Si* of the Holy Father Francis of 2015, which calls on all people to acknowledge the contribution to the disfigurement and destruction of creation and to find a shared solution for shaping the future of our planet. In order to face this crisis and to build a better future, an “integral ecology” is considered necessary, respecting the environment, but also our human and social dimensions (§ 137).

2 Toward a “Cultural Ecology”? Parallelisms Between the Encyclical Letter and the UNESCO Recommendation on the Historic Urban Landscape

Among the various issues stressed by the Pope, this article focuses on the “cultural ecology” perspective offered by the encyclical letter (§ 143; 146). Defined by Gunn as the study of the relationship and the interaction of culture, man and environment (Gunn 1980), the concept of “cultural ecology” highlighted in the encyclical letter is in line with another important international document—the *Recommendation on the Historic Urban Landscape* (UNESCO 2011)—adopted by UNESCO four years before: they both underline the role that cultural heritage may have in the promotion of sustainable development in the contemporary context of urban crisis, considering also its relationship with the urban environment and society.

On one hand, the encyclical letter recognizes that “together with the patrimony of nature, there is also an historic, artistic and cultural patrimony which is likewise under threat” (§ 143). This is particularly relevant for cities as “this patrimony is a part of the shared identity of each place and a foundation upon which to build a habitable city. Rather, there is a need to incorporate the history, culture and architecture of each place, thus preserving its original identity” (§ 143). In this sense, cultural heritage plays a fundamental role in sustainable development goals, because it is inherently recognized as one of the environmental resources that should be protected and transmitted to future generations.

On the other hand, the *UNESCO Recommendation on the Historic Urban Landscape* places the urban heritage at the center of the discussion as it “is for humanity a social, cultural and economic asset, defined by an historic layering of values that have been produced by successive and existing cultures” (UNESCO 2011, Preamble). It incorporates cultural and natural attributes, embracing the whole city and its broader urban context and its geographical setting (UNESCO 2011, art. 8) and linking the cultural heritage to its environment. The recommendation stresses the importance of this urban heritage that is “a key resource in enhancing the liveability of urban areas, and fosters economic development and social cohesion in a changing global environment. As the future of humanity hinges on the effective planning and management of resources, conservation has become a strategy to achieve a balance between urban growth and quality of life on a sustainable basis” (UNESCO 2011, art. 3).

Therefore, both the encyclical letter and the Recommendation on the Historic Urban Landscape highlight the importance to incorporate the environmental and cultural dimensions toward an “integral ecology” in urban environments.

3 The Need of Innovative Tools: What Role for Evaluation?

Considering the contemporary challenges affecting the urban heritage of cities, underlined both by the encyclical letter and the UNESCO recommendation, the need to preserve their cultural heritage—an essential component of the “cultural ecology”—has become more and more urgent. In particular, the UNESCO recommendation emphasizes the need to “better integrate and frame urban heritage conservation strategies within the larger goals of overall sustainable development” (UNESCO 2011, art. 5). To face these challenges, the two mentioned documents encourage the integration between tools that already exist or the development of interdisciplinary and innovative tools for a successful management of urban heritage in this dynamic environment. In this context, both documents stress the importance of the role that evaluation can play.

The UNESCO recommendation supports the improvement and the use of heritage and environmental impact assessments, frequently mentioned in the text, where they are considered as fundamental “to support and facilitate decision-making processes within a framework of sustainable development” (UNESCO 2011, art. 24). Similarly, Chap. “*For an Ethics of Urban Regeneration*” of the encyclical letter provides lines of approach and action, focusing on impact-assessment tools and stressing the importance to provide appropriate instruments to support the decision-making process in an effective way. In particular, it suggests that an Environmental Impact Assessment (EIA) “should be part of the process from the beginning, and be carried out in a way which is interdisciplinary, transparent and free of all economic or political pressure. It should be linked to a study of working conditions and possible effects on people’s physical

and mental health, on the local economy and on public safety” (§ 183). Moreover, it adds that “consensus should always be reached between the different stakeholders, who can offer a variety of approaches, solutions and alternatives” and “the local population should have a special place at the table” (§ 183).

These positions are predominant in literature, where EIA is considered as one of the most important tools to ensure sustainable development in urban contexts (Partal and Dunphy 2016). For this reason, EIAs are now consolidated procedures (Bottero and Mondini 2009), at least at the European level, being compulsory instruments in the majority of Member States for a wide range of public and private projects (Bond et al. 2004). They have the objective to evaluate the compatibility of these projects, to help decision makers to accept or reject them and to define specific mitigation actions for the adverse impacts they might have (Glasson et al. 2005).

EIAs take all environmental assets into account, including also cultural heritage since the 1990s (World Bank 1994). However, the perspective of cultural ecology mentioned above enables the star of reflection on the validity of these assessment tools in relation to current challenges in urban contexts.

In fact, over the recent years, some authors have underlined how the assessment of project’s impacts on cultural heritage is often limited to specific assets and far from being consistent and satisfactory (Bond and Teller 2004; Jones and Slinn 2008; Pereira et al. 2013). Moreover, it has still to be acknowledged that cultural heritage is very often “the weakest component in EIA studies” (Bond et al. 2004). This is clearly reflected by the fact that EIAs mostly focus only on outstanding objects (Hassler et al. 2004) and on built environment, material assets or protected areas (Langstaff and Bond 2004), frequently giving limited attention to the intangible aspects of cultural heritage, such as cultural identity or community cohesion (Bond and Teller 2004). Other scholars reveal other difficulties in taking into consideration cultural heritage in EIAs, which are related to the lack of specific guidance (Pereira 2013), to the discrepancies in its consideration between different countries (Langstaff and Bond 2004) and to the complexity of the identification of heritage values (Vakhitova 2010).

These critical issues arose also during the 28th Annual Conference of the International Association for Impact Assessment held in Perth (Australia) in 2008. Several sessions were organized on the subject of “Cultural Heritage and Impact Assessment”; the consensus appeared to be that cultural heritage needed to be better and earlier addressed in the impact assessment process.

Starting from the acknowledgement of the above-mentioned limits of traditional EIAs, ICOMOS, advisory body of the World Heritage Committee for cultural World Heritage (WH) sites, published in 2011 the “Guidance on Heritage Impact Assessments (HIA) for Cultural World Heritage Properties” (ICOMOS 2011) in order to provide managers, developers, consultants and decisions-makers with a specific assessment tool calibrated on heritage (Pereira and Van Oers 2012). Based on the EIA methodology (Pereira and Hudson 2012), this tool, even if it is little known and used, is very innovative, because it makes possible to have a global and holistic approach, without disaggregating the cultural heritage attributes as in EIAs

(Angrisano 2015). It focuses not only on tangible and intangible heritage, but also on the Outstanding Universal Value (OUV) of WH sites (ICOMOS 2011). The Guidance on HIA aims to evaluate the effective impacts of potential development projects on heritage, avoiding risks and threats to their integrity and authenticity, and it is essentially based on three fundamental questions: What is the heritage at risk and why is it important (how does it contribute to OUV)? how will change or a development proposal impact on OUV? and how can these effects be avoided, reduced, rehabilitated or compensated?

In this framework, this paper aims to highlight the key issues emerged in this literature review through the analysis and discussion of the case study of Liverpool, WH site, in danger beginning in 2012. This case represents an interesting example able to demonstrate the limits and strengths of EIAs and HIAs in assessing the impacts of a major development project on a city's cultural heritage.

4 Liverpool, World Heritage Site in Danger, as a Case Study

Liverpool, with its 478,600 inhabitants, is one of the major cities in the United Kingdom (UK). Located in the north-west region of England, the city has become a port city of world-wide significance, due to its strategic location on the east bank of the river Mersey. Starting from the second half of the 17th century, it became the most important transatlantic port in northern Europe. However, after a period of intensive economic development and urban growth, the city has undergone a huge demographic and economic decline since the 1930s, which is still ongoing. In order to face this social and economic degeneration, the city administration decided to invest in heritage-led regeneration strategies for a renaissance in its derelict city, starting from its own heritage and cultural identity (Rodwell 2008): significant monuments were restored, the inner-city was regenerated, an urban area was inscribed in the UNESCO World Heritage List (WHL) as "Liverpool-Maritime Mercantile City" in 2004 and the city was branded as European Capital of Culture in 2008.

Nevertheless, the only use of heritage-led development strategies has clearly demonstrated its limits and the complexity of a sustainable and integral approach to development (Labadi 2016): they proved to be insufficient to improve Liverpool's social and economic conditions and, according to the official data, the city is one of the most deprived local authorities in England (Liverpool City Council 2015). As a consequence, in recent years, the city decided to promote a new kind of development that aims to foster economic growth, social and urban regeneration, with the vision to make Liverpool able to compete with other waterfronts worldwide. A 30-year-long major urban regeneration scheme called *Liverpool Waters* was approved by the Local Council in 2010, with the objective to attract bigger investments, to stimulate economic development and to provide new job opportunities (Fig. 1).



Fig. 1 Comparison between Liverpool's present situation (left) and after the implementation of Liverpool Waters scheme (right). *Source* Planit-IE LPP, from concept to creation. Liverpool Waters, a waterfront for the world, p. 11. Images courtesy of www.rust.studio

However, at the same time, the potential impacts of this project, partially located on the WH site and on its buffer zone, may seriously damage the OUV of the WH property (UNESCO 2012). Since 2012, the city has been inscribed in the WH list in danger (World Heritage Committee 2012), so risking to lose its WH status.

Considering the project size, the activities and functions envisaged, the site's close proximity to environmentally sensitive habits and its partial location on the WH boundaries, a compulsory EIA was carried out by the developers (Peel Group) in 2010 in order to evaluate the environmental impacts that *Liverpool Waters* may have on Liverpool's historic docklands and to mitigate the possible effects (Liverpool Waters 2010). The EIA considered the following key environmental issues: archaeology and cultural heritage; landscape and visual impact; lighting; ecology and nature conservation; surface water, flood risk and drainage; ground conditions and underground water; air quality and odor; noise and vibration; traffic and transport; socio-economics; daylight and sunlight; wind; and waste.

Focusing on the socioeconomic impacts, the EIA stated that *Liverpool Waters* envisages "to be home of 1500 full-time jobs [...] by 2015, rising to 3300 in 2020, 11,000 in 2031 and 14,800 in 2041" (Liverpool Waters 2010, p. 39), generating £631 m in Gross Value Added (GVA) and income to employees of £412 m. Therefore, the new scheme is expected to strongly contribute to the city's economic development and regeneration, positively impacting also its region. Considering the effects on the cultural heritage, it underlined how the project will involve a high number of positive benefits on heritage assets (including the WH site) from one hand, but also a significant number of negative impacts on the other, if the appropriate mitigation measures included in the proposal are not implemented. Nevertheless, it concluded that the "residual negative impacts are low and strongly outweighed by the many positive heritage impacts identified" (Liverpool City Council 2010).

The EIA carried out was a valuable tool in the decision-making process as the predicted impacts made it possible to "modify the designed project, both from a morphological and from a functional point of view and to adopt additional

protective measures” (Appendino et al. 2016, p. 64). However, according to UNESCO and the English Heritage, the EIA submitted by the developers in 2010 did not adequately consider all the cultural-heritage attributes conveying the property OUV in its evaluation (World Heritage Centre 2011), both individually and collectively.

For this reason, two HIAs, focusing on the overall OUV of the WH property, were considered necessary to overcome this limit. They were conducted on behalf of the developer (Peel Group) and of the representative of heritage conservation (English Heritage) and were based on different assessment methodologies.

On the one hand, the Peel Group published *Liverpool Waters Heritage Impact Assessment on the historic dockland UNESCO site* (De Figueiredo 2011; Liverpool Waters 2011), starting from the ICOMOS *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* of 2011 (ICOMOS 2011). It evaluated all the direct and indirect impacts of *Liverpool Waters* (from no change to major change), weighting them in accordance with the value of the heritage assets (from negligible to very high). It included WH site attributes, other heritage assets, views and their settings, as well as an evaluation of the compliance of the project with the *Liverpool Mercantile City World Heritage Site Supplementary Planning Document (SPD)*, a non-statutory urban planning document which provides special guidance for protecting and enhancing the OUV. At the end of the evaluation, the assessment presented also a summary of the Cumulative Impact Assessment on the OUV, considering both tangible and intangible attributes.

On the other hand, Stephen Bond Consultancy published the *Outline of Methodology for Assessing the Impact of Liverpool Waters on the Outstanding Universal Value of the Liverpool World Heritage Site*, in November 2010 (Bond 2011, p. 1) on behalf of the English Heritage, based on the Department of Transport DMRB method, similar to the ICOMOS Guidance and already applied to WH sites. In this case, the degree of change for each heritage asset was associated with its specific significance with the objective to determine an overall assessment scale based on nine levels (from very large negative to very large positive). Moreover, it evaluated the compliance with the *SPD*, as well as with other international, national and local policies, including the *UNESCO Operational Guidelines for the Implementation of the World Heritage Convention* of 2008, the *Guidance Note on the Protection of World Heritage Sites* of English Heritage and the *Liverpool City Council Unitary Development Plan*.

Conversely from the HIA carried out on the behalf of the developers, in this case it was decided to not assess the cumulative effects of the project as they were not considered relevant to generate an overall impact score, which depends on disparate elements associated to different evaluation weights.

As a consequence, the two HIAs led to different results (Labadi 2016; Appendino et al. 2016): for the developer, the project is expected to have mostly beneficial impacts on the cultural heritage, while for the English Heritage it will implicate a significant negative impact on the WH site. On the basis of these results, the Liverpool City Council had to decide whether to continue with the project or not. In line with a general public consensus for the implementation of *Liverpool*

Waters Scheme, believing that the city will benefit “both economically and aesthetically” and the city image will be improved (Gibbens 2013, p. 33), the Local Council decided to go on with the urban regeneration scheme, demonstrating a greater support to socioeconomic interests rather than to the cultural one.

5 Learning from Liverpool’s Experience: Limits and Strengths of Existing Impact-Assessment Tools

The case of Liverpool underlined the importance of the EIA in assessing the environmental impacts (positive and negative) that a development project may have on the existing urban environment. It constituted a valuable tool to support decision-making in a context of urban transformations, which implicate the necessity to find a balance between diverging interests: the need to preserve the city’s cultural heritage over time and the necessity to promote social and economic growth for one of the most deprived cities in the UK.

However, it confirmed at the same time the limits identified in existing literature in relation to an adequate consideration of Liverpool’s cultural heritage assets and, especially, of the attributes conveying the OUV of the WH property. These limits were demonstrated by the necessity to develop and carry out two ad-hoc HIAs in order to fill this gap. Focusing specifically on cultural heritage attributes and the OUV of the WH property, they were able to consider the impacts of *Liverpool Waters* in a systematic and coherent way. They promoted a more global approach to Liverpool WH site, taking into account both tangible and intangible heritage attributes and providing a comprehensive evaluation of the project’s impacts on the overall authenticity and integrity of the WH property. This holistic approach to cultural heritage was not possible to consider separately the impacts on disaggregated heritage assets as in the case of EIA.

Moreover, the case study showed how, while the ICOMOS guidance (ICOMOS 2011) was taken into consideration by the developers, the English Heritage was able to use another methodology for conducting the analysis, indicating the lack of a shared and broadly accepted guidance for developing the HIAs (Pereira 2013; Langstaff and Bond 2004). Even if similar to the one proposed by ICOMOS, the use of different methodologies certainly contributed to increasing the level of discrepancy between the results of the two HIAs, which generated diverging results. In addition, these outcomes highlighted how both the assessment tools presented in the section above leave space for subjective interpretation (Appendino et al. 2016) as there is a lack of detailed criteria for the definition of cultural heritage attributes and values that must be the object of the evaluation (Angrisano 2015). As a consequence, the conflicts of interest between the promoters of socioeconomic development (the developers—Peel Group) and of cultural heritage preservation (English Heritage—Statutory Advisor of the Government of the United Kingdom),

both necessary to guarantee an urban sustainable development, is evident in the final results of the HIAs carried out to evaluate the project's impacts on the city as a whole and on its cultural heritage in particular.

6 Conclusions

This paper underlined how an integral vision of ecology is envisaged to face current challenges in urban environments, bridging diverging interests and needs. Focusing on the necessity to promote a “cultural ecology”, the paper presented a parallelism between the encyclical letter (Pope Francis Pope Francis 2015) and the *UNESCO Recommendation on the Historic Urban Landscape* (UNESCO 2011). They stressed the importance of linking the environmental dimension and the cultural one in a comprehensive manner and to emphasize cultural heritage conservation as an important starting point towards a more sustainable world. In this framework, the parallelism showed that both documents underlined the importance of using appropriate impact-assessment tools to support the decision-making process toward a more integral approach to the management of urban heritage in this challenging context. At the same time, the article highlighted how the actual tools seem not to be adequate to properly address a “cultural ecology” perspective.

Discussing the case of Liverpool, the paper demonstrated the limits of existing EIAs for assessing the impacts of a development project on cities' cultural heritages. It highlighted the strengths of developing ad-hoc HIAs for a more holistic and systematic consideration of cultural heritage. However, while EIAs are the most diffused impact-assessment tools in the European context, the same cannot be said for HIAs, which are still an under-known and underused evaluation tool. Therefore, there is still a need to improve the EIAs for a more detailed consideration of the impacts of a development project on cultural-heritage attributes (tangible and intangible) in the urban environment, as well as to strengthen the effectiveness of HIAs, which are discretionary tools for the local administration. This could be done with their introduction into existing regulatory frameworks or promoting further research for the diffusion of shared methodologies for conducting the assessments, which may limit their subjectivity. Their improvement and practical implementation might constitute a valuable tool for decision makers to take into consideration all factors involved in the urban management system, helping to move forward an “integral ecology” in urban contexts.

References

- Albert MT (2015) Perceptions of sustainability in heritage studies. De Gruyter, Berlin
- Angrisano M (2015) Economic heritage impact assessment as a tool for evaluating the impacts on the great requalification project of the coastal cities, UNESCO sites. The case study of Torre Annunziata, in the gulf of Naples. *Territorio Italia*, 2

- Appendino F, Giliberto F, Labadi S (2016) The role of environmental and heritage impact assessments in Liverpool world heritage site. *Valori e Valutazioni* 17:57–72
- Bond S (2011) Assessment of the potential impact of the proposed Liverpool waters master plan on OUV at Liverpool maritime mercantile WHS. Report prepared for English Heritage
- Bond A, Teller J (2004) The consideration of cultural heritage in present European environmental policies. *SUIT-Guidance for the environmental assessment of the impacts of certain plans, programmes or projects upon the heritage value of historical areas, in order to contribute to their long-term sustainability*. Research report 16
- Bond A, Langstaff L, Baxter R, Wallentinus H, Kofoed J, Lisitzin K, Lundström S (2004) Dealing with the cultural heritage aspect of environmental impact assessment in Europe. *Impact Assess Proj Apprais* 22(1):37–45
- Bottero M, Mondini G (2009) *Valutazione e sostenibilità*. Piani, programmi, progetti. Celid, Torino
- De Figureido P (2011) Liverpool waters heritage impact assessment: assessment of potential effects on the Liverpool world heritage site
- Gibbins J (2013) *Who's waterfront?: a study of Liverpool's waterfront regeneration*. Dissertation, College of Science and Technology, School of Forensic and Applied Sciences, University of Central Lancashire
- Glasson J, Therivel R, Chadwick A (2005) *Introduction to environmental impact assessment*. Routledge, London
- Gunn MC (1980) *Cultural ecology: a brief overview*. University of Nebraska, Nebraska Anthropologist, Paper 149
- Hassler U, Algreen-Ussing G, Kohler N (2004) Cultural heritage and sustainable development in *SUIT*. *SUIT-guidance for the environmental assessment of the impacts of certain plans, programmes or projects upon the heritage value of historical areas, in order to contribute to their long-term sustainability*. Research report 16
- ICOMOS (2011) *Guidance on heritage impact assessments for cultural world heritage properties*
- Jones CE, Slinn P (2008) Cultural heritage in EIA—reflections on practice in North West Europe. *J Environ Assess Policy Manag* 10(3):215–238
- Labadi S (2016) UNESCO, world heritage, and sustainable development: international discourses and local impacts. In: Gould P, Pyburn A (eds) *Collision or collaboration: archaeology encounters economic development*. One world archaeology. International Publishing, Cham
- Langstaff L, Bond A (2004) The consideration of cultural heritage within EIA practice throughout Europe. *SUIT-Guidance for the environmental assessment of the impacts of certain plans, programmes or projects upon the heritage value of historical areas, in order to contribute to their long-term sustainability*. Research report 16
- Liotta PH, Miskel F (2012) *The real population bomb: megacities, global security & the map of the future*. Potamic Books, Duellies
- Liverpool City Council (2010) *The index of multiple deprivation 2010*
- Liverpool City Council (2015) *The index of multiple deprivation 2015, a Liverpool analysis*
- Liverpool Waters (2010) *Environmental statement: non-technical summary*
- Liverpool Waters (2011) *Heritage impact assessment: non-technical summary*
- Longstreth R (2011) *Sustainability & historic preservation: towards a holistic view*. University of Delaware Press, Newark
- Newman P, Jennings I (2008) *Cities as sustainable ecosystems. principles and practices*. Island Press, Washington
- Partal A, Dunphy K (2016) Cultural impact assessment: a systematic literature review of current methods and practice around the world. *Impact Assess Proj Apprais* 34(1):1–13
- Pereira A (2013) *Monitoring cultural significance assessments*. In: IAIA13 Conference proceedings impact assessment the next generation, Calgary Stampede Centre, Alberta, Canada, 13–16 May 2013
- Pereira A, Hudson J (2012) *Change Management and Cultural Heritage*. In: Finch E (ed) *Facilities change management*. Wiley-Blackwell, Oxford

- Pereira A, Van Oers R (2012) Guidance on heritage impact assessments. Learning from its application on world heritage site management. *J Cult Herit Manag Sustain Dev* 2(2):104–114
- Pereira A, Bond A, Teller J (2013) Determining effectiveness in heritage impact assessments. In: IAIA13 Conference proceedings impact assessment the next generation, Calgary Stampede Centre, Alberta, Canada, 13–16 May 2013
- Pope Francis (2015) Encyclical Letter “Laudato si”
- Pope John Paul II (1991) Encyclical Letter “On Rerum Novarum”
- Rodwell D (2008) Urban regeneration and the management of change: Liverpool and the historic urban landscape. *J Archit Conserv* 14(2):83–106
- UNESCO (2011) Recommendation on the historic urban landscape
- UNESCO (2012) Report on the joint UNESCO-ICOMOS reactive monitoring mission to Liverpool—Maritime Mercantile City, 14–16 Nov 2011. 36th session of the world heritage committee, Saint Petersburg, Russian Federation, 24 June–6 July 2012
- UN-HABITAT (2016) New Urban Agenda, adopted during the United Nations conference on housing and sustainable urban development (Habitat III), Quito, Ecuador, 17–20 Oct 2016
- Vakhitova T (2010) Cultural heritage in impact assessment tools: challenges and opportunities. In: IAIA10 Conference proceedings the role of impact assessment in transitioning to the green economy, International Center Geneva, Switzerland, 6–11 Apr 2010
- World Bank (1994) Cultural heritage in environmental impact assessment. *Environmental Assessment Sourcebook Update*, 8
- World Heritage Centre (2011) State of conservation report, Liverpool—Maritime Mercantile City
- World Heritage Committee (2012) Decisions adopted at the 36th session of the world heritage committee, Saint Petersburg, Russian Federation, 24 June–6 July 2012 (Decision 36 COM 7B.93 and 36 COM 8C.1). pp 132–133

The Privatization of Water Services in Italy: Make or Buy, Capability and Efficiency Issues



Chiara D'Alpaos

Abstract Increasing private-sector participation to improve the efficiency of infrastructure services was a growing trend in Europe in the 1990s. Dissatisfaction with state solutions, ever-tightening government budgets and technical innovation favored therefore the privatization of the utilities sector and even water utilities. The privatization of water services was generally regarded as the supreme failure of the (welfare) State that turned water into a commodity. The paper presents a critical review of the privatization process of water services in Italy and provides a theoretical insight into critical issues related both to the regulatory framework and pricing mechanism and to make-or-buy decisions. The aim of the paper is to show how the State (i.e., the institution-of-institutions) and the Market can be conceived of not as opposing entities but in a complementarity perspective, according to which the State expresses in the broadest terms society's organization and historical course and intervenes to correct market failures.

Keywords Water services · Capability approach · Efficiency · Sustainability
Make or buy

1 Introduction

Policy makers and water-resources managers are worldwide concerned with increasing and competing demands on water as a scarce resource and are faced with uncertainty over its availability and quality due to population growth and climate change. Sustainable water policies have top priority in agendas at the national and international levels as scarcity and competition for water challenge poverty eradication policies, public health and food production (Ward 2007). Growing human demands for water are to be satisfied while protecting the ecosystems and identi-

C. D'Alpaos (✉)

Department of Civil Environmental and Architectural Engineering,
University of Padova, Padova, Italy
e-mail: chiara.dalpaos@unipd.it

fying the impacts and tradeoffs of current water-related decisions for future generations. Water decisions are controversial whenever emerging uses such as preservation or restoration of a natural environment compete (Giordano et al. 2016), for example, with agriculture, hydropower production and the city water supply. In this respect, water is a scarce resource, not in absolute terms but in relation to alternative remedies to its unavailability (Massarutto 2015; Buratto and D'Alpaos 2012, 2015): demand is to be compared with supply and the costs to access it. A water problem arises when water is not available in the desired quantity and quality in the place and at the time it is needed (Young 2005; D'Alpaos 2012) and risks of water stress for human communities and ecosystems are ever increasing.

The depletion of water represents a major concern in the Encyclical Letter "Laudato Si" of the Holy Father Francis as well. The Holy Father draws attention to the present consumption level that has already exceeded acceptable limits, (Penza 2016) whereas the fact that large cities have experienced water shortage and water poverty is still an unresolved problem in many countries worldwide. The Holy Father expresses apprehension for the growing tendency to privatize this resource and to turn it into a commodity subject to the market laws. By contrast, for economists, high water consumption has not a necessarily a negative connotation, but it is necessary to know whether and to what extent a specific use of the resource affects other alternative uses that can potentially increase individual and society utility. The concept of "value" refers in fact to the variation in utility of individuals and economists are concerned with the measurement of individual or collective utility variation and the occurrence of conflicts among alternative uses (Zamagni 1991, 2012; Massarutto 2015). Therefore, regarding water as an economic good has not an intrinsically negative connotation and does not mean turning it into a marketable good traded for a price, as well as defining scarcity costs as necessarily being other than zero. Similarly, the privatization of the utilities sectors that was a growing trend in Europe in the 1990s is not necessarily regarded negatively by economists. Privatization is not necessarily to be considered as the supreme failure of the (welfare) State and may potentially represent an opportunity to introduce technical innovation and increase the efficiency of water utilities. Nationalized industries gained a reputation for inefficiency and control problems that offset any pricing advantage of a public service provision with decreasing cost (Dnes 1995).

Although the main objective of welfare institutions remains that of protecting individuals from welfare losses, the "social" State currently fails to reconcile equity and liberty in a sustainable way. Differently than in the past, when risks to individual security were fundamentally considered as exogenous, in today's societies, insecurity is mainly endogenous and affects the organization of society itself and the economy (Zamagni 2009, 2012, 2015; Acemoglu and Robinson 2012; Reis 2012).

The paper presents a critical review of the privatization process of water services in Italy and provides a theoretical insight on critical issues related both to the regulatory framework and pricing mechanism and to make-or-buy decisions. The aim of the paper is to show how the State (i.e., the institution-of-institutions) and the Market can be conceived not as opposing entities but in a complementarity

perspective, according to which the State expresses in the broadest terms society's organization and historical course and intervenes to correct market failures and individuals are regarded as responsible agents that becomes partners in the design and delivery of public services. Currently the main challenge is indeed to create institutions that make resources available to individuals according to the capability approach à la Sen (1980, 1985, 2004) and to «avoid the erroneous identification of 'public' with 'state'» (Zamagni 2012, p. 123) whereas promoting the conceptual framework for equality of capabilities.

The remainder of the paper is organized as follows. Section 2 provide a review on privatization of water services and delegation schemes. Section 3 investigates the Italian reform of the water services and discuss its critical issues and outcomes. Section 4 concludes.

2 The Privatization of Water Services

Increasing private-sector participation to improve the efficiency of infrastructure services was a growing trend in Europe in the 1990s, after disenchantment with nationalization became widespread starting from the 1980s. Dissatisfaction with state solutions, ever-tightening government budgets and technical innovation favored therefore the privatization of the utilities sector that was historically viewed as either a natural monopoly or, of such extreme social interest, to require public ownership and public service provision (Demsetz 1968; Peacock and Rowley 1972; Williamson 1976; Braeutigam and Panzar 1993; Guash and Spiller 1999). Furthermore the EU policy on Services of General Interest tried to impose a more widespread recourse to competitive markets (European Commission 2004). In this respect, a vast literature suggests that private-sector participation in public utilities can be beneficial in improving service quality and management efficiency due to greater incentives in reducing costs and access to capital markets (Massarutto 2007; Massarutto et al. 2008).

During the 1990s, the dominant strategy was to create self-sufficient undertakings, sustained by customer fees on a full-cost recovery basis. Although this strategy did not require privatization or service commercialization, there was often a total delegation of responsibility to the private sector.

There exists a continuum of alternatives for involving the private sector in the provision of infrastructure services that ranges from supply and service contracts to concession-type arrangements that include *affermage* contracts and concessions (or franchises) *strictu* sensu (Guislain and Kerf 1995).¹ Menard and Peeroo (2011)

¹In management contracts, there is limited transfer of responsibility to private operators; in *affermage* contracts, the private contractor is responsible at its own risk for provision of the service, including operating and maintaining the infrastructure; in concessions, the private contractor is responsible for both operation and new investments.

provided a classification of private-sector involvement where the polar cases are *full divestiture* and *direct public management*.²

In particular, when utilities exhibit natural monopoly characteristics and competition in the market is not possible, competition for the market (i.e., competitive bidding for the exclusive right to provide a service) represents the sole opportunity for final users to gain some benefits from competition. This situation is likely to occur when large barriers (e.g., significant sunk-investment costs) prevent new firms from entering an industry. The basic idea is that monopoly franchises can be auctioned off to the firm offering the most attractive bids, e.g., the lowest price to consumers (Dnes 1995). From this perspective, private firms compete to be awarded a contract that gives them the right to be the natural monopolist, though regulated by a public authority or the government against monopolistic conduct and abuses.

The rationale of regulation in network industries and utilities resides in the antinomy between the urgency to prevent consumers for monopolist market power, thus promoting price reduction and the need for guaranteeing service at full-cost recovery in order to access credit in the capital market (Newbery 2000): regulation can therefore reconcile private ownership and consumers' political power.

This issue is particularly challenging in the water-service sector where the output is characterized as a public good but is an essential good and a human right so accessibility-and-affordability issue arise. Contextually, high capital intensity and long-lived investments with long repayment schedules increase investment risks for private operators and in turn require regulatory arrangements, such as renegotiations and cost pass-through. This limits the binding of the operator to ex-ante commitments and hinders competition and its surrogates (Armstrong and Sappington 2004; Massarutto et al. 2008). In this respect, successful governance of water services requires adequate institutional solutions that guarantee investors full-cost recovery and consumers against regulatory capture and monopoly rents. Poor outcomes of regulated industries depend usually on a regulatory failure.

Contractual arrangements that combine private operation with public financing of investment appear to be the most sustainable option in many countries (Massarutto and Ermano 2013).

The organization of the water-service sector is a controversial issue and radicalism is not supported by empirical evidence. Empirical studies have not proved superior performance of private management, and neither ownership nor alternative regulatory and privatization models impact performance levels (Renzetti and Dupont 2005; Abbott and Cohen 2009; Walter et al. 2009; Marin 2009; Massarutto and Ermano 2013; Massarutto et al. 2013). It is nonetheless unrealistic to complain about lack of competition in a sector where it is generally absent, as well as to rely

²Under the full-divestiture scheme, all assets are privately owned and the private company is responsible for providing the service and achieving quality standards specified by law; whereas, direct public management consists of hierarchical control of the public sector over operating companies.

on public financing when government budgets are ever-tightening and public debt is increasing.

The institutional settings proves to be indeed the dominant driver of efficiency.³ Definitely the organization of water services can be regarded as a make-or-buy decision where make costs are compared to buy costs. As far as water services are concerned, it is of paramount importance to determine whether the efficiency gains of privatization can outweigh higher market and regulatory risks (and in turn higher costs of capital) that confront private investors with respect to the State.

The problems arising from complete delegation of investment responsibilities to the private sector make an argument in favor of public–private partnership as a promising alternative both to pure public management with public procurement of assets and pure concessions to the private sector.

3 The Reform of Water Services in Italy

In Italy, the promulgation of Law n. 36/94, better known as Galli Law, represented a milestone in the reform and reorganization of the water-service sector. The increase in investments opportunity costs and the lack of public finances induced the government to promote the involvement of the private sector in the production and provision of water services. The reform of the water-service sector was meant to attract private financial resources and to reduce the fragmentation and the inefficiency that characterized the public production of water services in the 20th century and led to systematic and long-lasting underinvestment (Dosi and Muraro 2003; Muraro and Rebba 2003). The reform marked the privatization of the water-service sector, although it stated that ownership of water resources is public and water resources are to be preserved and used according to solidarity and fairness criteria. It represents though a peculiar combination of private and public. The Galli Law opened the water-service sector to competition in order to guarantee efficiency in production and management of water services in a setting where the public sector still controls the operations. The reform strategy aimed at the transformation of public organizations into commercial undertakings that are self-financed by cost-recovering tariffs, operate in optimal management units

³Many empirical studies conducted worldwide investigated the determinants of water-utilities performance with respect to their size and diversification and the existence of economies of scale, scope and density (Fraquelli et al. 2004; Farsi et al. 2008; Bortolotti et al. 2011; Pollit and Steer 2011; Ferreira da Cruz et al. 2013; Guarini and Romano 2014). In order to benefit from efficiency gains generated by scope and scale economies, some utilities responded to market liberalization by transforming themselves into multi-utilities (horizontal integration) that provide traditionally distinct services (e.g., gas, electricity, and urban waste collection and management). Nonetheless, the effects of horizontal integration are controversial: on the one hand, the emergence of multi-utilities can improve access and quality of utility services, but on the other hand, if not subject to closer control, it may paradoxically generate less competition, greater regulatory complexity and concentrate more political power in the utilities.

obtained by the aggregation of municipal utilities (ATOs) and take advantage of economies of scale. The reform established the separation between resource planning, assigned to the local water authority (AATO) and the operation of water utilities delegated to a single operator via auction procedures in case of private firms or via in-house providing⁴ in case of public firms, according to EC competition rules. The reform provided a variety of possible arrangements (fully private, fully public, public-private partnerships) and set up the delegation scheme based on a BOT concession contract⁵ (D'Alpaos and Moretto 2005, D'Alpaos et al. 2006; Massarutto et al. 2008, 2013). The AATOs set the price cap (i.e., maximum tariff increase) for water-service provision according to the full-cost recovery principle and including investments depreciation and an “adequate” capital rate of return⁶ (D'Alpaos and Valbonesi 2006; Danesi et al. 2007; Antonucci et al 2015).

The new water-service architecture designed by the Galli Law is complex and, after more than 20 years, it has not been fully accomplished yet: the institutional path was accomplished, but not the governance and management setting, and just 50% of the planned investments were undertaken. The expected outcomes were high, but the achieved results were poor because of regulatory failures, mainly due to contract incompleteness and regulatory capture.

Contrary to expectations, water tariffs increased (though they still remain among the lowest in Europe) and evidence of efficiency gains is insufficient. It is generally agreed that the reform implementation failed to achieve the win-win expected outcome: better quality, value for money, new investments and infrastructures upgrading (Massarutto and Ermano 2013; Massarutto et al. 2013). In order to accelerate the process, the government tried to favor private participation, but this raised strong public opposition that resulted in the 2011 referendum that sanctioned public ownership of water and established the non-profit operations of water utilities.

The referendum clearly marked a turning point and made clear the urgency of reconsidering the reform and its critical aspects. The debate is still controversial and no straightforward solutions can be easily found without overcoming the limits of the reform: delegation schemes based on concession; high regulatory and market risks; too many weak regulators; regulatory capture and contract incompleteness that lead to inefficient renegotiations; project-finance opportunity frustrated by tariff regulations that do not include financial amortization; lack of legal and political stability, and, last but not least, water poverty and affordability issues due to tariff increase.

⁴See Teckal case C-107/98, EU:C:1999:562.

⁵BOT contracts are build, operate and transfer arrangements where the private entity designs, builds and operates facilities according to the concession-contract requirements.

⁶The Galli Law defined a new pricing mechanism, i.e., the “Metodo Tariffario Normalizzato”.

4 Discussion and Conclusions

The Italian reform of water services is generally regarded as being responsible for the negative outcomes of the privatization of water services that shifted from State provision to market-based and from social rights to a commercial approach. Nonetheless, public interest is not per se an obstacle to private-sector involvement in service provision, as well as the charge to final users of cost-recovering tariffs does not necessarily turn water into a commodity subject to market laws. The quid-pro-quo principle and consumer responsibility might indeed increase efficiency in resource allocation and contribute to reduced public expenditure, on condition that inter and intra-generational equity and Sen's capability approach are not disregarded. An equitable allocation suggests that all final users, regardless of their ability to pay, maintain a human right to safe and healthy water.

Water pricing is concerned with the pursuit of social justice, subsidiarity and consumers' responsibility rather than solely on cost sharing among communities of citizens. Though economists regard water pricing as an instrument to achieve allocation efficiency, demand elasticity, supply indivisibility, transaction costs, long-lived investments and related market risks can potentially reduce the benefits of pricing.

It is generally agreed that the Italian reform of water services failed to achieve the win-win expected outcome and is a clear example of a regulatory and institutional failure. Successful governance of water services requires adequate institutional solutions that guarantee investors full-cost recovery and consumers against regulatory capture and monopoly rents. Accountability of regulators and consumers participation are fundamentals in any regulatory process.

References

- Abbott M, Cohen B (2009) Productivity and efficiency in the water industry. *Utilities Policy* 17(3–4):233–244
- Acemoglu D, Robinson J (2012) *Why nations fail: the origin of power, prosperity and poverty*. Crown Business, New York, p 544
- Antoniucci V, D'Alpaos C, Marella G (2015) Energy saving in tall buildings: from urban planning regulation to smart grid building solutions. *Int J Hous Sci Appl* 39(2):101–110
- Armstrong M, Sappington DE (2004) Towards a synthesis of models of regulatory policy design with asymmetric information. *J Regul Econ* 26(1):5–21
- Bortolotti B, Cambini C, Rondi L, Spiegel Y (2011) Capital structure and regulation: do ownership and regulatory independence matter? *J Econ Manage Strategy* 20(2):517–564
- Braeutigam RR, Panzar JC (1993) Effects of the change from rate-of-return regulation to price-cap regulation. *Am Econ Rev* 83(2):191–198
- Buratto A, D'Alpaos C (2015) Optimal sustainable use of drinking water sources and interactions between multiple providers. *Oper Res Lett* 43(4):389–395
- Buratto A, D'Alpaos C (2012) Multi stage optimal mix in the interconnection of drinking water sources. *Appl Math Sci* 6(125–128):6195–6213

- D'Alpaos C, Dosi C, Moretto M (2006) Concession length and investment timing flexibility. *Water Resour Res* 42(2):W02404
- D'Alpaos C, Valbonesi P (2006) Una valutazione delle ipotesi di revisione del Metodo Tariffario normalizzato per il servizio idrico integrato. *Economia Pubblica* 5–6:97–125
- D'Alpaos C, Moretto M (2005) La valutazione della flessibilità nel servizio idrico integrato. *Economia Pubblica* 3:27–60
- D'Alpaos C (2012) The value of flexibility to switch between water supply sources. *Appl Math Sci* 6(125–128):6381–6401
- Danesi L, Passarelli M, Peruzzi P (2007) Water services reform in Italy: its impacts on regulation, investment and affordability. *Water Policy* 9(1):33–54
- Demsetz H (1968) Why Regulate Utilities. *J Law Econ* 11:55–65
- Dnes AW (1995) Franchising and privatization, public policy for the private sector, The World Bank, Note no 40, p 4
- Dosi C, Muraro G (2003) I servizi idrici e il ruolo dell'intervento pubblico. In: Muraro G, Valbonesi P (eds) *I servizi idrici tra mercato e regole*. Carocci Editore, Roma, pp 19–39
- European Commission (2004) White paper on services of general interest, COM (2004). 374 def, 12 May 2004
- Farsi M, Fetzi A, Filippini M (2008) Economies of Scale and Scope in Multi-Utilities. *Energy J* 29(4):123–143
- Ferreira da Cruz N, Carvalho P, Cunha Marques R (2013) Disentangling the cost efficiency of jointly provided water and wastewater services. *Utilities Policy* 24:70–77
- Fraquelli G, Piacenza M, Vannoni D (2004) Scope and scale economies in multi-utilities: evidence from gas, water and electricity combinations. *Appl Econ* 36:2045–2057
- Giordano R, Montacchini EP, Tedesco S (2016) Living wall systems: toward the environmental and economic sustainability. *Research and experimental development. Valori e Valutazioni* 16:29–38
- Guash JL, Spiller P (1999) Managing the regulatory process: design, concepts, issues, and the Latin America and Caribbean Story. The World Bank, Washington, p 322
- Guerrini A, Romano G (2014) The determinants of water utilities performance. In: Guerrini A, Romano G (eds) *Water management in Italy—governance. Performance and Sustainability*, Springer, London, pp 17–35
- Guislain P, Kerf M (1995) Concessions—the way to privatize infrastructure sector monopolies, public policy for the private sector, The World Bank, Note no 59, p 4
- Marin P (2009) Public-private partnerships for urban water utilities, The World Bank, p 208
- Massarutto A (2007) Municipal waste management as a local utility: options for competition in an environmentally-regulated industry. *Utilities Policy* 15:9–19
- Massarutto A, Paccagnan V, Linares E (2008) Private management and public finance in the Italian water industry: a marriage of convenience? *Water Resour Res* 44(1–17):W12425
- Massarutto A, Antonioli B, Ermano P (2013) Assessing the impact of water service regulatory reforms in Italy: a multidimensional approach. *Water Policy* 15:1046–1063
- Massarutto A, Ermano P (2013) Drowned in an inch of water—how poor regulation has weakened the Italian water reform. *Utilities Policy* 24:20–31
- Massarutto A (2015) An economic approach to water scarcity. In: Antonelli M, Greco F (eds) *The water we eat*. Springer, London, pp 175–186
- Menard C, Peeroo A (2011) Liberalization in the water sector: three leading models. In: Kuenneke R, Finger M (eds) *International handbook of network industries—the liberalization of infrastructure*. Edward Elgar Publishing, Cheltenham, pp 310–327
- Muraro G, Rebba V (2003) La concorrenza per il mercato. In: Muraro G, Valbonesi P (eds) *I servizi idrici tra mercato e regole*. Carocci Editore, Roma, pp 237–303
- Newbery DM (2000) Privatization, restructuring and regulation of network utilities. The MIT Press, Cambridge MA, p 484
- Peacock AT, Rowley CK (1972) Welfare economics and the public regulation of natural monopoly. *J Public Econ* 1:227–244

- Penza G (2016) Pope Francis: The *Laudato si'* encyclical and the urban issue. *Valore e Valutazioni* 17:5–8
- Pollit MG, Steer SJ (2011) Economies of scale and scope in network industries: lessons for the UK water and sewerage sectors, In: *Cambridge Working Paper in Economics* 1152, p 36
- Reis J (2012) The state and the market: an institutionalist and relational take. *RCCS Ann Rev* 4(4): 86–109
- Renzetti S, Dupont D (2005) Ownership and performance of water utilities. In: Chenoweth J, Bird J (eds) *The business of water supply and sustainable development*. Greenleaf Publishing, Sheffield, pp 99–110
- Sen A (1980) Equality of what? In: McMurrin S (ed) *Tanner lectures on human values*. Cambridge University Press, Cambridge, pp 195–220
- Sen A (1985) *Commodities and capabilities*. North-Holland, Amsterdam, p 104
- Sen A (2004) Elements of a theory of human rights. *Philos Public Aff* 32(4):315–356
- Young RA (2005) Determining the economic value of water: concepts and methods. *Resources for the Future*, Washington, DC, p 374
- Walter M, Cullmann A, von Hirschhausen C, Wand R, Zschille M (2009) Quo vadis efficiency analysis of water distribution? A comparative literature review. *Utilities Policy* 17(3–4): 225–232
- Ward FA (2007) Decision support for water policy: a review of economic concepts and tools. *Water Policy* 9:1–31
- Williamson OE (1976) Franchise bidding for natural monopolies, in general and with respect to CATV. *Bell J Econ* 7:73–104
- Zamagni S (1991) Hicks on capital and growth. *Rev Political Econ* 3(3):249–267
- Zamagni S (2009) The lesson and warning of a crisis foretold: a political economy approach. *Int Rev Econ* 56:315–334
- Zamagni S (2012) New frontiers of welfare state and new challenges for the third sector. In: Brugnoli A, Colombo A (eds) *Government, governance and welfare reform: Structural changes and subsidiarity in Italy and Britain*. Edward Elgar Publishing, Cheltenham, pp 122–130
- Zamagni S (2015) Development, capabilities and institutions. In: Baranzini ML, Rotondi C, Scazzieri R (eds) *Resources, production and structural dynamics*. Cambridge University Press, Cambridge, pp 279–298

Historic, Artistic and Cultural Patrimony for a “Habitable City”: Incentives for Care



Fabiana Forte

Abstract The Encyclical Letter *Laudato si* of the Holy Father Francis on Care for Our Common Home recognizes historic, artistic and cultural patrimony—which is, like the patrimony of nature, under threat—«part of the shared identity of each place and a foundation upon which to build a habitable city» (§ 143). At the same time, social love—a key to authentic development—«moves us to devise larger strategies to halt environmental degradation and to encourage a “culture of care” which permeates all of society» (§ 231). The theme of the care of the historic, artistic and cultural patrimony for a “human and sustainable city” is traditionally a matter of concern for the appraisal and evaluation disciplines which, starting from the formulation of the “social use value”, have offered a meaningful development of methodological frameworks and innovative approaches. In this perspective and in the light of the significant and audacious reflections which the Holy Father Francis proposes on a possible “theology of the city”, the article seeks to address the issue of finding the necessary resources for the “care” of historic, artistic and cultural patrimony—in Italy diffusely “world heritage sites”—also considering the most recent ministerial initiatives for their *valorization*. With specific reference to the financial mechanisms and to the fiscal incentives to encourage the support of the private subjects in the conservation activities, if on the side of the public cultural goods, the most recently provisions tries to align Italy to others European countries, on the side of the cultural goods of private property, the question of the incentives is more delicate and complex, as this article will try to highlight.

Keywords Cultural heritage • Valorization • Incentives

F. Forte (✉)

Department of Architecture and Industrial Design, University of Campania “Luigi Vanvitelli”, Aversa, Italy
e-mail: fabiana.forte@unicampania.it

1 Historic, Artistic and Cultural Patrimony: Meaningful Convergences

The Encyclical Letter *Laudato si* of the Holy Father Francis, on Care for Our Common Home (2015) recognizes the historic, artistic and cultural patrimony—which is, like the patrimony of nature, under threat—«part of the shared identity of each place and a foundation upon which to build a habitable city» (§ 143). At the same time, social love—a key to authentic development—«moves us to devise larger strategies to halt environmental degradation and to encourage a “culture of care” which permeates all of society» (§ 231).

The theme of the care of the historic, artistic and cultural patrimony for a “human and sustainability city” is traditionally a matter of concern to the Italian appraisal and evaluation disciplines, which, already 40 years ago, starting from the formulation of the *social-use value*, have offered a meaningful development of methodological frameworks and innovative approaches, with reference also to the “new architectural assets” (Forte and Fusco Girard 2009).

Regarding the care of historical centers, the Neapolitan School of Monument Restoration, during the 1970s, set out a specific economic analysis for the renewal of the old center of Naples—still today without an organic plan of valorization, despite UNESCO recognizing it as World Heritage Site—representing the first operative case, in Italy, of the application of cost-benefit analysis for an intervention of environmental renewal (Forte 1971).

Also in the 1970s, Carlo Forte, in his avant-garde article ‘Ecology and urban economics’ (1972) referred to “human ecology” as «community science», developed in the North American economics literature during the 1920 (with a specific approach to the analysis of the value and the use of the urban space) and reformulated by John Paul II in the Encyclical *Centesimus annus* (1991). Thus, dealing with for the first time, under the ethical profile, the problem of safeguarding the cultural heritage, John Paul II, in the framework of the reflection on the universal destination of the goods, introduced the concept of human ecology.

This concept involves the safeguarding of environmental goods, not only the natural ones, but also those produced over time by human creativeness and such constituting the necessary habitat for the promotion of human dignity in all its aspects (Borrelli and Citterio 2016). It is the ethical-qualitative parameter, very different from the merely economic-quantitative one, which must solicit the individual and institutional responsibility to practice according to a code respectful of the universal destination of material goods (Forte 1993).

With point 40 of *Centesimus annus*: «...there are collective and qualitative needs which cannot be satisfied by market mechanisms. There are important human needs which escape its logic. There are goods which by their very nature cannot and must not be bought or sold...».

It is worth highlighting how these types of considerations were already present in the intuitions of Carlo Forte, who enlarged the concept of economic value of the cultural goods through the formulation of the *social-use value* (Forte 1977). This

value, different from the exchange value, reflects the appreciation which the community expresses for cultural goods on the basis of their capacity to satisfy multiple and heterogeneous needs, i.e., “collective and qualitative needs” as in the *Centesimus annus*.

In accordance with Mattia (1983), this particular category of goods is able to procure two different forms of utility: the first, which regards the possessor and which, in the absence of normative constraints and in the presence of an effective market, can be transferred to other subjects (particular utility). The second competes among a more or less higher number of persons who do not possess directly the good (diffuse utility).

The “particular value” and the “diffuse value” correspond respectively to these two utilities, with the sum being the “social value”. The collective action of *care* is developed whenever the society adverts to the diffuse utility of a good.

From this perspective, there is Cultural Ecology as in *Laudato si*, which, recognizing cultural heritage as under threat, clarifies: «...It is not a matter of tearing down and building new cities, supposedly more respectful of the environment yet not always more attractive to live in. Rather, there is a need to incorporate the history, culture and architecture of each place, thus preserving its original identity. Ecology also involves protecting the cultural treasures of humanity in the broadest sense. More specifically, it calls for greater attention to local cultures when studying environmental problems, favoring a dialogue between scientific-technical language and the language of the people. Culture is more than what we have inherited from the past; it is also, and above all, a living, dynamic and participatory present reality, which cannot be excluded as we rethink the relationship between human beings and the environment» (§ 143).

The attention on the *care* of the historic, artistic and cultural patrimony for a “human and sustainable city” is further set out in the Naples Declaration (Fusco Girard et al. 2003), drawn up during the World Meeting *The Human Being and the City: Towards a Human and Sustainable Development* (held in Naples 6–8 September 2000, on the occasion of the Great Jubilee of the Year 2000).

Among the points of the declaration, which anticipate several considerations present in the encyclical letter *Laudato si*, particularly concerning the subject of the present article, is the point 3: *The importance of collective memory and the culture of the city*: «cities are increasingly multiethnic and multi-cultural. The right to the city must be broad-based and all-encompassing. Nevertheless, the historical and cultural heritage, representing the collective memory of the city, its specificity and identity, must be preserved and promoted as a key contribution to the humanization of our cities».

The theme of the “humanization of our cities” is taken again in the Encyclical Letter *Laudato si*, where Holy Father Francis, starting from the acknowledgement of the complex socioenvironmental crisis, highlights the inseparability of the environmental, economic and social ecology from the *cultural ecology*, which involves the appropriate mentality and requires the respect for both nature and the historic, artistic and cultural patrimony of a community and from the *ecology of daily life*, which involves each inhabitant of the planet in its habits and behaviors.

From this perspective, Holy Father Francis proposes significant reflections on a possible «theology of the city» (Forte 2015), where cultural heritage plays a crucial role.

The approach to cultural heritage by the Italian appraisal and evaluation disciplines, as well as having been evolved with meaningful development of methodological frameworks and innovative approaches, has found convergence in the main scientific studies at European and international levels. At both these levels, in accordance to CHCfE «the past few decades have witnessed main conceptual and policy developments which have recognized the multiple and valuable benefits that cultural heritage brings at society as a whole» (CHCfE 2015), provided that it is opportunely *safeguarded* and *managed*.

As is well known, the richness of the cultural heritage in Italy is extraordinary, but the scarcity of public resources makes its protection and management problematic, becoming the involvement of private subjects (both in the management of state property and privately owned heritage) a relevant topic.

From this perspective, the article seeks to address the issue of finding the resources for the “care” of historic, artistic and cultural patrimony, focusing attention on a particular category of cultural goods, such as the immovable cultural property. Section 2, starting from the most recent EU declarations on the cultural heritage, focalizes on some innovative Italian ministerial initiatives; then, Sect. 3 analyzes the issues regarding the private cultural property, with reference to a specific context in the Campania region, in the South of Italy.

2 Financing the *Care* of Historic, Artistic and Cultural Patrimony: Some Innovations

For many countries the conservation of cultural heritage has become a national priority, as in the International and European Conventions and Charters.

At a European Union level, starting from the Faro Convention (2005), we have witnessed a growing awareness of the importance of the cultural heritage, recognized as “a strategic resource for a sustainable Europe” (Council of the European Union 2014) and “a shared resource and a *common good*”, as in the document “Towards an integrated approach to cultural heritage for Europe” (European Commission 2014).

In this document is also highlighted which «the economic value of heritage has recently come into research focus, but only partial estimates of its importance are available». It is clear that the issue of the evaluation of the impacts connected with the valorization of cultural heritage has become relevant in the policy agendas, both at European level and at national level (Forte and Listokin 2016).

With specific regard to Italy, the State, through the Ministry for Heritage, Cultural Activities and Tourism—MiBACT—is not only responsible for the strategic task involved in the protection of an extremely rich cultural heritage, but

has direct responsibility for the *management* of a huge number of national heritage institutions. Protection and management is regulated by the Italian Code of the Cultural and Landscape Heritage (L.D. n. 42/2004).

Public expenditures, allocated by several levels of government, have traditionally been the primary source in supporting cultural heritage; however, they have been progressively reduced, with Italy being among the EU states as one that spends less on culture, despite its extraordinary heritage (ISTAT, Rapporto BES 2016). As in other European countries, the involvement of private subjects (both profit and no profit) in the *care* of cultural heritage has become essential.

From this perspective, *valorization* should be interpreted. In Italy, the theme of valorization has been particularly debated since there is a “culture of conservation” that prevails, and it enforces a very ancient legislative tradition (starting from the period that precedes the unification of Italy, passing from the 1939 legislation), which must be “proudly” defended, but there was no a “culture of valorization”. In other words, the country has invested very little in its cultural heritage.

As set out in the Italian Code, valorization (or enhancement) consists of the exercising of the functions and regulation of the activities aimed at promoting *knowledge* of the cultural heritage, as well as ensuring the best conditions for the use and *public enjoyment* of the heritage, as in the perspective of Cultural Ecology of the Encyclical *Laudato si*. A private subject may concur, cooperate or participate in such activities. Then, in a purely economic interpretation (concerning the *mise in valeur*), it is possible to consider valorization as a way for an “entrepreneurial” management of the cultural heritage, capable of producing revenues for its preservation or *care*.

Among the various forms of management of cultural property undertaken by private initiatives, introduced by the Italian Code and aimed at the valorization of cultural heritage, there are *Sponsorship*, mainly implemented in the last years by important Italian brands of the creative industry for the restoration of several worldwide-known monuments; and *Additional Services*, already introduced by the enlightened Ronchey Law n.4/1993, but whose potential is still underestimated. Both tools have been analyzed, highlighting some critical aspects (Forte and Rupe 2015; Forte and Formisano 2015).

The most recent government reform on the overall system of cultural goods and activities, launched by the MiBACT with “Art Bonus” Decree (L.D. 83/2014 and successive modifications) encourages cash donations for the care of public cultural property, trying to align Italy with others European countries, but not with the USA where the fiscal incentives for historic preservation are, traditionally, so much more consistent (Listokin 2012).

According to MiBACT (2017), the first balance of the Art Bonus is positive: in three years, it was able to mobilize more than 4250 patrons to donate almost €158 million for almost 1150 interventions (the majority for the maintenance, protection and restoration of public cultural works), even if there is a profound territorial imbalance between the resources collected in the north and the rest of Italy.

Together with this innovative form of incentives, the L.D. 83/2014 introduces the Strategic Plan for “Major Cultural Patrimony Projects”, with the aim of

identifying goods or sites of exceptional cultural interest and of national relevance for which it is necessary and urgent to realize organic interventions of conservation, requalification, valorization and cultural promotion for the tourism sector. The financial resources (€85 million for the first triennium and €135 million for the years 2017–2018) are assigned for several typologies of interventions.

Ever from the perspective of the *care* of cultural heritage, there is the program promoted in 2012 by Agenzia del Demanio, with Invitalia and ANCI and other institutional subjects, “Valore Paese—Dimore” for the valorization of the historical-artistic public patrimony. The program aims to develop and put to work publicly owned properties for tourist accommodation that are of particular historic and artistic merit and located in sites of significance in terms of the environment and the landscape.

For the implementation of the program, inserted in the European Union programming 2014–2020 (Europe 2020) because of the historic, artistic and cultural value of the properties involved, it is necessary to submit to MiBACT the request for the authorization to the valorization through several tools, as concessions for valorization, surface right and alienation. Among the several properties that fall under the portfolio of immovable cultural properties of the “Valore Paese—Dimore”, there is the Bourbon Villa Favorita in Ercolano, in the metropolitan city of Naples and in the territorial development system Miglio-d’Oro Area Torrese Stabiese, object of research (as in Sect. 3).

If all these recent institutional initiatives regard cultural property owned by the State, the question of financing the care of cultural property owned by private subjects is far more delicate and complex.

3 Private Cultural Property: The Challenges for Care

Private cultural properties have a normative treatment that is different from other private goods, since they are of *public relevance*. In fact, private subjects who are owners of historic properties (historical villas, castles, palace etc.) are obliged, by law (L.D. 42/2004) to conserve and maintain their properties. The ministry may contribute to the expenses, both with capital grants and interest subsidies.

The owners who have received contributions are obliged to make the property accessible to the public, according to the modalities fixed, case by case, by special conventions. For each kind of intervention, there is a need for authorization from the competent authority and for the sale of the property the State have the power to purchase it by pre-emption.

Against conservation obligations, for which the private subject must maintain the property at its own expense and under its responsibility (also penal), traditionally the State reserves to the private owner a less burdensome tax regime, a sort of “compensation”. Nevertheless, in recent years, private cultural properties are facing a number of important challenges to survive (Napoli et al. 2017).

In fact, before 2011 the income of these properties was taxed on the basis of a symbolic value, the so called “figurative rent”, which, in the case of rented property, implied the fiscal irrelevance of the perceived rents (Law n.413/1991, art. 11). Starting from 2012, with the “Salva Italia Decree” (D.L. 201/2011), this tax regime has been replaced by some concessions, based on a diversification of functions of the use of the historical building. In the case of unrented historical buildings, for the fiscal person, the taxation, according to Irpef (personal income tax), is absorbed by the property tax (IMU); for companies, the income is constituted by the cadastral rent reduced by 50%. In the case of rented historical buildings, owners have to pay a tax on the rental revenue.

Furthermore, it is possible to deduce, according to Irpef, the costs sustained for the management of historical buildings: for the physical person, by the measure of 19%; and for the owners (entrepreneurs), the deduction from business income of the expenses for the care. Regarding municipal property-tax incentives for the historical buildings (ICI vs. IMU vs. IUC), the taxable base is reduced to half, in contrast with the past. Therefore, the increase of the tax burden on the historical properties, conjointly with the cadastral reform and the many bureaucratic bonds, are making the *care* even more burdensome. Thus, the ADSI (Associazione Dimore Storiche Italiane) proposal presented to the Government in 2015 is particularly efficacious.

It consists of the reduction by 30% of the property tax (the IUC—Imposta Comunale Unica—introduced in 2014 by the Stability Law) for owners of historic properties under the condition that they have to invest not only into the restoration but also in the valorization of properties, improving the services for their *enjoyment*, setting up a network with other realties in the territory and promotional activities.

This means all “additional services” which, according to the analysis, could generate a VAT revenue capable of compensating the reduction of the property tax, but also, in the best case, further revenues for the State to re-invest in activities of valorization, communication and education for the enjoyment of the cultural heritage, in the form of the multiplier effects (Monti 2015).

However in Italy, where the private cultural properties are consistent (only the Italian Historic Houses, monitored by ADSI, are estimated to be around 45–50 thousand and diffused over all the national territory), the listed buildings are not all valuable historical mansions, localized in the central areas of the cities.

Many listed buildings are located in secondary villages, in rural areas, in small municipalities in each part of the country. If they are of historic and cultural interest, they are degraded and of scarce economic and income value (Del Giudice et al. 2017; Torrieri et al. 2014).

In this regard, there is the ongoing research on the Development Territorial System F3—Miglio d’Oro—Area Torrese Stabiese.

The opportunity to deepen some aspects regarding the *care* of private cultural property derives from the participation in the Campus Project “Urban Ecotourism for the sustainable use of cultural heritage in Campania” (in implementation of the Operational Program ERDF Campania 2007/2013), managed by the Regional Center of Competence Benecon (Cultural Heritage, Ecology, Economics) of which one of the partners is the University of Campania “Luigi Vanvitelli”.

The project in fact involves the Development Territorial System F3—Miglio d’Oro—Area Torrese Stabiese, with twelve municipalities which constitute a “landscape-cultural mosaic” of considerable interest, where are concentrated not only goods of “outstanding universal value” (the UNESCO sites in the archaeological areas of Pompei, Ercolano and Torre Annunziata), but also immovable goods of notable cultural interest, both public and private. The latter include historic houses (villas and mansions) with gardens annexed, some designed and realized by famous architects (Vanvitelli, Sanfelice, Fuga, Vaccaro etc.) and the expression of one of the most florid Neapolitan period (the Bourbon one).

Some of these historic houses are part of the Authority for Vesuvian villas (now a foundation) instituted by state law n.578/1971 that provides for conservation, restoration and valorization of them. In 1976, with the Ministerial Decree of Constrain, the work of the Authority was begun for the preservation of the 122 monumental buildings in the territory of the municipalities of Naples, S.Giorgio a Cremano, Portici, Ercolano and Torre del Greco. Only a restricted number of these historical buildings have been restored and valorized, or are under transformation, as Villa Favorita in Ercolano thanks to “Valore Paese- Dimore” program.

Many others are in serious conditions of physical and functional obsolescence or have been abandoned. To have a measure of their consistency, in the municipality of S. Giorgio a Cremano there are 18 villas, in Portici 22, between villas and mansions, in Ercolano 18 historical buildings and just as many in Torre del Greco.

Consulting the cadastral rents (Agenzia delle Entrate) of the private historical buildings in Ercolano, the first municipality analyzed up to now, it emerges how only a few are classified as A/8 (according to the cadastral category, residential villas) or as A/1 (elegant houses) with high rents, while in most cases frequently fractionated properties, are classified as A/4 (popular house) or A/5 (ultrapopular house).

This condition, common to many others private cultural properties in the territorial contest analyzed, is very different from the historical buildings belonging to the ADISU, mostly characterized by category A/9 (castles, palaces of outstanding artistic or historical merit). Certainly the fiscal incentives, such as the “tax concession” system (fiscalità di vantaggio) for the *care* of historic, artistic and cultural patrimony could represent an efficacious solution, but is not the only possible one.

4 Conclusions

If artistic, historic and cultural patrimony is a strategic factor of human development— or of cultural ecology, as in the Encyclical *Laudato si*—in accordance with Zamagni (2014), it is necessary to realize that the contemporary development, more than a consequence of the abundance of natural and physical resources and of the adoption of well-conceived incentive schemes, depends on the civil capital accumulated in the course of time by a country or community. It is not the incentives that determine the desired outcomes, but the way in which the agents perceive and react to the incentives

themselves. The ways of perception and reaction depend on the peculiarities of the civil capital stock available.

As in the Encyclical *Laudato si'*, social love and commitment to the common good—the key to authentic development—«...moves us to devise larger strategies to halt environmental degradation and to encourage a “culture of care” which permeates all of society» (§ 231).

From this perspective, further possible strategies to encourage a “culture of care” in the territorial areas analyzed, characterized by many abandoned historic buildings under threat are alternative models of management, such as *social innovation*, at the center of the European Strategy 2020. Social innovation emerges where there are areas of need and which do not find adequate answers in the public and private spheres.

Specifically in the field of the valorization of cultural heritage, social innovation, remaining yet unexplored (Consiglio and Riitano 2014), seems to offer interesting development perspectives, also with reference to urban strategies of regeneration (Torrieri and Batà 2017) Thus, the role of the social enterprises has become even more meaningful in the light of the Italian reform of the third sector (Law 106/2016) which, among several activities, for the first time, also includes interventions for the conservation and valorization of the cultural patrimony and landscape and the management of cultural, touristic and recreational activities of particular social interest. As Zamagni has well highlighted in his intervention at the SIEV Conference (2016), the theme of the evaluation of *social impact* in the field of the third sector is of great potential, representing a new challenge also for the appraisal and evaluation disciplines.

References

- Agenzia del Demanio (2014) Progetto Valore Paese Dimore, 2013–2020, Valorizzare i beni pubblici per rilanciare lo sviluppo, Dossier 2014, Roma
- Borrelli G, Citterio M (2016) Environmental sustainability: From theory to practice. The contribution of the *Laudato si'* encyclical. *Valori e Valutazioni* 17:9–12
- CHCfE (2015) Cultural heritage counts for Europe. CHCfE Consortium, p 10
- Consiglio dei Ministri, Decreto Legge Salva-Italia (2011) D.L. n. 201 del 6 dicembre 2011, convertito con modificazioni dalla Legge n. 214 del 22 dicembre 2011, Roma
- Consiglio S, Riitano A (2014) *Sud Innovation. Patrimonio Culturale, Innovazione Sociale e nuova Cittadinanza*. FrancoAngeli, Milano
- Council of Europe (2005) Framework convention on the value of cultural heritage for society (Faro Convention), CETS 199. <https://rm.coe.int/1680083746>
- Council of the European Union (2014) Conclusions on cultural heritage as a strategic resource for a sustainable Europe. Education, Youth, Culture and Sport Council Meeting, Brussels, 20 May 2014
- Del Giudice V, De Paola P, Forte F, Manganelli B (2014) Real estate appraisals with Bayesian approach and Markov chain hybrid Monte Carlo method: an application to a central urban area of Naples. *Sustainability* 2017, 9, 2138
- European Commission (2014) Towards an integrated approach to cultural heritage for Europe. COM, Brussels, 477 final, 22 July 2014

- Forte B (1993) Per un'ecologia umana. Le ragioni etiche della salvaguardia dei beni culturali, intervention at the conference organized by the Neapolitan School of Monument Restoration., In *Cooperazione oggi*, anno 13, n.7 luglio-agosto 1993, Promocopp, Napoli
- Forte B (2015) Introduzione. Laudato sì. Sulla cura della casa comune. Commenti all'Enciclica. Editrice La Scuola
- Forte C (1971) Piano economico del rinnovamento ambientale. In Pane R, Cinalli L, D'Angelo G, Di Stefano R, Forte C, Casiello S, Fiengo G, Santoro L (eds) *Il centro antico di Napoli*. ESI, Napoli
- Forte C (1972) Ecologia ed Economia Urbana. In Fabbri M (ed) *La città inquinata*. Edizioni Medicea, Firenze
- Forte C (1977) Valore di scambio e valore d'uso sociale dei beni culturali immobiliari. *Arte Tipografica*, Napoli
- Forte F, Listokin D (2016) Evaluating impacts of cultural heritage valorization—or historic preservation: a comparative overview Italy—USA. In: *Proceeding of XIV international forum, Le vie dei Mercanti*, La Scuola di Pitagora, Napoli
- Forte F, Fusco Girard L (2009) Creativity and new architectural assets: the complex value of beauty. *Int J Sustain Develop* 12(2/3/4):160–191. ISSN: 0960-1406
- Forte F, Formisano R (2015) “Additional services” in the management of cultural heritage: the paradox of archeological site of Pompei. In: *Proceeding of XIII international forum, Le vie dei Mercanti*, La Scuola di Pitagora, Napoli
- Forte F, Rupe M (2015) Sponsorship in the enhancement of cultural heritage and the role of creative industry: some evaluative aspects. In: *Proceeding of XIII international forum, Le vie dei Mercanti*, La Scuola di Pitagora, Napoli
- Fusco Girard L, Forte B, Cerreta M, De Toro P, Forte F (eds) (2003) *The human sustainable city. Challenges and perspectives from the habitat agenda*. Ashgate, England
- Holy Father Francis (2015) Encyclical letter *Laudato si* on care for our common home. , Vatican Press, Rome, 24 May 2015
- Holy Father John Paul II (1991) Encyclical letter *Centesimus Annus*. Vatican Press, Rome, 1 May 1991
- ICOMOS, Fondazione Carlo Forte (1982) Economic and financial aspects of the conservation of monuments and historic city centres. In *Restauro* n.65-66-67, ESI, Napoli
- ISTAT (2016) *Rapporto BES 2016. Il benessere equo e sostenibile in Italia*, Istat, Rome
- Listokin D (2012) *Landmarks preservation & the property tax: assessing landmark buildings for real taxation purposes*. Transaction Publisher, Piscataway
- Mattia S (1983) *Appunti sulla stima del valore sociale dei beni culturali immobiliari*. CO.S.A., Milano
- MiBACT (2017) *Cultura e Turismo tre anni di governo, 2014–2017*. MiBACT, Rome
- Ministero dei Beni e delle Attività Culturali e del Turismo- MiBACT (2014) *Art Bonus Decree, Decreto Legge 31 maggio 2014, n. 83, Disposizioni urgenti per la tutela del patrimonio culturale, lo sviluppo della cultura e il rilancio del turismo*. Roma
- Ministero delle Finanze (1991). *Legge n.413/1991, art. 11*, Roma
- Ministero per i Beni e le Attività Culturali (1993) *Legge Ronchey, 14 gennaio 1993 n.4*, Roma
- Ministero per i Beni e le Attività Culturali (2004) *Code of the Cultural and Landscape Heritage, Legislative Decree n.42 of 22 January 2004*, Rome
- Monti L (2015) *Il patrimonio storico e artistico private nel contesto dell'economia della cultura: una concreta opportunità di sviluppo. Intervention at the XXXVIII Members' Assembly of A. D.S.I. meeting “Beni culturali: oneri o risorse? 13 may 2015*, Rome
- Napoli G, Gabrielli L, Barbaro S (2017) *The efficiency of the incentives for the public buildings energy retrofit. The case of the Italian Regions of the “Objective Convergence”*. *Valori e Valutazioni* 18:25–40
- Regional Center of Competence Benecon, *Progetto Campus Pompei*. <http://www.campuspompei.it/>
- Senato della Repubblica, Camera dei Deputati (1971) *Legge 29 luglio 1971, n. 578, Provvedimenti per le ville vesuviane del XVIII secolo*, Roma

- Senato della Repubblica, Camera dei Deputati (2016) Legge 6 giugno 2016, n. 106, Delega al Governo per la riforma del Terzo settore, dell'impresa sociale e per la disciplina del servizio civile universale, Roma
- Torrieri F, Del Giudice V, De Paola P (2014) Property value, urban quality and maintenance condition: a hedonic analysis in the city of Naples, Italy. *Adv Eng Forum* 11:560–565
- Torrieri F, Batà A (2017) Spatial multi-criteria decision support system and strategic impact assessment: a case study. *Special Issue on Real Estate Economics, Management and Investment, Buildings*
- Zamagni S (2014) Capitale culturale e progresso civile. La sfida del valore aggiunto culturale. In *Paradoxa*, anno VIII, numero 4, ottobre-dicembre 2014. Nova Spes International Foundation, Roma
- Zamagni S (2016) Intervention at SIEV—Valori e Valutazioni—Conference: L'influenza sui percorsi valutativi dell'Enciclica “Laudato si”, Roma 14–15 aprile 2016



Cecilia Scoppetta

Abstract By highlighting the (hidden) relationships between ecology and economics, a case-study is utilized in order to both underline the ambiguities of translating the concept of “resilience” in planning theory and practice and to suggest a rethinking of the current “green rhetoric” in favor of a more inclusive approach aimed at social justice.

Keywords Resilience · Boundary objects · New Orleans · Planning theory
Complexity theory

1 Framing Ecology Within the Complexity Turn

The aim of the paper is to critically investigate the simultaneous re-articulation of both ecology and economics within the frame of complexity sciences (see, e.g., Morin 1977; Prigogine and Stengers 1979) by underlining the implications of such a shift that has marked a radical departure from the classical equilibrium-based models. In fact, by replacing the idea of a transcendent ordering of nature by a divine Creator with a model of immanent self-ordering through competition, ecology—which emerged as an autonomous field of study at the threshold of the late 18th and early 19th century—resulted in the legitimization the economic notion of the “invisible hand” as a mechanism responsible for the immanent self-ordering of the market, so that the success of classical economic liberalism was based on its ability to articulate market mechanisms as “natural” (see, e.g., Walras 1954). Within such a “natural” frame, Keynesian approaches became tools for restoring the equilibrium. But during the 1970s, the Club of Rome’s report on the limits of growth (Meadows et al. 1972) clearly highlighted a divergence between ecology and economics, so that equilibrium-based models seemed to be no longer suitable (Odum 1971).

C. Scoppetta (✉)
Sapienza University of Rome, Rome, Italy
e-mail: ceci62@libero.it

The rethinking of ecosystems as open (Holling 1986, 1996) rather than closed systems (as previously defined by Tansley 1935) paved the way for the transition from an industrial economy organized on the consumption of finite natural resources to a post-industrial knowledge economy, grounded on the bottomless resources of the creativity of the human mind. In adopting the discursive framework of complexity sciences, both political economy and ecology assumed an understanding of nature as composed of multiple, emergent equilibria which exceeded science's capacity (Hayek 1952, 1989, 1994).

Within such a renewed frame, crises no longer were considered as something to be protected from, but rather as opportunities for growth. Crises were re-conceptualized as *necessary* for fruitful development and for the exercise of those faculties associated with resilience (Holling 1996), and “old” Keynesian approaches ceased being seen as having a debilitating effect (Hayek 1989[1974]) upon the processes of the economy itself. In this sense, climatic extremes—as well as the global financial crisis, energy exhaustion, pandemics and terrorism—contribute to construct a sort of apocalyptic frame that fits well the assumption of the «inevitability of capitalism and market economy as the basic organisational structure of the social and economic order, for which there is no alternative» (Swidgedouw 2010). Within such a (constructed) catastrophic scenario—and despite the dramatic evidence of climate change—economic growth no longer remains absolutely prominent in the political agenda, while ecological and social aspects are neglected or, at least, incorporated into the first one as “ecological modernization”. Profit, planet and people are seen not only as reciprocally interrelated, but also as mutually (but asymmetrically) reinforcing, with the third one as the weakest (Boström 2012; Connelly 2007).

The contradictions of the current «model of production and consumption» (with the related «structures of power») were at the heart of Pope Wojtyła's call for a «global ecological conversion», as well as Pope Benedict XVI's highlighting of how «the structural causes of the dysfunctions of the world economy» are strictly connected to the deterioration of nature. Pope Francis goes yet further in a manner that is radically political. Radical, because his «guide and inspiration» is Saint Francis's understanding of «how inseparable the bond is between concern for nature, justice for the poor, commitment to society, and interior peace», which implies an urgent need for a radical change. It is political, because of Bergoglio's post-colonial perspective, his view from the Global South of the «differential responsibilities» regarding climate change, in order to give voice to «the excluded» —«the majority of the planet's population, billions of people»—in claiming their rights.

2 Lessons from Katrina (New Orleans, August/September 2005)

The post-hurricane Katrina, uneven, “green” urban regeneration (see: Scoppetta 2013) constitutes an enlightening example. First, the disastrous event was not so much “natural” but rather man-made: the hurricane, in fact, was severe but not

catastrophic. The real catastrophe was due to the incomplete protective works that caused the collapse of major canal floodwalls, allowing water to submerge about 80% of the city. The situation had been made worse by further human decisions: extraction of groundwater, oil and natural gas, canal development, loss of barrier wetlands and global warming.

Furthermore, Katrina offered a useful unexpected opportunity for “cleaning” a predominantly poor, black, democratic city in the “deep South” of the US. Congressman R. Baker explicitly exulted: «we finally cleaned up public housing in New Orleans [...]. We couldn’t do it, but God did» (Hirsch and Levert 2009). J. Reiss, one of the mayor’s closest advisers said «those who want to see this city rebuilt want to see it done in a completely different way: demographically, geographically and politically. [...] I’m not speaking for myself here. The way we’ve been living is not going to happen again or we’re out» (Powell 2007). According to Secretary A. Jackson of the Department of Housing and Urban Development (HUD), New Orleans would become «smaller and whiter for the foreseeable future» (Graham 2009; for more, of a general nature on arguments of this kind, see: Smith 1996).

According to many scholars (e.g., Arena 2007, 2011), post-Katrina reconstruction is to be framed within the neo-liberal shift concerning public housing that occurred at the end of the 1990s in the US. Currently, just over one million units of public housing are home to 2.03 million people (Right to the City Alliance 2010), who are some of the poorest and most vulnerable in the US, with the elderly, disabled, children, single mothers, black and Latinos overrepresented, with only 49% of non-elderly, non-disabled households deriving their primary income from wages.

This is why public housing had become the predominant symbol of the federal government’s failure to address the persistent problem of urban poverty in the USA, as well as one of the few policy arenas still remaining outside the uncertainty of the market, so that at the end of the 1990s a federal program (HOPE) was developed (see: Reichl 1999; Popkin et al. 2009) in order to solve the problem within the renewed framework. HOPE followed the de-concentration thesis, based on the idea that physical and social isolation of poor urban communities not only leads to a “culture of poverty”, caused by high rates of crime, violence, drug use and unemployment, but also limits the inhabitants’ exposure to both economic opportunities and role models and the values of the middle-class (Goetz 2003). The program consisted of the demolition of public housing and its replacement with re-built mixed-income properties as a strategy for combating poverty by incorporating the poor into the market, as well as a tool for urban development.

Supported by federal subsidies and in partnership with housing authorities and private developers, through the 2000s about 100,000 “severely distressed” units were demolished and replaced with about 60,000 new units at a range of rental prices. It is estimated, however, that 60–70% of tenants never returned to the former sites, and a portion of residents disappeared from the housing authority’s rolls entirely (Popkin et al. 2009).

Further criticisms concern land grabs, gentrification, privatization (Imbroscio 2004; Lipman 2009), de-regulation and the weakening of the state and social safety net as a device to enter into the globalized economy at the expense of the poor (Jessop 2002; Peck 2006). Furthermore, even if mixed-income policies are technically race-neutral, they have explicit implications for poor, urban, non-white communities (Joseph et al. 2007).

Even in New Orleans, prior to the storm, the St. Thomas redevelopment into the physically attractive New Urbanist River Garden (with less than 20% of former tenants returning—see, Graham 2009) had been the flagship of de-concentration and mixed-income communities. At the same time, the city had reached the highest vacancy rate of any major US city, with almost 20% of houses empty in the decade prior to the storm. After hurricane Katrina, instead, New Orleans was transformed from a weak to a strong housing market. Indeed, the centrepiece of the Bush administration's Gulf Coast recovery strategy was the creation of a Gulf Opportunity Zone providing \$8 billion in tax breaks to stimulate business investment or expansion and affordable housing redevelopment in the devastated area, which even included zones with *modest* hurricane damage.

Prior to Katrina, HUD hosted about 5100 families in public housing and 9,000 using vouchers (10% of the city's population) (Kamel 2012). Because the state devoted the vast majority of its redevelopment funds to helping (mainly white) homeowners rebuild their properties (despite disproportionate damage to the city's non-public housing), allocating only about \$1 billion to rental properties, displaced tenants were significantly underrepresented in the city's recovery plans.

In fact, although thousands of evacuated residents' home were likely uninhabitable, housing destruction became an urgent problem that led to tenants' permanent dislocation from the city. Without their voice, the city's recovery process was ultimately dominated by elites, i.e., white residents whose houses were comparatively unscathed or who possessed resources to rebuild. On the contrary, the city's «unique character and [...] the intractable issues of race and class seemed to call for deep knowledge of local people, organisations, and practices» (Rubin 2009).

The (whiter and wealthier) city today has about 335,000 fewer people (only 22% black people) than prior to the storm (67%). The City Council, with a white majority for the first time in two decades, has approved the demolition of public housing. At the same time, «half of the working poor, elderly and disabled who lived in New Orleans before hurricane Katrina have not returned. Because of critical shortages in low-cost housing, few now expect tens of thousands of poor and working people to ever be able to return home» (Browne-Dianis and Sinha 2008). In sum, competitive economic growth has been valued over equity, by directly benefiting those who were already the most advantaged.

3 Resilience as a Useful “Boundary Object”

Post-Katrina reconstruction offers very useful insights into the risks—highlighted by Davoudi (2012)—of the transformation from natural and physical to social sciences on the basis of the assumption that social systems operate in similar ways to those in the natural or physical world. Such a “migratory process” of scientific concepts tends to produce «boundary objects» (Star and Griesemer 1989; Brand and Jax 2007), i.e., “objects” (such as texts, ideas, projects and so on) provided with various and only partially overlapping meanings, so that they can be interpreted differently by the actors involved, by allowing a mutual understanding or, if one wishes, productive misunderstanding that, however, can usefully favor connections between different cultural perspective and interests.

Resilience constitutes an effective example in this sense. A large literature exists on the different meanings of the term (see, e.g., Alexander 2013; Carpenter et al. 2001) which has been increasingly adopted by academic scholars, policy makers and practitioners on a variety of scales and in a variety of ways: as a descriptive or normative term, as a (sometimes ethical) paradigm or as a theory (Strunz 2011), as a desired outcome or as a process leading to a desired outcome (Kaplan 1999). Furthermore, many studies specifically focus on the urban dimension of resilience, in order to individuate a definition that can better fit the needs of assessment and management (see, among many: Meerow et al. 2016; Desouza and Flanery 2013; Ahern 2011).

Even in the natural and physical sciences, however, very different meanings co-exist. From an engineering perspective, resilience is the abi-lity of a system to return to its *preceding equilibrium state* after a disturbance. On the contrary, the ecological concept of resilience rejects the idea that systems can and should return to their pre-crisis state, rather, that they rather seek to adapt and evolve in the aftermath of that crisis by changing their own structure and configuration, so that resilience means establishing *a new equilibrium*. Evolutionary resilience goes forward by assuming that the drivers of change are not only external, but they can also be internally produced and involve gradual processes of change rather than sudden and unexpected shocks (see: Holling 1973, 1996). Which meaning of resilience do planners refer to when they use the term in planning theory and practices? Explicitly clarifying the approach becomes a relevant matter not only in terms of intellectual honesty, but also (and especially) in the case of planners aimed at sharing their “expert knowledge” with local communities in order to empower them by also considering bottom-up initiatives, (also historical) practices and communities as relevant knowledge sources.

In His Encyclical Letter “Laudato si”, Pope Francis interestingly highlights that, even if the excluded «are mentioned [...] one often has the impression that their problems are brought up as an after-thought, a question which gets added almost out of duty or in a tangential way, if not treated merely as collateral damage. Indeed, when all is said and done, they frequently remain at the bottom of the pile» (§ 49). The seasons are to be sought in what Pope Francis describe as

«“green” rhetoric», due to «the fact that many professionals [...] are far removed from the poor, with little direct contact with their problems».

Especially if resilience is intended within the framework of complexity theory, not considering the constructive role of all the synergies and feedback (which are at the heart of the theory itself) would lead to the suspicion that resilience necessarily implies winners and losers, the latter having to “adapt” while the former having not. As a matter of the fact, already-marginalized households are generally likely to be among the losers (Berkhaut 2008). As a consequence, assessments of resilience in social-ecological systems should not only consider the most general system level, but also take into account possible trade-offs and asymmetries in resilience between various groups and individuals within the same system, especially when—as in the case of New Orleans—the framing of system boundaries is a matter of conflict. In this sense, Swyngedouw (2010) interestingly focuses on the depoliticizing character of concepts such as “sustainability”, “resilience” and “adaptation”, whose appeal consists of defending a socioeconomic status quo, i.e., they are nothing but the result of the capital mode of production, which precisely is the underlying cause of the ecological crisis itself (see, e.g., Harvey 1996; Hartman and Squires 2006). And focusing on causes rather than effects is exactly what Pope Francis explicitly proposes when he claims: «I will then attempt to get to the roots of the present situation, so as to consider not only its symptoms but also its deepest causes» . Consequently, in cases of urban regeneration of poor neighborhoods, «a number of questions need to be asked in order to discern whether or not it will contribute to genuine integral development. What will it accomplish? Why? Where? When? How? For whom? What are the risks? What are the costs? Who will pay those costs and how?».

4 Rethinking Resilience

As the post-Katrina unjust reconstruction clearly shows, the use of resilience as a wide “umbrella term” risks appearing as a way to hide conflicts and power relations, by creating further tensions not only among those involved in implementing resilience, but especially among those who find themselves *forced* to become resilient. Many authors point out that other concepts with a stronger social focus should be connected with the notion of resilience in order to remove the suspect of resilience as a technical apolitical framework, in which the transformative dimension in terms of social justice ends up being ignored or forgotten. For instance, a concept that should be combined with resilience could be “vulnerability”, i.e., «the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt» (Adger 2006). A further concept could consist of “agency”, a term used to characterize individuals

as «autonomous purposive and creative actors, capable of a degree of *choice*» (Lister 2004). In this way, resilience could also be able to capture under its “umbrella” the freedom people have to negotiate their own lives (including their own resilience) (see, Mackinnon and Derickson 2012).

More generally, biological evolution implies that microscopic components, characterized by both simple structure and strong and relatively rigid ties, constitute—through their *interaction*—the constructive elements of more complex systems with weaker and more flexible ties, which enable adaptation to unpredictable environmental changes. In other words, a resilient system is formed by the dynamic interplay between deterministic forces and random events, structural factors and human agency, linear paths and contingency. The focus is on self-organization whose most relevant aspect is the sense of self-creation (Atlan 1983), so that a system can be conceived as a «not banal machine» (von Foerster 1981), which—in contrast to a “banal” one—does not work with a predictable input/output logic by simply responding to the specific need for which it was constructed. This is because a “not banal” machine is characterized by its own internal status that can generate multiple outputs. A further feature of the self-organization of living organisms obviously is complexity: biological systems, in fact, are at the same time something more and something less than the simple sum of their parts. This makes possible the emergence of features deriving from accidental consequences and secondary products of interaction, and these, in turn, through a feedback mechanism, stimulate each single part of the system towards the expression of their specific *potentialities*. What is interesting here is that the complexity sciences are marked by a crisis of traditional “boundaries”: between concepts such as “producer” and “product”, “cause” and “effect”, “one” and “many”, “organism” and “environment” and “science” and “not science”. This leads to the concept of «recursive organisation» (Morin 1977), in which effects and products are considered necessary for the production itself.

Translating the biological metaphor within the planning sphere then means considering the territory as a collective *construct* because it cannot be ascribed to a single definitive and deterministic project as the various actors involved constantly interpret it, make decisions and act. This collective construct is a resilient network based on weak ties shaping a not always predictable spatiality. The by-products of such construct—the *learning process* given by the feedback mechanism—are more relevant than the product itself, because they may enable further developments. As a “not banal” machine, the construct of such a «“synaptic” space» (Scoppetta 2012) is given by its own internal status—it depends on history—but it is able to produce *multiple* outputs and various development trajectories.

This means that, following Pope Francis, translating resilience in planning theory and practice requires an inclusive *collective* effort, as well as the abandonment of «an undifferentiated and one-dimensional paradigm».

References

- Adger NW (2006) Vulnerability. *Global Environ Change Hum Policy Dimens* 16:268–281
- Ahem J (2011) From fail-safe to safe-to-fail: Sustainability and resilience in the new urban world. *Landscape Urban Plan* 100:341–343
- Alexander D (2013) Resilience and disaster risk reduction: an etymological journey. *Nat Haz Earth Syst Sci Discuss* 1:1257–1284
- Arena J (2007) Whose city is it?: Public housing, public sociology, and the struggle for social justice in New Orleans before and after Katrina. In: Richelle S, Kristen Bates K (eds) *Through the eye of Katrina: social justice in the United States*. Carolina Academic Press, Durham
- Arena J (2011) A right to the city?: Race, class, and neoliberalism in Post-Katrina New Orleans. In: Levon C, Grantham R (eds) *Urban Society: the shame of governance*. Sloan Publishing, Cornwall-on-the-Hudson
- Atlan H (1983) L'emergence du nouveau et du sens. In: Dumouchel P, Dupuy JP (eds) *L'Auto-organisation. De la physique au politique*. Colloque de Cerisy, Seuil, Paris
- Berkhaut F (2008) Order in socio-technical systems: the dark side of resilience. In: Leach M (ed) *Re-framing resilience: a symposium report*. STEPS Working Paper 13, IDS, Brighton
- Boström M (2012) A missing pillar? Challenges in theorizing and practicing social sustainability, introduction to the special issue. *Sustain Sci Practice Policy* 8:3–14
- Brand FS, Jax K (2007) Focusing the meaning(s) of resilience: resilience as a descriptive concept and a boundary object. *Ecol Soc* 12(1):23–37
- Browne-Dianis J, Sinha A (2008) Exiling the poor: the clash of redevelopment and fair housing in post-Katrina New Orleans. *Howard Law J* 51:481–508
- Carpenter S, Walker B, Anderies JM, Abel N (2001) From metaphor to measurement: resilience of what to what? *Ecosystems* 4(8):765–781
- Connelly S (2007) Mapping sustainable development as a contested concept. *Local Environ* 12:259–278
- Davoudi S (2012) Resilience: a bridging concept or a dead end? *Plann Theory Practice* 13(2): 299–307
- Desouza KC, Flanery TH (2013) Designing, planning, and managing resilient cities: a conceptual framework. *Cities* 25:89–99
- Goetz EG (2003) *Clearing the way: deconcentrating the poor in Urban America*. The Urban Institute Press, Washington, DC
- Graham L (2009) *Amnesty International USA's Rebuilding the Gulf Coast: Final Evaluation Report*. The Mertz Gilmore Foundation
- Hartman C, Squires GD (eds) (2006). *There is no such thing as a natural disaster. Race, class, and Hurricane Katrina*. Routledge, New York
- Harvey D (1996) *Justice, nature and the geography of difference*. Blackwell, Oxford
- Hayek FA (1952) *The Counter-Revolution of Science: Studies on the Abuse of Reason*. The Free Press, Glencoe
- Hayek FA (1989[1974]) The pretense of knowledge. *Am Econ Rev* 79:3–7
- Hayek FA (1994[1964]) The theory of complex phenomena. In: Martin M, McIntyre LC (eds) *Readings in the philosophy of social science*. MIT Press, Cambridge
- Hirsch AR, Levert AL (2009) The Katrina conspiracies: the problem of trust in rebuilding an American City. *J Urban Hist* 35:207–219
- Holling CS (1973) Resilience and stability of ecological systems. International Institute for Applied Systems Analysis, Laxenburg
- Holling CS (1986) Resilience of ecosystems; local surprise and global change. In: Clark WC, Munn RE (eds) *Sustainable development of the biosphere*. Cambridge University Press, Cambridge
- Holling CS (1996) Engineering resilience versus ecological resilience. In: Schulze P (ed) *Engineering within ecological constraints*. National Academy Press, Washington, DC
- Imbroscio DL (2004) Can We grant a right to place? *Politics & Soc* 32:575–609

- Jessop B (2002) Liberalism, neoliberalism, and urban governance: a state-theoretical perspective. *Antipode*:34(3):452–472
- Joseph ML, Chaskin RJ, Webber HS (2007) The theoretical basis for addressing poverty through mixed-income development. *Urban Affairs Rev* 42:369–409
- Kamel N (2012) Social marginalization, federal assistance and repopulation patterns in the New Orleans Metropolitan Area following hurricane Katrina. *Urban Stud* 49(14):3211–3231
- Kaplan HB (1999) Towards an understanding of resilience: a critical review of definitions and models. In: Glantz MD, Johnson JL (eds) *Resilience and development*. Kluwer Academic, New York, pp 17–83
- Lipman P (2009) The cultural politics of mixed-income schools and housing: a racialized discourse of displacement, exclusion, and control. *Anthropol Educ Q* 40(3):215–236
- Lister R (2004) *Poverty*. Polity Press, Cambridge
- Mackinnon D, Derickson KD (2012) From resilience to resourcefulness: a critique of resilience policy and activism. *Prog Hum Geogr* 37(2):253–270
- Meadows DH, Meadows DL, Randers J, Behrens WW (1972) *The limits to growth: A report for the club of Rome's project on the predicament of mankind*. Pan Books, London
- Meerow S, Newell JP, Stults M (2016) Defining urban resilience: a review. *Landscape Urban Plann* 147:38–49
- Morin E (1977) *La Méthode, vol I: La nature de la nature*. Seuil, Paris
- Odum H (1971) *Environment, power and society*. Wiley Interscience, New York
- Peck J (2006) Liberating the city: between New York and New Orleans. *Urban Geogr* 27(8): 681–713
- Popkin SJ, Levy DK, Buron LF (2009) Has HOPE VI transformed residents' lives? Newe from the Hope Vi panel study. *Housing Stud* 24(4):477–502
- Powell LN (2007) What does american history tell us about Katrina and vice versa? *J Am Hist* 94(3):863–877
- Prigogine I, Stengers I (1979) *La nouvelle alliance*. Gallimard, Paris
- Reichl A (1999) Learning from St. Thomas: community, Capital, and the redevelopment of public housing in New Orleans. *J Urban Affairs* 21(2):169–187
- Right to the City Alliance (2010) We call these projects home: solving the housing crisis from the ground up. A right to the city alliance report on public housing. http://www.urbanjustice.org/pdf/publications/We_Call_These_Projects_Home.pdf
- Rubin V (2009) Response to 'post-disaster planning in New Orleans': necessary conditions for community partnerships. *J Plann Educ Res* 28:401–402
- Scoppetta C (2012) Synaptic spaces of Europe: a challenge for spatial planning. In: *Aesop 2012 E-book of abstracts*. Tolga KOC, Ankara
- Scoppetta C (2013) Port-cities on the storm. *Discuss Post-disaster Plann*, Portus Plus, p 6
- Smith N (1996) *The New Urban frontier. Gentrification and the Revanchist City*, Routledge, London
- Star SL, Griesemer J (1989) Institutional ecology, 'translations' and boundary objects: amateurs and professionals in Berkeley's Museum of vertebrate zoology. 1907–39. *Soc Stud Sci* 19:387–420
- Strunz S (2011) Is conceptual vagueness an asset? Resilience research from the perspective of philosophy of science. Working paper series in Economics, University of Luneburg, 205. Available at: www.leuphana.de/institute/ivwl/publikationen/workingpapers.html. Accessed 23 Feb 2016
- Swyngedouw E (2010) Apocalypse forever? post-political populism and the spectre of climate change. *Theory Culture Soc* 27:213–232
- Tansley AG (1935) The use and the abuse of vegetational concepts and terms. *Ecology* 16:284–307
- von Foerster H (1981) *Observing systems*. Intersystem Publications, Seaside
- Walras L (1954) *Elements of pure economics*. Richard D. Irwin, Homewood

A Green District to Save the Planet



Domenico Enrico Massimo, Mariangela Musolino, Cinzia Fragomeni
and Alessandro Malerba

Abstract The Earth (Mother and Sister, according to Encyclical Letter) cries out to us because of the harm we have inflicted on her by our irresponsible use and abuse of the Earth's goods (Laudato si', 2) and calls all people to global ecological conversion in key sectors, such as excessive energy consumption in urban areas and buildings and the consequent additional pollution. This research is devoted to answer the encyclical's call by conceiving, designing and experimenting experiences of related to the Green City and Green Building. It deals with energy consumption in urban and construction management and CO₂ emissions. Through the establishment of a specific methodology and experimentation on unprecedented city and district scales, the study compares energy consumption and CO₂ reduction of different scenarios of interventions based on the main pillars of Green Conservation and Ecological Retrofitting. A Valuation Framework, enabled by Web-GIS tools, supports the present research, to integrate: unprecedentedly detailed 3D city-modelling; alternative scenarios (Sustainable vs. Business-as-Usual BAS) for whole-city energy management; cost estimates for investments in alternative urban scenarios; valuation of energy management in an alternative scenarios; overtime economic and financial analysis, comparing various scenarios.

- case study: a real-world design and social experimentations have been activated in Reggio Calabria (Italy) and Boston (USA). Two case studies constitute two case studies. The first one is going to be implemented in the real world as an experiment entitled <Sustainable Urban District Retrofitting> in an urban neighborhood whose features include: 6,400 residents; 490,000 m² of total area; 125 urban blocks; 840 buildings; 2,500,000 m³ of constructions; 800,000 m² of apartments; around 6,600 apartment units.

The key outcome of real-world experimentation is the “ecological passivation” (i.e., insulation works and material for non-consumption of energy).

D. E. Massimo (✉) · M. Musolino · C. Fragomeni · A. Malerba
Geomatic Valuation University Laboratory (GeVaUL), Patrimony Architecture
Urbanism (PAU) Department, Mediterranean University of Reggio Calabria,
25 via Melissari, 89124 Reggio Calabria, Italy
e-mail: demassimo@gmail.com; gevaul2@gmail.com

A global appraisal of experimentation provides valuation of the economic and ecological aspects quantifying the initial slightly higher costs of passivation and assessing the number of years needed to pay-back the additional cost of investment by the offset of a large saving in ongoing energy spending. It has been demonstrated, both theoretically and practically, that it is possible to reduce energy consumption up to 50%. Attributions: Massimo D. E. par. 2, 7. Musolino M. par. 5, 6. Malerba A. par. 1, 3.

Keywords Valuation · Appraisal · Sustainability · Urban regeneration
Ecological retrofitting · Scenarios

1 Introduction

The Earth (Mother and Sister, according to the Encyclical Letter) cries out to us because of the harm we have inflicted on her by our irresponsible use and abuse of the Earth's goods (Laudato si', 2) and calls all people to global ecological conversion in key sectors, such as excessive energy consumption in urban areas and buildings and the consequent additional pollution. This research is devoted to answer the encyclical call by conceiving, designing and experimenting on experiences of the Green City and Green Building. States and international organizations are aware of Earth's environmental emergency, as well as of urban ecological and energy crises. One causal factor among several is the disinvestment in existing old settlements and the migration of a high percentage of rural population to metropolis. A dramatic consequence is the wild urbanization of all available rural agricultural land surrounding original built areas in large cities and the increase of urban congestion which causes, among others effects, artificial mobility, private cars over-use, energy over-consumption, and excessive air pollution (Figs. 1 and 2).

Communities and territories are addressed by leading organizations to treasure and reuse consolidated old settlements, not to abandon them, and therefore to save the open and arable land surrounding cities and metropolises, by means of: revitalization of the economy of historic towns and old villages; and physical rehabilitation following their economic revamping. For denser settlements, already existing "Green Urban Conservation" actions are introduced and addressed, such as: restoration and retrofitting interventions, characterized by both bio-ecological and cultural sustainability, spanning the broad heritage; energy rehabilitation of buildings for dramatic reduction of consumption; adoption of renewable-energy sources; diffusion of zero-mile, decentralized energy production (with no transport) aiming to make local communities energy independent and, as much as possible, self-sufficient. Analysts and policymakers, worldwide, have a growing strong interest in the energy and environmental performance of the construction industry, and the improvement of the energy performance of both new built and existing building stock is a physical and economic challenge for the future of urbanization (Bottero et al. 2016a, 2017; Lombardi 2016, 2017a, b; Torabi et al. 2016a, b; Ma et al. 2012).

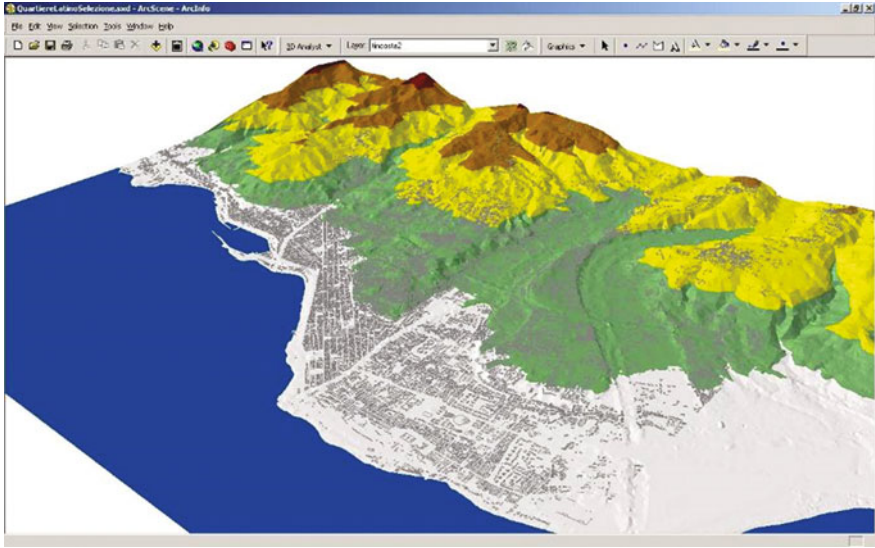


Fig. 1 Reggio Calabria city, Italy. Geometrical, metabolism and thermal modeling of urban spaces. Urban scale 3D-GIS terrain model

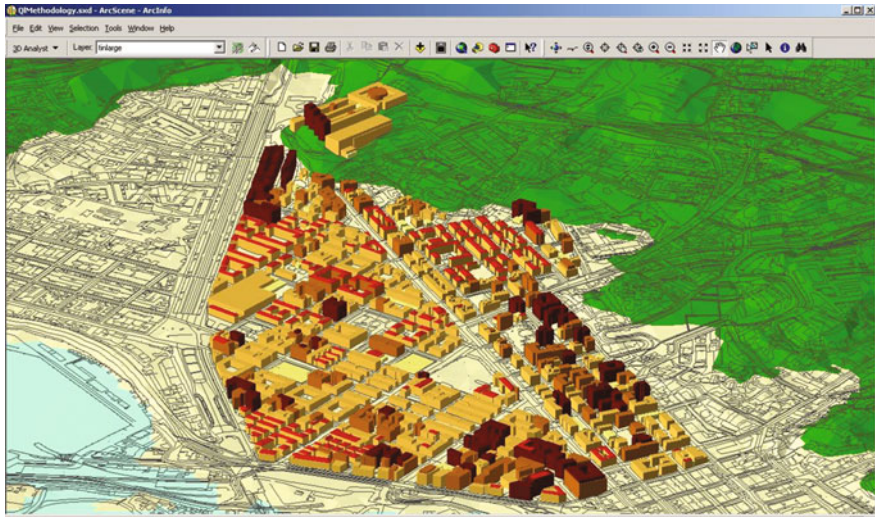


Fig. 2 Reggio Calabria. Latin Quarter. Geometrical, metabolism and thermal modeling of urban spaces. Urban scale 3D-GIS terrain model

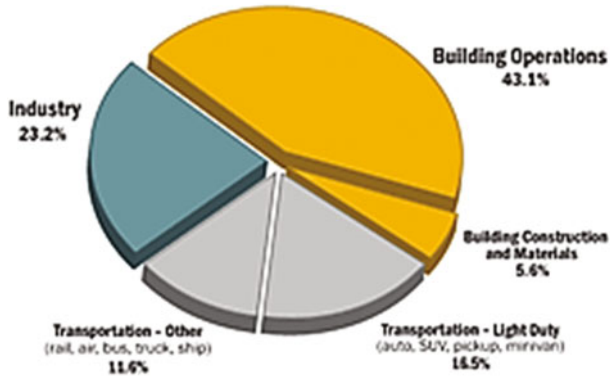


Fig. 3 US energy consumption by sector. *Source* ©2011–2030 Inc./Architecture 2030. *Data Source* US Energy Information Administration (2011)

The ecological collapse hanging over the Earth has stimulated research into the causes of the increasing and widespread environmental decay and to create shared strategies to overcome the criticalities that have exploded in recent years. The construction sector and, specifically, the energy operating management of existing buildings, according to international assessments, is responsible for over 40% of the total energy consumed on the Earth (Kats 2010). They are among others the major causes of: waste of resources; demand for fossil fuels and resources; CO₂ emissions; and our planet's pollution (Fig. 3).

Pollutant emissions, the result of combustion and one of the final outputs of the settlement process, are among the major causes of the Global Warming (GW) of the planet, according to the Intergovernmental Panel on Climate Change (IPCC) (2013, 2014). Sustainable cities are those cities that are more attentive to citizens' needs and in which energy and environmental issues and socioeconomic interests are integrated in a harmonious way (co-evolution) and that are forward-looking about the role of the private sector and focused on economic growth of the local market (Caragliu et al. 2011). However, while the tools to evaluate the energy–environmental efficiency of buildings have increased, also due to the issue of European standards on energy consumption reduction, the evaluation of sustainability performed through analytical models has been less investigated (Massimo and Musolino 2013). Researchers seek to overcome the lack of a shared and common methodology that allows an objective assessment of sustainability at the urban level and impacts of ecological investment in pollution mitigation (Massimo et al. 2008, 2009a, b, c, 2010, 2011, 2012, 2017a, 2017b, 2017c; Massimo and Musolino 2013); Spampinato and Massimo 2017).

2 Methodology

Researchers aims to devise, at urban scale, a general methodology and appraisal framework to quantify energy saving and the financial pay-back period of green differential investments. A case-study approach is adopted in this research in order to verify methodology effectiveness and its replicability in various contexts.

Research deals with the principle of New Sustainable Urbanism, specifically addressing and confronting the emergency of the growing overconsumption of energy in human settlements, particularly in urban areas. The study investigates the possible global solution to the inefficient thermal behavior of modern buildings, as well as to the excessive latter energy consumption, and consequent CO₂ emissions, one of the principal causes of Global Warming. It has established a connection between urban-regeneration and urban-rehabilitation strategies and building-energy efficiency by integrating several elements of data and valuation within a GIS framework: 3D-city modelling; design of actions for a Green City; cost estimates of actions for Green City investments; valuation of supplying the total annual energy demand; comparison with the status quo, as well as further unsustainable scenarios; appraisal of operating costs in alternative scenarios; comparative ecological-impact analysis of alternative scenarios; and comparative long-term economic analysis of alternative scenarios.

Research is divided into steps ranging from the climatic-energy behavior enhancement of single buildings to generalization of the interventions at urban and city scales. The impacts of Green Building global actions at urban level should be:

1. **insulation** (extended on the urban level) for structural and forever energy saving, i.e., thermal “passivation” of existing buildings and hydro, humidity and moisture regulation (perspiration) of structures;
2. consequent sizeable **reduction** of energy consumption in the urban level for both winter heating and (more important) highly inefficient summer air-conditioning in the existing buildings; integrated with:
3. **energy production** (decentralized at the zero mile) by means of solar photovoltaic and thermal panels on the urban block level integrated into buildings’ pitched and flat roofs;
4. **reduction** of CO₂ emissions on the urban level as a consequence of the lower and lower quantities of fossil material combusted;
5. **curb** of total running cost in the building life-cycle defined as the “thermal positive premium” to be assessed over time in: environmental terms (by summing-up all the avoided pollutants); energy terms (by summing-up the avoided kWh or megawatts, i.e., not employed); monetary terms by summing-up all savings; financial terms, actualizing future money, using appropriate rates (Fig. 4).

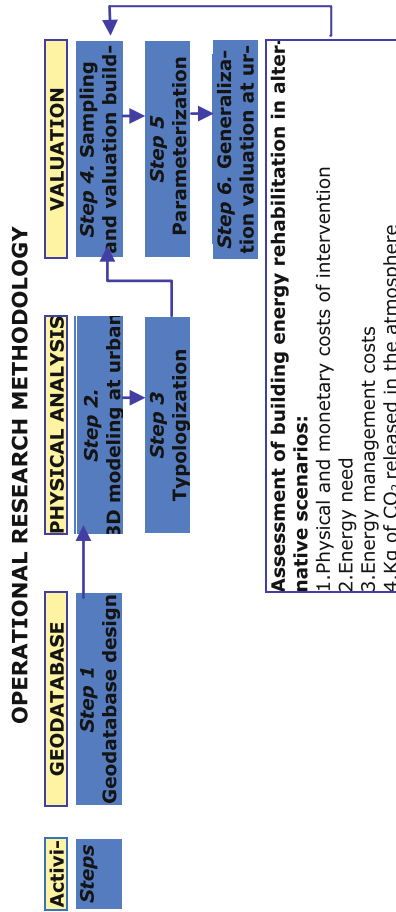


Fig. 4 Logic chart. Methodology for sustainable retrofit generalization at district and urban level

A systematic has been set-up for valuation of Green Urban Conservation Strategy, tested in the case study and articulated by some major activities such as: “GeoDataBase” activity, i.e., application of GeoDataBase to reality, and design of a Geographic Information System dedicated to gather urban information; “Physical Analysis” activity, i.e., geometrical modeling at city scale and urban 3D information system: 3D; typologization; “Valuation” activity, i.e., behavior and metabolism modelling and integrating energy-ecological-economic-financial analysis: sampling; parameterization; generalization.

Each activity produces outputs whose intersection enables achievement of one of the research goals, i.e. to calculate the energy saving, the “passivation” or rehabilitation costs and the energy-management costs on the single-prototype building level. After that, it is possible to generalize the results on the uncommon and unprecedented valuation level of neighborhoods and entire urban areas. Urban strategy aims to redirect the unavoidable ordinary maintenance works toward building passivation with specific interventions involving external plaster and roof renovation with natural ventilation and insulation. All this is designed in an original way that allows the works to be done on only the exterior, making it unnecessary for residents to leave their houses. Therefore, this summarized implementation process of strategy-integrated valuation is articulated in the steps of the following operational methodology sketched out in the flow chart.

3 Case Study on the District Level

To test the methodology, researchers developed a case study, designing “passivation” of a whole neighborhood aimed to implementation in the real world a Green District located in Calabria, a Mediterranean region of southern Italy.

The case study is located in the town of Reggio Calabria, rebuilt at the beginning of 1900 as an notable Liberty—*Art Nouveau* settlement. Reggio Calabria boasts a high quality of an Urban City with an exemplary system of a road grid, urban-block patterns, squares, public buildings, private constructions and an extraordinary waterfront.

Nowadays, this urban settlement is referred to as a successful example by leaders of the International Movement: Congress of New Urbanism (CNU).

Alternative Scenarios of Intervention: Sustainable versus Business-as-Usual

The study identified the possibility to act for urban conservation, energy consumption and CO₂-emissions reduction by proposing different alternative approaches on the same kind of decay (comparative-scenarios technique).

Sustainable Scenario

It is conservative and highly energy efficient. Its design adopts, on the building level, ecological techniques and materials to reduce heat dispersion to the outdoors, as well as to cut fossil-fuel consumption for heating and air-conditioning and consequently to lower related CO₂ emissions. In the case study, the sustainable materials for this scenario are the following.

1. **Plaster renovation** of external wall coating for insulation makes use of “volcalite”, i.e., mortar made of natural hydraulic lime (clinker-cement free) with special inert elements that are highly insulating, such as expanded perlite, vermiculite and pumice.
2. **Roof-insulation and waterproofing** renovation adopts membranes with natural perspiring qualities for aerating, ventilating and insulating groove panels made of natural materials such as fluted cork (©lis).
3. **Windows replacement:** single-glass windows are replaced with double ones with interstitial air space; aluminum windows are replaced by new ones made of highly insulating materials of a superior quality.

Business-as-Usual (BAU) Scenario

Its design employs popular materials commonly used in ordinary construction yards or building sites, i.e., *chantiers*, characterized by poor thermal behavior and mediocre (almost nonexistent) insulating characteristics that sometimes make energy dispersion progressively worse compared to the *status quo ante*.

These materials are, on the one hand, cheaper to buy and easier to install, but, on the other hand, they do not help either building efficiency or city-energy management because they do not have good thermal and insulating characteristics.

1. **Plaster renovation** in BAU scenario, is made using mortar comprising only sand and cement, with a high level of transmittance, applied to vertical surfaces;
2. **Roof insulation** uses epoxy resin as a membrane without either insulating or perspiration characteristics, to substitute for the existing, old, natural asphalt for roofs and balconies waterproofing;
3. **Windows replacement** highly emissive, not-ecological and inefficient metals (aluminum) for doors and windows (Fig. 5).

4 Real-World Green District. Design and Appraisal

New, broader eco-urban approaches, as well as new technological support (such as valuation GIS tools), have been deployed and employed in real-world design and social experimentation, constituting the case study concerning the creation of an “Ecological Green Urban District” in an already existing urban area. The neighborhood or district has been usefully map with a 3D-valuation GIS to estimate the total area the relevant district: 490,000 m²; 125 urban blocks; 840 buildings



Fig. 5 Case study. Reggio Calabria. The Latin Quarter. Identification of the Green District + University Campus (Northeast). *Source* Author's rendition from a Bing Maps view

covering a built-up area of 208,000 m² with 2,500,000 m³ of built volume; 800,000 m² of apartments; more than 400,000 m² of fronts to be insulated; about 180,000 m² of roofs to be aerated-ventilated and insulated; a population of 6400 residents, plus thousands of university students living there as non-residents renting rooms and flats privately and unofficially during the academic year.

Urban Sustainability (i.e., passivation) is implemented in the real-world case study on the quarter level. The renovation steps for passivation (especially insulation with natural materials) were designed and evaluated regarding their environmental and energy impacts.

In the prototype experimental buildings, natural insulation and ventilation reduce the need, and consequent energy consumption, for winter heating, as well as for even more demanding air-conditioning in summer. Relevant is also the amount of avoided kg of CO₂.

“Typologization” divides the built environment into typologies on the basis of architectural characteristics (considering both structural and material features as well as architectural language). On the basis of the detailed analysis conducted and thanks to the in situ testing and feedback, a specific thematic map has been created that identifies the four different prevailing building typologies within the case study area: Eclectic of Reggio Calabria; Liberty; Rationalist; post-war multi-story buildings with high residential density.

For each typology, parameters of interventions, energy, and saving costs, have been derived for the corresponding experimental prototype buildings.

The use of GIS tools makes possible automatic assessment on the neighborhood or district or quarter level. By using the cost and energy parameters as calculated, it

was possible to derive estimates for the entire quarter or neighbourhood or district: total physical amount of work in the two alternative scenarios (pure usual maintenance, BAU, vs. “passivation”=); total monetary investment cost of works per each scenario and typology; energy consumption per each scenario; total annual operating costs in each scenario; pay-back period for the additional costs of “passivation” (sustainability premium); kg of CO₂ emitted into the environment for each scenario.

5 Green District. New Evidence

Strategy implementation aims to redirect and change the ordinary maintenance work for building-envelope passivation with specific works (or interventions) consisting of: external plaster; roof renovation; and window replacement.

The generalized plan has been performed from the architectural-prototype level to the district level of the case-study area.

5.1 Total Cost of Works in Euros

1. **Front passivation.** Passivation of vertical surfaces (front; elevation) of 400 buildings (50% of total) is considered. A cycle of only six or eight years is anticipated for the completion of the program of 400,000 m² (1,000 m² per building) with an average of 82 m of perimeter and 12 m of height. Front passivation of 400,000 m² for an average cost of 80 €/m² produces a potential minimum investment of €32,000,000 for 50% of the total neighborhood.
2. **Roof insulation.** The thermal-insulation and ventilation of roofs for 180,000 m² with aerating natural cork cost 60 €/m², so the total investment for the whole neighborhood is of €10,800,000.

Summation. It follows that the total cost of passivation for the 50% of the neighborhood is €42,800,000 (i.e., for the whole district: €85.600.000 in the sustainable scenario vs. €64,400,000 in the BAU scenario).

It is of paramount importance to keep in mind that a large and majority part of this amount must be spent in any case for mandatory unavoidable maintenance work in the usual (BAU) way. Thus, sustainability accounts only for a small part of expenses, exactly the differential for bio-ecological materials. This differential is very soon recovered by the owners of single-family houses with annual instalments constituted by the substantial saving on energy bills, as described and quantified.

5.2 Energy Consumption

The existing total built volume, assessed by means of the built GIS, is 2,500,000 m³. By considering an average height per unit of 3 m, it is possible to give a first estimate of the built unit surface in the entire neighborhood, i.e., about 830,000 m² to be managed in regard to energy aspects.

Sample analyses performed on the various prototype buildings have estimated an average annual theoretical energy need per m² of 100 kWh/m² in the BAU scenario and of 60 kWh/m² in the alternative sustainable scenario. By multiplying this parametric data for the total 830,000 m² of all buildings, one can obtain a first rough result of the total energy needs of the entire neighborhood of about 83,000,000 kWh per year for the BAU scenario vs. 50,000,000 kWh per year for the sustainable scenario with a differential of 33,000,000 kWh (-40%)

5.3 Total Annual Operating Costs

Using a pure production cost of energy of 0.19 €/kWh, we obtain a total expense of energy management of about €12,450,000 per year for the BAU scenario. Research, field work, yard observations, as well as specific experimentations performed on the sample prototypical buildings, assuming an intervention of sustainable energy rehabilitation, have highlighted an average reduction of 40% of the theoretical amount of energy needed (Wang 2014). With an average cost of 0.19 €/kWh, we obtain a smaller total expense per year for energy management of about €7,500,000. The consequent monetary amount of annual energy saving is €4,950,000. Considering a total saving of passivation equal to €4,950,000 per year, the correspondent payback, at a steady interest rate of 4%, can be attained in about five years, not even considering the monetary equivalent of benefit deriving from the CO₂ cut (Luay 2015).

5.4 Results

All the results are summarized in the following Tables 1 and 2.

In five years, the pay back is completed: €22,020 of discounted energy expenditure saving are larger than the €21,200 of differential cost of the initial works for sustainability (Table 3).

Table 1 Green District

Blocks	n	125
Buildings	n	840
Roof area	m ²	180,000
Facades/elevation	m ²	400,000
Volume	m ³	2,500,000
Apartment surface	m ²	800,000
Market value	€	800,000,000

Latin Quarter. Data Summary. Built area and volume

Table 2 Green District

		BAU	Sustainable	D	D
		×1000	×1000	×1000	%
Investment work cost. Initial t = 0	€	64,400	85,600	+21,200	+24
Energy needs. Year	kWh	83,000	50,000	-33,000	-40
Energy management costs. Year	€	12,450	7500	-4950	-40
CO ₂ emission. Year	kg	16,000	9500	-6500	-40

Data summary. Passivation investment and energy

Table 3 Green district

Yrs	Energy saving	Rate	Saving actualiz	Saving sub-total
n	€ ×1000	$(1 + i)^{-n}$ i = 4%	€ ×1000	€ ×1000
1	4950	0.961	4,759	4,759
2	4950	0.924	4,576	9,335
3	4950	0.888	4,400	13,735
4	4950	0.851	4,216	17,952
5	4950	0.821	4068	22,020
6	4950	0.79	3,911	25,93
7	4950	0.759	3,761	29,694
8	4950	0.73	3,616	33,310
9	4950	0.702	3,477	36,787
10	4950	0.675	3,343	40,131
...
20	4950	0.456	2258	67,236

Short pay-back period of five years (i = 4%)

6 Conclusions

The study has established and tested an experimental approach—methodology—strategy, based upon a case study of urban regeneration. Particular attention was paid to the environmental and climate dimensions of the built environment.

The experimental research strategy enabled creation of a large scale-plan to apply a sustainability policy on the urban level and to achieve the objectives of large energy-saving programs. The operational methodology made it possible to: precisely quantify and estimate the general urban plan for energy savings; reduce the time required for investigations; provide guidelines to firms, investors, realtors, households, society and to local governments on the possible results achievable by large urban-scale interventions; and derive keystone prototype data. In fact, in the specific research here presented, the clustering of buildings per typologies has made it possible, by surveying and studying carefully a limited number of paradigmatic prototype and sample buildings, to obtain reliable results in a reasonable time, to employ less activity and to reduce the costs for the analyses, estimates, assessments and design.

In the end, besides the most relevant outcomes above cited, research has made it possible to: sort out parametric costs and energy consumption data per m²; develop subsequent cross-analysis thanks to the build-up of a GeoDataBase within a Geographic Information System; deepen the assessment for entire urban areas; include environmental and monetary effects of avoided CO₂ pollution, and considering them in the assessment of the “first cost” period of return. All the created data, collected information and performed analyses are organized safely in a stable, querying, flexible GeoDataBase System.

Finally, intervention simulation in the case-study area shows that with the building passivation strategy it is possible to achieve an energy saving of 33-million kWh in the neighborhood each year, by analyzing just winter heating, taking into mind and account that impacts on expensive and demanding summer air-conditioning will produce yet more benefits, both monetary and ecological. The methodology has been tested in a real-world yard prototype. The post-yard permanent monitoring of temperature and humidity, performed with remote data loggers, has positively confirmed the ex-ante valuations. The positive results achieved give two empirical positive evidences:

- physical, in terms of energy saving thanks to sustainable bio-ecological materials employed;
- economic, with a short period of pay-back of the “initial cost monetary negative premium”.

After 20 years, the discounted energy expenditure saving (or saving present value) equal €67,236,000, corresponding to the market value of 670 medium-sized apartments, i.e., 1\12 (€800,000,000: €67,000 = 11.94) of total capital value embodied in the real-estate properties of the whole district. And this saving will go on perpetually.

These empirical evidences encourage the implementation of follow the path of Sustainable Urban Conservation on a large scale and to test the methodology in other prototype buildings, in other districts and in different climate zones.

References

- Bottero M, Mondini G (2016) Evaluation of social benefits of urban regeneration: a stated preferences approach. In: 9th international conference on innovation in urban and regional planning, Torino, pp 447–452, 14–15 Sept 2016
- Bottero M, Mondini G (2017) Assessing socio-economic sustainability of urban regeneration programs: an integrated approach. In: Bisello A, Vettorato D, Stephens R, Elisei P (eds) *Smart and sustainable planning for cities and regions*. Springer, Berlin, pp 165–184
- Bottero M, Bravi M, Mondini G, Talarico A (2017) Building energy performance and real estate market value: an application of the spatial autoregressive (SAR) model. In: Stanghellini S, Morano P, Bottero M, Oppio A (eds) *Appraisal: from theory to practice*. Springer, Berlin, pp 221–230
- Bottero M, Mondini G, Oppio, A. (2016). Decision support systems for evaluating urban regeneration. *Proc Soc Behav Sci* 223:923–928
- Caragliu A, Del Bo C, Nijkamp P (2011) Smart cities in Europe. *J Urban Technol* 65–82
- IPCC (2013) *Climate change 2013: the physical science basis*. Cambridge University Press, Cambridge, p 1535
- IPCC (2014) *Fifth assessment report*. Cambridge University Press, Cambridge
- Kats GH (2010) *Greening our built World. Costs, benefits and strategies*. Island Press, Washington, DC, pp 1–260
- Lombardi P (2016) Challenging the energy security paradigm. In: Lombardi P, Gruenig M (eds) *Low-carbon energy security from a European perspective*. Elsevier, London, pp 1–13
- Lombardi P (2017a) Transition towards a Post Carbon City—does resilience matter? In: *Future challenges in evaluating and managing sustainable development in the built environment/ Brandon, Lombardi, Shen*. Wiley, London, pp 55–68
- Lombardi P (2017b) Evaluating the smart and sustainable built environment in urban planning. In: *Handbook of research on social, economic, and environmental sustainability in the development of smart cities/Andrea Vesco (Istituto Superiore Mario Boella, Italy) and Francesco Ferrero (Istituto Superiore Mario Boella, Italy)*. IGI Global, pp 44–60
- Luay ND, Kherun NA (2015) Green buildings cost premium: a review of empirical evidence. *Energy Build* 110:396–403
- Ma Z, Cooper P, Daly D, Ledo L (2012) Existing building retrofits: methodology and state-of-the-art. *Energy Build* 55:889–902
- Massimo DE et al (2008) The role of GIS in the protection of Cultural Heritage. In: *Proceeding of 3rd chef meeting UNESCO. Cultural heritage protection against Flooding*, Genova. Università di Genova, Facoltà di Ingegneria, Genova. Mimeo, 14–15 April 2008
- Massimo DE (2009a) Valuation of urban sustainability and building energy efficiency. A case study. *Int J Sustain Develop* 12(2–3–4):223–247. ISSN: 1460-6720
- Massimo DE et al (2009b) Risparmio energetico e paesaggio urbano. Recenti innovazioni e sperimentazioni valutative. In: Stanghellini S (ed) *Energia, paesaggio, valori*. Dei, Roma
- Massimo DE (2009c) *Architettura sostenibile e democrazia energetica. Risparmio annuo di kWh nel Quartiere Latino di Reggio Calabria*. In: Neri G (ed) *Forme dell’Energia*. Edizioni Centro Stampa d’Ateneo, Reggio Calabria
- Massimo DE et al (2010) Urban 3D for energy planning and management. *Atti 6° Conferenza Nazionale in Informatica e Pianificazione Urbana e Territoriale*. Input 2010. Università degli Studi della Basilicata, Potenza, Italy

- Massimo DE et al (2011) Sustainable urbanism: ecological city versus urban decay and energy crisis. Zero-distance energy for sustainable latin quarter. In: Beguinot C (ed) *The City Crises. The UN Priority of the XXI Century*. Giannini Editore, Napoli, Italy, pp 778–780. ISBN: 978-88-7431-52-2-2
- Massimo DE et al (2012) Stima del risparmio energetico a scala urbana con il supporto di strumenti GIS. In: *Atti della 13a Conferenza Nazionale Utenti ESRI. Intelligenza del Territorio*. Roma, 18–19.04.2012. ESRI Italia, Roma, Italy. CD-ROM
- Massimo DE, Musolino M, Malerba A (2017a) Complesso isolato abitativo passivato nel framework della Post Carbon City. In: Bottero M (ed) *Valutazioni economiche e questione energetica*. Springer, Berlin
- Massimo DE, Musolino M, Malerba A (2017b) Dal processo edilizio ai BIO materiali per la BIO sostenibilità urbana nature-based in un Circular Economy Framework. Sperimentazione ad un edificio universitario. In: Bottero M (ed) *Valutazioni economiche e questione energetica*. Springer, Berlin
- Massimo DE et al (2017c) Geographically Weighted Regression for the post carbon city and real estate market analysis: a case study. In: Bevilacqua C, Calabrò F, Della Spina L (eds) *Smart Innovation, Systems and Technologies*. Berlin. ISSN: 2190-3018
- Musolino M, Massimo DE (2013) Mediterranean urban landscape. Integrated strategies for sustainable retrofitting of consolidated city. In: Sabiedriba, integracija, izglitiba”. ISSN: 1691-5887. Rezekne, SL—4600, Latvia (Lettonia)
- Spampinato G, Massimo DE et al (2017) Carbon sequestration by cork oak forests and raw material to built up post carbon city. In: Bevilacqua C, Calabrò F, Della Spina L (eds) *Smart Innovation, Systems and Technologies*. Berlin. ISSN: 2190-3018
- Torabi MS, Lombardi P, Ugliotti FM, Osello A, Mutani G (2016a) BIM-GIS modelling for sustainable urban development. In: *Newdist* 339–350
- Torabi MS, Mutani G, Lombardi P (2016b) GIS-based energy consumption model at the urban scale for the building stock. In: *JRC conference and workshop reports*, Paolo Bertoldi, European Union, Luxembourg, pp 56–63
- U.S. Department of Energy (2012) *Buildings energy data book*. Online Publication. www.energy.gov
- Wang Q, Holmberg S (2014) A methodology to assess energy-demand savings and cost effectiveness of retrofitting in existing Swedish residential buildings. *Sustain Cities Soc* 14:254–266

Urban Blight and Redevelopment: An Urban Participation Path



Teresa Cilona

Abstract This paper pays particular attention to one of the many participatory models present in the landscape of urban and territorial planning. Specifically, the *Action Planning* model was chosen, a model used in Anglo-Saxon countries to identify the problems and needs of the inhabitants of a given territory, through the involvement of interested parties or stakeholders. The model is applied in Sicily, to Villaseta, a small rural settlement, located south-west of the city of Agrigento, which consists primarily of affordable and social housing. It is a suburb without identity, left to itself, where—despite the valuable cultural, historic, scenic and, most importantly, human resources—one notes the presence of degradation, hardship and social exclusion. The quality of life is poor, the housing requires serious restoration work and a large number of public spaces are unused, due to decades of failure in the management policies of the local government.

Keywords Citizen · Participation · Emargination · Urban blight

1 Introduction

In recent years, in the construction of public policies—particularly in urban planning—multidisciplinary paths have been outlined that contain various theoretical and experimental paths. Alternative design and communication approaches have been identified, such as to enable the population to take an active part in the planning of the territorial government, as they are also the main recipients (Marchesi et al. 2011).

Among the major factors of the inhabitants' impatience is the poor quality of life. Most urban centers are characterized by widespread degradation and a lack of meeting places, equipment and essential services (ISPRA 2012). Today, urban planning is called to respond to the current needs of the community through

T. Cilona (✉)

Department of Architecture, University of Palermo, Palermo, Italy
e-mail: teresa.cilona@unipa.it

sustainable planning that adapts to changes in the city and avoids the mistakes of the past (Cilona 2016).

To restore the environmental, economic and social quality in degraded and peripheral areas or to recover abandoned public spaces, definitely responds to the concept of sustainable cities, limits urban sprawl, reduces environmental impacts and respects the landscape and surrounding territory, as described in the encyclical “Laudato si” of 24 May 2015 (Lettera Enciclica Laudato Si’ del Santo Padre Francesco sulla Cura della Casa Comune 2015): “... *We need a conversation which includes everyone, since the environmental challenge we are undergoing, and its human roots, concern and affect us all.*” (§ 14).

Therefore, it is necessary to implement participatory strategic actions that ensure a high quality of life, as well as a responsible management of territorial resources. Participatory practices, from a planning perspective, are many and various (Fastelli 2015).

The correct individuation makes it possible for citizens to acquire the maximum of information and awareness, also providing tools—in moments and ways that differ from classic vote expression—that permit the expression of judgments regarding consensus about the public work, dissent or the proposition of alternative solutions to the diverse issues and problems present in our cities.

2 New Methods of Territorial Governance

Increasing socioeconomic complexity and the financial crisis of the public sector is forcing a rapid reinterpretation of institutional and political roles, in addition to the redesign of institutional arrangements and the need for special skills and abilities.

The obsolescence of traditional land-management policies led to the opening of administrative boundaries to the outside, through the involvement of the plurality of local community actors and the development of extended networks. It has gone from the classic, bureaucratic centralized model to an approach of “local urban governance” (Schmitt and Van Well 2016), as it is defined by the European Union and described in the international literature (Avanzi European Ministers responsible for Urban Development 2007; Tiezzi and Marchettini 1999; Desouza 2013).¹

Both institutional and non-institutional subjects are part of an initial shared strategic planning process. Each of these subjects—with their own “*capabilities and resources*”—is involved in various ways in the formulation and management of policies and public interventions.

Participatory planning thus represents a new way of defining the needs of changing cities to:

¹<http://www.a21coordinamento.it/GliimpegnidiAgenda21/DaRiodeJaneiroadAalborg>.

- meet the challenges posed to local systems for the modernization of the city;
- formulate common strategies of development and implement decisions in accordance with sustainability criteria;
- favor the competitive repositioning of the local system;
- promote interventions to improve urban quality;
- legitimize and give value to the “*hidden or latent resources*” of the territory (Hirschman 2010);
- initiate processes of re-appropriation of the territory;
- create (or rediscover) shared meanings;
- grow the social capital of an urban context.

For several years, the literature on participatory planning often referred to the “*scale of citizen participation*” (Fig. 1), defined in 1969 by Sherry R. Arnstein.²

However, over time Arnstein’s “*ladder*” (Arnstein 2016) was reworked on several occasions. Among others, it was reworked by Connor with the “*New Ladder of Citizen Participation*”, in 1988; by William Potapchuk with the “*Levels of Shared Decision Making*”, in 1991; by David Wilcox,³ in 1994; by Choguill, with the “*Ladder of Community Participation for Underdeveloped Countries*”, in 1996 (Bruns 2003; Guaraldo Choguill 1996; Connor 1988; Potapchuk 1991); and again in the model created by Ecosfera in 2001, and in the revised European Charter of Participation in 2003.

In addition, participatory processes have also been experimented on regarding an increasing range of issues, from the environment to healthcare, to transportation, budget policies, social policies and local development. Methods of various types have been developed to initiate or manage participatory processes, abiding by techniques for listening or project interaction (Bobbio and Pomatto 2005; Magnaghi 2006).

Such methods are used to define problems, get an idea, reflect on one’s own or others positions, help participants listen, encourage constructive interaction among participants, induce participants to be forward-looking, make assumptions about the future, help people who are less accustomed to speaking in public or in making complex arguments, understand problems and choose alternative solutions in an intuitive way. These listening techniques include: Outreach, Territorial Animation, Action Research, the Neighborhood Walk, Focus Groups, and Brainstorming.

Among techniques for project interaction, we mention the EASW—European Awareness Workshop Scenario, Planning For Real, Consensus Building, the Town Meeting, Open Space Technology, Micro-planning, Strategic Choice, A Pattern Language, Design Game, and Action Planning.

²The American sociologist Arnstein groups participatory practices on the basis of qualitative criteria in eight categories or steps on a hypothetical scale leading to three main levels of citizen participation.

³He simplifies the scale in the following hierarchy: Information, Consultation, Deciding together, Acting together and Supporting independent community.

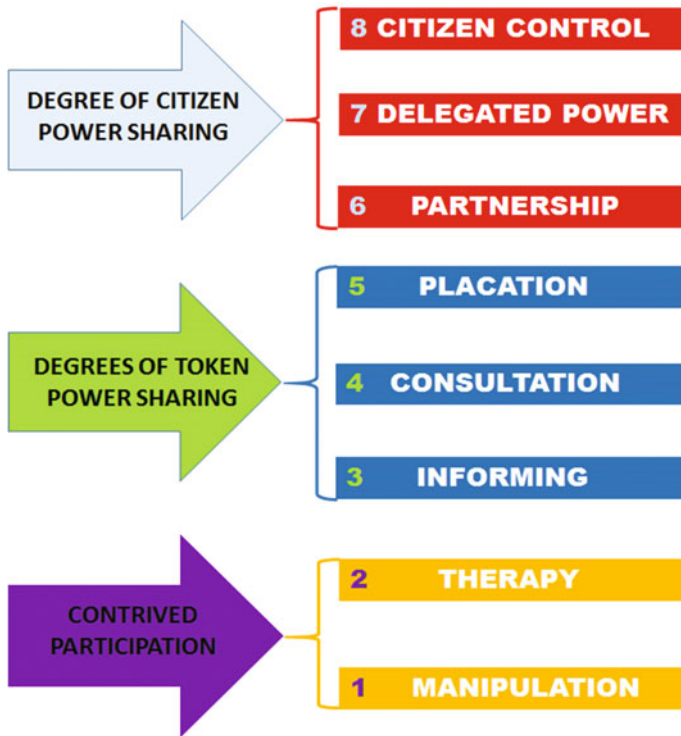


Fig. 1 Scale of the participation of citizens by Sherry R. Arnstein (the level that Arnstein calls the “power of the citizens” concerns the “high” forms of participation, where citizens are the real stars of the decisions about their neighborhoods, their towns and their territories. *Partnership* is the rung of the ladder at which one can actually speak of participation. The planning and decision-making responsibilities are shared between those in power and an organization representing the needs of the community. The “*delegation of powers*” means that, in the case of a specific plan or program, such authority is conferred on the citizens, by which they can hold a clear majority of seats on committees or in specially established commissions. This enables the exercise of an effective control over the administration’s choices and thus on the entire decision-making process. *Citizens’ control* bestows on participants or residents a level of power or control such that they can manage a program and negotiate the terms with the powers that be. The citizens through the acquisition of information, knowledge and awareness express judgments of consensus and dissent about public works, as well as the proposition of alternative solutions to diverse problems, by drafting a list of priorities given to local administrators and members of the municipal board)

When deciding which method is most appropriate, it is essential to consider certain elements:

- Objectives: the reasons for involvement and the expected results;
- Argument: nature and purpose of the matter;
- Participants: who is involved or interested or who can contribute to the solution;
- Time: time available;

- Resources: economic, political, social, and cultural resources;
- Tools: used in various techniques.

In this study, we chose to examine the method of *Action Planning*, which enabled us to work and develop common projects through work groups, workshops, technical desks, and design laboratories. This is a highly structured multidisciplinary and collaborative approach, adaptable to the context in which it is used. The inhabitants may define, together with technical and political representatives, problems and issues to be addressed, develop proposals and alternative solutions, analyze “winning” proposals, produce elaborate reports (reports, papers, models) on the job they are doing, ensure that proposals turn into actions. Action Planning is particularly suitable for urban design and physical-planning issues, such as:

- regeneration strategies for specific regions or neighborhoods;
- development strategies for specific sites;
- solutions to specific problems such as traffic congestion.

Events last anywhere from one day to several weeks.

During the event, the Team will go through the following process:

1. Briefing by key stakeholders (local planners, landowners, residents, politicians, etc.);
2. Physical reconnaissance of area (on foot, by bus or even from the air);
3. Topic workshops (open to everyone);
4. Design workshops (open to everyone);
5. Brainstorming;
6. Analysis and synthesis;
7. Presentation of proposals reported back (open to everyone);
8. Published report of proposals, normally including sketch plans, drawings, organization charts and action points.

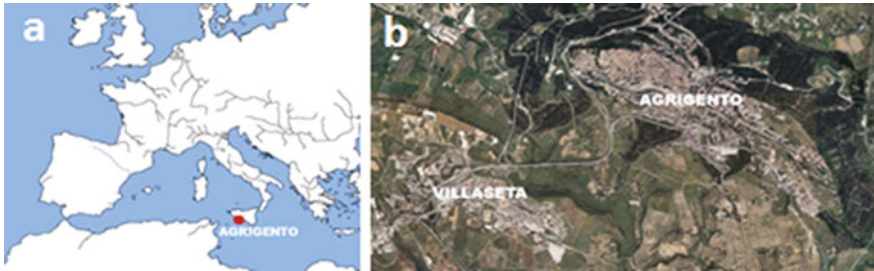
Moreover, there may be special events organized for specific stakeholder groups. Preparatory activity before the event and follow-up activity are also vital parts of the overall action-planning process (New Economics Foundation 1999; Giangrande and Mortola 2000a, b, 2005; Giangrande et al. 2000; Gibson 1984).

3 A Participatory Planning Experience. The Case Study and *Action-Planning* Method

As previously mentioned, the action-planning method is a collaborative design tool, born in the UK, and used to identify the needs of a territory through the participation of the local community.

Table 1 The phases of action planning

Action planning		
1st phase	General cognitive	Direct observation Construction of the overall picture
2nd phase	Proactive Progettuale Termination	Active listening Realization of future scenarios

**Fig. 2** Agrigento—Villaseta

This methodology facilitates the involvement of citizens and enables everyone to express their own ideas in a free manner.⁴

The method follows two phases: the first of a general-cognitive type, necessary and preliminary to the construction of the overall picture; the second of a proactive-planning-decisive type.

The common goal is to restore economic-social-environmental quality to abandoned areas, to recover crumbling public spaces and thus respond to the concept of sustainable cities (Table 1).

The model is applied in Sicily, to Villaseta, a small rural center located to the southwest of Agrigento (Fig. 2), built around the 17th century and developed after the landslide of Agrigento (19 July 1966) (Cilona 2007; Petrotto 2013).

Villaseta is a peripheral suburb, consisting primarily of low-income and social housing left to itself that today has lost its historical identity. It constitutes an urban environment where, despite the presence of an important historical, natural, cultural and above all human heritage, one notes the presence of neglect, hardship, and ghettoization.

The Villaseta neighborhood, extending over about 70 ha, was redesigned after the landslide by a group of professionals led by the renowned urban planner from Rome, Mario Ghio, and is characterized by a road axis running east-west along which should have been established commercial activities, green areas and parking.

The residences are made up of various building types, gravitating around school buildings and green areas served by a network of pedestrian paths. To the south of

⁴<https://www.kent.ac.uk/careers/sk/skillsactionplanning.htm> (2016).



Fig. 3 a–b Villaseta—aerial photography; c–d examples of buildings

town, large sports facilities were also planned. The project paid particular attention to the pattern of open spaces with pedestrian paths differentiated from vehicle flows, public and private parking for residents, but probably not well-suited to the recipients who were artisans or farmers. Like most public interventions in southern Italy, Villaseta was also built slowly in bits and pieces, and some of these works were completed in the 1990s, while others are still waiting for funding to be completed.

Today, the Villaseta neighborhood is very different from that imagined and designed by Ghio. Commercial activities were never developed and the area exudes an air of marginality, poverty, and degradation, given the absence of maintenance and inspection by the city, in addition to interventions of the inhabitants who personalized various dwellings with works and superstructures, some without authorization, which now require interventions of urban regeneration (Fig. 3).

For these reasons, in rethinking a new plan for the neighborhood, meeting the new needs of the community and avoiding the mistakes of the past, a more democratic path has been followed, in concert with the city council, different from the classic approach of urban requalification imposed from above.

In fact, thanks to the application of the participatory practice of *Action Planning*, it was possible to arrange meetings between stakeholders (residents, municipal administrators, associations, entrepreneurs and experts) in order to understand the needs and requirements of the community (Bobbio 2007).

The first step taken, before dialogue with the resident population, between 30 and 80 years of age, was to conduct a direct observation of the physical spaces and above all understand the way these spaces and these places were being used and how the people relate to the spaces of the neighborhood.

Table 2 SWOT analysis

Strengths	Weakness
Close to the valley of the temples	Unsafe places
Free green areas	Poor maintenance of buildings
Unused public places	Lack of public transportation
Presence of older people, children and young people	Insufficient electric lighting
Sports facilities	Green areas uncovered
Unused shopping mall	Disconnected sports areas

Specifically, the relationship of the inhabitants and occasional visitors to the neighborhood with the facilities and services present were analyzed. Meaningfully, we observed how public spaces are used or transformed according to the most disparate needs of citizens (some spaces are well cared for, others illegally fenced off, others still are car parks or garbage dumps).

The second step was to listen to citizens directly in a meeting–debate. In this phase, we addressed all participants with general questions in reference to the locations under consideration and proceeded to draw up a list of the strengths and weaknesses of the studied context (Table 2).

The meeting–debate is characterized by various moments:

- Defining a list of priorities through a stimulating, animated, “creative” and constructive meeting.
- Posting of the neighborhood plan on a scale of 1:2000 (it was necessary to help inhabitants orient themselves with the cartography—an unfamiliar tool for them, by asking them to identify squares, buildings and open spaces in the neighborhood that, in their view, were representative of the site and identifiable as reference points).
- Application of target stickers on places to be prioritized in the debate because they were considered more important.⁵
- Dialogue–Discussion (each person presented the reasons why he/she considered a particular theme to be a priority, proposing possible solutions and exposing them aloud to the rest of the group. Each proposal was annotated on special post-its as a reminder for the final stage.

Among the various issues examined, three in particular raised the greatest interest:

The first was the reuse of the former mall, now abandoned. The working group initially split up and then came to a single conclusion that everyone welcomed:

⁵The targets were posted close to the schools, the sports area and the former mall. A theme was also introduced that did not appear in the list of priorities because it was not directly linked to a part of the neighborhood. According to the participants in the discussion, some of the neighborhood’s problems are exacerbated by a lack of civic sense and respect for the place by a portion of Villaseta’s inhabitants.

the restoration of commercial activities as a first priority with the introduction of craft activities.

The second was the revival of the sports facilities in order to develop a “sports tourism” given the proximity to the *Valley of the Temples*, the home of *Luigi Pirandello* and the *Scala dei Turchi*.

The third was about public green space: “*Too much green space and too difficult to manage!*” It would be appropriate to entrust these to private parties, in accordance with procedures and times established in advance, since the municipal administration is unable to manage them on a regular basis.

In deciding future scenarios, each person was able to compare their proposal with those of others and together managed to carry out a peaceful discussion, with moderate tones in an effort to reach a singular solution that was better, effective and, above all, possible. In cases where multiple solutions were preconfigured, they were able to handle conflicts by listening patiently to others proposals, eventually reaching shared project outcomes.

Our role was to:

- Facilitate the understanding of concepts expressed by various components of the participation group;
- Explain ideas that may sometimes appear to others unclear because they were expressed too broadly;
- Translate into a few key words and challenge the emerging reasoning;
- Stimulate a personal vision not only unilaterally but from different points of view.

By the end of the meetings (Fig. 4a)—started in March 2015 and concluded in September—among the various proposals for urban regeneration that the citizens have decided giving priority to are:

1. the restoration and care of green areas that are currently often used to dump waste materials (Fig. 4b);
2. the completion of sports facilities in order to develop a sports tourism of international acclaim (Fig. 4c);
3. the reuse of the former shopping center to favor an artisanal economy that has almost disappeared (Fig. 4d).

The total cost of the interventions is about €4,000,000.

In this scenario, the municipal administration, always present at the meetings, collected all the material produced and noted what emerged along the participatory path (Table 3). Unfortunately, this process has not yet been fully completed and awaits *Neighborhood Contracts*, the *Protocols of Understanding* and the public financial commitments that will enable it to be implemented.



Fig. 4 a Moments of the meetings; b green areas; c sports areas; d shopping center

Table 3 Synthesis of the participatory experience

Dates of the Participation Process	March 2015 (start) September 2015 (reunions end)
Subjects involved	Residents, municipal administrators, socio-cultural associations, entrepreneurs, experts
Advertising and involvement	Verbal invitations, mail, posters, leaflets, radio, newspapers, internet
Working groups	Group of 10–20 people
The moments of the meeting	Defining a list of priorities; posting of the neighborhood planimetry; application of target stickers on places to be prioritized; decision of the priorities
Role of the facilitator	Facilitate, explain, translate, stimulate
Materials and tools used in the reunions	Billboards, pens and colored pencils, post-it, colored stickers, scissors, scotch tape, projector, computer

4 Conclusions

At the end of this participatory process, far from classical approaches to urban regeneration, the result has definitely been positive. Of course, involving a hundred people, getting them to work together, talking to them, dealing with conflicts, creating a context in which they could freely express themselves and enrich their own viewpoints, and finding common ground, has not been easy (Goni Mazzitelli 2016; Governa 1997; Khakee 1999). But, we can say we are satisfied with the outcome.

The method applied to Villaseta is not only a more democratic method, but includes people that are bearers of knowledge essential for understanding the place; their involvement is a guarantee of success for the future development of the neighborhood and for the drafting of a plan or project, being themselves a main component.

They are the real experts on what works and what doesn't in the organization of the territory, on the resources present and the things to be improved; they have expectations to be verified and ideas to make the area in which they live more livable, attractive and competitive (Cilona 2015).

Through the participatory process, it was also possible to understand how important the relationship between participants was to the process as well as that between participants and the administration. During the process people met, worked together, exchanged information, dealt with difficulties and problems, found common affinities and interests, verified their differences and sometimes overcame them and gained mutual trust. All of these relational effects can be defined as an increase in the social capital resource available to a community; a form of empowerment in the sense that if social capital develops, citizens will increase their abilities and skills and learn to walk alone (Bobbio 2007, Ibidem).

We must, therefore, as Oriol Bohigas affirms (Bohigas 2016):... *understand the city starting from the neighborhoods, this involves the advantage of properly channeling popular participation. This participation, while difficult for learning overly general or abstract themes, is instead really effective when it refers to issues that immediately impact the identity of the neighborhood or on personalized urban elements. Participatory planning can provide valuable information to the calibration of general proposals, valuable suggestions for designing and implementing concrete urban transformation of specific areas such as neighborhoods or parts of them. It also creates greater public support for decisions made.*

It then becomes necessary to use methods and techniques that can fully include people in urban planning.

Acknowledgements The author thanks all who participated in the meetings: the community administrators, associations, entrepreneurs and the citizens.

References

- Arnstein Sherry R (2016) A ladder of citizen participation. <http://lithgow-schmidt.dk/sherry-arnstein/ladder-of-citizen-participation.html>
- Avanzi European Ministers responsible for Urban Development (2007) Leipzig charter on sustainable European cities final draft. http://ec.europa.eu/regional_policy/archive/the-mes/urban/leipzig_charter.pdf
- Bobbio L (2007) Amministrare con i cittadini, Viaggio tra le pratiche di partecipazione in Italia, Dipartimento di Studi Politici, Università degli Studi di Torino
- Bobbio L, Pomatto G (2005) Modelli di coinvolgimento dei cittadini nelle scelte pubbliche, rapporto sulla qualità della democrazia partecipata nella provincia di Trento
- Bohigas O (2016) Il paesaggio urbano. <https://cartesensibili.wordpress.com>

- Bruns B (2003) Water tenure reform: developing an extended ladder of participation. In: Politics of the commons: articulating development and strengthening local practices. RCSD conference, Chiang Mai, Thailand, 11–14 July 2003
- Cilona T (2007) Agrigento e le sue periferie. www.planum.net
- Cilona T (2015) Gestione partecipata, integrazione sociale e rigenerazione urbana. Un caso studio. Urbanistica Informazioni, speciale ISSUE, INU, IX giornata di studi, Infrastrutture blu e verdi, reti virtuali, culturali e sociali
- Cilona T (2016) Sustainability, territorial resources and social capital. In: Proceedings of the 11th international conference on urban regeneration and sustainability. Wit Press Sustainable City, SDP-V12-N4, pp 819–828
- Connor DD (1988) A new ladder of citizen participation. *Nat Civic Rev* 77(3):248–257
- Desouza KC, Flanery TH (2013) Designing, planning, and managing resilient cities: a conceptual framework. *Cities*. www.elsevier.com/locate/cities
- Fastelli L (2015) La Pianificazione strategica territoriale attraverso il metodo dei processi partecipativi. Report, Centro Interdipartimentale di ricerche agro-ambientali
- Giangrande A, Mortola E (2000a) Manuale di autoprogettazione per piccoli interventi di riqualificazione dell'ambiente urbano, Assessorati alla Partecipazione, alle Politiche educative, all'Ambiente, ai Lavori pubblici e alla Mobilità del Comune di Roma
- Giangrande A, Mortola E (a cura di) (2000b) Architettura, Comunità e Partecipazione: quale linguaggio? Seminario internazionale, Università degli Studi Roma Tre, 4–5 aprile
- Giangrande A, Mortola E (2005) Neighbourhood renewal in Rome: combining strategic choice with other design methods. In: Friend J, Hickling A (eds) *Planning under pressure*, 3rd edn. Elsevier, Oxford
- Giangrande A, Mortola E, Spada M (2000) Progettare con la comunità, Seminario internazionale, Comune di Roma e Università degli Studi Roma Tre, 13–14 aprile
- Gibson T (1984) Counterweight. the neighbourhood option. *Town and Country Planning Association & Education for Neighbourhood Change*, Nottingham
- Goni Mazzitelli A (2016) La crisi della progettazione e la nascita della pianificazione collaborativa, Il Gioco non si arresta, pratiche di pianificazione partecipativa, Dipartimento di Studi Urbani, Roma Tre, Gangemi Editore
- Governa F (1997) Il milieu urbano. L'identità territoriale nei processi di sviluppo, Franco Angeli, Milano
- Guaraldo Choguill MB (1996) A ladder of community participation for underdeveloped countries. *Habitat Int* 20(3):431–444
- Hirschman A (2010) Risorse nascoste o latenti - la strategia dello sviluppo economico. La Nuova Italia, Firenze
- ISPRA (2012) Pianificazione e Progettazione Urbana Sostenibili: Individuazione di Strumenti Informativi e Applicativi
- Khakee A (1999) Scenari partecipativi per lo sviluppo sostenibile: temi metodologici, *Urbanistica*, n. 112, gennaio-giugno
- Lettera Enciclica Laudato Si' del Santo Padre Francesco sulla Cura della Casa Comune (2015) http://w2.vatican.va/content/francesco/it/encyclicals/documents/papafrancesco_enciclica-laudato-si.html
- Magnaghi A (2006) Dalla partecipazione all'autogoverno della comunità locale: verso il federalismo municipale solidale. *Democrazia e diritto*, n. 3:134–150
- Marchesi G, Tagle L, Befani B (2011) Approcci alla valutazione degli effetti delle politiche di sviluppo regionale, numero 22, Ministero dello sviluppo economico, Dipartimento per lo sviluppo e la coesione economica, unità di valutazione degli investimenti pubblici
- New Economics Foundation (1999) Participation works! 21 techniques of community participation for the 21st century, New Economics Foundation with members of the UK Community Participation Network
- Petrotto T (2013) Villasetta: open city action planning. Il caso studio di un quartiere a sud-ovest di Agrigento. Tesi di laurea, Relatore Prof. Arch. Teresa Cilona, Università degli Studi di Palermo, a.a. 2012/2013, Agrigento

- Potapchuk WR (1991) New approaches to citizen participation: building consent. *Nat Civic Rev* 82(2):158–168
- Schmitt P, Van Well L (2016) *Territorial Governance across Europe, pathways, practices and prospects*. Routledge Research in Planning and Urban Design, London
- Tiezzi E, Marchettini N (1999) *Che cos'è lo sviluppo sostenibile?* Donzelli Editore, Roma, pp 86–90

Evaluating Tangible and Intangible Aspects of Cultural Heritage: An Application of the PROMETHEE Method for the Reuse Project of the Ceva–Ormea Railway



Marta Bottero, Federico Dell’Anna and Massimo Nappo

Abstract The paper seeks to investigate the role of multicriteria analysis approaches to support landscape and territorial planning. In particular, the project for the revitalization of the Ceva-Ormea railway line (northern Italy) is the starting point for the analysis. The goal of landscape enhancement is to turn the abandoned trackside into a greenway and to propose the recovery of the stations for tourist purposes. The use of PROMETHEE II will try to guide the decision maker’s choice, using a set of criteria for evaluation. A number of experts have been involved in the weighting of the criteria in order to evaluate the project from various points of view.

Keywords Strategic assessment · Cultural heritage · Multicriteria analysis
Landscape values

1 Introduction

Cultural Heritage is a multi-dimensional, multi-faceted and multi-value economic benefit (Mazzanti 2003). According to the Encyclical Letter “Laudato si” of the Holy Father Francis (2015), it is necessary to integrate the history, the culture and the architecture of a place, safeguarding its original identity. Ecological science asks to pay attention to local cultures when discussing issues related to the environment by creating a dialogue with the language of the technical-scientific domain. Culture in fact has to be understood not only as the monuments of the past, but especially in its living, dynamic and participatory sense (Francis 2015). In this sense, local communities see heritage as a means of stimulating economic activity in regions with economic problems and as a good thing to preserve for future

M. Bottero (✉) · F. Dell’Anna · M. Nappo
Department of Regional and Urban Studies and Planning,
Politecnico di Torino, Viale Mattioli 39, 10125 Torino, Italy
e-mail: marta.bottero@polito.it

generations (Penza 2016). Tourists are increasingly demanding, and these historical realities could provide cultural experiences of various types (Bowitz and Ibenholt 2009). The exploitation of goods leads to the activation of economic processes that can counter the degradation and abandonment of the territories. These processes need appropriate decision/ support systems that can define multidimensional action policies (Bottero and Lami 2010; Bottero et al. 2016).

The paper focuses on the application of a particular multicriteria approach, the PROMETHEE method (Brans et al. 1986), for supporting the definition of the reuse project for an abandoned railway line. The study has been developed within the research activities carried out by the Postgraduate School of Cultural Heritage and Landscape of Politecnico di Torino in the context of the analysis of the cultural heritage of the Alta Val Tanaro in northern Italy. In particular, the line under examination connects the city of Ceva to the city of Ormea. The railway was in use until the year 2014, and afterwards the line has been abandoned. Given its recent closure, the line is still well-equipped, even though degradation is becoming increasingly evident. Station buildings still existing are found to be in decent conditions. The rail-reuse project aims to create an infrastructure that connects the various territories (Sirchia 2000). This connection is essential for enable the territory to escape the condition of deep economic depression that has been affecting the valley over recent decades. In order to promote the valorization of the territory, several municipal authorities in the valley are discussing the proposal for re-use of the railway line for tourist purposes. The transformation would enable the accessibility and the mobility within the territories to achieve the valorization of the landscape and of the local cultural heritage. The starting point of this valorization process consists of the restoration of the stations located along the line that are crucial elements for the regeneration of the territorial connections in the valley. The re-use of the railway line is linked to the definition of the most suitable stations to be restored in order to maximize the effects of the reuse project in terms of the tourist revitalization of the area and the creation of economic synergies. The eight railway stations along the line were compared using the PROMETHEE method based on a tangible and intangible criteria family, evaluated by various experts and decision makers to select the most appropriate stations to be restored and included in the tourist-railway project.

2 Methodological Background

The PROMETHEE method is one of the most recent Multicriteria Decision Analysis (MCDA) methods that has been developed, first proposed by Brans et al. (1986) and subsequently extended by Brans et al. (1986) and Brans and Vincke (1985). PROMETHEE is an outranking method for a finite set of alternative actions to be ranked and selected among criteria, which are often conflicting (Roy and Bouyssou 1993). The method should be developed according to these subsequent steps:

- Step 1. Establishment of an impact matrix. A double-entry table for the selected criteria and alternatives can be established by using cardinal (quantitative) and ordinal (qualitative) data.
- Step 2. Application of the preference function $\prod(a, b)$. For each criterion, the selected preference function is applied to choose how much the alternative a is preferred to b . These preferences are represented by a preference between 0 and 1. A strict preference of an alternative over another alternative is equal to 1, while the indifferent preference value between two alternatives is equal to 0. Six typical kinds of preference functions have been established in the PROMETHEE methodology; Usual criterion; Quasi criterion (U-shape); Criterion with linear preference (V-shape); Level criterion; Linear criterion; and Gaussian criterion (Brans et al. 1984, 1986).
- Step 3. Calculation of the overall preference index $\prod(a, b)$. The overall preference index $\prod(a, b)$ represents the intensity of preference of a over b and it can be calculated according to the formula (1):

$$\prod(a, b) = \sum_{j=1}^k w_j P_j(a, b) \quad (1)$$

where: $\prod(a, b)$ is the preference degree of a over b , w_j is the weight of the criterion j and $P_j(a, b)$ is the preference function of a over b w.r.t. criterion j .

- Step 4. Calculation of the outranking flows: leaving flow $\Phi^+(a)$ and entering flow $\Phi^-(a)$. In the PROMETHEE method, two flow measures can be determined for each alternative (where n is the number of the alternatives). There are a leaving flow (outranking):

$$\Phi^+(a) = \frac{1}{n-1} \sum_{b \in A} \prod(a, b) \quad (2)$$

and an entering flow (being outranked):

$$\Phi^-(a) = \frac{1}{n-1} \sum_{b \in A} \prod(b, a) \quad (3)$$

- Step 5. Comparison of the outranking flows to define the overall ranking of the alternatives. PROMETHEE II provides a complete ranking of the alternatives by calculating the net flow (4).

$$\Phi(a) = \Phi^+(a) - \Phi^-(a) \quad (4)$$

Many applications of the PROMETHEE method exist in the literature (Behzadian et al. 2010). As far as the landscape and territorial planning field is

considered, environmental management studies (Farahani et al. 2010; Oppio and Bottero 2017) and specific evaluation approaches have been developed.

3 Application

The proposal is related to the project for the recovery of a railway line located in northern Italy (Fumagalli and Toccolini 2012; Toccolini et al. 2006). In this case, the recovery of disused territorial infrastructures is linked to the integration with the local public-transport system and the widespread hospitality network. These paths could represent soft transport routes with homogeneous characteristics in terms of separation from motorized traffic, accessibility, ease of travel and safety. In addition, the network of routes links areas where recreational and touristic activities take place, traversing regions characterized by landscapes of high aesthetic quality. The station buildings along the line represent a significant cultural heritage, characterized by historical and local values that can be usefully included in the re-use project of the line as bars, restaurants, hotels, hostels, museums, rental facilities etc. In this application, a multicriteria model based on the PROMETHEE II is used to identify the most suitable station buildings to be re-used for tourist purposes (Bottero 2015).

3.1 *Description of the Alternatives*

The Ceva–Ormea railway line is in northern Italy, at the border between Piedmont and Liguria regions (Giordano 1857; Rebagliati et al. 1993). The line was built at the end of the 19th century to increase accessibility to a very important and vital area of the Piedmont Region and to ensure the strategic connection to the Ligurian ports (Basteris 1993; Marengo 2012). Unfortunately, the completion of the tracks to the Liguria region was never realized; moreover, in the second half of the 20th century, most of the economic activities of the valley were abandoned, and the Ceva–Ormea line was used less and less. For this reason, in the year 2014, the operation of the line was discontinued (Fiorani 1996; Notario and Nada 1993).

The present research focuses on the investigation of the stations along the line with the aim of identifying the most suitable assets to be restored and included in the reuse project (Fiore et al. 2016). For this purpose, the stations along the line have been considered as alternatives for the evaluation (Fig. 1).



Fig. 1 The stations along the Ceva–Ormea railway line

3.2 Definition and Evaluation of the Criteria

The first step for the application of the PROMETHEE method consists of defining the evaluation criteria that provide the measure for the impacts of the considered alternatives.

For this purpose, a family of ten criteria has been identified and the criteria have been organized according to the main aspects of the decision problem, namely environmental, social, urban and economic aspects (Table 1). The subsequent step consists of estimating the performance of the alternatives from the point of view of the evaluation criteria and in assigning a preference function with the related thresholds of indifference and preference (q, p) (Brans et al. 1984, 1986) (Table 2).

3.3 Weights' Determination

For the development of the PROMETHEE II method, various decision scenarios were taken into account. The various scenarios reflect the point of view of various actors who face the problem under investigation. For this purpose, in the application of the methodology, personal interviews with experts in various fields and local decision makers were considered (Giordano et al. 2016). In particular, eight actors were considered for the evaluation, including four experts with competences in restoration, history of architecture, archiving and historic document management and economic evaluation, the president of the association for the valorization of the river, the Mayor of the city of Ormea, a representative of the local party and one inhabitant of the valley. In accordance with to the revised Simos procedure (Figueira and Roy 2002), the interviews were carried out through the set of cards methodology that enables setting the criteria weights and determining their

Table 1 Identification and description of the criteria

Issues	Criteria		Description	Unit
Environmental	Quality of landscape	E1	Quality level of the landscape surrounding the main building	5-point scale
	Synergies with the cultural heritage	E2	Number of cultural sites able to provide attractiveness to tourists	No.
	State of conservation	E3	Level of preservation of railway building	5-point scale
Social	Hotels and restaurants	S1	Number of facilities related to catering and accommodation	No.
	Tourist flows	S2	Number of tourists for each municipality served by each railway station	No.
Urban	Availability of adjacent land	U1	Amount of auxiliary space close to the buildings	m ²
	Car mobility	U2	Accessibility and mobility infrastructures in the surrounding area of each building	5-point scale
	Bicycle and pedestrian mobility	U3	Number of existing cyclo-pedestrian trails crossing the municipality	No.
Economic	Availability of adjacent buildings	F1	Amount of additional stock and service buildings in the area	m ²
	Flexibility of spaces	F2	Number of spaces and their versatility, and architectural value level of building	5-point scale

priorities, according to the actors' preferences. The weight values obtained for the various specialists are shown on the axes of the radar charts in Fig. 2. As one can see, all the actors agreed in their consideration of environmental aspects as the most important ones. In particular, the criterion "quality of the landscape" is very valuable for all the people interviewed. On the contrary, the criteria related to mobility factors and to the availability of adjacent spaces are not so important, according to all the actors involved in the evaluation.

3.4 Aggregation

The ranking analysis of the alternative stations was performed using the decision-support software Visual Promethee 1.4 (Mareshal 2008). A look at the PROMETHEE II complete ranking helps us to draw some interesting conclusions. In Fig. 3, the vertical axis represents the weighting index between -1 and 1. It shows the index rate of each alternative, the position of the actions indicating their

Table 2 Input parameters for the impact matrix

	E1	E2	E3	S1	S2	U1	U2	U3	F1	F2
Preference function	U-shape	Linear	U-shape	Linear	U-shape	Linear	U-shape	U-shape	Linear	U-shape
q	2	1	2	1	2	125	2	2	15	2
p	n/a	20	n/a	28	n/a	900	n/a	n/a	200	n/a
Nucetto	Good	8	Very good	6	Not good	1244	Average	Good	154	Very good
Bagnasco	Very good	11	Average	3	Not good	3029	Good	Good	237	Very good
Pievetta	Good	1	Not good	0	Bad	449	Bad	Bad	0	Bad
Priola	Good	6	Bad	4	Not good	1287	Not good	Bad	180	Good
Garessio	Very good	22	Average	7	Good	3154	Very good	Very good	0	Good
Trappa	Good	4	Not good	0	Not good	0	Bad	Not Good	152	Good
Eca-Nasagò	Good	3	Not good	0	Bad	373	Bad	Average	0	Not good
Ormea	Very good	17	Good	28	Very good	2046	Good	Very good	222	Very good

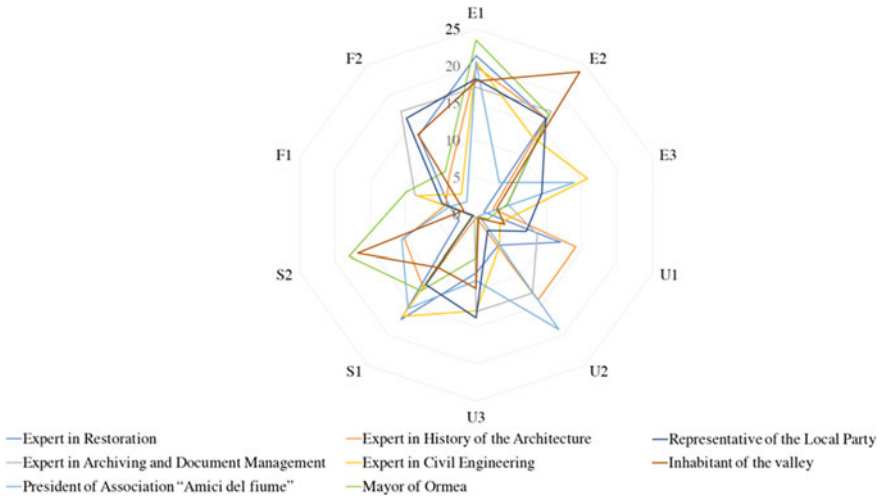
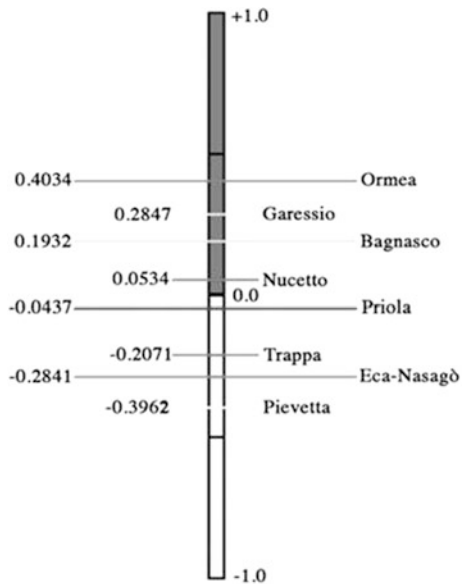


Fig. 2 Sets of weights resulting from interviews with the various actors

Fig. 3 Global ranking resulting from the PROMETHEE application



importance from top to bottom. The aggregation of the PROMETHEE II results indicated that the Ormea station is the most suitable for the restoration, followed by the stations of Garessio and Bagnasco.

Figure 4 shows the final ranking of the alternative strategies with reference to the sets of weights of the various actors. As one can see, the ranking is consistent in all

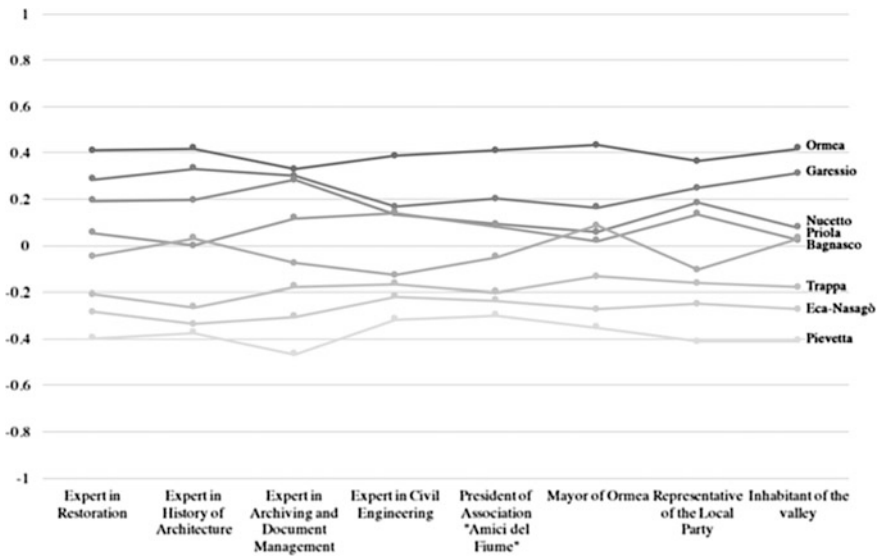


Fig. 4 Ranking comparison of the various actors

the cases, and the stations of Ormea and Garesio are confirmed as the best performing sites to be restored and included in the reuse project of the railway line. According to the results of the evaluation, the stations of Bagnasco, Nucetto and Priola also are worthy of consideration as they place in the third, fourth and fifth position in the actors’ rankings. Moreover, mention has to be made to the fact that the site of Pievezza is classified as the worst alternative of all the considered cases.

4 Discussion and Conclusions

This paper shows how PROMETHEE II method can be used in decision problem related to territorial choices. A revitalization scenario was evaluated using a set of qualitative and quantitative criteria, according to urban, social, environmental and economic aspects (Bottero and Mondini 2009, 2013). In this case, the abandoned railway line between Ceva and Ormea (northern Italy) was considered. The treated scenario was evaluated by taking in consideration the opinion of experts and local stakeholders and decision makers. The project is closely linked to the Italian Abandoned Railway project, which aims to protect disused railways and transform them into a greenway network. From this perspective, the disused railroad tracks represent potential routes for new land use, with decommissioned stations, usually located in strategic locations in the area, providing space for tourist attractions and tourism businesses. The results obtained from the PROMETHEE application identifies the Ormea station as the most suitable to place touristic functions.

As multi-actor analysis shows, the Ormea and Garessio stations best match the preferences of the eight experts.

Future perspectives of the present work could consider a reinforcement of the final result by means of sensitivity and robustness analysis. Further research could also be done by collecting the preferences of inhabitants and tourists for the re-use scenarios using stated preferences methods, such as Choice Experiments (Oppio et al. 2017).

References

- Basteris F (1993) *La ferrovia Ceva-Garessio-Ormea un secolo di sogni verso il mare (1893–1993)*. Gigò Edizioni, Mondovì
- Behzadian M, Kazemzadeh R, Albadvi A, Aghdasi M (2010) PROMETHEE: a comprehensive literature review on methodologies and applications. *Eur J Oper Res* 200:198–215. <https://doi.org/10.1016/j.ejor.2009.01.021>
- Bottero M (2015) A multi-methodological approach for assessing sustainability of urban projects. *Manag of Environ Q: An Int J* 26:138–154. <https://doi.org/10.1108/meq-06-2014-0088>
- Bottero M, Lami IM, (2010) Analytic Network Process and sustainable mobility: an application for the assessment of different scenarios. *J Urban Int Res Placemaking Urban Sustainability* 3(3):275–293
- Bottero MC, Mondini G (2009) *Valutazione e sostenibilità: piani, programmi, progetti*. Celid, Torino
- Bottero MC, Mondini G (2013) Lo studio di fattibilità: evoluzioni normative e recenti sviluppi nel settore delle grandi opere pubbliche. *GEAM* 138:59–70
- Bottero M, Baudino I, Antonelli P (2016) Valutazioni strategiche e Analisi Multicriteri: un'applicazione del metodo PROMETHEE per l'analisi di scenari di rigenerazione urbana. *GEAM. GEOINGEGNERIA AMBIENTALE E MINERARIA* 148:5–16
- Bowitz E, Ibenholt K (2009) Economic impacts of cultural heritage—research and perspectives. *J Cult Herit* 10:1–8. <https://doi.org/10.1016/j.culher.2008.09.002>
- Brans JP, Mareschal B, Vincke P (1984) PROMETHEE: a new family of outranking methods in multicriteria analysis. *Oper Res* 84:447–490
- Brans JP, Vincke P (1985) Note—a preference ranking organisation method. *Manag Sci* 31: 647–656. <https://doi.org/10.1287/mnsc.31.6.647>
- Brans J, Vincke P, Mareschal B (1986) How to select and how to rank projects: the Promethee method. *Eur J Oper Res* 24:228–238. [https://doi.org/10.1016/0377-2217\(86\)90044-5](https://doi.org/10.1016/0377-2217(86)90044-5)
- Farahani RZ, Steadieseifi M, Asgari N (2010) Multiple criteria facility location problems: a survey. *Appl Math Model* 34:1689–1709. <https://doi.org/10.1016/j.apm.2009.10.005>
- Figueira J, Roy B (2002) Determining the weights of criteria in the ELECTRE type methods with a revised Simos procedure. *Eur J Oper Res*. [https://doi.org/10.1016/s0377-2217\(02\)00087-5](https://doi.org/10.1016/s0377-2217(02)00087-5)
- Fiorani D (1996) L'invecchiamento e il degrado. In: Carbonara G (ed) *Trattato del Restauro Architettonico*. UTET, Torino
- Fiore P, Nesticò A, Macchiaroli M (2016) The energy improvement of monumental buildings. An investigation protocol and case studies. *Valori e valutazioni* 16:45–55
- Francis (2015) *Encyclical Letter of the Holy Father Francis on care of our common home*. Vatican Press, Vatican
- Fumagalli N, Toccolini A (2012) Relationship between greenways and ecological network: a case study in Italy. *Int J Environ Res* 6(4):903–916
- Giordano F (1857) *Relazione al Progetto per la costruzione di una strada di ferro da Fossano ad Oleglia*. Tipografia Favale e C, Torino

- Giordano R, Montacchini E, Tedesco S (2016) Living wall systems: toward the environmental and economic sustainability. Research and experimental development. *Valori e valutazioni* 16:25–34
- Marengo M (2012) L'Alta Val Tanaro: modalità e percorsi di costruzione di un territorio montano. In: Le peculiarità territoriali, fra storie e leggende locali. Pacini, Ospedaletto Pisa
- Mareshal B (2008) Multicriteria decision aid. Promethee & Gaia methods, Decision Lab Software
- Mazzanti M (2003) Valuing cultural heritage in a multi-attribute framework microeconomic perspectives and policy implications. *The J Socio-Econ* 32:549–569. <https://doi.org/10.1016/j.socec.2003.08.009>
- Notario P, Nada N (1993) Il Piemonte sabauda. Dal periodo napoleonico al Risorgimento. In: Galasso G, Notario P, Nada N (eds) *Storia d'Italia*. UTET, Torino, pp 239–244
- Oppio A, Bottero M (2017) A strategic management based on multicriteria decision analysis: an application for the Alpine regions. *Int J Multicrit Decis Mak* (forthcoming)
- Oppio A, Bottero M, Ferretti V (2017) Designing adaptive reuse strategies for cultural heritage with choice experiments, *Green Energy and Technology*, pp 303–315
- Penza G (2016) Pope Francis: the Laudato si' encyclical and the urban issue. *Valori e Valutazioni* 17:5–8
- Rebagliati F, Ferro GF, Dell'Amico F (1993) I cento anni della linea ferroviaria Ceva-Ormea (1893–1993). *Dopolavoro Ferroviario*, Savona
- Roy B, Bouyssou D (1993) Aide multicritère à la décision: méthodes et cas. *Economica*, Paris
- Sirchia G (2000) La valutazione economica dei beni culturali. Carocci, Roma
- Toccolini A, Fumagalli N, Senes G (2006) Greenways planning in Italy: the Lambro River Valley Greenways System. *Landsc Urban Plan* 76:98–111

Valuating Historic Centers to Save Planet Soil



**Alessandro Malerba, Domenico Enrico Massimo
and Mariangela Musolino**

Abstract The Encyclical Letter (*Laudato si'*, 2) teaches that Earth cries out because of the harm Humanity has inflicted on her by its irresponsible use and abuse of the Earth goods, such as soil, and it calls people to global ecological conversion in key sectors such as soil to replace consumption as the basis for urban development via new buildings and the consequential pollution of areas and landscape. This research is devoted to answer the encyclical call by conceiving, designing and testing cases of Historic Center treasuring, an alternative to new buildings, additional development and further urban sprawl. This research tries to enhance the process of urban sustainability by the mean of a new methodology for Historic Center that includes total knowledge, analysis, valuation, treasuring and valorization. Attributions: Malerba A. authored § Abstract, 2; Massimo D. E. authored § 3, 4; Musolino M. authored § 1, 5.

Keywords Urban appraisal · Multidimensional valuation · Multi criteria analysis (MCA) · New McaGis · Historic center valuation · Geographic information system

1 Introduction

Historic Centers and districts are strategic resources for town, provinces, regions, countries and Europe. “No one knows” what “ancient cities and districts” (Icomos) are, and where, because of several key gaps of knowledge, as specified below.

First. There is a general lack of knowledge about what (1), how many (2) and where (3) Historic Centers are. Definition (1): taxonomy, census; (2) on the field detection; mapping (3) geographic information systems; all are useful tools to know what, how many and where “ancient cities, neighborhood and districts” are.

A. Malerba · D. E. Massimo (✉) · M. Musolino
Geomatic Valuation University Laboratory (GeVaUL),
Patrimony Architecture Urbanism (PAU) Department, Mediterranean University
of Reggio Calabria, 25 via Melissari, 89124 Reggio Calabria, Italy
e-mail: demassimo@gmail.com; gevaul2@gmail.com

And to help their analysis (4) assessment/valuation. Consequently, their treasuring (5) conservation/preservation. In Europe and in Italy, there is not a clear, shared conceptual definition (1) of Historic Center. Therefore no definition, no census (2)! Ergo, no on the field detection/verification, no list, no exhaustive inventory exists. Nor has the consequent mapping (3) at topographic scale been laid out, concerning site perimeters and boundaries of all historic settlement in countries, regions and provinces.

Second. There is a severe lack of applied comparative analysis about the magnitude of intrinsic and use values embodied in each urban entity. This analysis will be based upon the objective characteristics of each center. Features or characteristics are intended as valuation criteria, so, consequently, Multicriteria Analysis is needed to understand the meaning of historic settlements.

Third. There is no available unified theory, methodology, or shared approach and software tool to perform “comparative qualitative valuation of Historic Center clusters”, based upon the objective characteristics of all entities. Therefore, no unique, hierarchical ranking method (inside center total inventory) exists to prioritize investments or to address the management of consolidated urban structures.

Fourth. Also lacking are shared, unified valuation approaches and updates of the features of technical tools. Any future valuation approach and related software tool will (and must) be updated to be constitute a state-of-art software. Updating would be useful: to better perform future assessments, overcoming the limitation on the number of adopted criteria and alternatives; to work synergetically with further parallel valuation tools and software, e.g., on the Sami platform with AHP&N approaches or Flag Models or others updated MCAs; adopt state-of-the- art computer programming languages; to spatialize and geo reference (on GIS Based Maps) site boundaries and their built in “ancient cities, centers, districts, neighborhoods”; and to share via the web, publications and email.

2 Aim of the Paper

This research and the present paper aim to propose feasible solutions to several problems and the issues just raised about the severe lack of knowledge and management tools concerning Historic Centers, namely, inventory, valuation, treasuring, conservation and preservation. Research studies seek to produce specific methodological and practical answers to each demand in the entire complex sector of “ancient settlement” and its future, with specific focused contributions, as briefly summarized in the following sections.

Research focuses on a complete, real-world, spatial experiment, implementing and testing all designed and proposed solutions on a case study, all based on empirical evidence of documented results. The geographic boundaries of experiment study areas are progressive. They start from the smallest scale of “cultural district” level (a cluster of few towns) and are scalable to provinces, regions and countries.

3 Specific Contributions of the Paper. Methodological Steps

This research aims to explain and test a methodology devoted to the definition, detection, analysis, valuation and a consequent pledge for treasuring Historic Centers.

Step 01. Definition of an Historic Center

A comprehensive review of international and local literature has been performed. There is not a shared definition of “ancient city”, so-called by Icomos, or of “Historic Center”, so-called by Italian Ministry of Heritage. The present research defines its object (Historic Center system), considering first of all the area perimeters/boundaries of village foundations, labeling them as: “sites of historic settlement”. Centers built up in the past within/inside these boundaries are defined only in a scientific, archival way and locating them on historical topographic maps, as well as from forerunner historical demographic data and old censuses.

An historical map is a snapshot of a site’s physical and cultural features at a particular time. Diachronic maps of the same area can show how an area looked before development and provide a detailed view of changes over time (UGS 2017).

Settlements are defined as follows.

- (a) “Historic Centers” before the “Industrial Revolution” (1870s), detected and drawn on the basis of historical topographic maps printed around 1850–1870, or older.
- (b) “consolidated centers” existing before the “Italian industrial miracle” (1960s), detected and drawn on the basis of historical technical maps printed around 1950, or before.

The proposed definition shall be a solution for the first problem of definition.

Step 02. Historic Center complete detection—census

A definition made it possible to perform the second step of the methodology: the complete quantitative census, list, index and numerical account of all Historic Centers (and consolidated centers) existing and having existed within the geographic boundary of the studied site or the area. Given a definition, total detection is possible thanks to the diachronic analysis of historical documents of the last three centuries: overlapping of all existing historical maps of various years, compared with rare, unpublished historical demographic data and previously unknown old censuses. The results of the second Methodological Step 02 is the “total atlas of Historic Centers within a given boundary” (town; county; province; region; country). The proposed and spatial total atlas will be a solution for the second problem of total knowledge, as determined.

Step 03. Analysis: Check Sheet. Multicriteria description

The other side of the coin is the field work for each detected site. The methodology encompasses field-work practice, i.e., the direct analysis for each settlement, conducted on site using a Check Sheet (Ishikawa 1985) for ordinal scoring of several characteristics of the center. The sheet enables an original check of site features and global status of the settlement at the present time. The selection of the few significant characteristics to be analyzed (among a huge number of potential alternatives) is a demanding task, and the choice relies upon scanty existing literature focused on the criteria analysis of Historic Centers. Exiguous literature is articulated in subsequent stages: first Icomos request (1970s–1980s: Icomos 1981); incipient valuation approach set up (1980s: Liechfield 1981; Nijkamp 1981; Therond 1981); first (1980s–1990s: Nijkamp 1988) and second (Massimo et al. 2014a, 2014b, 2014c, 2014d, 2016) scientific experiments; recent revamping of the issue (2010s: Comino et al. 2014; Fattinnanzi and Mondini 2015; Rosso et al. 2014; Stanghellini et al. 2017).

The list of selected site features will be a solution for the third problem raised concerning scientific comparative multicriteria analysis of all Historic Centers.

Innovation and novelty in the present research, with respect to other very recent (Massimo et al. 2014b), and previous (Massimo 1991, 1995) studies, is based on the higher number of characteristics, features or criteria adopted for valuation. Valuation criteria details are in Massimo et al. (2014a, 2014c, 2014d, 2016).

Each appraiser gives a score (an ordinal value) expressing his/her quality appreciation for each valuation criteria of each center. The characteristics or criteria are grouped in four sub cluster or four quality analysis scenarios: insediative; urban/settlement; architectural; cultural/tourist. Here are the 14 criteria:

Insediative scenario: 01. accessibility; 02. location; 03. physical consistency.

Urban/settlement scenario: 04. Original urban characteristics/qualities; 05. urban street quality; 06. urban block quality.

Architectural scenario: 07. construction quality; 08. integrity; 09. front quality; 10. urban squares quality and density.

Cultural/tourist scenario: 11. landscape attractiveness; 12. urban attractiveness; 13. extraordinary monuments; 14. monument density.

Step 04. Appraisal expert panel for deep knowledge and analysis of Historic Centers

Step 04 includes the casting of expert panel (appraiser with education in: appraisal, valuation, urban studies, architecture, art history, economics) and encompasses one of the most interesting step of designed methodology: use of the Check Sheet to score criteria by the designed expert appraiser panel, during on site direct inspection, verification, survey and visit to each historic settlement (Fig. 1).

HISTORIC CENTRE VALUATION. METHOD SELECTION. IMPLEMENTATION STRATEGY

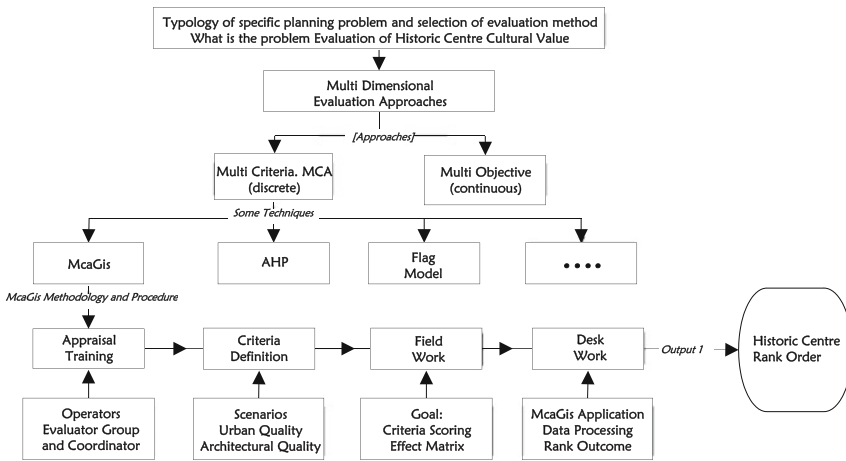


Fig. 1 Multi-dimensional valuation of Historic Centers. Selection of the valuation method

Step 05. “The steps of the valuation that have been developed”

According to Chart 01, the steps of the valuation process (performed by the appraisal expert panel) that has been developed, are the following.

- (a) Appraisal training, to prepare the appraisers for on-site work devoted to qualitative scoring of each center’s features/criteria, using the Check Sheet.
- (b) Criteria training, to well inform the appraisers of the specific criteria adopted for analysis and for on-site valuation of each center’s criteria.
- (c) Field Work or on-site verification, encompassing observation, knowledge, analysis and, finally, criteria scoring. The experts on the valuation panel visited the centers and recorded their scores in an individual matrix supported through the Check Sheet. The heavy field work for criteria scoring must be done without communication or sharing information between the assessors.
- (d) Desk Work, or implementation of new McaGis to derive the Historic Center Qualitative Ranking, i.e., expected final output as specified in Step 06.

Step 06. Results. Score, matrix, ranking

All individual criteria scoring are summed up in the key **Qualitative Effect Matrix** to derive the expected center’s quality ranking. The key innovation of the research is the brand new appraisal approach, engine and software, named together:

McaGis GeVaUL (detailed in: Cefalà and Massimo 2016).

This new updated multi criteria valuation approach, method, math and software tool makes possible these innovations:

- = Better performance of the assessments, overcoming fatal limitations in the small number of alternatives and criteria that previous tools were able to process.
- = Working in synergy with further parallel valuation tools and software, e.g., with Sami platform: AHP&N approaches or Flag Models or future more robust Mca tools.
- = Adoption of state-of-the-art computer programming languages, such as Python.
- = Sharing on the web = publish = email.
- = And, very important, spatialization and geo referencing on GIS-Based Maps of site boundaries and their built-in “ancient cities, centers, districts, neighborhoods”.

With this innovative and updated multicriteria-valuation engine, the **Qualitative Effect Matrix** is processed and the expected final research result is produced:

Historic Center Quality Ranking.

4 Testing the Methodology. The Case Study

Through the new case study, we attempt to answer the most demanding institutional request: to define, detect, select, visit directly, score and rank the most prominent and highest-potential Historic Centers of the whole province of Reggio Calabria, the southern-most of continental Italy. In this province, 202 centers have been detected.

Among the 202, only 27 Historic Centers have been selected by an experimental trans-disciplinary, singling-out or selection procedure and then ranked through the brand new McaGis methodology (Cefalà and Massimo 2016). Key choice in this first and pioneering experiment that implemented the new McaGis is the subdivision of the province into sub-provincial areas called “Cultural Districts”. The latter represent territories having similar cultural identity and geographic homogeneity. Several district might be connected by historic State Routes, overlapping frequently used tourist itineraries, than centers belonging to contiguous different districts shall be analyzed together. In the presented case study, centers of different two districts are assessed together because they belong to the same cultural itinerary of the well-known State Route SS106. The selection procedure, of the most prominent Historic Center, has been based upon several prestigious historical sources.

First. We succeeded in detecting the leading historical function belonging (during the past three centuries) to **28** centers as main village–towns or chief villages—town (“capoluogo”). During the province’s history (1783–1948), of sub-county administrative (non-constituent) territorial sub-division so called: “Mandamento”. The chief villages (or main villages) are the following. 1. Ardore; 2. Bagnara; 3. Bova; 4. Calanna; 5. Casalnuovo; 6. Castelvetero; 7. Cinquefrondi; 8. Gallina; 9. Gerace; 10. Gioiosa; 11. Grotteria; 12. Laureana; 13. Mammola; 14. Melito; 15. Oppido; 16. Palmi; 17. Pedavoli; 18. Polistena; 19. Radicena; 20. Reggio; 21. San Luca; 22. Scilla; 23. Seminara; 24. Siderno; 25. Sinopoli; 26. Staiti; 27. Stilo; and 28. Villa San Giovanni. This list, derived from historical maps and documents, has been compared to other lists created by contemporary researches, as follows.

Second list is the selection of most relevant 14 Historic Centers and 12 Historic Plantations (so-called: 18th century “new settlement towns”) of the province, formulated through the almost 30 years of research in the PAU Department (est. 1989), at Mediterranean University, in the field of Architecture (History; Restoration; Treasuring; Valorization), Conservation, Urbanism. The two sub-lists are the followings. (A) 14 prominent Historic Centers: 1. Bova; 2. Brancaleone Superiore; 3. Caulonia; 4. Galliciano; 5. Gerace; 6. Mammola; 7. Palizzi; 8. Pentadattilo; 9. Reggio Calabria; 10. Roghudi Vecchia; 11. San Giorgio Morgeto; 12. Scilla; 13. Siderno Superiore; 14. Stilo. (B) 12 18th century new settlement towns: 1. Bagnara; 2. Bianco; 3. Cittanova; 4. Fiumara di Muro; 5. Gallina; 6. Oppido Mamertina; 7. Palmi; 8. Polistena; 9. Reggio; 10. Sant’Eufemia d’Aspromonte; 11. Seminara; 12. Taurianova.

The third list has been extracted from the draft of Calabria Regional Government Spatial Plan. The list contains for the province a typological taxonomy of 27 relevant Historic Centers, as follows. Two with the highest urban relevance: 1. Gerace; 2. Stilo. Eight of high urban relevance: 1. Bagnara; 2. Bova; 3. Brancaleone (S); 4. Caulonia; 5. Gioiosa Ionica; 6. Grotteria; 7. Mammola; 8. Siderno (S). Just one of medium urban relevance: Roccella Ionica. Twelve are the probable new settlements after earthquakes on 1638 (moment magnitude scale = 6.6 mm), 1783 (6.9 mm), 1905 (7.1 mm), 1908 (7.1 mm): 1. Cinquefrondi; 2. Cittanuova 3. Gioia Tauro; 4. Laureana di Borrello; 5. Locri; 6. Oppido Mamertina; 7. Palmi; 8. Polistena; 9. Reggio Calabria; 10. Rosarno; 11. Sant’Eufemia d’Aspromonte; 12. Siderno Marina. Four with strong emotional landscape and perceptive value: 1. Canolo; 2. Pentadattilo; 3. Roghudi; 4. Scilla.

On final list, there are 27 Historic Centers included in both Table 1 and Figs. 2 and 3.

The new, rigorous McaGis methodology has been applied relying on well-trained, highly skilled, motivated, experienced and very capable valuation teams.

Table 1 The qualitative effect matrix

N	Criteria centers	01. A1.	02. A2.	03. A3.	04. B1.	05. B2.	06. B3.	07. C1.	08. C2.	09. C3.	10. C4.	11. D1.	12. D2.	13. D3.	14. D4.
01	Ardore	2	3	3	2	2	2	3	2	2	3	1	2	2	2
02	Bagaladi	3	2	3	2	3	2	2	2	2	4	2	2	3	3
03	Bova	3	4	4	4	4	4	4	3	3	3	3	4	4	5
04	Caulonia	3	4	3	5	4	4	4	3	3	4	3	3	3	4
05	Chorio	4	3	3	3	2	2	2	2	2	3	2	2	1	1
06	Condofuri	2	3	4	1	3	1	2	1	1	2	1	1	1	1
07	Fossato	2	2	4	1	3	3	2	1	1	2	1	2	2	2
08	Galliciano	3	4	1	3	3	2	4	3	3	4	5	4	4	2
09	Gerace	3	5	5	5	5	5	5	4	5	5	4	4	5	5
10	Grotosa	4	3	4	4	3	3	3	3	3	3	3	2	3	3
11	Grotteria	2	2	2	1	1	1	1	1	1	2	3	1	1	1
12	Locri	4	2	3	2	4	2	3	2	2	3	1	2	4	2
13	Mammola	4	4	4	3	3	3	4	3	3	2	3	2	3	3
14	Melito	4	3	4	3	3	2	2	2	1	2	2	3	2	3
15	Montebello	3	3	3	2	3	1	3	2	2	1	2	2	1	1
16	Palizzi	2	3	4	3	2	3	3	2	2	2	5	2	3	3
17	Pentidattilo	4	4	2	2	2	3	4	2	2	1	5	2	4	2
18	Pietrapennata	2	2	2	3	2	1	2	1	1	2	2	2	2	1
19	Roccaforte	1	3	2	3	2	2	2	2	2	1	2	2	1	1
20	Roccella	4	3	5	1	2	1	3	1	2	3	2	1	3	3
21	Roghudi Vecchio	1	3	1	3	2	2	2	3	2	2	4	3	1	1

(continued)

Table 1 (continued)

N	Criteria centers	01. A1.	02. A2.	03. A3.	04. B1.	05. B2.	06. B3.	07. C1.	08. C2.	09. C3.	10. C4.	11. D1.	12. D2.	13. D3.	14. D4.
22	San Lorenzo	3	2	2	3	2	2	3	2	2	1	2	3	3	2
23	San Luca	1	2	2	1	1	1	2	1	1	2	2	1	3	1
24	San Pantaleone	3	2	3	1	2	1	2	2	2	2	1	1	1	1
25	Siderno	3	2	2	2	2	2	4	3	3	2	1	1	2	3
26	Staiti	2	2	4	4	3	2	2	1	1	3	2	2	4	2
27	Stilo	2	4	3	4	3	4	5	4	4	3	3	2	5	5

Calabria Region. "Grecanica" and "Locride" two districts. Multi criteria valuation of Historic Centers. Expert panel scores

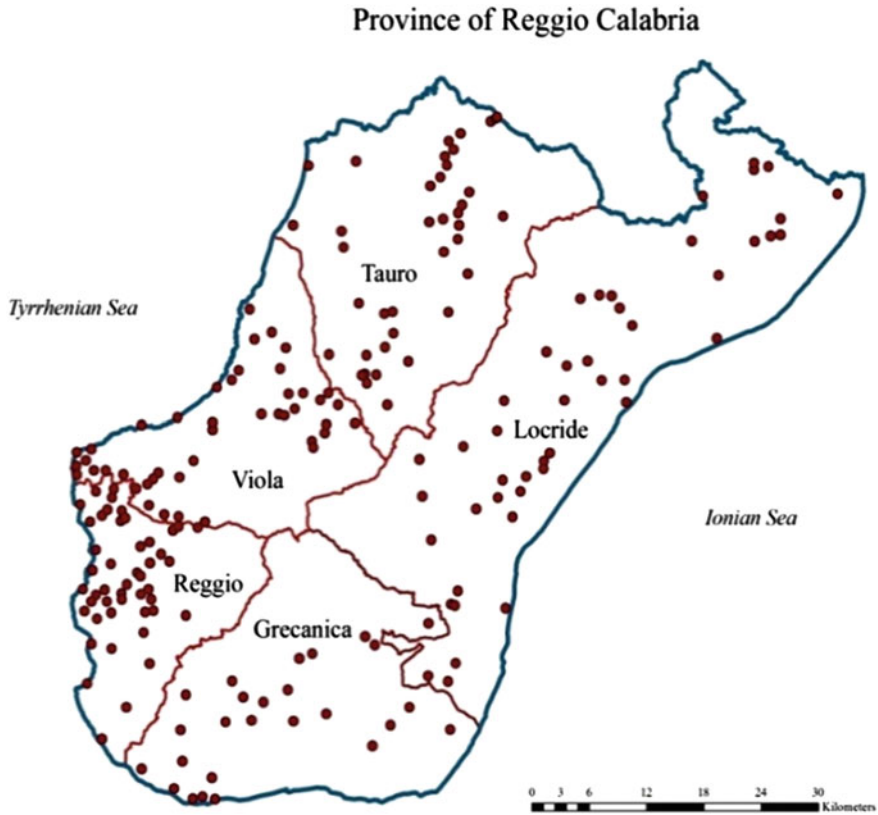


Fig. 2 Reggio Calabria province. Detection of a total of 202 Historic Centers. [Five Cultural Districts: 1. Tauro; 2. Locride; 3. Viola; 4. Reggio; 5. Grecanica]

The demanding on-site tour enabled both the scoring according to methodology and a related innovation. This is the checking with the written report and picture documentation about the blight and decay of settlements and their architectures. This is the first documented monitoring act following analytic and evaluative research.

A demanding tour was performed to accomplish the field work, including conservation documentation and assessment, as well as McaGis scoring of each settlement for each criterion, for two, jointly assessed sub-provincial districts.

In the present paper, two Historic Center districts (Locride, East; Grecanica, South) are assessed together and not in an autonomous way. It is interesting to compare the results and rankings of this novel, jointly with the combined McaGis valuation. The first outcome of the new McaGis software procedure is the sum of all

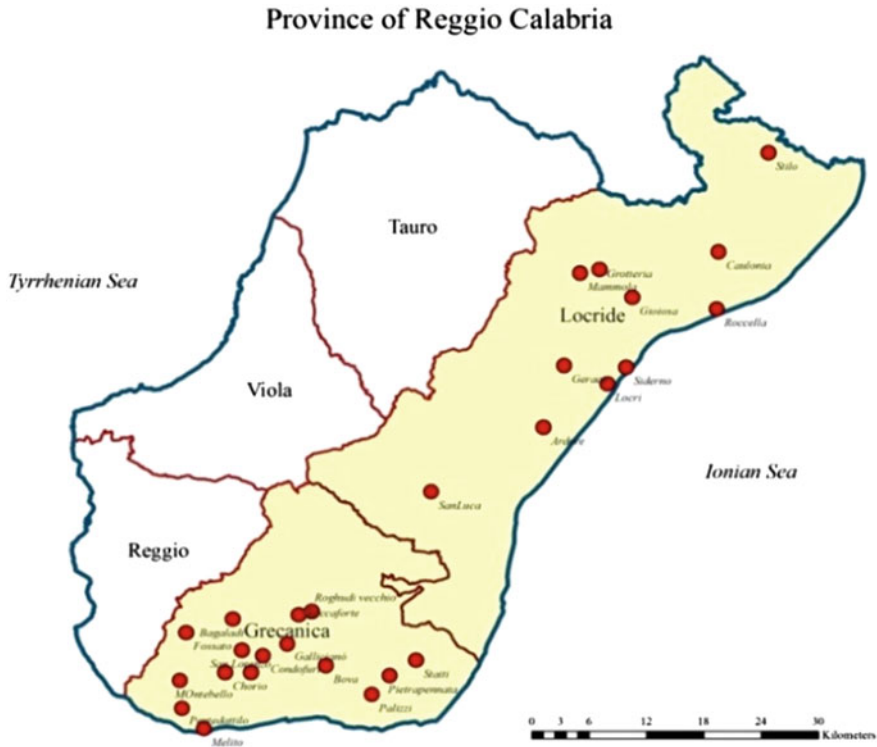


Fig. 3 Reggio Calabria province. Selected of 27 leading Historic Centers connected through State Route SS106 in two contiguous districts: Locride and Grecanica

scoring for each appraiser in the qualitative effect matrix, run separately and autonomously (by each appraiser), then merged with partial results in a unified Qualitative Effect Matrix. In fact, the software runs the autonomous Qualitative Effect Matrices and then the main unified Qualitative Effect Matrix.

The final outcome of the new McaGis is the ranking of all Historic Centers according to the scoring activity of the panel.

Three centers— Gerace, Bova and Stilo—emerged as the highest quality settlement, as displayed in Table 2 (Fig. 4).

Table 2 Case study

N	Historic Centers	Rank McaGis	Score McaGis	N	Historic Centers	Rank McaGis	Score McaGis	N	Historic Centers	Rank McaGis	Score McaGis
01	Gerace	1	1000	10	Melito	10	0527	19	Roghudi	19	0244
02	Bova	2	0917	11	Locri	11	0436	20	Montebello	20	0230
03	Sfilo	3	0892	12	Bagaladi	12	0380	21	Fossato	21	0182
04	Caulonia	4	0864	13	San Lorenzo	13	0354	22	Roccatorte	22	0101
05	Galliciano	5	0762	14	Roccella	14	0371	23	Pietrapennata	23	0098
06	Mammola	6	0724	15	Chorio	15	0365	24	San Pantaleone	24	0044
07	Gioiosa	7	0714	16	Siderno	16	0326	25	Condofuri	25	0032
08	Palizzi	8	0586	17	Ardore	17	0314	26	San Luca	26	0022
09	Pentedattilo	9	0583	18	Staiti	18	0262	27	Grotteria	27	0004

Province of Reggio Calabria. Joint valuation of Historic Centers in Locride and Grecanica districts

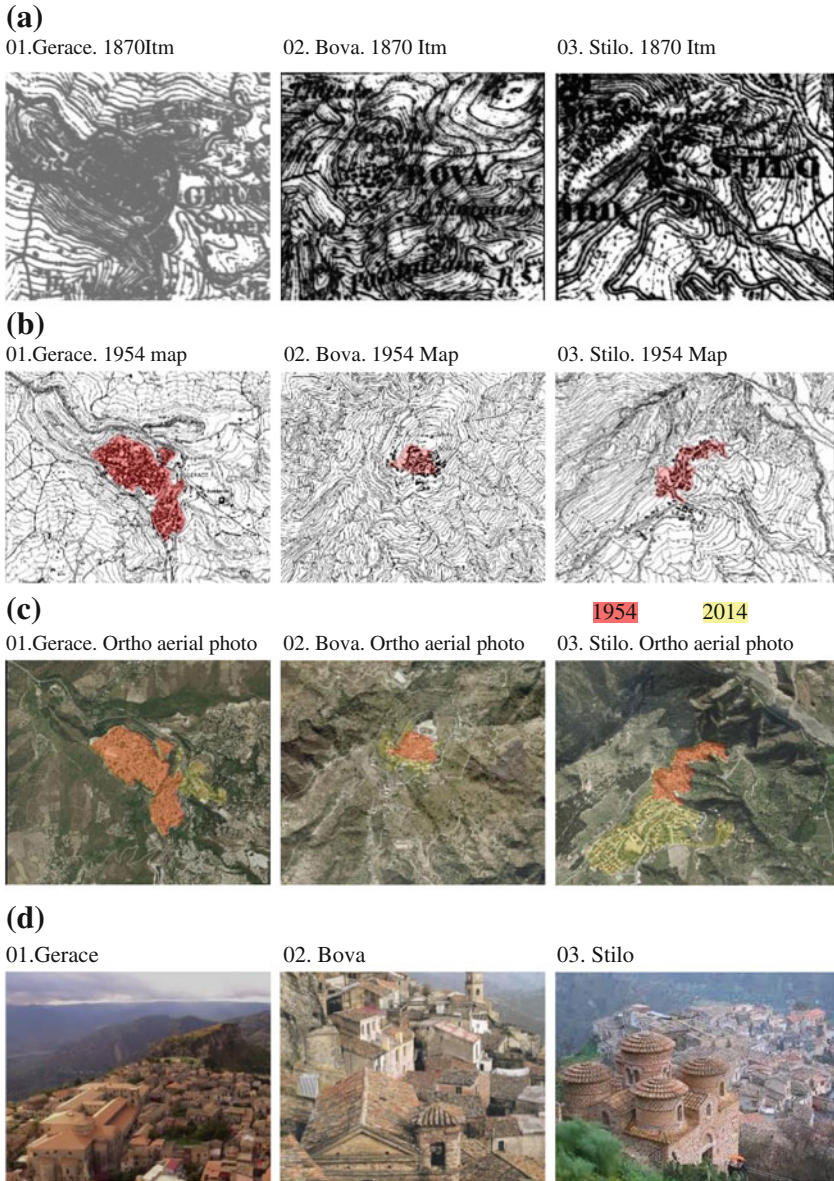


Fig. 4 Case study. Province of Reggio Calabria. “Historic Centers”. The three highest ranked centers using the new McaGis. **a** 1870 Itm military map. Visualization Scale 1:50.000. **b** 1954 Technical map. Visualization Scale 1:50.000. **c** Aerial ortho photo views. Visualization Scale 1:50.000. **d** Pictures

5 Conclusions

A specific methodology has been designed to enable a research team to produce, simultaneously: a systematic “Atlas of Historic Centers” based on objective data; a multi-dimensional valuations performed with a defined path and, specifically, with a brand new McaGis tool. The expected final output gives a hierarchical ranking of Historic Centers, useful to set-up revitalization policy and strategy. The main and new case study is the direct answer to the institutional request and demand to detect and rank the most prominent and highest-potential Historic Centers of a whole province. Of the 202 detected centers, only the most prominent 27 were selected, then, as first step, the Historic Centers of two districts were jointly ranked through the new McaGis methodology and software. Urban policies plan the re-use of historic villages for compatible tourism activities, bio-agriculture centers and small historic towns, as productive services. These serve as key alternatives to further metropolitan development, new buildings, sprawl, soil destruction and additional landscape contamination. The point is to precisely set-up a hierarchical or ranking valuation of all historic villages that compares them in the specific case study. Multicriteria valuation has a strategic relevance. It is the basis for decision making about priorities of intervention for settlement revitalization. It is positively advisable, in a “pull-in” strategy, to take action starting with the strongest Historic Centers where the positive impacts of interventions will be the fastest and most effective. Therefore, they will pull-in other small Historic Centers, in cluster interaction, toward further revitalization. The research output is the cited global rankings based upon exhaustive knowledge about the number of Historic Centers, linked to a systematic Multicriteria valuation, based on their characteristics. In conclusion, the results of the present case study seem to be reasonably consistent when compared to rational heuristic expectations. Finally, the set-up of such a methodology made possible and easier future monitoring, over time, of the features, characteristics and quality level of Historic Centers. This follow-up will make possible examining the positive or negative impacts over time of four agents: nature acting on building; the unavoidable decay from ageing of building materials; owner-maintenance actions; and bad or good public interventions. The system has been validated, used in experiments and revised, then adopted by the institution as a prototype Gis, McaGis and WebGis for knowledge, preservation, conservation and the treasuring of Historic Centers.

References

- Cefalà R, Massimo DE (2016) New McaGis. GeVaUL (Geomatic Valuation University Laboratory), Mediterranea University, Reggio Calabria, Mimeo
- Comino E, Bottero M, Pomarico S, Rosso M (2014) Exploring the environmental value of ecosystem service through a spatial multi criteria analysis. In: Land Use Policy, vol 36, pp 381–395. ISSN 0264-8377

- Fattinnanzi E, Mondini G (2015) *Analisi Multicriteri tra valutazione e decisione*. Dei, Roma. ISBN 9788849644319
- Icomos (1981) *Economic analysis for choosing priorities in a conservation strategy*. Mimeo, Icomos, Naples
- Ishikawa K (1985) *What is total quality control?*. Prentice-Hall, Englewood Cliffs, NJ
- Liechfield N (1981) *Economic analysis for choosing priorities in a conservation strategy*. Mimeo, Icomos, Napoli
- Massimo DE (1991) *Environmental and historic preservation, economic development, social decision analysis*. Master thesis proposal. Department of Economics Department of Urban Studies and Planning. Massachusetts Institute of Technology, MIT. Cambridge, MA
- Massimo DE (1995) *Heritage conservation economics: a case study from Italy*. In: Coccossis H, Nijkamp P (ed) *Planning for our cultural heritage*. Avebury, Aldershot (England)–Brookfield (USA)–Hong Kong–Singapore–Sydney, pp 171–189
- Massimo DE et al (2014a) *Landscape and settlements. Historic center qualitative and quantitative valuation*. *Agribus Paesaggio Ambiente* 17:51–64; Online ISSN: 2038-3371; Print ISSN: 1594-784X
- Massimo DE et al (2014b) *Landscape quality valuation for its preservation and treasuring*. *Adv Eng Forum* 11:625–633
- Massimo DE et al (2014c) *Landscape and comparative valuation of its elements*. In: *Agribusiness, Paesaggio & Ambiente*, vol 17/2014, pp 55–61. Web of Sciences: 000399691400005, ISBN:978-88-942329-0-5, ISSN Online: 2038-3371
- Massimo DE et al (2014d) *MCA in valuation supporting landscape planning decisions*. In: Mondini G, Bottero M (eds) *Analisi multicriteri, valutazione, processi decisionali*. Dei Edizioni, Roma
- Massimo DE et al (2016) *Landscape and sprawl. Diachronic quantitative assessment*. In: *Agribusiness, Paesaggio & Ambiente*. Collana: Il mosaico paesistico-culturale. Book series: The Landscape-cultural Mosaic, vol III, pp 301–312
- Nijkamp P (1981) *Ancient cities in transition: a socio-economic evaluation framework*. Mimeo, Icomos, Napoli
- Nijkamp P (1988) *Culture and region: a multidimensional evaluation of monuments*. *Environ Plan B* 15:6–15
- Rosso M, Bottero M, Pomarico S, La Ferlita S (2014) *Integrating multi criteria evaluation and stake holder analysis*. In: *Energy policy*. vol 67. Elsevier, April 2014, pp 870–881
- Stanghellini S, Morano P, Bottero M, Oppio A (2017) *Appraisal: from theory to practice*. Springer, Berlin
- Therond D (1981) *Economic aspects of conservation*. Mimeo, Icomos, Napoli
- United States Geological Service (2017) *Historical topographic maps, preserving the past*. Washington, DC

An Integrated Assessment Model on Local Aptitudes for Green-Energy Self-sustainability



Maria Fiorella Granata and Filippo Gagliano

Abstract The Encyclical Letter *Laudato Si* of the Holy Father Francis on “Care for our Common Home” holds human society responsible for the achievement of a fairer world, through research into solutions to environmental problems and a moderate and efficient use of nonrenewable resources. It recalls that energy usage is one of the major factors of environmental pressure and shares the crucial questions of current European and international energy policies. In Italy, for the electric sector, energy policy requires the increase of energy production by renewable sources and the development of a transmission grid able to support a diffused and non-programmed production of electrical energy (a smart grid), as it is the case for energy production through photovoltaic power stations near the consumption centers. In this line, the present paper proposes an evaluation model for verification of local aptitudes for green-energy self-sustainability based on the use of photovoltaic technology built on surrounding, abandoned agricultural land. The model combines the analysis of geo-referenced data, elaborated by the GIS tool, providing knowledge of the territory and the verification of technical feasibility of the diffused power stations, and financial analysis of the project. The application of the model to a case study confirms that it could be useful for local governments in planning energy self-sustainability interventions and in the negotiation phase of project financing.

Keywords Integrated evaluation · Solar rent · Energy self-sustainability
Periurban areas · GIS · Renewable energy · Financial feasibility

M. F. Granata (✉) · F. Gagliano
Department of Architecture, University of Palermo, Palermo, Italy
e-mail: maria.granata@unipa.it

F. Gagliano
e-mail: fmgagliano@gmail.com

1 The Energy Question in the Encyclical Letter *Laudato Si*

The Encyclical Letter *Laudato Si* recalls human society to its responsibility for the achievement of a fairer world. This moral question does not require a merely economic intervention, since the world is a whole entity in which interconnections among human activities, social, culture and natural systems do exist (Francesco 2015, § 6 and Fusco Girard et al. 2014). As the degradation of natural environment and the overconsumption of natural resources have serious consequences on human life, it reminds us that finding solutions for environmental problems is a compulsory course (Francesco 2015, § 110).

Among the various negative effects deriving from the imbalanced relationship between human societies and the environment, the global warming and the consequent climate change particularly are worrying, since their effects have repercussions on socioeconomic systems all over the world, mainly damaging people lacking in economic means to adapt themselves to extreme climate impacts (Francesco 2015, § 25; IPCC 2014). A moderate and efficient use of nonrenewable resources is required in order to limit the negative climate phenomena (Francesco 2015, § 26), contrast the growing “Decline in the quality of human life” (Francesco 2015, Chap. IV, Sect. IV) and the “Global inequality” (Francesco 2015, Chap. IV, Sect. V) and aid “Justice between the generations” (Francesco 2015, Chap. IV, Sect. V).

Analogously, the impacts on human health and quality of life and climate change—with its distributive impacts on poor populations and its damaging effect on rural, natural and urban areas (heat waves, extreme precipitation and storm events, inland and coastal flooding, landslides, increased drought and water scarcity) (IPCC 2014)—are the foundation of international energy policies (United Nations 2015), together with the need to combat and handle the critical issues related to energy supply in many countries (International Energy Agency 2015).

The global nature of the ecological challenge requires a common effort, since isolated actions of single countries are not enough (Francesco 2015, § 164). But, although the complexity of the energy question passes over the possible contribution of single communities, an effective opposition to greenhouse emissions requires the participation of all (Francesco 2015 § 219).

The same perspective is assumed in the present work focusing on the possibility that the numerous towns with low energy consumption can contribute to the cut in non-renewable energy production by an accessible effort. In particular, we propose an integrated evaluation model to define projects for self-sustainability of the territory on a town scale, using abandoned agricultural or at-risk-of-forsaking lands for the installation of photovoltaic power stations. The model integrates a technical analysis, based on a Geographical Information System (GIS) tool and on multi-criteria analysis, and a financial feasibility analysis.

2 Normative and Theoretical References on the Energy Question

Although the need for a global commitment of all nations of the world has been proclaimed since 1972 (United Nations 1972), as yet, the energy policies adopted did not prove capable of confronting efficaciously the climate-change phenomenon that is still a current object of international policies (United Nations 2015).

The Encyclical Letter *Laudato Si* is consistent with recent European and international energy policies, whose main objectives are an increase in the use of renewable energy, greater efficiency of the energy system (European Union 2011) and the reduction of greenhouse-gas production to levels within the Earth's carrying capacity (United Nations 2015).

Most European countries adopted national energy policies in compliance with these directives. For example, the Italian energy policy, which is fixed by the National Action Plan for Renewable Energy (2010) and the National Energy Strategy (SEN) (2013), requires increasing recourse to renewable energy sources and the development of a transmission grid able to support diffused and nonprogrammable production of electricity (smart grid), as is the energy obtainable from photovoltaic power stations nearby the consumption centers.

As already stated, the present work proposes an evaluation model for technical and financial definition of plans for municipal electric self-sufficiency based on the use of photovoltaic technology. The focus on electric power derives from the fact that in many countries the gross production of this kind of energy is still obtained using thermoelectric power stations fed with fossil sources. For example, in Italy, traditional power stations produce about 61% of electric power (Ministero dello sviluppo economico 2016). The proposed evaluation model supports the design of energy self-sufficiency projects and participates in the broad field of experimentation on local energy planning (Patlitzianas and Christos 2011; De Mare et al. 2013; Morano et al. 2015) and integrated evaluations.

Integrated evaluations are recognized as tools able to consolidate fundamental knowledge for design and planning on various geographical scales (Ravetz 2000; Bammer 2005; Lee 2006; Mondini 2009; Fusco Girard et al. 2014) according to three main interpretation: an overall assessment of economic, social and environmental impact ("horizontal integration of assessments"); a use of previous evaluation findings regarding decision making in the planning process ("integration of assessments into decision-making"); and a joint use of distinct assessments undertaken at various stages of the project/planning process ("vertical integration of assessments") (Lee 2006). Integrated assessments have been widely used in various fields and sometimes in conjunction with spatial analysis, to support planning and design decisions (Fusco Girard and De Toro 2007; Cerreta et al. 2012; Ferretti et al. 2014; Oppio et al. 2015; De Mare et al. 2015; Leman et al. 2016). In particular, energy-related integrated assessments have concerned multi-regional, long-term energy planning (Koltsaklis et al. 2015), the management of life cycle CO₂ emissions from a building (Roh and Tae 2017), a solar-thermal electricity project

(Rodríguez-Serrano et al. 2017), a small rooftop PV-grid-interconnected energy system (Sagani et al. 2017), an energy-supply system for an energy-efficient building (Džiugaitė-Tumėnienė et al. 2017), the photovoltaic power stations in comparison to other electricity-production technologies (Lo Piano and Mayumi 2017), and the analysis of several energy-system variants for urban communities energy self-sufficiency based on renewable-energy resources (Petersen 2016). In this paper, electric self-sufficiency of small towns based on photovoltaic power stations in surrounding rural areas with low rental costs is dealt with.

Towns located in areas with a high “solar rent” (Granata 2010; Granata 2014), that is an original and natural energy endowment of the place, and whose economies have a low energy demand, can easily achieve a great local production of energy from renewable sources. We propose the photovoltaic use of agricultural lands with a very low cadastral income but a high “solar rent” as a possible contribute to the achievement of the more sustainable word hoped by the Encyclical Letter *Laudato Si* (Francesco 2015 § 13 and 18).

Due to the low entropic impact of its life cycle (Coiante 2004), photovoltaic technology is compatible with the critical role that the second law of thermodynamics plays in the economic context (Georgescu-Roegen 1971; Daly 1974), in the system of values of sustainability (Rizzo 1999) and in the conservation of natural capital, whose services are essential for human life and economy (Costanza et al. 1997). Furthermore, local energy production by renewable sources commensurate with the needs of the settled community respects the fundamental principle of self-sustainability (Fusco Girard and Nijkamp 1997). It also increases the energy efficiency and the local energy independence; preserves the functions of soil in natural cycles; does not generate irreversible transformations of the soil (Coiante 2004); and creates a new form of positive dependence of urban areas on the agrarian ones (Lo Piccolo 2009).

3 The Proposed Assessment Model on Local Green-Energy Self-sustainability

In consideration of the above recalled spiritual, normative and scientific references, an integrated assessment model on local aptitudes for green-energy self-sustainability is proposed. The evaluation model, on a municipal scale, is aimed at giving technical and financial information for the design of a diffused power plant for the local self-production of energy requirements by photovoltaic technology. It concerns the use of a part of agricultural lands, characterized by a very low cadastral income, for the installation of photovoltaic power plants, consistent with the constraints in force.

The model is articulated by the following phases.

1. Assessment of the local demand for energy. The electric energy demand is estimated on the basis of statistical data on economic and residential sectors and

on the needs of public buildings. The energy demand for the transport of people and goods has been ignored, since the conversion to the electric source would require the replacement of the entire fleet of vehicles.

2. Definition of the technical criteria for the choice of rural areas that can be used for solar-power plants. There are ambient context constraints, which are the technical criteria proper to territorial planning and engineering technical criteria connected to the installation of photovoltaic power stations.

The ambient context constraints adopted are those prescribed by the Italian Ministerial Decree, September 10, 2010 entitled “Guidelines for the authorization of plants powered by renewable sources”. The legislator establishes the criteria for the exclusion of areas in order to limit the consumption of fertile agricultural land and/or intended for specialty crops, to ensure hydro-geological safety and to protect the historical, archaeological, artistic and cultural heritage and the landscape.

After identifying a first set of suitable rural lands on the basis of the ambient context constraints (low-fertility/profitability and lack of hydro-geological, archaeological, historical, artistic, cultural and landscape bonds), relevant technical engineering criteria will be used to discern among them the most suitable lands for photovoltaic energy production. The engineering technical criteria adopted in the proposed model are the availability of solar radiation corresponding to the local geomorphology and the distance from the local system of the electricity-network infrastructure. The former affects the energy production of photovoltaic plants, while the latter influences the cost of connection of plants to the electric grid.

3. Analysis of the local rural land, aimed at the identification of suitable areas from the point of view of the ambient context. This analysis is carried out using a cognitive model based on the use of geo-referenced data processed by the GIS tool. The territory is analyzed in the light of the ambient-context constraints, related to landscape and to ecological, hydrological, productive and agro-cultural factors. The critical lands can be filtered out by the analysis of these constraints, enabling the analyst to identify a set of “suitable areas”.
4. Application of a multi-criteria procedure on suitable areas for their further selection on the basis of the abovementioned technical factors relevant to the installation of photovoltaic plants. The overall engineering technical performance of the first set of “suitable areas” is assumed to be the weighted sum of the marginal performances with respect to the relevant criteria that are distances from existing energy infrastructures and the micro-local levels of solar irradiation. The overall engineering technical performances of areas assign a ranking of the set of suitable areas. Geo-referencing of ambient-context constraints, together with consideration of technical characteristics of the territory and the structure of the existing electric grid, provide the necessary knowledge to identify the “most suitable areas” for the installation of photovoltaic plants to fulfill the local demand for energy.

5. Qualitative assessment of selected areas in light of the inter-visibility criterion. The current process of construction of new “energy landscapes” (Angelucci 2011) outlines the need for specific evaluation instruments for the design of energy exploitation of lands, reflecting awareness of the dependence of landscapes by energy innovations. The inter-visibility analysis is intended to exclude areas with a high level of visual exposure from the use of photovoltaic energy production. Areas identified and ranked on the basis of the above described process will be used for photovoltaic plants installation only if they meet the low inter-visibility requirement.
6. Financial pre-feasibility analysis. It analyzes economic and financial aspects related to the system of photovoltaic plants for the energy self-sufficiency of towns. It is aimed at clarifying the economic and financial sustainability of photovoltaic plants installed in the areas identified by the previous process. For this purpose, a computerized sub-model for financial analysis must be implemented. It applies the Discounted Cash Flow Method. Net cash flows generated by the project in the various periods of time are used to calculate several profitability indicators (Net Present Value, Internal Rate of Return, Discounted Pay Back Period). The preliminary financial analysis is accompanied by a sensitivity analysis in relation to the financing structure. It creates the basic knowledge for the determination of: the actors who may be involved in the operation (private lenders, financial institutions, companies, local governments) (Stanghellini and Copiello 2011); the financing structure of the project; and the business plan of the project (Caselli and Gatti 2005).
7. Assessment of the avoided production of CO₂ that is recognized as one the main greenhouse gases. It supplies a measure of the environmental benefit of the electric self-sufficiency project.
In short, the model permits the identification of suitable rural areas for the achievement of a total or, eventually, partial energy self-sufficiency of users in a given town. At the same time, these areas must fulfill the requirements of a low land rent, suitability according to the technical criteria of territorial planning, low visibility and technical suitability for energy power photovoltaic plants. Technical analysis is integrated by a financial pre-feasibility analysis and an assessment of the avoided production of CO₂.

In Sect. 4, the assessment model proposed is tested in a real case.

4 The Case Study

4.1 *The Town Studied and Estimation of Local Demand for Energy*

Motta Sant’Anastasia is a town in the province of Catania (Italy) covering about 3,550 ha. Surrounding the built-up area, there are extensive agricultural lands partly

abandoned and partly occupied predominantly by olive groves and citrus orchards. The town is located in a geo-climatic region very suitable for the use of photovoltaic technology and also presents a high risk of abandonment of agricultural lands.

The town's demand for electric energy was estimated on the basis of statistical data (source: ISTAT—Business Census, ATECO 2007). The annual quantity of equivalent electric energy employed in the economic and residential sectors of the town amounts to 44,454,428 kWh. The annual energy demand by the municipal administration was quantified on the basis of the values identified in 2011, indicated as typical ones by the local competent office. The consumption of electric energy, natural gas and diesel fuel in the municipal nursery, schools and town halls was estimated from data on energy costs and converted in kWh (conversion factors by UNI 10389). The annual energy consumption of the municipal administration summed up to 1,321,954 kWh. The total electricity needs of the entire municipality amount to 45,776,382 kWh.

At present, the town is equipped with photovoltaic systems for 1,820.55 kW rated power (source: GSE-Atlasole, 31 July 2013). The average annual electric energy they produce is estimated conservatively in 2,520,000 kWh. Considering that the annual global radiation on the horizontal surface in the local area is equal to the conservative value of 1,630 kWh/m² (source: ENEA-Atlante italiano della radiazione solare) and typical values of the efficiency of photovoltaic modules (12.5%) and BOS (85%), the energy produced by a 1 kW plant is about 1,385.5 kWh/kW. Therefore a total capacity of about 33,040 kW must be installed. These facilities cover about 65 ha, which could be reduced considering the contribution of PV plants already installed in the town.

The analysis of the local land (Sect. 4.2) was designed to verify the presence of sufficient areas that meet the prearranged technical and ambient context criteria.

4.2 Identification of Suitable Areas for Photovoltaic Systems and Quantification of Some Technical Factors Through the GIS Tool

A study of the territory of Motta Sant'Anastasia, aimed at identifying potential suitable areas for installing photovoltaic systems on the ground, was made using the GIS tool. It employed spatial analysis (Burrough 1986) that considered: abiotic and biotic components of the landscape; historical, artistic and cultural heritage; protected and agricultural areas; hydro-geological bonds; and impacts on productive agricultural activity and on the landscape. These territorial components are contained in the GIS geo-database both in vector format and in raster format, geo-referenced in the system of Gauss-Boaga EST zone with map projection Monte Mario Italy 2 (according to the census of the European Petroleum Survey Group) for processing with the GIS tools.

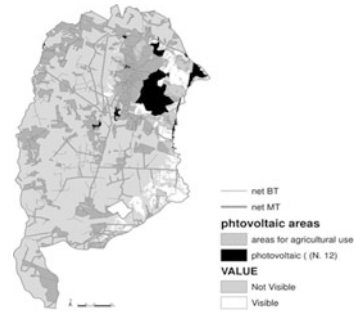
The Department of Energy of the Sicily Region prepared maps of suitable and not suitable areas for the construction and operation of renewable energy plants throughout the region, in accordance with the Ministerial Decree on September 10, 2010 (<http://www.arcgis.com/home/search.html?q=owner%3AosservatorioEnergia&focus=all>). The overlap of these areas with data from the Landscape Plan of Catania approved by the Superintendence for Cultural Heritage, used by the GIS system proposed, showed that the not suitable areas do not accurately reflect the environmental and landscape constraints of the landscape plan, but includes the only level of constraint on the national scale. It was decided to complete the data for the bond landscape.

The exclusion criteria adopted in the proposed study include the areas subject to landscape bond, the areas identified in conformity with the article no. 142 of the Legislative Decree 42/2004 and subsequent amendments, the Important Bird Areas, the areas included in the Nature 2000 network (Sites of Community Importance and Special Protection Areas), the areas prone to hydro-geological constraints and their buffer zones, the built-up areas and the roads. In addition, the factors of the slope of the terrain (Slope), orientation of the ground (Aspect) and solar radiation on inclined surfaces were analyzed. They were calculated from a digital terrain model (DTM) appropriately created with a pitch of 2 m, importing the coordinates x, y, z of the land from ASCII files, the standard format used to convert the information in geo-referenced raster format. The choice of the size of the elementary cell (2×2 m) enables the achievement of very accurate results: the extensions of the involved surfaces can be evaluated by the values of analysis counting the differentiated cells.

In relation to land use, only lands classified as arable ones, pastures and agricultural fallow-abandoned land have been taken into account. These areas, of various sizes, are located in the municipal region with respect to the natural boundaries (roads, bridges, buffer zones of rivers etc.), and then they can be used in full for the purposes of the present work. Through the spatial analysis conducted with the GIS tool, the bounded lands and the areas that have a high degree of naturalness were excluded from the potential areas. On the basis of the ambient criteria, a first set of 204 areas was selected, with a total surface amount of 1284 ha.

As input variables, the GIS uses location (latitude, longitude), slope of the land and orientation of the land on planes oriented to the south to calculate potential total annual solar irradiance on inclined surfaces and creates a raster map with the value of irradiation measured in MJ/cm^2 per annum for each cell. The average annual value of solar radiation was attributed to each area potentially suitable for the installation of photovoltaic systems. These data allow the quantification of the electric energy produced. The values of global irradiation take into account both the direct radiation and the scattered radiation, derived from the deviation of the atmosphere and the presence of clouds. The tools used in GIS were developed by the Department of Botany and Plant Pathology (Oregon State University). They are based on a trigonometric regression to improve the interpolation of the calculated results (McCune 2007).

Fig. 1 Final suitable areas for the installation of photovoltaic systems and their inter-visibility



The distances of potential zones from the low (BT) and medium-voltage (MT) cabs of transformation were measured through the use of spatial aggregation, with the aim to quantify the cost of connection of plants to the electric network.

The yearly solar radiation on land parcels and their distances from the electrical infrastructure were used as the criteria for ranking the initial set of 204 areas, through the sub-model described in Sect. 4.3. Table 2 shows that the first 12 areas of the ranking would suffice to produce the yearly electric energy demand of the town. According to the assessment model described in Sect. 3, these areas must also satisfy the inter-visibility verification.

The analysis of inter-visibility was then done with the GIS tool on the initial set of areas identified. According to this analysis, all the first twelve areas of the ranking comply with the esthetic requirement of the assessment model.

The final result of the just described analyses is synthesized in Fig. 1, which shows the twelve areas chosen for the installation of photovoltaic systems, in compliance with all the criteria considered, their relationship with the electrical infrastructure and their total inter-visibility.

5 The Sub-Model Assessing the Technical Performance of Lands

The first set of areas, suitable with respect to the ambient-context constraints, were classified on the basis of their technical quality, assessed by a multi-criteria analysis using the additive model in the functional form of the weighted sum. Table 1 shows the range of values measuring the technical marginal performance of the areas and the weights assigned to the criteria.

The suitable areas with the better technical profiles were finally subjected to the verification of inter-visibility, which showed an almost homogeneous visual performance of the identified areas. An extract of the final outcome of technical assessments on the initial chosen areas is shown in Table 2.

Table 1 Weights on technical criteria and measuring range of performance values

Technical criteria	Values	Weights
Yearly solar radiation on the surface at optimal inclination and orientation	[0; 5]	0.8
Distance from the electrical infrastructure	[0; 5]	0.2

6 Financial Analysis and CO₂ Balance of the Project

The following financial pre-feasibility analysis provides a first response on the financial aspects of the project.

The type of PV system is on the ground, grid connected, with polycrystalline silicon PV modules and fixed panels. The produced electricity is sold to the Energy Services Operator (GSE) by the “dedicated withdrawal” mode. It was assumed that the construction of the work requires one year, while the time horizon of the project was set at 20 years. After this period, the facilities will be decommissioned and disposed of, because of commercial and technological obsolescence. Therefore, the analysis assumes that the residual value of the plants is equal to zero.

For the calculation of revenues, expenses, project profit and loss accounts, cash flows and profitability indicators of the investment, a separate spreadsheet was implemented.

The revenues generated by the investment depend on the selling of produced energy. The annual net compensation amounts to € 5,152,546.61, pursuant to the AEEG Resolution no. 348/07. The investment costs include: turnkey cost of photovoltaic systems; cost of connection to the grid; regional authorization charges; and establishment cost of the company. The initial total investment cost is € 39,511,341.22. After ten years, the cost of extraordinary maintenance will be supported.

Annual operating expenses are: maintenance costs; operating expenses; financial costs, which depend on the mix between equity and borrowed capital; taxes; rent of lands.

In the event of recourse to borrowed capital, the depreciation schedule uses constant annual installments, and the applied rate of interest is the current one for investments involving the municipalities (7.14%). The discount rate is determined on the basis of the opportunity cost criterion (the current rate of return of long-term Italian Treasury Bonds, 4.5%). The inputs and outputs are expressed in current values. Table 3 shows the major indicators of financial performance for various mixes of risk capital (RC) and debt.

The realization of the project would avoid the emission of 437 gCO₂/kWh, considering the fuel mix used in the Italian thermoelectric sector (ISPRA—Istituto Superiore per la Protezione e la Ricerca Ambientale 2011), while the photovoltaic technology generates the emission of 40 gCO₂/kWh in its life cycle (Alsema EA de Wild-Scholten 2006). The energy self-sufficiency of the town analyzed would result in a reduction of about 18,310 tons/year of CO₂ emission.

Table 2 Extract from the table on technical data and performance of the selected areas

Ranking order	Code	Distance from MT cab (m)	Yearly solar radiation (kWh/m ²)	Technical performance			Project power (kWp)	Production (MWh)	Occupied area (Ha)
				On distance	On radiation	Total			
1	180	0.00	2,191.94	5.00	4.93	4.94	655.04	1,220.44	1.31
...
12	60	146.99	2,165.56	4.76	4.84	4.83	5,898.12	10,856.81	11.80
	Sum						30,228.74	56,039.62	60.46

Table 3 Values of financial indicators for different financing structures

Indicators		Financing structures				
		100% RC	65% RC	60% RC	30% RC	10% RC
NPV (€/1000)	post-tax	3,083.28	2,470.66	2,295.85	1,009.50	53.9
	before tax	15,740.58	13,952.42	13,696.97	12,164.26	11,142.45
IRR (%)	post-tax	5.51	5.54	5.50	5.08	4.53
	before tax	8.88	9.36	9.45	10.23	11.21
DPBP (years)	post-tax	18–19	18–19	19–20	19–20	>20
	before tax	13–14	13–14	13–14	13–14	13–14

7 Concluding Discussion of Results

The Encyclical Letter *Laudato Si* suggests taking up an “ecological conversion” (Francesco 2015, Chap. VI, Sect. III) able to steer the construction of a “common house” in which fairness among living and future peoples is achieved. The integrated assessment model here proposed fits into this vision of the world, helping the investigation of technical and financial pre-feasibility of projects for energy valorization of local lands through the use of photovoltaic technology (Borrelli and Citterio 2016).

The application of the model to an actual case ascertained that it is possible for the town to realize its energy self-sufficiency by renewable sources, observing the environmental, technical and esthetical constraints, and attaining a significant reduction of impact on climate.

The model seems suitable to assist: 1. the design of analogous interventions of energy sustainability, through the analysis of geo-referenced data for the knowledge of the territory and the verification of the technical feasibility of the project; and 2. the negotiation phase of project financing by the financial feasibility analysis.

In the case study, the pre-feasibility study highlights the need for careful financial planning. In order to cover the financial requirements generated by the large tangible assets, it is necessary to identify the most appropriate sources of funding that can be activated (equity capital, senior debt, leasing etc.). Whatever the type of involved financial source is, it would be convenient if local public administrations were both promoter and guarantor of this kind of projects. Although the proposed scenario of costs reduction (International Energy Agency 2015) will eventually favor the self-production of energy from renewable sources, the adoption of special fiscal and/or financial strategies should be put in place to favor the return on investment.

Attributions and acknowledgements The sections are due to M.F. Granata, excepting Sect. 4.2 which is the work of F. Gagliano. The authors are grateful to the anonymous reviewers who helped with the improvement of this paper.

References

- Alsema EA de Wild-Scholten MJ (2006) Environmental impacts of crystalline silicon photovoltaic module production. Paper presented at the 13th CIRP international conference on life cycle engineering, Leuven, 31 May–2 June 2006
- Angelucci F (2011) *La costruzione del paesaggio energetico*. FrancoAngeli, Milano
- Bammer G (2005) Integration and implementation sciences: building a new specialization. *Ecol Soc* 10(2) art. 6
- Borrelli G, Citterio M (2016) Environmental sustainability: from theory to practice. The contribution of the *Laudato si'* encyclical. *Valori e Valutazioni* 17:9–12
- Burrough PA (1986) Principles of geographic information systems for land resource assessment. Monographs on Soil and Resources Survey, No. 12. Oxford Science Publications, New York
- Caselli S, Gatti S (eds) (2005) *Structured finance. Techniques, products and markets*. Springer, Berlin, Heidelberg, New York
- Cerreta M, Panaro S, Cannatella D (2012) Multidimensional spatial decision-making process: local shared values in action. In: Murgante B et al (eds) *ICCSA 2012. Part II, LNCS 7334*. Springer, Berlin Heidelberg, pp 54–70
- Coiante D (2004) *Le nuove fonti di energia rinnovabile*. FrancoAngeli, Milano
- Costanza R et al (1997) The value of the world's ecosystem services and natural capital. *Nature* 387:253–260
- Daly HE (1974) The economics of steady state. *The Am Econ Rev* 64(2):15–21
- De Mare G, Manganelli B, Nesticò A (2013) The economic evaluation of investments in the energy sector: a model for the optimization of the scenario analyses. In: Murgante B et al (eds) *ICCSA 2013, vol 7972, LNCS, Part II*. Springer, Berlin Heidelberg, pp 359–374
- De Mare G, Granata MF, Nesticò A (2015) Weak and strong compensation for the prioritization of public investments: multidimensional analysis for pools. *Sustainability* 7(12):16022–16038
- Džugaitė-Tumėnienė R et al (2017) Integrated assessment of energy supply system of an energy-efficient house. *Energy Build* 138:443–454
- European Union (2011) *Energy Roadmap 2050, COM/2011/0885*
- Ferretti V, Bottero M, Mondini G (2014) An integrated approach for exploring opportunities and vulnerability of a complex territorial system. In: Murgante B et al (eds) *ICCSA 2014, Part III, LNCS 8581*. Springer International Publishing Switzerland, pp 667–681
- Francesco (2015) Encyclical Letter *Laudato Si'*, 24 May
- Fusco Girard L, De Toro P (2007) Integrated spatial assessment: a multicriteria approach to sustainable development of cultural and environmental heritage in San Marco dei Cavoti, Italy. *CEJOR* 15:281–299
- Fusco Girard L, Nijkamp P (1997) *Le valutazioni per lo sviluppo sostenibile della città e del territorio*. FrancoAngeli, Milano
- Fusco Girard L, Cerreta M, De Toro P (2014) Integrated assessment for sustainable choices. *Scienze Regionali* 13(1):111–141
- Georgescu-Roegen N (1971) *The entropy law and the economic process*. Harvard University Press, Cambridge
- Granata MF (2010) *Economia dell'informazione energetica nella società capitalistica. La rendita solare dell'ambiente naturale e costruito*, FrancoAngeli, Milano
- Granata MF (2014) Rendita catastale e “rendita solare” degli impianti di produzione elettrica a fonti rinnovabili: perequazione fiscale energetico-immobiliare. *Valori e Valutazioni* 13: 113–127
- International Energy Agency (2015) *World energy outlook*. International Energy Agency, Paris
- IPCC (2014) *Climate change 2014: synthesis report*. IPCC, Geneva, Switzerland
- ISPRA—Istituto Superiore per la Protezione e la Ricerca Ambientale (2011) *Produzione termoelettrica ed emissioni di CO₂ (Rapporto 135)*. <http://www.isprambiente.it>

- Koltsaklis NE, Liu P, Georgiadis MC (2015) An integrated stochastic multi-regional long-term energy planning model incorporating autonomous power systems and demand response. *Energy* 82:865–888
- Lee N (2006) Bridging the gap between theory and practice in integrated assessment. *Environ Impact Assess Rev* 26(1):57–78
- Leman N et al (2016) GIS-based integrated evaluation of environmentally sensitive areas (ESAs) for land use planning in Langkawi, Malaysia. *Ecol Indic* 61:293–308
- Lo Piano S, Mayumi K (2017) Toward an integrated assessment of the performance of photovoltaic power stations for electricity generation. *Appl Energy* 186:167–174
- Lo Piccolo F (2009) Vocazioni agricole in territori fragili: sperimentazione di pratiche identitarie e applicabilità di percorsi di ricerca. In: Leone M et al (eds) *Il paesaggio agricolo nella conca d'oro di Palermo*. Alinea editrice, Firenze
- McCune B (2007) Improved estimates of incident radiation and heat load using non-parametric regression against topographic variables. *J Veg Sci* 18:751–754
- Ministero dello sviluppo economico (2016) *La situazione energetica nazionale nel 2015*. Italy
- Mondini G (2009) La valutazione come processo di produzione di conoscenza per il progetto. *Valori e valutazioni* 3:5–17
- Morano P, Locurcio M, Tajani F (2015) Energy production through roof-top wind turbines. A GIS-based decision support model for planning investments in the City of Bari (Italy). In: Gervasi O et al (eds) *ICCSA 2015. Part III, LNCS 9157*. Springer International Publishing, Switzerland, pp 104–119
- Oppio A et al (2015) Giving space to multicriteria analysis for complex cultural heritage systems: the case of the castles in Valle D'Aosta Region, Italy. *J Cult Herit* 16:779–789
- Patlitzianas KD, Christos K (2011) Sustainable energy investments in Hellenic urban areas: examining modern financial mechanisms. *Renew Sustain Energy Rev* 15:5186–5193
- Petersen J-P (2016) Energy concepts for self-supplying communities based on local and renewable energy sources: a case study from northern Germany. *Sustain Cities Soc* 26:1–8
- Ravetz J (2000) Integrated assessment for sustainability appraisal in cities and regions. *Environ Impact Assess Rev* 20:31–64
- Rizzo F (1999) *Valore e valutazioni. La scienza dell'economia o l'economia della scienza*, FrancoAngeli, Milano
- Rodríguez-Serrano I et al (2017) Assessing the three sustainability pillars through the framework for integrated sustainability assessment (FISA): case study of a solar thermal electricity project in Mexico. *J Clean Prod* 149:1127–1143
- Roh S, Tae S (2017) An integrated assessment system for managing life cycle CO₂ emissions of a building. *Renew Sustain Energy Rev* 73:265–275
- Sagani A, Mihelis J, Dedoussis V (2017) Techno-economic analysis and life-cycle environmental impacts of small-scale building-integrated PV systems in Greece. *Energy Build* 139:277–290
- Stanghellini S, Copiello S (2011) Urban models in Italy: partnership forms, territorial contexts, tools, results. In: Dalla Longa R (ed) *Urban models and public-private partnership*. Springer, Heidelberg, pp 47–130
- United Nations (1972) *Declaration of the United Nations conference on the human environment*
- United Nations (2015) *Paris agreement under the United Nations framework convention on climate change*

Urban Spaces in the City of Climatic and Social Changes



Valentina Dessì

Abstract Activities and institutional initiatives related to urban regeneration are now characterized by approaches that involve the environmental aspect, increasingly accompanied by objectives related to improving the liveability of cities, social inclusion and a mix of neighborhoods and cities. In this respect, there is a strong parallel between the approach also used in significant experiences and the words of the encyclical “Laudato si” of Pope Francis. Indeed, arguing that a true ecological approach is always a social approach (§ 49), the inseparability of the two aspects of development of the city is asserted. The framework in which this symbiosis finds its best combination is the urban space. Its centrality, in tune with what the Pope says (pp. 150, 151), is the goal of some instances of rethinking the city or parts thereof described in the paper.

Keywords Urban space • Liveability • Environment • Liveability index
Community

1 “Laudato Si” Versus Some Institutional Courses

About three years after the publication of the encyclical “Laudato si” of Pope Francis, one might wonder why this has found such a unanimous acclaim, globally, shared not only among the believers but also (and perhaps especially) among the laity. Following its publication, the Pope was called ecologist and planner, and, actually, to face the current issues in a sustainable way, it is really necessary to have a comprehensive and systemic view of the areas that human development has involved over time and with which it still interacts.

The encyclical has the capacity to systematize some reflections that have occurred over the past 40 years and that perhaps only now converge, that is, to focus on the real goal of safeguarding the planet and, at the same time, ensuring

V. Dessì (✉)

Department DASTU, Politecnico di Milano, Via Bonardi 3, Milan, Italy
e-mail: valentina.dessi@polimi.it

good levels of liveability for its inhabitants. The energy-environmental issue, as well as the issue of poverty and inequality in the world, has only grown since the 1970s. As to the first aspect, it is worth recalling that in 1972 the results of a research commissioned by the Club of Rome to an expert team of the MIT were published, with the goal of defining long-term energy scenarios.

The research, released as the book “The Limits of Growth”, didn’t provoke the deserved approval; on the contrary, it provoked strong position in defense of the development of human activities that relied on an overly optimistic view about unstoppable technological and economic progress, even linked to the supposed inexhaustibility of energy resources from non-renewable sources. Still, in the early 1970s, the United Nations Conference on the Human Environment (UNCHE, United Nations Conference on the Human Environment) took place in 1972 in Stockholm. The Stockholm Declaration was in fact a statement of an awareness of human responsibility towards the environment, the protection of which is considered the basis of human well-being and of development; it recognized the need to share principles and common visions in order to drive people all over the world to focus their efforts to the preservation and improvement of the human environment. Fifteen years later, in 1987, the report of the UN Commission on the Environment, “Our Common Future”, defined sustainable development according to three declinations taking into account the environmental, economic and social issues.¹

Among the recent opportunities to meet and work on a common platform, we should remember that on September 25, 2015, in New York, during the 70th anniversary of the constitution of the UN, was held an important summit—attended by over 150 world leaders—which established new goals to be achieved by 2030. Proceedings for the adoption of the new agenda were opened by a speech by Pope Francis who had flown to New York for the occasion. The purpose of the summit was to approve the document “Transforming our World: the 2030 Agenda for Sustainable Development” including 17 new sustainable development goals and 169 targets, oriented to overcome those previously approved; they are the follow-up of the results of the Millennium Development Goals proposed in 2000 and represented common objectives on a set of important topics for development: to fight against poverty, end hunger and combat climate change, to name just a few. The ambitious goals were to stimulate activity in key areas linked to the five Ps: People, Planet, Peace, Prosperity and Partnership. The agenda cut across crucial issues but was not able to launch a real challenge for change. For this reason, the goals and 169 targets have not raised great enthusiasm. To draw a parallel between the recent encyclical and Agenda 30 has become almost automatic, given that the same issues were addressed in both documents. It could be useful to apply some analyses to better understand the weaknesses of the UN document. In particular the article

¹The texts “Declaration of the United Nations Conference on the Human Environment” and “Our common future” are available on the website of UN Documents: Gathering a Body of Global Agreements, the digital collection of key United Nations documents relating to sustainable development, education, human rights, peace, etc. at the link <http://www.un-documents.net/index.htm>.

entitled “The Pope v the UN: who will save the world first?” appeared in *The Guardian* newspaper, 23 June 23 2015 (J. Hickel et al.) highlighted important differences: unlike the encyclical, which had created a stir in the world, Agenda 30 appeared immediately as an old document without the strength to propose any real paradigm shift compared to business as usual.

The Pope, with his encyclical *Laudato si*, openly challenges the usual development models of our society, which generate, among other things, consumerism, the scrap culture, an almost complete absence of long-term visions of the consequences of our life styles; and so, biodiversity loss, water scarcity, air pollution and, not least, climate change, are some of the consequences of this model, that the Pope challenges and attempts to overturn.

The Stockholm Declaration represented only the first step; in fact, this awareness has strengthened over the ensuing 40 years. However, the Pope Francis’ document focuses on the relationship of cause and effect, which requires different approaches than in the past, or settled practice. To better explain this sentence we could refer to the point n. 139: “...it is no longer possible to find a specific, discrete answer for each part of the problem. It is essential to seek comprehensive solutions that consider the interactions within natural systems themselves and with social systems. We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis which is both social and environmental”.

Reflections contained in the *Laudato si* could be considered the right words at the right time. Before Francis, Paul VI and then John Paul II and Benedict XVI, as Pope Francis reminds us, had predicted and described the environmental and social crisis, but their words had not created the same reverberations as the encyclical of 2015. The topics are many, and the analysis are on-time and in-depth, but on one point we should focus our attention (§ 139): “When we speak of the “environment”, what we really mean is a relationship existing between nature and the society which lives in it. Nature cannot be regarded as something separate from ourselves or as a mere setting in which we live. We are part of nature, included in it and thus in constant interaction with it”. According to these Pope Francis’ words, a series of signs to deal with the situation highlights. The guidelines for the solutions require a comprehensive approach to fight poverty, to give back dignity to the excluded and at the same time to take care of nature. This clear awareness of the centrality of the human being, but also the conviction that the fragility of the planet and human poverty are linked in a closely connected world, can be found in the introductory words of the encyclical and are the common thread running through all the text. Today, we are all more receptive to these kind of warnings probably because we started to experience, even on an individual level and in the various fields, the consequences of these actions produced in other areas. We begin to observe attempts to deal with problems in the interdisciplinary and transdisciplinary form. And above all, what the Pope proposes is an approach that is a strategic system that now we know as and call “nature based solutions”, i.e., strategies and design solutions based on the implementation of natural elements (in particular green and water) to better deal with climate-change mitigation and adaptation to the actual climate-change effects. The encyclical often focuses on the urban environment, the

place where is currently concentrated half of the world population, at the heart of the Pope's reflections, for absolutely shareable reasons. The city, according to the Pope, is the environment in which human life develops and where our identity is expressed. Unfortunately, in respect to the increasing environmental deterioration, people's perception of social decay increases. Speaking of decay of human and social life, the Pope notes that (§ 44) "...we are conscious of the disproportionate and unruly growth of many cities, which have become unhealthy to live in, not only because of pollution caused by toxic emissions but also as a result of urban chaos, poor transportation, and visual pollution and noise". Although more and more virtuous urban-regeneration projects can be found, it is however true that, as the Pope states (§ 44): "Neighborhoods, even those recently built, are congested, chaotic and lacking in sufficient green space. We were not meant to be inundated by cement, asphalt, glass and metal, and deprived of physical contact with nature".

To take care of people's living environment means improving a place that, as the Pope says speaking about the setting in which people live their lives, influences the way we look at life, the way to feel and to act (§ 147). We should not limit, therefore, improvement to the energy efficiency of the city's system, or the profitability of the "product" city, but we should realize conditions for the development of a fair and friendly environment for human life. The city, in fact, as by now clearly demonstrated, is the main source of pollution of the space around us, and therefore is among the most responsible for the poor state of the planet's health. The increase of air and ocean temperature and CO₂ emissions in the atmosphere for anthropogenic environmental reasons, as well as the desertification of some areas already affected by drought, have repercussions not only on the anthropic environment that has generated the impact, but also on the ecosphere and on natural environments of the planet, as stated during the Earth Summit of Rio de Janeiro in 1992. This was reaffirmed, for instance, by the Convention on Biological Diversity, in which the Convention's members regularly share ideas on best practices and policies for the conservation and sustainable use of biodiversity with an ecosystem approach. Although the Pope's reflections are related to the human condition around the planet, the focus of the paper is on what happens in Europe (although many initiatives arise from meetings between heads of state and government from all over the world, for example, the Conference of Rio de Janeiro in 1992, and the afore-mentioned conference of 1972 in Stockholm, as well as the one of 2015 in New York), in order to find parallels between these activities and the encyclical.

To focus on the European documents, it means to retrace a path started in the 1990s, while the encyclical of 2015 is a unique script that summarizes and gathers many of the themes related to the defense of the people (especially those in poverty or other vulnerable conditions) and the planet simultaneously.

In the 1990s, we started to see the concept of sustainability linked to the theme of urban development. In particular with the "Green Book on the Urban Environment" of the European Commission, published in 1990, we became aware of the difficulties of the urban development, and we started to define lines of action based on a "holistic view of urban problems and an integrated approach to solve them."

It is an important document for those who work on city planning because some recommendations are based on the urban form and linked to the presence of urban diversity and mixed-use urban space to counter urban sprawl and the consequent use of private transport. During recent years, local authorities have begun to meet and share some commitments aimed at the sustainable development of cities, for example, attending the European Conference on Sustainable Cities, organized by ICLEI, organization linked to the UN that developed a shared Charter: Aalborg Charter 1994 to join Agenda XXI. Some years later, in 1996 the Lisbon Charter was approved in order to ensure the transition from principles to action. In addition to the regular appointments of the conferences involving public authorities, mainly oriented to verify and monitor progress starting from the bottom, it must be considered the work of the European Commission, which establishes periodic meetings among the ministers of the member states involved in urban policies.

In 1998, based on the Communication of the EU Commission “Towards an urban agenda in the European Union” (COM 97/197), the Commission itself presented the EU Action Framework for Sustainable Development in the European Union, with the aim of improving the effectiveness of policies directed toward urban areas and their potential. This framework enables the sensitivity to urban problems to be increased and verified so that the policies can have a positive impact for integrated development. At the Ministerial Meeting in Bristol, in December 2005, Bristol Accord was reached, in which Sustainable Communities are defined as “places where people want to live and work, now and in the future. These communities meet the diverse needs of existing and future residents, are sensitive to their environment, and contribute to a high quality of life. They are safe and inclusive, well planned, built and run, and offer equality of opportunity and good services for all” (ODPM 2005, p. 6). The aim of the Bristol meeting was to reflect upon the benefits that the EU countries might have from the development of sustainable communities in Europe. In 2007, the German President of the EU prepared “The Leipzig Charter on Sustainable European Cities”. Member States shall undertake acts on integrated urban planning as an important condition for sustainable development of European cities, through strategies for the enhancement of the urban fabric, the improvement of local economies and the labor market, the encouragement of clean transport and social integration. By designing in an environmentally sustainable way or starting processes of urban regeneration unfortunately doesn’t always result in improving the human condition itself. In fact, it often happens that the processes that lead to the improvement of the quality and livability of the space represent an opportunity for gentrification, i.e., environmental improvement, fruition and quality. This transformation often corresponds to a high price to pay, usually by the poorest of the population who are in fact urged to move away from “their” area, as it becomes economically inaccessible. This is what actually has happened in many cities subjected to regeneration works that had as a consequence an increase in terms of the cost of homes, especially for the underprivileged class of the population, and that’s what is happening here, too, in Milan.

To make just a couple of examples, we can mention the case of area of Navigli, Garibaldi-Repubblica, the “Isola” neighborhood and “Scalo di Porta Romana”, but it is generally what’s going on in the centers of Turin, Genoa, Florence, etc.

The Pope words perfectly fit this condition: “In some places, rural and urban alike, the privatization of certain spaces has restricted people’s access to places of particular beauty. In others, “ecological” neighborhoods have been created which are closed to outsiders in order to ensure an artificial tranquility. Frequently, we find beautiful and carefully manicured green spaces in so-called “safer” areas of cities, but not in the more hidden areas where the disposable of society live” (§ 45).

The lack of policies in this crucial situation is evident, while the needed intervention, consisting of the regulation of housing costs, as well as the management of public space, is strategic, in order to ensure the mix of functions and inhabitants that makes a city or a neighborhood vibrant, safe in the daytime and in the evening hours and welcoming. Even this concept of *mixité* has been evolving. In this regard, we can refer to another important point of the encyclical (§ 147).

If, in the transformation of a more or less wide area, which supports the existence of people, an integral improvement in the quality of human life has not occurred, than it means that it will not have experienced authentic development. It is not maintain the linkage between these two aspects because they can be considered in opposition (if the perception of people as to what is considered liveable, in reality is not environmentally sustainable). About that, Mike Houck, founder of the “Urban Greenspaces Institute” based in Portland, Oregon, one of the American cities with a high degree of gentrification, commented: “We could have saved a lot of time and energy in writing our updated comprehensive plan, climate action plan and climate preparation strategies had we received an early draft of Pope Francis’ *Laudato Si, On Care For Our Common Home*. I was struck by the many parallels, both conceptual and textual, between the Encyclical and our efforts to better integrate nature into the urban context, our responses regarding mitigation and adaptation to climate change, and our efforts to create an ecologically healthy, equitable and resilient city”. In June 2010, the informal meeting in Toledo between the EU ministers responsible for urban development for EU Member States produced a document, known as the Toledo Declaration, on the topic of integrated urban regeneration. It is an important document because it affirms the strategic importance of integrated urban regeneration to achieve a development for smart, sustainable and inclusive cities. Moreover, as the present ministers declared, the city has a vital role for achieving the objectives of the EU package in 2020.

In the time during which we face the issue of urban regeneration in accordance with the principles and strategies set out in the Declaration of Toledo, it is assumed that cities are to be regarded as a unitary body interconnected and characterized by a complex mix of functions, where an intervention on a specific part of the city may have consequences on the rest of the urban system. If the Leipzig Charter gave directions for an integrated approach, the Toledo Declaration encourages a holistic approach such that: “...cross-cutting and multi-dimensional, complementary and synergistic. (...) The actions should be unitary, and deal with all the complexity of urban development, taking into account the role of each part of the city in its global

structure” (§ 13). One of the more recent contributions is the so-called Amsterdam Pact, adopted in 2016 and created with the intention of sharing a common European Agenda, in full consistency with the papal document in many aspects. But there is a passage of the encyclical that summarizes in a few words the sustainable approach, especially from the environmental and social point of view. It is in fact a warning that the Pope launches, which requires a reflection on who plans and manages the city (§ 150): “Given the interrelationship between living space and human behavior, those who design buildings, neighborhoods, public spaces and cities, ought to draw on the various disciplines which help us to understand people’s thought processes, symbolic language and ways of acting. It is not enough to seek the beauty of design. More precious still is the service we offer to another kind of beauty: people’s quality of life, their adaptation to the environment, encounter and mutual assistance. Here too, we see how important it is that urban planning always take into consideration the views of those who will live in these areas”.

At this point the need emerges for a transdisciplinary approach to the issue of planning and urban design that takes into consideration the response of people to an intervention on a piece of city. Winston Churchill once said: “We shape our buildings; thereafter they shape us”; the same thing can be said about our urban spaces. In this beautiful phrase, the Pope argues that the realization of urban spaces that are pleasant and respectful of nature improves the quality of people’s lives, as well as their relationships with the context. It also helps to trigger the mechanism for mutual support between generations and social classes that helps to develop a strong sense of belonging to the community and to the specific place. However, it also means one more thing: if we want to realize liveable and vibrant urban spaces, we cannot ignore the involvement of final beneficiaries of these spaces, which ultimately determine the success or the failure of a realization or regeneration of a part of the city.

2 Virtuous Initiatives

The question is whether, on the basis of declarations and intergovernmental/local commitments, there is a willingness by local governments to set up an urban regeneration work that starts from the dialogue among the various parties involved, including experts and technicians dealing with green, mobility and urban design.

There are three experiences that are worth mentioning that reflect these ways of tackling the issue of urban regeneration by three different points of view: the first case is the institutional initiative to disseminate Best Practices in European cities; the second one is related to an approach proposed by a public participation agency based in Barcelona that develops urban regeneration projects for public authorities; and the third case consists in the work carried out in Italy by the Emilia-Romagna Region that included a brief collaboration along with Politecnico of Milano that successfully combined research and practice. The first experience (already mentioned) is the recent commitment of the EU Commission–DG Environment to

promote and disseminate practices and virtuous behavior in European cities. The European Green Capital Award was established in 2010 to annually select the most notable city that enacts sustainable urban-regeneration projects sustainable that somehow can be a model for emulation. The first city to be awarded was Stockholm, while for 2018 already the Dutch city of Nijmegen has been nominated. The cities taking part in the selection have to submit a report that describes their measures, planned or implemented, according to an index indicated by DG that includes the chapters “Climate change: mitigation and adaptation” and “Green urban areas incorporating sustainable land use”. While, in some reports, some aspects have been treated in a more in-depth manner than in others, in other cases the integration among the various aspects is more evident. It is however important to verify that all the cities respond to these points and that the aspects of mitigation and adaptation to climate change are connected with the green areas and sustainable land use, as well as with the environment and biodiversity, and, not least, mobility.

The second aspect to mention concerns the methodology proposed by the Agency of Urban Ecology of Barcelona, which addressed the renewal of parts of cities or of the whole city with a transdisciplinary approach thanks to a team of about 20 people with various skills, coordinated by an ecologist, Mr. Salvador Rueda, who heads the agency (<http://www.bcnecologia.net/en>). Among the most interesting aspects, there is definitely one that plans to simultaneously address a number of topics and related data relevant to urban development (all computers are in fact connected to the same GIS files). This means that, for instance, an architect who is working on the development of new urban spaces must necessarily interface with experts dealing with mobility, as well as with others dealing with population density in the area. The other point is that all aspects taken into account help to define an indicator that combines both quantitative and qualitative aspects, which are also calculated in the form of numbers and then are “integrable” together with the other data. An interesting example is the work done for the city of Vitoria-Gasteiz (later winner in 2012 of the European Green Capital Award, an initiative of the European Commission Environment)² (Figs. 1 and 2).

Preliminary work was done on the actual state and then on the regeneration project that aims to bring more experiences of nature into the city. This project corresponds, on the one hand, to the realization of new thermally comfortable urban spaces and the connection of the urban areas to the extra-urban green belt, while, on the other hand, pedestrian and cycle paths have been expanded within the city and it was verified that the presence of a mix of functions and activities should encourage

²On the website of the European Green Capital Awards, http://ec.europa.eu/environment/europeangreencapital/index_en.htm, it is possible to find all the information about good and best practices and the reports of each winning city. In particular, the report of Vitoria-Gasteiz can be downloaded following the link <http://ec.europa.eu/environment/europeangreencapital/wp-content/uploads/2011/04/VG-Green-Conclusiones.pdf>. Other information about Vitoria-Gasteiz is reachable via the city’s website http://www.vitoria-gasteiz.org/we001/was/we001Action.do?idioma=en&aplicacion=wb021&tabla=contenido&uid=u_1550d0e4_148c51d23a0_7fc4, where, in particular, it is possible to peruse the strategies and projects since 2012.

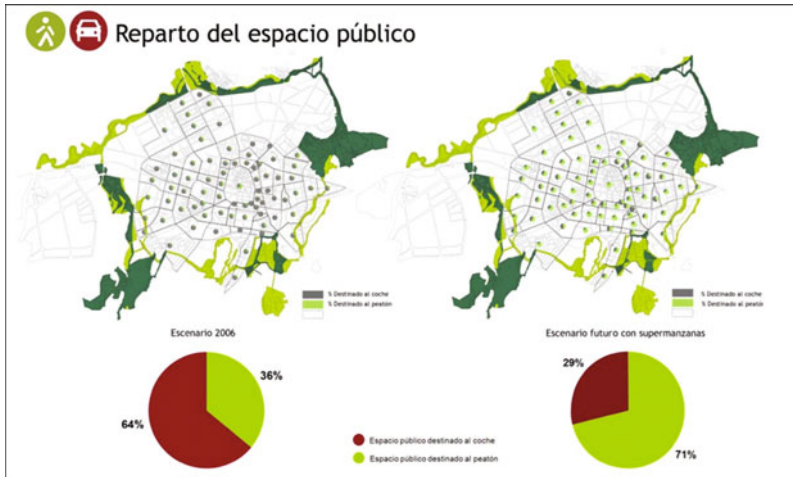


Fig. 1 Urban spaces in Vitoria-Gasteiz. Maps reporting the situation of the year 2006 and the future scenario of the pedestrian areas after the project concerning the reduction of the private mobility and improvement of urban spaces. *Source* Report presented to the European Green Capital Award, <http://www.vitoria-gasteiz.org/wb021/http/contenidosEstaticos/adjuntos/es/49/60/44960.pdf>

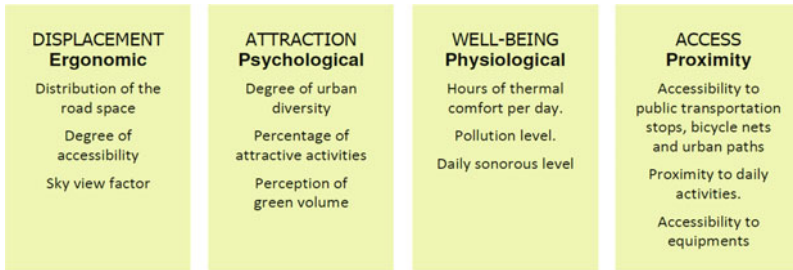


Fig. 2 Determinant factors of habitability used to calculate the indicator, proposed by the Urban Ecology Agency of Barcelona

and increase the presence of people in public spaces. The assessment of the project was made by using the liveability indicator, either by comparing the final stage with the state of art and with an intermediate stage.

The ultimate experience concerns the work that the Emilia-Romagna Region has been doing in recent years. The Directorate General “Cura del territorio e dell’ambiente” has participated as a partner of the European project called “Republic-med” (retrofitting public spaces in intelligent Mediterranean cities-programme Med), coordinated by the Greek Research Center CRES and funded by the 7th EU Framework Programme. The research was designed to identify and develop ways to mitigate urban heat islands and was focused on the indoor public

space, i.e., buildings, as well as on urban spaces. The dissemination of the results produced by the research program represented an opportunity for education training for many engineers and public administrators of cities of the Emilia-Romagna Region. These moments of training, called REBUS, were organized to bring together, on the same workbench, the various skills that could work on a specific topic within a very short span of time. The activity was organized in a simulation game in which three teams had to deal with a different urban renewal project. Each team was composed of architects, landscape designers, agronomists, engineers, urban planners and public servants, with the help of a facilitator. In the end, a jury evaluated the project from various points of view. In parallel, there were established opportunities for training by agronomists,³ experts on climate and bioclimatic design. Within the framework of the capitalization activities of the project the region Republic Med-programme MED 2007–2013 is engaged in defining an action plan and the development of application tools for the introduction of MED methodology for “retrofitting”, at the national level and in the European Mediterranean area. This is intended to be from the local and regional authorities’ point of view, especially through the use of methods, tools and innovative approaches. This is the reason why the region has started, with the Politecnico of Milano and in particular with the DASTU department, a collaboration that led to the development of guidelines concerning design solutions, at the urban and architectural scales, for the urban heat-island mitigation and the improvement of the thermal comfort in public spaces and the presence of urban green. The guidelines are addressed to the municipal authorities and to professionals involved in planning and urban design processes. The guidelines, resumed and enriched at a later stage, led to the definition of a booklet. In addition to the writer, who comes from the academic world, an official of the Emilia-Romagna Region, an architect and an agronomist (respectively: V. Dessi, E. Farnè, L. Ravanello, M. T. Salomoni) were tasked with writing a booklet entitled “Rigenerare la città con la natura. Strumenti per la progettazione degli spazi pubblici tra mitigazione e adattamento ai cambiamenti climatici”.⁴

This cross-disciplinary collaboration between complementary skills, aimed at defining a reference framework, addressed to designers, planners and administrators involved in the implementation of calls for proposals and evaluation of projects, is an approach that is desirable, according to the Pope’s invocation to always have the overall and systemic vision of the context in which we act, especially to predict the possible effects of an action on other involved areas.

³All the documents and presentations at the conferences and seminars of the REBUS training course can be consulted on: issuu.com/laboratoriorebus.

⁴The booklet with the guidelines can be downloaded from the website of the Emilia-Romagna Region: <http://bit.ly/RIGENERARELACITTACONLANATURA>.

3 Conclusions

It has now reached a point where the energy and environmental, as well as social and economic policies, addressed to city management advance the same direction, and can “reinforce” each other in a systemic vision that enhances the city in the overall vision of sustainability. The cited activities, especially the Urban Ecology Agency of Barcelona activities and research and dissemination carried out by the Emilia-Romagna Region testify that Francis’ words about the development of inclusive and environmentally friendly cities are not disconnected from reality. In fact, they find support, not only in the ferment at the institutional level—unfortunately, often not sufficiently incisive and engaging—but also in local initiatives, which, from the bottom up approach can involve administrative, technicians and designers and go to identify strategies and tools compatible with that specific territory. Someone spoke about the need to humanize urbanism. The Pope, with his words, expresses what makes city planning human: the constant attention to the wellness of the people living the city, who need close contact with nature. He considers it important, both for the health of nature and of humanity, and for this reason he calls for us to interweave nature and the built environment. Nature, in this context, contributes to protect the city’s image, but also the ability to attract and aggregate urban spaces, the possibility of mitigating the causes of climate change and the ability of cities to adapt to the unavoidable effects of it.

Apart from the population, the main beneficiary of the interventions, it is important that the public and the private sectors and the enterprises were involved, according to a system of relationships that are still difficult to define, but which can be based on sharing the benefits, social, economic and environmental ones, that can be found in the processes of city renewal.

It is an important and difficult challenge, but the few experiences mentioned remind us that facing them is not impossible and the results are examples to be studied and replicated. It is therefore essential, as all three examples remind us, to blend together knowledge and skills, to put as much as possible a transdisciplinary approach into play, frequently present in research on urban regeneration, but only seldom applied on the work table. Echoing the Pope’s words, already cited (§ 139): “...it is no longer possible to find a specific, discrete answer for each part of the problem. It is essential to seek comprehensive solutions which consider the interactions within natural systems themselves and with social systems.”

Moreover, “if in the transformation of an area in which takes place the existence of the people, a comprehensive improvement in the quality of human life will not occur, no development will not have been made” (§ 147).

It’s not easy to keep these two aspects connected since they can be both considered in opposition (in the perception of people is livable what is not environmentally sustainable). Eventually one last consideration is worth doing, that is also derived from the observation of the three examples: the evaluation of urban quality becomes increasingly quantitative; on the one hand, it is necessary to use the simulation tools of environmental performance (spaces, economic etc.) before the

project is concluded because a design change is still viable if the first project does not meet the necessary requirements; then it is possible to communicate better both with stakeholders and with the population the expected results from an intervention on the part of the city, and it has therefore less impact and shares the new realization project yet more. On the other hand, a project, as a result of systematic work among various disciplines and skills, can be assessed and verified by measuring the effects of a change of land use, proposed by a specific sector, also on other aspects involved. Increasingly, therefore, it is important to spread these simulation tools, on the one hand, the simplified ones, useful for evaluating the margins for improvement between one version and the other of the project. They are also able to more easily overcome the resistance that many potential users of these simulation tools have. On the other hand, it is important to use sophisticated tools (or entrust on the expertise of competent professionals) that describe the realistic dimension of the variables designed and precisely measure the importance and the effects of the changes.

References

- Dessi V, Farnè E, Ravanello L, Salomoni MT (2015) Rigenereare la città con la natura. Strumenti per la progettazione degli spazi pubblici tra mitigazione e adattamento ai cambiamenti climatici. Maggioli, Sant’Arcangelo di Romagna (Ri)
- Echave C, Rueda S (2008) Habitability index in the public space. In: International conference Walk21 IX: a moving city, Barcelona, Walk21, Cheltenham, Gloucestershire (UK)
- EU Commission (1990) Green paper on the urban environment. COM (90) 218 final, 27 June 1990
- Houck M (2015) Reflections on “Laudato Si”, on care for our common home. Consulted in. <https://www.thenatureofcities.com/2015/11/10/reflections-on-laudato-si-on-care-for-our-common-home/> Nov 2016
- Meadows DH, Randers J, Meadows D (1972) Limits to growth. Club of Rome, Geneve

Part III
Intergenerational Equity

Intergenerational Justice in the Evaluation of Urban Regeneration Projects



Patrizia Lombardi and Ian Cooper

Abstract This contribution highlights the complexity of the problem of evaluation of urban regeneration projects, with reference to the time variable and to the impacts of ethical nature and social justice related to the concept of sustainable development.

Keywords Intergenerational justice · Planning evaluation · Time

1 Introduction

A central theme within the processes of development, management and transformation of the territory is that of urban regeneration, which means not only retraining the existing building heritage, but also launching programs for environmental, social, economic and cultural recovery, able to favour the elimination of social hardship, contributing at increasing the quality life of the inhabitants, supporting processes for enhancing both tangible and intangible cultural resources, favouring economic processes, protecting environmental and natural resources, and so on. These areas of interest are also at the centre of the attention of the “Encyclical Letter *Laudato Si*” of the Holy Father Francis on the Common House “(May 24, 2015), when he reflects, in particular, on the current ecological crisis and future strategies in a sustainability perspective. In particular, the Holy Father Francis encourages at embracing the principles and values of a new human ecology, able to integrate the environment, society, economy, culture and the common good in an overall broader vision, aimed at protecting the whole environment. In the field of evaluation of urban regeneration projects, this means changing the perspective of

P. Lombardi (✉)

Interuniversity Department of Regional and Urban Studies and Planning,
Politecnico di Torino, Turin, Italy
e-mail: patrizia.lombardi@polito.it

I. Cooper
Eclipse Research, Cambridge, UK

analysis and the selection criteria, still totally anchored within a cost-benefit logic based on the so-called “economic advantage” of the promoter (public or private), in order to consider “The environment [...] is on loan to each generation, which must then hand it on to the next” (Encyclical Letter *Laudato Si*, [159], p. 118) rather than a resource (input) within the utilitarian economy. In other words, it is a matter of making operative in our evaluation practice of engineers and architects dealing with the problems of the territory, the paradigm of Sustainable Development, understood as “the development that satisfies the needs of present generations without compromising the possibility of satisfying the own needs” (Brundtland Report 1987) and in particular to its fundamental principle of “Intergenerational Justice”. This principle concerns the equity and consideration of future generations in the treatment of the planet resources and focuses on how we think and give importance to the course of time and its effects, an element that plays a fundamental role in our way of thinking and in our view of the world, but often ignored in the practice of our decisions concerning the urban community, those decisions that are generally taken here and now, *hic et nunc*. In this short article, we intend to highlight the complexity of the problem of evaluation of urban regeneration projects, with reference to the temporal variable and to the impacts of ethical nature and social justice related to the concept of sustainable development.

2 Time and Urban Sustainable Development

Time has been the subject of a great number of studies in science, mathematics, philosophy, anthropology, sociology, literature, poetry, and fine arts. Time is a fundamental characteristic of human experience. The personal experience of time is always of the present, and the subjective idea of time comes from reflecting on this experience. Through the course of time, experience of everyday life turns into memory, that is part of personal background and identity. Past, present, and future are three temporal horizons characterizing man’s experience of everyday life. The Collins English Dictionary (2000) defines time as “The continuous passage of existence in which events pass from a state of potentiality in the future, through the present, to a state of finality in the past.” The ancient Greeks distinguished two kinds of time, ‘kairos’ that means an opportunity or a propitious moment) and ‘chronos’, that refers to the eternal or ongoing time. While the first offers hope, the second extends a warning. Kairos is the time of cleverness, while chronos the time of wisdom. As highlighted by Brandon and Lombardi (2005), today we still live in a golden age of Kairos, where the cult of the individual is paramount and where the corporate sense which will allow us to engage with time is hard to come by. This has its zenith in economic evaluation where the views of shareholders in corporations often seems to dictate a short term perspective in policy matters and where the evaluation methods discount heavily the value to future generations. As we can understand, both time and sustainable urban development are inextricably entwined. Assumptions about how long a development is expected to be

sustainable, or over what period an issue is to be considered, are at the heart of sustainability (Brandon and Lombardi 2005). Scientists, governing bodies, and planners make decisions within the context of an assumed time period. How long this time period should be is a question of great importance. This is particularly true at urban community level where major tensions are currently concentrated. According to recent reports and statistics (Habitat III 2016; United Nations 2014; World Bank 2014, IPCC 2014; UNEP 2015), the world population in 2050 is expected to increase to 9.3 billion, most of which will be absorbed by urban areas. The future of built environments is affected by the uncertainty due to rapid change. We are becoming a city planet (Brandon et al. 2017). Urban areas are crucial for improving sustainable living and human quality of life. At the same time, cities are responsible for the majority of the world's greenhouse gas (GHG) emissions (71–76%). International reports show that cities consume 75% of natural resources and about 67–76% of energy.

Memory, identity, and background are grounding concepts in urban planning. All human settlements (cities, villages, etc.) are rooted in time. There are a variety of views of the time horizons and time dimensions related to sustainable development. Sustainable development deals with environment, economy, social integration, equality, politics, personal and collective well-being, safety, cultural identity, and background. All these aspects are fields for scientific investigation and have proper time horizons and dimensions, which appear to be independent from one another. Over what time sustainable development is to be achieved is a crucial and not yet answered question. Some might argue that as sustainable development is thought to be a process then it is not necessary to pay too much attention to this matter. It is part of getting all the stakeholders to think in a certain way about the future to avoid leaving future generations in a worse position than we have today. It is therefore as much about culture and the creation of a learning environment as it is about calculation and prediction (Brandon and Lombardi 2005).

3 The Lack of Intergenerational Justice in Urban Regeneration Evaluation Approaches

As discussed above, time is central to Sustainable Development and critical to our conceptual thinking and our world view but is often ignored when it comes to practical decision making. Underlying all the assessments and evaluations of sustainable development must be some consideration of the time period over which we are making the assessment. Although the continuous development and application of increasingly sophisticated analysis and evaluation methodologies of future scenarios, *forward looking*, which concern urban transformations or regeneration of entire urban spaces, the intergenerational equity is not still faced, is the obvious “elephant in the room” that no one considers. The weakness of current approaches to evaluation in relation to the concept of intergenerational justice has been

recognized and highlighted by a number of experts in the scientific field related to the topic. For instance, the mapping of the assessment methodologies developed by (Veaking et al. 2009) shows that none of the current “post-Brundtland” assessment tools, although capable of dealing with the entire life cycle of project on the territory, is able to include all aspects of the problem of urban sustainability, in its recognized multidimensionality. Moreover, the most soft but crucial elements of sustainable development, such as equity, harmony, inter-generational justice are not considered, although some non-use or bequest or existence values have been widely recognized in the literature of the environmental economy. As we know, the economic valuation, based on the monetary approach, such as the cost and benefit analysis has an extreme difficulty at incorporating elements that are outside the market logic (such as the eco-benefits) and identifying an appropriate intergenerational discount rate. The current evaluation approaches and protocols are not able to operate at different spatial levels and to assume a temporal framework that considers different generations (Lombardi and Cooper 2009). The planning recognizes the importance of spaces and places. But, as Stenberg (2004) reports, there is not a detailed reference frame for the time dimension in relation with planning procedures. Such consequence, the consideration of time is a serious problem. In general, only the time related to the economic-technical system is considered, while the temporal aspects related to biological, mental and social systems are generally excluded by the analysis. These aspects require a more sophisticated consideration of time, articulated in its five different components: absolute time, relational time, time related to the phenomenon under examination, time related to ideas and time related to material aspects. Despite the serious problem, Stenberg suggests when considering time, tools and techniques for defining the future continue to proliferate as Hales et al. (2012) record. The work on *forward-looking* decision supporting tools continues to be taken into consideration. For instance, for the financing at building scale, there are tools to support the decision that recognize the uncertainty such a characteristic inherent to the future (Fawcett and Ellingham 2013). These have suggested the use of the sustainability tools of the entire life of the project, what they describe as simple “back of the envelope” techniques and self-assessment tools for architects in understanding the life cycle of their buildings. At the same way, at wide scale, there are multiple techniques to capture and internalize explicitly the value of nature in the cycles of decision and policy making through the translation and adaptation of the ecosystem approach. For example, the *Neat toolkit* contains a range of methods to look into the future but typically only in the time frame of twenty years (NEAFO 2014). While these methods try to offer possibilities for future vision, they do not encourage the decision makers to look back or to search for a balance with what is valid in the past in relation with the needs provided in the future. Commonly, planning decisions focus on adults who are in the age of work and/or in the voter register. Typically, less attention is given to the aspirations and needs of those who are socially, economically and ethnically excluded, and in the same way to the young and/or younger, although the problems involved in the inclusion of these types of stakeholders are well known (see for example Turok et al. 1999; Joseph Rowntree Foundation 2002; Agger and Norvig

2009; and Age UK, not dated). Similarly, outside the context of recognized sites of historical architectural importance (Hey-Eddie et al. 2011) and despite the importance related to the protection of cultural heritage there are no codified rules of engagement of the population in deciding what value to assign to the local environment, in the definition of what is worth protecting and that is worthy of cultural value from the past or that you want to go to your grandchildren. Lombardi and Cooper (2016) suggest to use a five-generation reference framework in that to place the evaluation of territorial transformation and development interventions. This framework recognizes the existence of (at least) five time intervals, each one as long as one generation (30 years), to which we can be careful when making sustainable planning decisions at present. These five time intervals develop over 150 years, from the current adult generation to grandparents (perhaps no longer alive) to future grandchildren (perhaps still to be born). The attention to the past generations is recomposed in the intrinsic values and in the identity of the places we have inherited from them. The aspirations of future generations must be articulated but not ignored, as the principle of intergenerational equity shows us clearly. By paying attention to each of these time frames, when deciding if and how to intervene on a place, it is possible to attribute a more careful attention and balance the aspirations and attentions of past, present and future generations. This implies treating urban planning decisions as if they require the passage of a witness between generations and at the same time maintain a level of freedom between generations in making sustainable choices, while respecting the values of cultural heritage. Using this framework, accompanied by a balanced treatment of the tangible and intangible components of the architectural and cultural heritage, we could take into account all the different stakeholders that have to do with a decision of urban regeneration as it would require community of researchers to capture the information that is being spread over five generations. This will require necessarily the use of information and techniques for inclusion and participation that can pay attention, in a balanced manner, both to professionals and decision makers and to citizens who live the experience and legitimize negotiation in decisions concerning the sustainable development of territory (Van Hulst 2012; Abram 2007).

4 Conclusions

Intergenerational decisions have been recognized such an endemic problem in the field of urban regeneration and sustainable development decisions of the territories, not least because they raise the problem of social justice. In accordance with Dobson (1999) in his book “Fairness and futurity”, if future generations are the owners of justice, “What should we leave them in inheritance?”. This question is difficult, as observed by Honey et al. (2014), because “taking seriously the needs and aspirations of future generations is an emotional experience as well as an intellectual attempt”. Their exploration about the future, through guided visualization exercises with the participants, has led Honey et al. to believe that: “... our

most effective strategy to help the most distant generations can be through our active support to neighbouring and overlapping generations to redirect them towards sustainability”.

References

- Abram S (2007) Living through regeneration— capturing multiple stakeholder perceptions to enrich the qualitative research methods curriculum. *CEBE Trans* 4(2):67–84
- Age UK (Undated) Engaging with older people: evidence review, Age UK. http://www.ageuk.org.uk/Documents/EN-GB/For-professionals/Research/Evidence_Review_Engagement_with_Older_People.pdf?dtrk=true
- Agger A, Norvig L (2009) Exclusion in area-based urban policy programmes. *Eur Plan Stud* 17(7): 1085–1099
- Brandon P, Lombardi P (2005) *Evaluating sustainable development*. Blackwell Publishing, Oxford
- Brandon P, Lombardi P, Shen G (eds) (2017) *Future challenges in evaluating and managing sustainable development in the built environment*, Wiley, Oxford
- Dobson A (ed) (1999) *Fairness and futurity: essays on environmental sustainability and social justice*. Oxford University Press, Oxford
- Fawcett W, Ellingham I (2013) *Whole Life Sustainability*. RIBA Publishing, London
- Habitat III (2016) United Nations, Department of Economic and Social Affairs, Population Division (2016). *Policies on spatial distribution and urbanization: data booklet (ST/ESA/SER.A/394)*
- Hales C, Hewitt CN, Jankovic L, Jefferson I, Leach J, Mackenzie AR, Memon F, Pugh TAM, Sadler JP, Wein-Gaertner C, Whyatt JD, Rogers CDF (2012) Using scenarios to explore urban UK futures: a review of the literature 1997 to 2011. In: Lombardi D, Barnes M, MacKenzie AR (eds) *Designing resilient cities: a guide to good practice*, HIS BRE Press, Bracknell
- Hey-Eddie T, Murusuri N, Moure CJ (2011) Engaging local communities in world heritage sites: experience from the community management for protected areas program. In: Weber S (ed) (2012) *Rethinking protected areas in a changing world: proceedings of the 2011 George Wright Society biennial conference on parks, protected areas, and cultural sites*. Hancock, Michigan, The George Wright Society, pp 131–136
- Honey RJ, Le Menestrel M, Arenas D, Rauschmayer F, Rode J (2014) Enriching intergenerational decision making with guided visualization exercises. *J Bus Ethics* 122(4):675–680
- IPCC (2014) Summary for policymakers. In: Edenhofer O, Pichs Madruga R, Sokona Y, Farahani E, Kadner S, Seyboth K, Adler A, Baum I, Brunner S, Eickemeier P, Kriemann B, Savolainen J, Schlömer S, von Stechow C, Zwickel T, Minx JC (eds) *Climate change 2014: mitigation of climate change. Contribution of working group III to the fifth assessment report of the Inter-governmental panel on climate change*. Intergovernmental Panel on Climate Change/Cambridge University Press, Cambridge
- Joseph Rowntree Foundation (2002) *Involving young people in local authority decision-making*, JRF Findings 632, JRF, New York. <https://www.jrf.org.uk/report/involving-young-people-local-authority-decision-making>
- Lombardi P, Cooper I (2009) The challenge of the e-Agora metrics: the social construction of meaningful measurements. *Int J Sustain Dev* 12(2/3/3):210–222. ISSN 0960–1406
- Lombardi P, Cooper I (2016) Inter-generational justice: time to tackle our evaluation practice? In: VALORI E VALUTAZIONI dei tipografia genio civile, pp 5, pagine 19–23. ISSN: 2036–2404
- NEAFO (2014) *The national ecosystems approach toolkit, tools: applications, benefits and linkages for ecosystems (TABLES) project*, UK National Ecosystem Assessment Follow On (NEAFO), <http://neat.ecosystemsknowledge.net/index.html>

- Pope Francis (2015) Encyclical Letter “Laudato Si’”, of The Holy Father Francis, on care for our common home, May 2015. http://w2.vatican.va/content/francesco/en/encycli-cals/documents/papa-francesco_20150524_enciclica-lauda-to-si.html
- Stenberg J (2004) Planning in interplace? On time, power and learning in local activities aiming at social inclusion and sustainable development. Department of Built Environment and Sustainable Development, Chalmers Architecture, Goteborg, Sweden
- The Collins English Dictionary (2000) <https://www.collinsdictionary.com/dictionary/english/time>
- Turok I, Kearns A, Goodlad R (1999) Social exclusion: in what sense a planning problem? The town planning review, Vol 70, No 3, A national spatial planning framework for the UK (Jul 1999), pp 363–384
- United Nations, Department of Economic and Social Affairs, Population Division (2014) World Bank (2015) World development indicators 2015. Washington, DC
- United Nations (2015) Global initiative for resources efficient cities, Paris, France. Paris, United Nations Environment Programme. Retrieved from <http://unep.org/>
- UNEP (2015) United Nations Environment Programme: Annual Report 2015 United Nations Environment Programme (UNEP), <https://www.unenvironment.org/annualreport/2015/en/index.html>
- Van Hulst M (2012) Storytelling, a model of and a model for planning. Plan Theory 11(3): 299–318
- World Bank (2014) World urbanization prospects: the 2014 revision, CD-ROM edition. UNEP, 2012; IPCC, 2014; UNEP, 2015
- World Commission on Environment and Development (1987) Our Common Future. Brundtland Report (1987) Oxford, Oxford University Press. p 27. ISBN 019282080X

Climate-Change Adaptation: New Paradigms for Environmental Urban Planning



Mara Balestrieri, Giovanni Maciocco and Clara Pusceddu

Abstract This paper proposes a cause to reflect on adaptation to climate change at the urban level and the implications it may have on the environmental planning process of a city, in accord with principles endorsed in the papal Encyclical “Laudato si”. Because cities are both largely responsible for climate change and the major victims, it is evident that cities are also the places in which to test innovative climate-change adaptation technologies. In this sense, the implementation of urban-adaptation policies represents a challenge for urban planners and policy makers who question the autopoietic capacity of urban systems and are obliged to rediscover, review and incorporate new criteria and project categories.

Keywords Climate change adaptation · Environmental urban planning
Laudato SI

1 Introduction

The scientific community has long been unanimous in recognizing that ongoing climate change and the ability to adapt comprise a crucial issue for the future development of our planet (Kahn 2016; McEvoy et al. 2006). According to projections made by the International Panel for Climate Change (IPCC 2014), the

M. Balestrieri (✉)

Dipartimento di Agraria, Università degli Studi di Sassari, Sassari, Italy
e-mail: marabalestrieri@uniss.it

G. Maciocco

Dipartimento di Architettura, Design e Urbanistica, Università degli Studi di Sassari, Sassari, Italy
e-mail: maciocco@uniss.it

C. Pusceddu

Ministero dell’Ambiente e della tutela del territorio e del mare, Direzione Generale per il Clima e l’energia, Università degli Studi di Sassari, Sassari, Italy
e-mail: puscedd@uniss.it

phenomena associated with climate variability will intensify in the coming decades and extreme climate-related events can create more and more environmental, social and economic risks. In the past 20 years, multiple efforts have been made within the institutional, political and scientific frameworks to address the critical issues related to climate change. Several initiatives have been undertaken to enhance the long theoretical debate and field experience. In particular, the need to find solutions for mitigating and reducing greenhouse-gas emissions that characterized the first phase of the studies in this field has been integrated with the awareness that adaptation planning is required at various levels to limit the impacts of climate change and increase the resilience of territories. The recent agreement signed in Paris (21st Conference of the Parties of the UNFCCC COP21 United Nations Framework Convention on Climate Change in December 2015) focused on implementing a comprehensive global climate policy that would be capable of limiting the effects of climate change confirmed the need for intervention in terms of adaptation.

In addition to ambitious mitigation targets that are aimed at keeping the average global surface temperature below 2 °C compared to pre-industrial levels, and to “make efforts” to reduce it to 1.5 °C, the role of adaptation has gradually gained a great deal of recognition. In fact, even if the 2 °C limit were to be respected, some of the current and potential future effects of climate change would still occur. For this reason, one of the main aims of the agreement was to increase adaptation efforts to meet the adverse impacts of climate change by promoting resilience and sustainable development in various sectors and at the local, national and international levels.

The International Panel on Climate Change (IPCC 2014) defines climate-change adaptation as “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderate harm or exploits beneficial opportunities”, while the European Environment Agency defines it as the set of “policies, practices and projects which aim to mitigate the damage and/or realize opportunities associated with climate change” (EEA 2005). However, adaptation requires investment to implement coherent and shared strategies for addressing territorial management and development models at various levels (national, regional and municipal). In this sense, cities should play a particularly important role as they are primarily responsible, as well as being the victims of the ongoing processes. In fact, the issues caused by climate change require a drastic reprioritization within the field of urban planning, which has to deal with the environmental issues in governance practices more than ever before. Moreover, it seems that urban planners have neglected the relationship between climate and land-use planning, yet it is obvious that cities will be the key to achieving or definitively abandoning sustainable-development conditions for the planet (Carter 2011).

The implementation of an adaptation policy is an issue that requires much reflection on the autopoietic capacity of urban systems and obliges us to rediscover, review and incorporate new criteria and project categories.

2 The National Strategy on Adaptation and City Issues

In line with the projects carried out in other European countries, following the adoption of the EU's "European Strategy for Climate Change" in 2013, Italy implemented a National Strategy for Adaptation to Climate Change (SNAC) which was approved by the Ministry of the environment in June 2015 (Directorate General for Climate and Energy, Ministerial Decree n. 86 of 16 June 2015). The aim of the strategy is to develop a national vision to address climate change by counteracting and mitigating its impacts. The strategy determines the expected impacts and major sectoral vulnerability on national territory, as well as the first set of guidelines and actions to be undertaken, especially in light of the main impacts summarized below:

- Lower quality and availability of water resources and alterations of hydro-geological regime (landslides risk, flood etc.).
- Degradation of soil with erosion and desertification.
- Fires and droughts in forests and major islands.
- Loss of biodiversity and natural ecosystems.
- Flooding and erosion of coastal areas.
- Reduced agricultural productivity, changes in arable crops by region.
- Increases of health problems: heat-related mortality, cardiovascular and respiratory diseases, infectious diseases.
- Damage to the economy.

The Italian strategy identifies 12 sectors and nine micro-sectors (and two special cases). For each sector, the strategy addresses and proposes actions distinguishable by type (cross-between sectors, "soft" meaning non-structural, "green" based on an eco-system approach, "grey" based on infrastructures and technologies) and priority (to be implemented by or after 2020), selected on the basis of four criteria:

- Economic: largest cost-benefit ratio.
- Win-win: actions contribute to adaptation while also having other social, economic and environmental benefits, and mitigation effects.
- No regret (or low regret): options that yield benefits even in the absence of climate change and where the costs of the adaptation are relatively low vis-à-vis the benefits of acting.
- Social: for the well-being of the weaker sections of society.

The strategy will be implemented through a "Plan of Action" that the Ministry is preparing and delivered through regional and municipal actions.

In fact, there is increasing awareness that the policies must have an effect on urban development because cities are responsible for most of the global greenhouse-gas emissions (demand for mitigation policies). They are the places in which the high population density makes the effects of climate change particularly severe for human society (demand for adaptation policies) and have been the hub of environmental problems for some time now.

3 Impacts of Climate Change on Urban Systems

The majority of the Italian population live in cities (90% according to the Istat 2011 census). As highlighted by the SNAC and the literature, the main impacts of climate change at the urban scale (Hallegatte and Corfee-Morlot 2011; Wilby 2007; Arnfield 2003; Ashley et al. 2005) are primarily:

- Impacts on health and welfare deriving from increases in temperature (especially from heat waves) and the effects of amplification (urban heat islands) that occurs in city centers. Furthermore, air-quality deterioration is caused by high temperatures to magnify the levels of various atmospheric components (PM, ozone etc.).
- Impacts on infrastructure and technology networks: since heavy rainfall and extreme events (floods) can damage bridges, roads, sewage treatment plants and water, electric and telecommunication networks; heavy rainfall events can also exceed sewage-treatment plant capacities and cause flooding in lower areas.
- Impacts on the energy sector—sudden increases in energy demand and a higher incidence of blackouts caused by high temperatures in homes and workplaces during heat waves.
- Impacts on social interaction caused by lower attendance (due to excessive temperatures) in public places (squares, streets, recreation centers etc.).
- Impacts on biodiversity caused by the increased levels of disturbance in the natural or semi-natural habitats within the urban perimeter.
- Impacts on public green areas caused by summer droughts and the increase in attendance due to the more favorable (compared to buildings) weather conditions.
- Impacts on water resources, e.g., potable water shortages caused by changing rainfall regimes and especially to the lengthening of summer drought.
- Impacts on competitiveness and economic opportunities, especially in the settlements where the production system is based on agriculture, forestry, fishing and tourism.
- Impacts on the social and political structures due to the need to allocate substantial human and financial resources to public-health services and risk prevention, as well as to the restoration of structures damaged by extreme events.
- Significant impacts on the quality of life of certain sections of the population, especially lower income families, the sick, the lonely, the elderly, recent immigrants and people living in poor housing conditions.
- Impacts related to river flooding because changing rainfall regimes could increase the flood discharge compared to historical statistics, thus endangering areas that were previously considered safe.

- Impacts related to increased landslides caused by heavy rainfall. In this respect there is a particularly worrying situation in Italy, considering the Italian Landslide Inventory that documents around 485,000 potential landslides, 12% of which can cause harm to people and damage to properties.
- Especially in conjunction with storms and high tides, impacts from rising sea levels can flood low-lying coastal areas and have devastating effects on sites of historical and artistic heritage (Venice is an obvious example).

These impacts are a function of several variables:

- The magnitude of the changes (*exposure*).
- A set of context elements of each settlement (sensitivity), for example, the altimetry and wind regime, the size of the building, the condition of the infrastructures, the nature of economic activities, income and educational levels of the population, history of hydrogeological issues, the urban green facilities and services, mobility conditions etc.
- The response capacity (adaptive capacity) of each settlement that can support the containment of some impacts. In this sense, the level of citizens' awareness and the capability of local government administrations play important roles.

Moreover, it is important to note that the size of the settlements and their various organizational processes may lead to variations in the impacts according to the context, thus making them difficult to quantify.

There are 46 large cities in Italy (>100,000 inhab.) in which approximately a quarter of the population (13.7 million people) reside, and 151 medium to large towns with a population ranging from 40,000 to 100,000 pop. (total population of 8,845,000 inhabitants, approximately 15% of the national population). These centers are generally the areas with the greatest climatic problems, which will increase even more in the future (at least in quantitative terms), yet they are also presumably better equipped administratively and technically and are the areas that will play active roles in testing climate-adaptation paths. There are 1007 small-to-medium-sized centers (from 10,000 to 40,000 inhabitants) in which approximately 30% of the Italian population (18,206,000 people) reside, while a similar percentage (18,714,000 persons; 31.5% of the national total) live in small centers (up to 10,000 inhabitants) distributed across 6888 municipalities. Therefore, most of the Italian urban structure is composed of small-medium and small centers both in terms of number (approximately 85% of the municipalities) and of settled inhabitants (over 60% of the urban population). There will also be significant climate-change impacts on these centers, but climate-adaptation initiatives could be hampered by issues related to small size (lack of information, internal competences of the authorities, resources), and therefore it is essential that those interested in promoting adaptation paths (state, regional, provincial, local government associations) pay them adequate attention.

4 Social and Ecological Crisis. Transition to an Integral Ecology in Urban Settings

The Encyclical Letter “Laudato si”, published in June 2015 and written by Pope Francis in the third year of his pontificate, explicitly refers to climate-change issues regarding which he calls for environmental ethics in the relationship between human beings and their natural environment. The aim of his worldwide message was to address the gap that has developed between government decisions concerning environmental policies and the livelihoods of those living in developing countries. As many scholars have argued, religion exercises an incomparable “power of convocation” over people. For this reason, international environmental policy makers view the role religion plays in educating individuals about ecological issues as being both strategic and useful (Orioli 2016; Deane-Drummond 2016).

The climate is a common good, belonging to all and meant for all. At global level, it is a complex system linked to many of the essential conditions for human life [...]. Humanity is called to recognize the need for changes of lifestyle, production and consumption, in order to combat this warming or at least the human causes which produce or aggravate it (§ 23).

From this perspective, the interpretation of the relationship between human activity and environment requires a systemic view in which the environment is considered as a complex web of relationships between various biotic and abiotic components, in which man has a role and a responsibility that differentiate him from any other living species because humans are able to affect the future evolution of the system through their actions. In fact, population, activities and places are parts of a unitary system that affect one another through harmonious and adaptive or conflicting and selective interactions.

When we speak of the environment, what we really mean is a relationship existing between nature and the society which lives in it. Nature cannot be regarded as something separate from ourselves or as a mere setting in which we live. We are part of nature, included in it and thus in constant interaction with it [...]. We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis, which is both social and environmental. Strategies for a solution demand an integrated approach to combating poverty, restoring dignity to the excluded and at the same time protecting nature (§ 139).

The encyclical underlines that cities and their administrations are not managing places and resources in a responsible and balanced way, since there is great disharmony between inhabitants and the environment from ecological, social and economic points of view.

Because the weakest people and the poorest economies (48 Encyclical) will be the first to suffer the consequences of climate change and the problems linked to them, when implementing development strategies it will be essential to prioritize some social aspects, such as the vulnerability of certain sections of the population—for example, people aged 65 and over and low-income families deemed to be of secondary importance for too long.

Efforts must be made over time to change the physical structure and organization of the cities (45 encyclical), overcoming the widespread privatization of the spaces that is leading to new forms of exclusion and inequality in the “right to the city” that is the possibility to use the city as a place of opportunity and to use its spaces as an affirmation of belonging to it (Lefebvre 1991).

All these points determine the need to recover the ethical role in planning. As it is recognized that the ethical role of the discipline precedes the technical role (Campbell 2012), this is an aspect that should not be overlooked. As Lefebvre pointed out, space is a social, even before physical, product of human action, since it contains “very different objects, [...] which are not only things, but rather relations” (Lefebvre 1972). Planning is therefore a political action that affects the collective interest of current citizens and future generations. Therefore, it implies a moral and civil responsibility, equity, respect for social willingness and foresight. Scholars in the field of development have raised important questions regarding the distribution of adaptive capacity between populations and communities. Dow et al. (2006) discussed the disparate abilities of groups to adapt to climate change, highlighting the lower levels of adaptive capacity associated with poverty. In this sense, although adaptation is a relatively new topic in urban planning, research into new paradigms draws on never-resolved but widely debated issues.

There are various viewpoints on this question in the literature, such as the debate on the link between ecology and ethics (Abedi-Sarvestani 2008; Webb 1999) and the analysis of the conflict between market logics and defense of public goods in the urban approach (Sandercock 1977), in addition to the research branches on risk management (Wisner et al. 2004; Begueria 2006; Thomalla et al. 2006) and the increasing attention paid to urban resilience as a priority in governance policies (Coaffee 2008; Pickett et al. 2014). Nevertheless, the issue of climate change underlines the need for a new perspective in urban planning that places the environmental question at the center of the debate.

5 New Paradigms for Environmental Planning

The topic of climate change is certainly the result of a recent debate when viewed in relation to the history of the urban spatial-planning discipline. However the desire to find solutions to climate change necessarily requires a change of scale, combining the global approach required to reduce greenhouse-gas emissions, with a local strictly urban and extremely localized approach for adaptation (Laukkonen et al. 2009). In fact, adaptation is a particularly local and urban question since there are no efficient adaptation policies and actions. Urban settlements are complex systems because they are composed of various elements, residential buildings, productive activities, facilities, infrastructures and networks, green areas, water-courses etc. that imply large territorial relations regarding the mobility of individuals, the supply of water and energy resources, the exchange of commodities and goods, the management of waste and the emission of pollutants. As cities are

predominantly artificial systems without autonomous resilience (however environmental processes should be put into play), their ability to adapt will therefore be entrusted to conscious human actions (or to the construction of interaction scenarios, autopoietic capacity, resilience). The new challenge for the territorial government will have to take several elements into account:

- (1) *Policies of adaptation at the urban level must be implemented by revising ordinary policies in light of a new adaptive vision.*

It is essential to support and disseminate adaptation cultures at the regional and local levels and to overcome regional disparities caused by the absence of national guidelines in terms of local actions. In Italy, there is a clear lack of homogeneity in the implementation of adaptation paths (strategies/plans/guidelines) at regional level. Some regions (the most virtuous) have their own regional adaptation strategy, and others are aware of the issue and are starting to develop their own tools, while others trail far behind and need support. However, in order to promote adaptation policies, one must modify existing tools rather than create new ones, thus avoiding useless overlaps and redundancies while allowing for a self-reliant adaptation process. In this sense, it is essential to raise awareness of the possibility of implementing adaptation paths from those that are the available planning instruments at the regional, national and European levels. It is also strategically important to take action with respect to the lack of homogeneity, with regard to dialogue between regions and local communities because encouraging and supporting experiences of adaptation at the local level is still very limited in the Italian landscape.

- (2) *It is necessary to recover the autopoietic capacity of territories but revisiting it in order to make urban systems capable to develop their own capacities of resilience.*

From a systemic point of view, a city that does not want to die needs to develop its own autopoiesis through continuous redefinition. The concept of autopoiesis implies a substantial co-implication and interdependence between individuals and the environment, so that the individual-environment unit becomes an autonomous and concluded self-contained system that is configured according to its internal structure. Autopoietic mechanisms (Maturana and Valera 1980, 1987) are able to achieve a particular dynamic equilibrium that is based on the possibility of mutual regeneration between the whole and the parts of the organism. Shifting the concept of resilience into the urban field is certainly akin to its ecological definition that considers the “city system” as an organism in constant transformation, which organizes itself to respond to stressful, natural or socioeconomic events to reach acceptable levels of efficiency (Walker and Salt 2012). However, in light of the ongoing changes to which cities are increasingly vulnerable, urban systems cannot only resist but they must change by planning innovative social, economic and environmental responses, thus enabling them to withstand long-term stress (Jabareen 2013). It is important to note that climate change will experience a southern shift so that cities like Rome will experience climatic conditions similar to

those of Tunis. According to forecasting models, urban settlements and the current forms of management will require profound structural changes according to the principles of limitation of land use, the design of green infrastructures, enhancement of slow mobility and rural architectural cultural heritage and reduction and management of sprawl, moving towards a more compact city model.

- (3) *It is necessary to recover the environmental components of the city in order to build scenarios of integration between urbs and civitas, city and country.*

Urban planners need to develop a higher sensitivity for environmental questions and overcome the usual representation of the relationship between urban settlement and context. The valorization of the environment should not be purely decorative but must encourage a collective conscience and a greater coherence in space organization. The term environment should not only be used to refer to physical and material elements, but as a combination of nature and history. The crisis of sociality has made citizens (civitas) indifferent for urban places (urbs) and has left a passive and fragmented citizenry that is unable to find new forms of social cohesion (Choay 1994).

- (4) *Adaptation is a transversal question so it is essential to create specific models of governance.*

The governance of processes linked to climate-change impacts and the construction of adaptation modalities and mitigation strategies represent complex planning activities. The factors linked to these processes cannot be treated separately since their individual functioning is related to the totality and vice versa by non-linear relations. These complex topics require a multilevel approach oriented to the pluridimensionality of the governance by an operative dialectic between traditional vertical governance (connections between the lower and higher levels of government) and an increasingly horizontal dimension (cooperative interaction between regions and local communities) for the greater effectiveness of local public policies and development strategies (Camarda 2012). Efforts must be made to realize a system according to which the responsibility for defining and implementing adaptation policies is distributed between the various levels of government and institutions with various procedures and roles regarding the administrative actions of programming, monitoring, evaluation and management (Bulkeley and Betsill 2005).

Furthermore, some value-based issues must be taken in account:

- (1) *It is necessary to insert the criteria for adaptation into the assessment of policies, plans and programs* (for example, Regional Operational Programme ROP, Environmental Impact Assessment EIA, Strategic Environmental Assessment, SEA, public procurement etc.). The European Commission has long stressed the need to integrate climate issues into the Environmental Impact Assessment (EIA) and the Strategic Environmental Assessment (SEA). Even if the SEA Directive already includes climate in the environmental parameters that must be taken into account in the evaluation

procedure, a lack of attention to this issue was observed by the Member States in the practical application of the Directive (European Commission 2007, 2009). The SEA as a tool aimed at overcoming sectoral approaches with a complete assessment of climate-change impacts, their cumulative and synergic effects, and the need to identify mitigation measures and compensation and a continuous monitoring system can strongly support adaptation policies.

- (2) *It is essential to recognize the importance of assessments that take into account the cost of adaptation, as well as the cost of inaction.*

Despite the need to develop specific lines of research, as yet few studies have been carried out on this subject. In Italy, there are national studies that provide a summary of current knowledge on impacts, vulnerability and adaptation to climate change at the national level (Medri et al. 2013; Castellari e Artale 2009; Antonioli et al. 2007). However, from an economic-analysis perspective, several studies have tried to carry out a comprehensive analysis of the impacts of climate change on the Italian GDP.

Carraro (2008), based on a Computable General Equilibrium model, showed that even with a small increase in temperature, approximately 0.93 °C compared to 2001, the losses induced by climate change could range between 0.12 and 0.16% of GDP in 2050. These economic losses could rise to 0.2% of GDP if the change in temperature was +1.2 °C. The study also shows that the impacts will increase exponentially during the second half of the century, thus causing a six-fold reduction in GDP in 2100 compared to 2050. This data, substantially confirmed by the only other available studies (McCallum et al. 2013), can be interpreted as bearish estimates since they only marginally consider extreme events and do not capture either catastrophic events or most of the social dimensions of impacts. For example, Carraro (2008) highlights that, if the damage was measured in terms of consequences on household consumption rather than in terms of GDP, the loss would be much greater.

Some researchers have argued that, if by 2020 a global agreement has not been made aimed at limiting emissions, there will be a significant increase in mitigation and adaptation costs than the costs assumed in the case of taking immediate action (Rogelj et al. 2013).

6 Conclusions

Urban areas are the parts of the planet for which the social costs of global warming will be higher, and therefore it is essential to tackle the issue of adaptation to climate change in regional and urban planning. Some of the issues defined in the encyclical of the Pope's "Laudato Si" are linked to this aspect and to the centrality of the urban dimension in the wide perspective of adaptation. The city is a fertile ground in which adaptive urban models must be created even if certain categories

that characterize the city's environmental planning must be revised by constructing scenarios for integration between environmental processes and urban processes to address the related evaluation questions.

References

- Abedi-Sarvestani A, Shahvali M (2008) Ecology and ethics: some relationships for nature conservation. *J Appl Sci* 8(4):715–718
- Arnfield AJ (2003) Two decades of urban climate research: a review of turbulence, exchanges of energy and water, and the urban heat island. *Int J Climatol* 23(1):1–26
- Antonoli F, Artale V, Campiotti CA, Cocito S, Delfanti R et al (2007) Dossier ENEA per lo studio dei cambiamenti climatici e dei loro effetti. http://old.enea.it/produzione_scientifica/dossier/D09_CambiamentiClimatici.html
- Ashley RM, Balmfort DJ, Saul AJ, Blanskby JD (2005) Flooding in the future—Predicting climate change, risks and responses in urban areas. *Water Sci Technol* 52(5):265–273
- Beguería S (2006) Validation and evaluation of predictive models in hazard assessment and risk management. *Nat Hazard* 37(3):315–329
- Bulkeley H, Betsill MM (2005) Rethinking sustainable cities: multilevel governance and the urban politics of climate change. *Environ Politics* 14(1):42–63
- Camarda D (2012) Intelligenza spaziale e pianificazione. Dalla governance ai multi agenti. Francoangeli, Milano
- Campbell H (2012) Planning ethics and rediscovering the idea of planning. *Plann Theory* 1(11):379–399
- Carraro C (2008) Cambiamenti climatici e strategie di adattamento in Italia. Una valutazione economica. Mulino, Bologna
- Castellari S, Artale V (2009) I cambiamenti climatici in Italia: evidenze, vulnerabilità e impatti. Bononia University Press, Bologna
- Carter JG (2011) Climate change adaptation in European cities. *Curr Opin Environ Sustain* 3(3):193–198
- Choay F (1994) Le règne de l'urbain et la mort de la ville. In: AA.VV., La ville. Art et architecture en Europe 1870–1993. Centre G. Pompidou, Paris
- Coaffee J (2008) Risk, resilience, and environmentally sustainable cities. *Energy Policy* 36(12):4633–4638
- Deane-Drummond C (2016) “Laudato Si” and the natural sciences: an assessment of possibilities and limits. *Theol Stud* 77(2):392–415
- Dow K, Kasperson R, Bohn M (2006) Exploring the social justice implications of adaptation and vulnerability. In: Adger N, Paavola J et al (eds) *Fairness in adaptation to climatic change*, Cambridge. MIT Press, Cambridge
- EEA (2005) European Environment Agency, vulnerability and adaptation to climate change in Europe. EEA Report No. 7/2005
- European Commission (2009) Adapting to climate change: towards a European framework for action. White Paper
- European Commission (2007) Adapting to climate change in Europe, options for EU action. Green Paper
- Kahn ME (2016) The climate change adaptation literature. *Rev Environ Econ Policy* 10(1):166–178
- Hallegatte S, Corfee-Morlot J (2011) Understanding climate change impacts, vulnerability and adaptation at city scale: an introduction. *Clim Change* 104(1):1–12
- IPCC (2014) Climate change 2014: impacts, adaptation, and vulnerability. Part A: global and sectoral aspects. In: Field C, Barros, DJ, Dokken, KJ, Mach MD et al (eds) *Contribution of*

- working group II to the fifth assessment report of the intergovernmental panel on climate change. Cambridge University Press, Cambridge.
- Jabareen Y (2013) Planning the resilient city: concepts and strategies for coping with climate change and environmental risk. *Cities* 31:2020–2229
- Laukkonen J, Blanco PK, Lenhart J, Keiner M, Cavric B, Kinuthia-Njenga C (2009) Combining climate change adaptation and mitigation measures at the local level. *Habitat Int* 33(3):287–292
- Lefebvre H (1991) *The production of space*. Blackwell Publishing, London
- Lefebvre H (1972) *Espace et politique*. Anthropos, Paris
- McCallum S, Dworak T, Prutsch A, Kent N, Mysiak J et al (2013) Support to the development of the EU Strategy for Adaptation to Climate Change: background report to the Impact Assessment. Environment Agency Austria, Vienna
- Maturana HR, Varela FG (1987) *The tree of knowledge*. Shambhala, Boston
- Maturana HR, Varela FG (1980) *Autopoiesis and cognition. The realization of the living*. Springer, Berlin
- McEvoy D, Lindley S, Handley J (2006) Adaptation and mitigation in urban areas: Synergies and conflicts. *Proc Inst Civil Eng: Municipal Eng* 159(4):185–191
- Medri S, Venturini S, Castellari S (2013) Overview of key climate change impacts, vulnerabilities and adaptation action in Italy. CMCC Research Paper, Issue RP0178
- Orioli L (2016) Laudato si and the New Paradigm of Catholic Environmental Ethics: reflections on environmentalist movements in Italy. *J Agric Environ Ethics* 29(6):931–943
- Pickett STA, McGrath B, Cadenasso ML, Felson AJ (2014) Ecological resilience and resilient cities. *Build Res Inf* 42(2):143–157
- Rogelj J, McCollum DL, Reisinger A et al (2013) Probabilistic cost estimates for climate change mitigation. *Nature* 493:79–83
- Sandercock L (1977) *Cities for sale: property, politics and urban planning in Australia*. Melbourne University Press, Carlton
- Thomalla F, Downing T, Spanger-Siegfried E, Han G, Rockström J (2006) Reducing hazard vulnerability: towards a common approach between disaster risk reduction and climate adaptation. *Disasters* 30(1):39–48
- Walker B, Salt D (2012) *Resilience thinking: sustaining ecosystems and people in a changing world*. Island Press, Washington
- Webb NR (1999) Ecology and ethics. *Trends Ecol Evol* 14(7):259–260
- Wilby RL (2007) A review of climate change impacts on the built environment. *Built Environ* 33(1):31–45
- Wisner B, Blaikie P, Cannon T, Davis I (2004) *At risk. Natural hazards, people's vulnerability and disasters*, 2nd edn. Routledge, London

When Efficiency Is Not Enough: Should Equity be Embedded in Decision Making and Evaluation?



Marta Berni and Laura Gabrielli

Abstract The Encyclical “Laudato si” pushes scholars and researchers to reflect on the fact that «We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis which is both social and environmental» and, at the same time, that «Strategies for a solution demand an integrated approach to combating poverty, restoring dignity to the excluded, and at the same time protecting nature» (§ 139). This means that an integral ecological approach, based on a new paradigm of justice and equity, should be adopted. The neoclassical view of economics sharply separates the economic and the social sphere, and, in so doing, it has excluded the problem of inequality from economic analysis. Economic evaluations (cost-benefit analysis) claim to be able to consider intra- and intergenerational equity, by applying a system of distributional weights and a social-discount rate. Nonetheless, they remain anchored to the efficiency criterion. The paper proposes a reflection on whether to adopt new evaluation approaches and tools in decision making when the equity criterion is called into question. In particular, it suggests two possible ways. Related to intra-generational justice, the first approach suggests the adoption of evaluation strategies that are able to consider the distributional effects of the project on the capacity of the participants to influence the decisions (deliberative democratic evaluation). Related to inter-generational justice, the second approach fosters the adoption of the precautionary principle, which suggests an extremely cautious, risk-averse attitude, in defence of future generations.

Keywords Intra and intergenerational equality · Precautionary principle
Deliberative democratic evaluation

M. Berni (✉)

Department of Architecture (DIDA), University of Florence, Florence, Italy
e-mail: marta.berni@unifi.it

L. Gabrielli

Department of Architecture (DA), University of Ferrara, Ferrara, Italy
e-mail: laura.gabrielli@unife.it

1 Introduction

You do not need to be a believer and accept a religious point of view to meet the many challenges that Pope Francis poses in his “*Laudato si*” encyclical (Bergoglio 2015). As researchers in the field of the evaluation of territorial transformations, we cannot avoid confronting ourselves with Pope Francis’ vision. According to his vision, contemporary urban issues are dealt with by integrating social and environmental questions, urban degeneration is presented as a social problem, the city is understood as a common good and all citizens (especially the weakest ones) have the right (and duty) to participate in decisions (Bentivegna 2016).

In view of the ecological and urban crisis, the encyclical raises a few themes, such as the complexity of today’s problems, the double (environmental and social) dimension of the integral ecology, the critique of the technocratic paradigm and the need to adopt a perspective of justice and equity, which are particularly relevant for evaluation as a discipline (Penza 2016).

In the last few decades, the ecological-environmental issue was a fundamental ethical concern worrying both society (see the worldwide ecological movements) and the economists (see the development of environmental economics studies). The result is a widespread awareness of the problem even if effective solutions are still far from being achieved. We share the opinion of many economists (e.g., Sen, Stiglitz, Zamagni) that holds that current and future equity and poverty are the new pressing problems coming to the fore. In fact, the upper 1% of the world population is now amassing more than the other 99% of income put together, and the trend is continuously increasing. This means that our societies are becoming more and more unequal: economically, in terms of distribution of resources and wealth; socially, regarding equal access to resources; and politically, in terms of the capacity to influence the public decision-making process.

The equality issue, both in terms of intergenerational and intra-generational solidarity, is a central concern in the encyclical. As a matter of fact, if «Intergenerational solidarity is not optional, but rather a basic question of justice, since the world we have received also belongs to those who will follow us» (§ 159), the present inequality has the same relevance as the pope recommends «Let us not only keep the poor of the future in mind, but also today’s poor» (§ 162). Moreover, it is stated: «in addition to a fairer sense of intergenerational solidarity there is also an urgent moral need for a renewed sense of intra-generational solidarity» (§ 162). Regrettably, issues like equity and solidarity have no room either in urban policy (Amendola 2016), or in neoclassical or in mainstream economics—claimed to be an objective, value-free science—or in evaluations stemming from it. Therefore, we think that researchers should strive to reconsider and question the prevailing traditional evaluative approach.

The paper has mainly a methodological approach. It starts with a short summary that highlights some of the major flaws of neoclassical economics and cost-benefit analysis, suggesting that a different evaluation approach is required to encompass the equality issue (understood as inter and intra-generational equity). The

precautionary principle and deliberative democratic evaluation are also proposed as possible paths that may be undertaken and explored in finding new possible, suitable evaluative approaches.

2 Flaws of Neoclassical Mainstream Economics and Cost-Benefit Analysis

According to neoclassical-mainstream economics, as Robbins (1932) wrote, «Economics ... is concerned with that aspect of behaviour which arises from the scarcity of means to achieve given ends. It follows that Economics is entirely neutral between ends; that, as far as the achievement of any end is dependent on scarce means, it is germane to the preoccupations of the economist. Economics is not concerned with ends as such» and he later repeats, «Economics is neutral as between ends. Economics cannot pronounce on the validity of ultimate judgments of value». Therefore, «it is worthwhile delimiting the neutral area of science from the more disputable area of moral and political philosophy» (Robbins 1932).

Economics and ethics have taken different paths due to their dissimilar elements. First, there was an incorrect and insufficient interpretation of the underlying assumptions of economic models and theories. The thoughts and ideas of Smith had, perhaps, a shallow analysis: the theory of self-interested behavior and the maximization of economic benefits regarding efficiency in a regulatory market, considered as *deus ex machina*.¹ In neoclassic economic theory, man was seen as a *homo oeconomicus*, who behaves rationally, aiming to maximize profits and utility. All human beings were considered to possess the same desires and needs. Moreover, a large part of economic theory has made excessive use of mathematical and statistical models, whose parameters were estimated using econometric techniques. Nevertheless, mathematical models, which just reveal numbers and apply analytical methods, are not able to reflect the needs of human beings.

This position was so pervasive that only recently some strands of economic thought have spread the necessity to reduce inequalities, and it is not only a moral duty, but it also implies a sense of justice as hardships and poverty are driven by others, or rather, by the consumer welfare of others. Among others, it is the case of Sen's capabilities approach (1999, 2005), Yunus social business (2007), Stiglitz's and Piketty's positions against inequality (Stiglitz 2012, 2015; Piketty 2014), which criticize the capitalistic model. But, regrettably, up to now, all these efforts, and not

¹The argument of the Smith's invisible hand—that guides markets to equilibrium—postulates that markets are approaching the ideal of free competition, in which there are neither monopolies nor oligopolies nor information asymmetry. However, everyone knows that the conditions for markets of perfect competition are never met in real life. In addition, people have different talents and abilities. It follows that if the rules are shaped to enhance, say, opportunistic behavior, dishonest, immoral and so on. Robinson (1966) wrote, «the hidden hand will always do its work, but it may work by strangulation».

even Zamagni's and Bruni's proposed "Civil Economy" (Zamagni and Bruni 2015) are able to produce a new, alternative non-capitalistic vision of the market economy.

According to the vision of mainstream welfare economics,² the economic and social spheres are not only different but also separate. The market operates to maximize wealth creation: it is the place where, according to the efficiency criterion, all people egoistically pursue their own self-interests. On the other hand, the social sphere has the task of redistributing wealth. It is the place where, according to equity criterion, the State pursues sympathetic, collective interests. This means that ethics is related only to distribution problems, as the production should be performed according to the "iron logic" of the market, while it is up to the State to mitigate the adverse effects on society. Therefore, the system of values is focussed on efficiency, which has become the actual principle in reality. Not surprisingly, the most popular evaluation procedure used in the evaluation of public investment on the territory is cost-benefit analysis.

Evaluating public interventions in the territory requires a long-term perspective and many kinds of overlapping and competing values (e.g., cultural, economic, political, aesthetical social, environmental etc.), and is strongly dependent on the particular context. Mono-objective economic methods prevail due to the great deal of credibility they have gained. These methods (presenting data in a seemingly objective form (prices) and appealing quite directly to the business-thinking mentality) are so well refined and so tightly theorized to block out uncertainties and to exclude all other kinds of values (Mason 2002).

When considering a public intervention in the territory as an investment producing a capital asset, the economists and evaluators are concerned with the stream of economic effects produced by the investment into the future. The «benefits are represented by the value of the services the asset provides, the costs by the value of resources used up in producing those services» (Throsby 2002). To determine the net value of the investment/asset's earnings, future costs and benefits have to be discounted³ to bring them to equivalent terms in the present. Starting from these concepts and data, economists use the general category of investment appraisal techniques called cost-benefit analysis (hereafter CBA) to determine, based on some performance indicators, whether or not an investment is economically convenient and the ranking of the available alternatives.

²Indeed, in order to ensure the scientific nature of the economic discipline, Robbins (1932) and his followers claimed that value judgments—being conceptions or ethical beliefs of people about what is good or bad—should not be of interest for the economist but only of social inquiry.

³Economists distinguish two different concepts of the discount rate; the first measures the preference of an individual or of society for consumption now, rather than in the future (respectively, the individual and the social-time-preference rate). The second concept is the opportunity-cost rate, defined as the best alternative risk-free rate of return available to the investor at time zero (Throsby 2002).

The use of CBA in analyzing and informing investment decisions in the public sector may be problematic due to many flaws,⁴ especially detected in environmental economics (Ackerman and Heinzerling 2002; Ackerman 2008). CBA applies essentially individualistic rational-choice reasoning to the complex, multidimensional, social decision-making process where inter and intra-generational equity questions are to be faced.

As far as intra-generational equity is concerned, CBA «tends to ignore, and therefore has the effect of reinforcing patterns of economic and social inequality. The CBA consists of adding up all the costs of a project, adding up all the benefits, and comparing the totals. Implicit in this innocuous-sounding procedure is the controversial assumption that it does not matter who gets the benefits and who pays the costs. Both benefits and costs are measured simply as dollar totals; those totals are silent on questions of equity and distribution of resources» (Ackerman and Heinzerling 2002).

Moreover, as intangible benefit and costs are measured by the willingness-to-pay, and the rich are able and willing to pay for more than the poor, according to CBA, the net benefit to society is maximized, dismissing the dangerous activities and/or facilities in the low-income areas. This means that «If decisions are based strictly on cost-benefit analysis and willingness to pay, most environmental burdens will end up being imposed on the countries, communities, and individuals with the least resources» (Ackerman and Heinzerling 2002). It is not relevant how such willingness to pay is measured by revealed or stated preferences, as the principal problem is that individuals are considered solely as egoistic consumers—merely concerned with efficient behavior in the market—rather than as citizens with a sense of moral responsibility to the larger society and concerned with equity.

Of course, existing patterns of injustice are not determined by CBA, «Still, cost-benefit analysis rationalizes and reinforces the problem, allowing environmental burdens to flow downhill along the income gradients of an unequal world» (Ackerman and Heinzerling 2002).

The term intergenerational equity, or intertemporal distributive justice, is used to refer to fairness in the distribution of welfare, utility or resources between generations (Throsby 2002). From the economic point of view, intergenerational equity refers to the maintenance of an equal level of welfare or utility between generations, expressed as per capita consumption or as an endowment of resources or capital stock (Young 1992). According to the neoclassical approach to economics, as Solow (1986) states: «Whether productive capacity should be transmitted across generations in the form of mineral deposits or capital equipment or technological

⁴Accordingly with Ackerman and Heinzerling (2002), CBA suffers from four kinds of fundamental flaws since: «standard economic approaches to valuation are inaccurate and implausible; the use of discounting improperly trivializes future harms and the irreversibility of some environmental problems; the reliance on aggregate, monetized benefits excludes questions of fairness and morality; and the value-laden and complex cost-benefit process is neither objective nor transparent».

knowledge is more a matter of efficiency than of equity». Not surprisingly, CBA faces the issue of intertemporal/intergenerational resources allocation from the point of view of efficiency rather than of equity, simply looking for the maximization of the net present value indicator. But if «Discounting is a perfectly sensible practice when evaluating financial transactions that occur within a single lifetime», it is problematic and controversial out of its domain of validity in a context where the analogy to an individual investment decision breaks down as «the time span is so great that different generations are involved in costs today and benefits tomorrow» (Ackerman 2008).

The choice of the discounting rate may be conditional when the decision is about which project is most worthwhile because it has two relevant effects on highlighting long-term projects' impacts and determining the relative importance of the future compared to the present. A low discount rate contributes to many future benefits and adverse effects of long-lasting projects (such as the redevelopment of distressed urban areas and suburbs, restoration of architectural heritage, requalification of urban and natural landscapes etc.). «If the future matters, the discount rate must be very low» or even zero (Ackerman 2008) because «any positive discount rate, however low, will mean that some future benefits will be effectively reduced to zero, inevitably giving what many would regard in ethical terms as undue weight to the preferences of the present generation» (Throsby 2002).

When intergenerational equity is called into question, CBA and its theoretical rationale cannot provide operational decision rules to guide choices. «In short, equity is an important criterion for evaluation of public policy, but it does not fit into the cost-benefit framework. The same goes for questions about rights and morality principles that are not reducible to monetary terms» (Ackerman and Heinzerling 2002). Questions about ethics and equity require thinking through the whole range of moral issues: «there is no need then to collapse the complex moral inquiry into a series of numbers. Pricing the priceless merely translates our inquiry into a different, and foreign, language one with a painfully impoverished vocabulary» (Ackerman and Heinzerling 2002).

3 The Equality Issue

The economic environment is characterized by the growth of wealth globalization but also of fast-growing inequality. According to Zamagni (1994), there are no economic laws so uncontroversial as to be exempted from the comparison with the ethical dimension. In such a way, the collapse of the economic theories of Pareto welfare, the poor trade-off between efficiency and distribution contributes to the economic failure of the theory to solve the real problems assumed in the models.

If economics and evaluation tackle the fairness issue, they are forced to move from the firm ground of objective reasoning—where the leading criterion is efficiency—to the “quicksand” of ethics and political philosophy logic. We should choose among the various possible conceptions of social justice. If we endorse Pope

Francis' call for equity, as economists and evaluators, we should abandon any claim of technical objectivity and assume responsibility by siding with the weakest people.

The notion of equity is fundamentally «based on a value judgment» (Sen 1979), and, as a consequence, it is a normative notion rooted in some concept of social justice, which «represents a belief that there are some things which people should have, that there are basic needs that should be fulfilled, that burdens and rewards should not be spread too divergently across the community, and that policy should be directed with impartiality, fairness and justice towards these ends» (Falk and Brownlow 1989).

'Equality' and 'equal' are incomplete predicates as they denote the relation between the objects that are compared, raising the question: equality of what? Different concepts of equality can be distinguished according to the different answers we give to the key question. As equality is a complex and multifaceted concept, depending on the particular historical context, no single notion of equality, as the literature testifies, may be unanimously accepted and shared.

This is not the place for any survey of either the various concepts or measurement of equality, therefore the paper refers just to Sen's capability approach (1979) as it constitutes the theoretical foundation of the human development paradigm promoted by the United Nations Development Program, and most of the equality frameworks sink their roots in its theoretical underpinning.

Sen uses the term "capability" with the meaning of positive freedom. A capability is something between "raw capacity" and a remarkably-well executed activity. A raw capacity, with experience and education, can become a capability and then an activity when it is performed with excellence. The capability is what people are enabled to be and do, given their characteristics, the other people around them, the resources and services they can draw on, the rights they can access, the institutions, and the structures and legal framework of society. Sen assesses the quality of life as the ability to achieve valuable "functionings", which are states of "being and doing", such as being well nourished, having shelter etc. The heart of the capabilities theory is that social achievements should target the expansion of the capacity of individuals, i.e., the freedom of achieving the crucial functioning to do and to be.

According to Sen's approach, there is no single correct answer that can help assessing equality: the choice of the measure is a regulatory process influenced by the context and purpose of the evaluation. To be valid, the selection of the measurement process must be more transparent, more democratic and as well-informed as possible. This interpretation of the capability approach thus provides the commitment and involvement in the process of extensive and public consultation with specialists and stakeholders, individuals and the groups at risk of incurring disadvantages.

4 Evaluation of Urban Transformation and Inter/Intra Generational Equity

According to Pope Francis' encyclical point of view, the issues at stake now are: how may we translate the issues of equity at the level of timely intervention in the territory (ranging from the realization of significant infrastructure to the requalification of the distressed peripheral district)? How may we take care of the interests of people who have no voice (like the future generation or the weakest) in decision making to decrease the imbalance of powers? Consequently, who has the right to speak in their name? What kind of evaluative approach may we envisage in the face of complex urban transformation projects that affect the quality of life of the weakest people living in socially and economically distressed suburban areas?

In other words, how can evaluation in complex decision making concerned with urban transformation projects consider the issues of both inter- and intra-generational equality? Moreover, and more importantly, what kind of equity do we refer to?

The last question requires a normative, political decision related to what kind of equity we should refer to. It is commonly recognized that human beings are different due to their personal heterogeneities, social factors and relational perspectives. Individual differences relate to physical conditions, cognitive and non-cognitive skills, and so on. Social differences relate to how social factors shape the context in which individuals employ their resources and abilities and makes choices. Relational differences relate to how people understand their relative position in society, like social norms and conventions that define gender roles or discriminating practices (Vargas et al. 2016). This means that, in any evaluation exercise, we should consider a plurality of evaluation perspectives because all these differences (and mainly the social positions) affect the point of view of the various actors. According to Bentivegna (2016) «if we make decisions only according to the financial evaluation disregarding the utility evaluation, we are taking into account the interests of few actors while discriminating the interests of the inhabitants of the suburbs, who are concerned with the correspondence between the results and expected effects of the project and their needs».

We think that endorsing intra-generational equity in evaluating urban transformation raises different issues than endorsing intergenerational equity; therefore, the question has been split into two parts.

Pope Francis' encyclical dedicates an entire chapter to “Dialogue and Transparency in Decision-Making” explicitly asking for opening up decision making and, consequently, evaluation to the participation of the all components of civil society. «An assessment of the environmental impact of business ventures and projects demands transparent political processes involving a free exchange of views» (§ 182). Furthermore, he goes beyond giving directives about how to manage the process: «A consensus should always be reached between the different stakeholders, who can offer a variety of approaches, solutions and alternatives. The local population should have a special place at the table; they are concerned about

their own future and that of their children, and can consider goals transcending immediate economic interest» (§ 183).

The central question is how should it be made possible for the weakest of people to take part in complex decision making and influencing its results. In recent years, various participatory and—more structured—deliberative models of democracy have been proposed to overcome the flaws of representative democracy. According to Floridaia (2013), «a democratic deliberative procedure is based on public debate and reciprocal reason-giving, and may aim to attain a rational consensus or a shared solution, or at producing better decisions; but it may also be limited to circumscribing the reasons for a disagreement or a conflict, so as to render them more productive by identifying possible areas of equilibrium or compromise». It means that the deliberative democracy «places great demands upon citizens' abilities and willingness to express their reasons publicly and consider the public reasons of others. For this reason, it also implies a demanding ideal of equality» and specifically of «equality of effective social freedom understood as the equal capability for public functioning» (Bohman 1997).

As «The proper criterion for deliberative democracy is *equality of effective social freedom*, understood as equal capability for public functioning»⁵ (Bohman 1997), there is a strict relationship between deliberative decision-making processes and a concept of equity based on Sen's capability approach. The capability equality not only emphasizes the importance of active citizenship and thus of effective participation in public life, but also the need to «mitigate power imbalances among citizens so as to permit their free and equal participation» (Howe and Ashcraft 2005). Indeed, according to Bohman (1997), if citizens are unable to function adequately⁶ in the public arena, they can neither have influence nor achieve their goals.

In evaluating the effects of urban-transformation projects, we cannot assume that citizens are similarly capable of making use of their opportunities and resources since this invariably means favoring advantaged persons or groups, viz., who are most educated, who have access to exclusive information, and who possess the greatest resources and privileged social positions (Bohman 1997). In dealing with the differences between human beings, we should judge equality based on the results of deliberative decision making. Regrettably, we cannot use satisfaction of preferences because deliberation asks citizens to adjust their preferences⁷ and beliefs in order to achieve an innovative and shared solution. A possible alternative

⁵Emphasis in the original.

⁶An adequate functioning is the capability for full and effective use of political opportunities and liberties in deliberation whereas, capability means what «is necessary to equalize the functionings that persons are able to achieve». It does not imply that the disadvantaged people are less competent or capable, but that they have fewer such functionings and choices available to them and thus a more restricted scope of effective freedom (Bohman 1997).

⁷Preference transformation as the distinctive feature of the deliberative decision making is a crucial issue that has relevant unexplored effects on evaluation. The topic deserves further in-depth treatment at the methodological level, which will be developed in a further paper.

might be referring to “freedom to achieve” as far as the relevant conditions for human functioning are concerned⁸ (Bohman 1997).

From the evaluation point of view, this means that we should focus on the decision-making process—rather than on the products—taking care of individuals’ equal capabilities and adopting an evaluation approach encompassing the principles of deliberative democratic theory and which is flexible enough to adapt to the specific decision-making contexts/framework. In other words, this is called the Deliberative Democratic Evaluation (hereinafter DDE) approach.

According to House and Howe (2000), DDE is based on three general principles: inclusion, dialogue and deliberation. The principle of inclusion requires that all groups with a significant interest—namely, the stakeholders—be included in both the design and conduct of the evaluation of a program or project. Of course, this does not mean that every interest, value or view concerned should be given an equal weight but, merely, that all relevant ones should be considered. The most relevant actors in a complex intervention project in a territory are: community and other culture groups (both the general and the organized public interest groups); the market (promoters, banks); the State (politicians, public administrations or institutions); experts (architects, urban planners, ecologists, local experts etc.); property owners; ordinary citizens etc. Some of them are “at the table” where values are identified, assessed and ranked, and where decisions are made, while other legitimate stakeholders are not present. Insiders are those who can participate in the process by right or might. They, such as public officials, bureaucrats, policy makers, and, to an extent, professionals involved in the process, are endowed with some decision power. All the other actors, i.e., the weakest people with a stake in the project in question, with neither leverage on nor knowledge of the decision-making process and perhaps even only a small interest in participation, remain outside (Berni 2015).

As Howe and Ashcraft (2005) state, various degrees of inclusion are possible, ranging from the lowest passive⁹ to the most active one¹⁰ and including many intermediate gradations.¹¹ There is neither a general rule nor an absolute best solution to the choice of the level of inclusion to pursue. The decision will depend on the specific evaluation exercise: the nature of the questions to be addressed, the decisional context, the participants’ knowledge, the available resources etc. A democratic evaluation requires active inclusion, which shades into the requirement of dialogue. Dialogue is an evidence-driven, cognitive activity in which

⁸Bohman (1997) underlines that egalitarian justice cannot be understood even as equality of resources as «resource equality ignores a very basic difference among persons: the difference in their capacities to transform means, resources, and opportunities into the achievement of their chosen goals. Or, to use Sen’s terms, human diversity implies that agents have different capacities to transform objective conditions into human functionings and thus to choose a valuable life».

⁹It is the case of participants simply requested to fill out a fixed-response survey.

¹⁰It is the case of participants engaged in face-to-face discussions.

¹¹For example, a kind of so-called “representative” inclusion where evaluators perform, interpret and report the results of a series of face-to-face dialogue with participants.

participants and evaluators collaboratively engage and from which the most rationally defensible conclusions emerge. Dialogue¹² is based on mutually respectful listening and communication of opinions and ideas of all the stakeholders. Its primary goal is the achievement of commonly shared meanings and solutions, provided that an attitude of mutual understanding and legitimation of the various interests, objectives and values of the participants is assumed.

«[A]s active inclusion shades into dialogue, critical dialogue shades into deliberation» (Howe and Ashcraft 2005). Indeed, deliberation is related to the manner in which dialogue is structured and the information that is entered into it is processed. Deliberation is a reflexive, thoughtful reasoning about the relevant problems at stake—including preferences and values identification and transformation—by which all the stakeholders reach findings, conclusions and (shared or at least acceptable) solutions.

People entering into a dialogue about an urban-transformation project may be mistaken or misinformed about its positive and negative effects. «The crux of the deliberative democratic view is that reaching evaluative conclusions, including value-laden ones, should be evidence-based and requires genuine cognitive give and take» (Howe and Ashcraft 2005).

Even though «the deliberative democratic approach is conceived as a method that mitigates inequalities in power among stakeholders», in actual situations «certain people come to deliberations with more knowledge, better sources of information, and greater facility with discursive practices than certain others do» (Howe and Ashcraft 2005). This provides them with a greater communicative power and a strategic advantage allowing them to manipulate the dialogue to serve their self-interests. To reduce these undue advantages and to secure inclusion, defenders of deliberative democracy mainly rely on the procedures of debate.

The evaluators should provide suitable rules and procedures in implementing any deliberative democratic evaluation. Unfortunately, although participation processes are becoming increasingly frequent in architectural projects and urban planning, the literature mainly offers examples of democratic deliberative evaluations of policies or public programs, whereas experiences of deliberative valuations in the field of urban transformation project are still limited. In any case, a three-stage procedure may be advisable. The first stage consists of an empowerment process that provides people¹³ with the capacity to participate in decision making with a minimum amount of organization, to assume responsibility and «to speak with a single voice» (Plottu and Plottu 2009). It mainly consists of a learning process about the evaluation experiment that helps people to think and reason

¹²«Dialogue ranges from elucidating to critical. Elucidating dialogue is limited to clarifying the views and self-understandings of [evaluation exercise] participants. Critical dialogue includes clarifying the views and self-understandings of [evaluation exercise] participants but also subjecting these views and self-understandings to rational scrutiny» (Howe and Ashcraft 2005).

¹³Including the less powerful, not just the ones such as staff, administrators, private investors etc., who typically sit at the decision table.

“evaluatively¹⁴”. Notably, the empowerment process requires real changes in evaluators’ professional attitudes. According to Quinn and Patton (2002) «‘the democratic evaluator’ recognizes and supports value pluralism with the consequence that the evaluator should seek to represent the full range of interests in the course of designing an evaluation». More than a neutral external judge, the evaluator (dismissing a technocratic approach) acts as an information broker¹⁵ between groups who want and need knowledge about each other, providing them with evaluation methods and techniques accessible to non-specialists.

The second stage is a deliberative process involving all the stakeholders (public administrations, property owners, public and private investors, experts, civil society as individuals and organizations etc.) in a dynamic process of the collective construction of the problem of choice of a shared solution through changes (not merely aggregation) of preferences. Therefore, the deliberative process requires some fundamental preconditions. For example: meeting places where communication without domination can take place; open access to relevant information; time for reflection and discussion; stakeholders’ mutual recognition and legitimation of all the values preferences, interests and systems of knowledge at stake; and a shared commitment to a reasoning based on rational and impartial argumentations.

The third stage is a multi-criteria analysis, which, according to (Plottu and Plottu 2009), is fundamental to democratic evaluation as it provides first, a formal framework for the development of the deliberation process. Secondly, it presents an algorithm for the project selection encouraging a deliberative decision-making process to achieve a shared creative solution.

The multi-criteria evaluation aims at recreating the various dimensions of the decision-making problem and the diverse opinions of the various actors. It allows a plurality of values, objectives, interests and criteria, assigning a relative importance to the various criteria, processing both quantitative and qualitative data, including a multiplicity of stakeholders. It also simultaneously considers (by a multi-decision-makers approach) various structures of preferences, taking care of changes in preferences and producing creative solutions.

Criticisms of the deliberative approach argue against a vision of deliberation restricted to rational argumentation, which privileges a culturally specific kind of formal speech and devalues forms of expression, like narratives, typically used by marginalized groups and minorities and favors a greater presence in deliberation to those with higher educational and income levels (Vargas et al. 2016).

¹⁴“Thinking evaluatively” is not an instinctive or automatic process; it rather must be learned. Quinn Patton (2002, p. 127) says: «It is not enough to have trustworthy and accurate information (the informed part of the informed citizenry). People must also know how to use information, that is, to weigh evidence, consider inevitable contradictions and inconsistencies, articulate values, interpret findings and examine assumptions, to note but a few of the things meant by ‘thinking evaluatively’».

¹⁵Bobbio (2006) also suggests that in the face of contrasting positions, the evaluator should endorse a sympathetic attitude of equi-proximity rather than equidistance, to help participants in distinguishing the benefits or traps that can result from the various solutions.

Moreover, at the operational level, DDE must face some relevant problems related to: (1) How the weakest people—who are neither willing nor interested in active participation—can be involved; (2) Who manages the deliberative process (including its evaluation); (3) How and to what extent it is reasonable to consider the opinions of the weakest, but at the same time least-informed people, when technical and strategic issues are at stake. They all are problems that require an in-depth, case-by-case consideration depending on the specific context. This might be an interesting and fruitful field for further research.

As far as inter-generational equity is concerned, the first question to deal with is who has the right to speak in their name. Both the concepts of poverty and equity are relative and subject to change in time and various contexts. As a consequence, who nowadays can foresee and safeguard the interests, as well as the social and cultural assets, of the weakest people and decide which alternative project will improve the quality of life of future generations, thus reducing inequality in term of capabilities? A risk-adverse precautionary approach, more than a traditional compensatory one, appears more promising.

A definition of the precautionary principle (hereafter PP) is included in the publication of COMEST (2005): «When human activities may lead to morally unacceptable harm that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. Morally unacceptable harm refers to harm to humans or the environment that is threatening to human life or health, or serious and effectively irreversible, or inequitable to present or future generations, or imposed without adequate consideration of the human rights of those affected».

The PP is often used in sustainable development, which implies that the needs of the present generation should be met providing they do not jeopardize the possibility and capacity of meeting future generations' needs. This concept requires an ethical balance between the present and the future generation, and it is traditionally called inter-generational equity.

«The PP, being directly related to the principle of sustainable development, incorporates inter-generational equity in the sense that considerations of possible significant long-term and future harm provide enough reason to act now, even though present interests may not be threatened. The PP should embrace the principle of inter-generational equity» (COMEST 2005).

In his encyclical, the Pope wrote, «“where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a pretext for postponing cost-effective measures” which prevent environmental degradation. This precautionary principle makes it possible to protect those who are most vulnerable and whose ability to defend their interests and to assemble incontrovertible evidence is limited» (§ 186).

As it has been shown in Sect. 1, the attempt to embed inter-generational equity in CBA fails both when it tries to evaluate the effects on the future generations through the discounting procedure and when it tries to incorporate and measure

equality with the inclusion of weights, which represent various groups (efficiency cost-benefit analysis).¹⁶

Instead, PP is generally used when problems have connotations of complexity in natural and social systems and of uncertainty, which is usually unmeasurable or unpredictable. The CBA has limited use under these conditions.

As Steele (2006) states, «The issue of inter-generational justice is yet a further challenge, because it involves thinking about others who do not yet exist, and who thus cannot voice preferences. In this case, added to the uncertainty about future consequences of an action, is uncertainty about what will actually constitute future well-being».

As a general proposition, «the precautionary principle states that decisions that may lead to irreversible change should be approached with extreme caution and from a strongly risk-averse position, because of the imponderability of the consequences of such decisions» (Throsby 2002). The principle, according to Throsby, asserts that it is necessary to use a higher level of care when the irreversibility is involved.

In the encyclical, the irreversibility concept is stressed in words: «If objective information suggests that serious and irreversible damage may result, a project should be halted or modified, even in the absence of indisputable proof. Here the burden of proof is effectively reversed, since in such cases objective and conclusive demonstrations will have to be brought forward to demonstrate that the proposed activity will not cause serious harm to the environment or to those who inhabit it» (§ 186).

The precautionary principle is configured as a risk-management strategy when there is no scientific certainty about the potential negative effects of an activity, project or action. The implementation of a strategy, according to the PP, should start with a process of identification, measurement and weighing of risks carried out by analysts who can define the probability that a negative event occurs, in quantitative terms, and its impact. At the same time, the decision makers have to value the need and the use of the PP, pursuing various goals. On the one hand, they should apply a high level of protection (to the environment, the community, human rights and to health) pursuing the population's interests, while, on the other, they should be reconciled with the need for the constant development of the countries.

In fact, as stated in the encyclical, the PP «does not mean being opposed to any technological innovations, which can bring about an improvement in the quality of life. It does mean that profit cannot be the sole criterion to be taken into account, and that, when significant new information comes to light, a reassessment should be

¹⁶As stated by Rose-Ackerman (2011) «... many policies raise important issues of distributive justice, individual rights, and fairness, especially between generations. Talk of “net-benefit maximization” does not help illuminate these value choices. These issues raise measurement problems, but the difficulties with CBA run deeper. Even if everything could be measured precisely, CBA would be an inappropriate metric. Attempts to add distributive weights to CBA are fundamentally misguided. They suppose that technocrats, especially economists, can resolve distributive justice questions».

made, with the involvement of all interested parties. The outcome may be a decision not to proceed with a given project, to modify it or to consider alternative proposals» (§ 187).

PP is not yet definitive: it is revocable whenever it undergoes changes in the conditions under which it was adopted. PP must be maintained as long as the scientific data are inadequate, imprecise or inconclusive, and as long as the risk is considered too high to accept. Therefore, it advocates placing legal restrictions on the activities of independent actors where there is a significant chance of harm to shared interests.

In the application of PP, it is proposed to distinguish the phase of risk assessment from that of its management. The first phase is of scientific nature; the second part is more related to a political domain and consists of determining the acceptable risk threshold and the preparation of precautionary measures to deal with it. It should be noted, however, that the level of uncertainty influences the separation between the two phases. The lower the degree of uncertainty, the more the risk assessment assumes technical characteristics and borders policy decisions in the management phase. The risk assessment must be transparent and involve all the population in the process of the management of potential risks. The PP is not a research method or a scientific principle, but rather a political tool that can enable the adoption of special precautions and non-discriminatory measures. The PP suggests the overcoming of the individualistic logic leading to a supportive and ethical vision that stimulates the entire population to a collective consciousness. In other words, «if the ethics of responsibility leads to strong interpretation of prudence, the PP is a weak version. The PP, therefore, corresponds with a prudent approach, which aims to avoid both the abstaining and the technical-scientific interventionism» (Marchese [undated](#)).

PP has very different definitions, with major differences regarding uncertainty, the severity of consequence, risks, precautionary measures etc. While most of the variations of the principle are semantic, other differences are crucial and related to the application of the precaution. For some reason, the various interpretation of the PP definitions can lead arbitrary decision by governments, public sector or other decision makers.

One of the most significant criticisms that have arisen for the PP is that it tends to slow or stop the innovation, the development, the projects or actions before they are implemented or come to the market. Based on the principle that it is “better to be safe than sorry”, it can be argued that the PP is based on fear and irrationality. PP’s applications require the measurement of uncertainty and risk associated with projects and actions; it is important to define who is going to measure those risks and how those risks can ban or restrict an action that is not safe, acceptable or harmful. It is hard to define the level of threat necessary to trigger the PP and the difference between irreversible damage and possible risk: it is a blurred line, even if the difference has enormous policy importance.

5 Conclusions and Further Steps

The paper, endorsing Pope Francis' vision of contemporary urban issues that integrates social and environmental questions and requires the adoption of a perspective of justice and equity, has sought to highlight the possible more relevant implication of evaluation as a discipline. First, the paper discussed the shortcoming of the traditional neoclassical approach in facing equity issues and, in particular, exposed why CBA fails when trying to incorporate and measure equality, even with the inclusion of weights that represent various groups.

Subsequently, according to Sen's approach, two possible directions have been proposed to envisage a more comprehensive evaluative methodological approach: the deliberative democratic evaluation and the precautionary principle. At the same time, the paper stresses the operational limits of both methods when they are used in performing an evaluation of urban-intervention projects. Several lines of research can be identified to apply the DDE and the precautionary principle to the urban interventions.

The first line of research is given by providing a common conceptual and methodological basis for developing indicators. Using indicators could be an analytical tool that brings together evidence for human rights analysis and, above all, assessment. Their primary goal is to be instruments for policymakers and communities alike, in response to increasing national emphasis on promoting human rights and to reduce inequalities or to ascertain priorities for funding and resources. Very few examples and applications look at how inequality plays out in a different form at the urban (city) level, so it will be of strategic importance to construct a framework for the evaluation of projects at the urban scale.

The second line of research is related to the questions exposed in the previous sections on the application of the PP and DDE. These issues, now only raised in a theoretical context, will have to be answered in the identification of several methodologies that can include equity in decision making and evaluation of territorial intervention projects.

Finally, another possible line of investigation and application could be the possibility of proposing an evaluation model that takes into account the aspects of equity in a profoundly changing economic environment. This process starts from the criticism of the past, from earlier failures to build a new, more equitable, future. Therefore, before proposing new methodological aspects, it is necessary to understand how to introduce equity and how the conditions for this evaluation process could lead to democratic evaluations.

In addition, it is crucial to recognize the rules by which the assessment is to be based, such as its inclusiveness and the need to introduce the poor or peripheral (abandoned) areas at the core of the assessment. In short, it is strategically necessary to understand whether economic and decision-making equities are different or antithetical or whether they might coexist. This will lead to a proposal for an evaluation methodology in which the principle of optimizing the criterion against the principle of optimization of objectives will be discussed.

References

- Ackerman F, Heinzerling L (2002) Pricing the priceless: cost-benefit analysis of environmental protection. *Univ PA Law Rev* 150(5):1553–1584
- Ackerman F (2008) Critique of cost-benefit analysis, and alternative approaches to decision-making. *Friends of the Earth England, Wales and Northern Ireland*, London
- Amendola G (2016) The Just City. *Valori e Valutazioni* 17:13–14
- Bentivegna V (2016) Dialogue and transparency in decision-making. *Valori e Valutazioni* 17: 25–28
- Bergoglio J (2015). *Laudato Si'*—Encyclical letter. Vatican
- Berni M (2015) Democratic evaluation of architectural heritage. In: XIII International forum *Le vie dei Mercanti, heritage and technology*. La Scuola di Pitagora
- Bobbio L (2006) Dilemmi della democrazia deliberativa. *Democrazia e diritto* 4:11–27
- Bohman J (1997) Deliberative democracy and effective social freedom. In: Bohman J, Rehg W (eds) *Deliberative democracy*. MIT Press, Cambridge, Massachusetts, London, England, pp 321–348
- COMEST, UNESCO (2005) The precautionary principle. World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris
- Falk J, Brownlow A (1989) *The Greenhouse challenge: what's to be done?* Penguin Books, Victoria
- Florida A (2013) Participatory democracy versus deliberative democracy: elements for a possible theoretical genealogy. Two histories, some intersections. In: 7th ECPR general conference, Bordeaux
- House ER, Howe KR (2000) Deliberative democratic evaluation. In: Ryan K, De Stefano L (eds.). *Evaluation as a democratic process: promoting inclusion, dialogue, and deliberation new directions for evaluation*, No. 5. Jossey-Bass, San Francisco, pp 3–12
- Howe KR, Ashcraft C (2005) Deliberative democratic evaluation: successes and limitations of an evaluation of school choice. *Teach Coll Rec* 107(10):2275–2298
- Marchese M (undated). Il principio di precauzione tra luci ed ombre. www.comparazioneidiritto.it
- Mason R (2002) Assessing values in conservation planning: methodological issues and choices. In: De La Torre M (ed) *Assessing the values of cultural heritage*. The J. Paul Getty Trust, Los Angeles, pp 5–30
- Penza G (2016) Pope Francis: The *Laudato si'* Encyclical and the urban issue. *Valori e Valutazioni* 17:5–8
- Piketty T (2014) *Capital in the 21st Century*. Harvard University Press, Cambridge, p 2014
- Plottu B, Plottu E (2009) Approaches to participation in evaluation some conditions for implementation. *Evaluation* 15(3):343–359
- Quinn Patton M (2002) A vision of evaluation that strengthens democracy. *Evaluation* 8(1): 125–139
- Robinson J (1966) The pure theory of international trade. In: *Collected economic papers*. Basil Blackwell, Oxford, p 189
- Robbins L (1932) *Essay on the nature and significance of economic science*. MacMillan, New York
- Rose-Ackerman S (2011) Impact assessment and cost-benefit analysis: What do they imply for policymaking and law reform? In: *Revue française d'administration publique*, vol 4 (n° 140), pp 787–806. Also in Auby JB, Perroud T (eds) (2013) *Regulatory impact assessment*. INAP, Center for the Study of Democracy, Seville pp 93–124
- Sen A (1979) Equality of what? Tanner lecture on human values. *Tanner Lectures*, Stanford University, Cambridge
- Sen A (1999) *Commodities and capabilities*. OUP Catalogue
- Sen A (2005) Human rights and capabilities. *J Hum Dev* 6(2):151–166

- Solow RM (1986) On the intergenerational allocation of natural resources
- Steele K (2006) The precautionary principle: a new approach to public decision-making. *Law Probab Risk* 5:19–31
- Stiglitz JE (2012) *The price of inequality: How today's divided society endangers our future*. WW Norton & Company, New York
- Stiglitz JE (2015). *The great divide*. Penguin, UK
- Throsby D (2002) Cultural capital and sustainability concepts in the economics of cultural heritage. In: De La Torre M (ed) *Assessing the values of cultural heritage*. The J. Paul Getty Trust, Los Angeles, pp 101–117
- Vargas A, Lo A, Howes M, Rohde N (2016) *The problem of inclusion in deliberative environmental valuation*. Environmental Values, The White Horse Press
- Young R (1992) Evaluating long living projects: the issue of intergenerational equity. *Aust J Agric Econ* 36:207–232
- Yunus M (2007) *Creating a world without poverty: social business and the future of capitalism*. Public Affairs, New York
- Zamagni S (1994) *Economia e filosofia*. Dipartimento di Scienze Economiche, Mimeo, Bologna
- Zamagni S, Bruni L (2015) *L'economia Civile*. Il Mulino, Bologna

Economic Evaluation and Urban Regeneration: A New Bottom-up Approach to Local Development Policies



Rosa Maria Caprino, Gianluigi De Mare and Antonio Nesticò

Abstract In the present context of continuing economic and financial crisis and increased social disadvantage, particularly marked in the Mezzogiorno of Italy, the experience of the Antonio Genovesi Prize was born. It's a prototypical experiment of collaboration among the university, local government, business and local banks for economic, social, cultural and environmental development in the provinces of Salerno, Avellino and Napoli and overall for the implementation of useful synergies for the establishment of stronger growth prospects. This initiative has initiated to develop the economic feasibility profile for over 70 projects in five years, since 2011, for an investment budget of more than 500 million euros (De Mare et al. in *La valutazione finanziaria di progetti per il rilancio del territorio. Applicazioni a casi reali*. Franco Angeli, Milano, 2012). This report aims to represent and to highlight the effects of the actions undertaken through related activities at the regional level (Bottero et al. in *Proc Soc Behav Sci* 223:923–928, 2016). As a function of the increasing relevance of extra-monetary repercussions for investment decision makers, this paper estimates such social and environmental effects attributable to examined projects. This is in accordance with recent EU guidelines (see, the Social Impact Agenda for Italy). This association was founded in 2016 to collect the experience of the Social Impact Investment Taskforce (SIIT), launched in 2013

Rosa Maria Caprino, Gianluigi De Mare and Antonio Nesticò have contributed in equal parts to this paper. Thanks to Dr. Silvio Petrone and Dr. Camillo Catarozzo, respectively, President and Vice-President of Cassa Rurale ed Artigiana—BCC di Battipaglia, for guidance and constant support concerning the analytical and developmental strategies of the initiative.

R. M. Caprino
Cassa Rurale Ed Artigiana Banca Di Credito Cooperativo of Battipaglia,
Montecorvino Rovella, Italy
e-mail: rmcaprino@hotmail.com

G. De Mare · A. Nesticò (✉)
Department of Civil Engineering, University of Salerno, Fisciano, SA, Italy
e-mail: anesticò@unisa.it

G. De Mare
e-mail: gdemare@unisa.it

during the UK Presidency of the G8, to bring social-impact investments to the forefront of national agendas. This is about those initiatives strongly desired by Pope Francis in his Encyclical *Laudato Si'* (2015) and able to give an answer to often unsatisfied needs for health, disabilities, new and more sustainable ways of living, social exclusion, promotion of cultural heritage (Nesticò et al. in Sustainability 7(11):14661–14676, 2015), cooperative management of goods and sharing economy platforms. In the manner shown and with the aim of collecting information in particular on occupational and environmental effects, the use of cross-sectoral matrices enable the prediction of the impacts on regional economy arising from concrete realization of interventions planned in the construction industry.

Keywords Economic evaluation · Urban regeneration · Cross-Sectoral matrices
Social effects · Genovesi prize

1 Emigrate or Cooperate? the Experience of the Genovesi Prize

The Province of Salerno is the primary area of interest targeted by the examined projects that are part of the activities eligible for the Antonio Genovesi Prize. This territory is marked by negative externalities with respect both to structural indicators of the European Community and to the survey on the quality of life (IISole24Ore 2016; ISTAT 2016). The main problem concerns the work. Calculations on 2016 ISTAT data reveal that the male employment rate is 63%, the female's only 37% and the inactivity rate is as much as 62% in the age range of 15–29 years. These ratios are even more worrying when compared with EU objectives for 2020, which aim for an employment rate (age range of 20–64 years) in Europe at 75% and in Italy at 67–69%, as well as to raise the female employment rate twice as much as that of men.

At the same time, the question arises about the inactivity rate of young people aged 15–29 years. In this age group, the population in the Province of Salerno is 199,549, with as many as 124,300 inactive, i.e. an inactivity rate of about 62%.

With regard then to the quality of life, it is sufficient to examine the summary of the data for the main indicators, namely school (education and training, full-time and day nurseries), elderly (care services and assistance), transport, health and justice, economic well-being, safety, environment. These are all issues of extreme importance, as is fully explained in the Encyclical *Laudato Si'* (Borrelli and Citterio 2016). The province of Salerno is rated in the 103rd place out of 110 counties in the classification of the IISole24Ore (2016). Details can be found in the Bes report (ISTAT 2016).

In this alarming context, the only alternative to migration resides in a solidarity aggregation. The decision to migrate is in fact a cost that not everyone is able to bear in economic and emotional terms, so that citizens remain inert as long as

someone else decides for them. Only an exogenous factor, an occasion or a shared opportunity leads to aggregation and to cooperation (see Bank of Italy 2009).

The Genovesi Prize, in this context, constitutes a collaborative, bottom-up hypothesis implemented among universities, local authorities, business and local banks, to pool the experience and know-how necessary for the realization of public-interest investments through project financing and, therefore, with self-contained financial charges for the public sector.

The experiment of the Genovesi Prize enables Master Degree students in Civil, Environmental and Architecture Engineering granted by the Faculty of Engineering of the University of Salerno, or to those who have successfully completed a Course in Economic Evaluation of Projects, to select and verify the economic and financial sustainability of projects to be implemented in the territories, particularly aimed at urban regeneration (De Mare et al. 2015a, b; Nesticò and Pipolo 2015; Guarini et al. 2017). This theme is decisive in reading the content of the Encyclical of Pope Francis, too.

In this path, economic evaluation regains that centrality denied during many years of great waste of public resources, and the environment becomes an endogenous variable for development, together with cultural growth and accumulation of shared capital, able to influence the decision of young people to stay or to emigrate from their places of birth.

Even the Association for the Development of Industry in Southern Italy (SVIMEZ) identifies urban regeneration as the main driver for development of the South, as already experienced in Italy during the Second World War (SVIMEZ 2016). From this perspective, mutual and rural banks often become crucial links between the decision-making process and the realization, even to indicate a sustainable future and helping to preserve and recover the beauty of local areas (Granata 2015).

From an operative point of view, since 2010, thanks to the experience gained from the study meetings at the Cassa Rurale of Battipaglia, it was clear that any path to development of the activities about the Genovesi Prize must necessarily involve institutions, stakeholders of the area of interest and, above all, unused leveraged social capital.

The starting point of the study actions implemented are Three-year Plans of the local government and Regional Park Projects. The actors are students of the University of Salerno and entrepreneurs of the National Association of Builders (ANCE), as well as private virtuous entrepreneurs (e.g., Socomer Grandi Lavori) and the local bank Rural and Artisan Bank of Battipaglia and Montecorvino Rovella. The goal is to promote the realization of investments with positive economic, social and environmental impact, but also to pool experience and know-how to overcome the distinctions of class and background. The award takes the form of a certificate and a cash contribution in favor of the best research groups for each of the three categories in the competition, i.e., feasibility, creativity and research.

The job steps that engage students in project exercises of the Course in Economic Evaluation of Projects in the Department of Civil Engineering (DICIV) of the University of Salerno are:

1. analysis of three-year plans of the government and selection of priority actions for the business sector, feasibility and investment amounts;
2. for the selected action, the study of the relevant economic sector, market analysis, preliminary characterization of the co-treasurers and financial plan (revenue sources, potential customers etc.), and verification of available elaborated designs;
3. sizing of the interventions and the schedule of works (once the design choice is justified and the functional destinations are defined);
4. determination of the assumptions of cash and payment, sales, financing and other financial specifications;
5. estimation of the valuation indicators, often accompanied by *risk analysis*.

If the performance indicators (IRR, NPV etc.) demonstrate the sustainability of the project, the economic investigation ends with a positive opinion. If not, it continues to outline the strategic alternatives for enhancing investment performance.

The first five years (2011–2015) of the Genovesi Prize have attracted the participation of over 300 students, who worked on 70 selected projects for investment of more than 500 million euros (see Table 1). The urban and regional regeneration interventions represent about 45% of the total, for an amount of 235 million euros. The investment projects have been located so: 64% in the province of Salerno; 25% in the province of Avellino; and the remainder in the province of Naples and elsewhere in the country.

2 Cross-Sectoral Matrices for the Measurement of the Generated Effects on the Regional Economy

The total investment cost of €113,114,552, which flows from concrete realization of 23 of the 70 interventions on the survey area, is the starting point for predicting the economic effects produced in Campania. The computational tool is a

Table 1 Selected projects in the 2011–2015 editions of Genovesi Prize

Sector	Investment cost (€)	Number of projects	Average cost per project (€)
Regeneration	235,231,992	20	11,761,600
Sports facilities	10,344,800	3	3,448,267
Transport	57,752,377	5	11,550,475
Tourism, heritage	86,188,718	17	5,069,925
Energy	76,707,140	12	6,392,262
Other	62,975,305	13	4,844,254
Total	529,200,332	70	7,560,005

cross-sectoral matrix. This helps in determining the impacts (*output*) generated by a change in aggregate demand (*input*, such as the investment in an industry) on the economy of the territory to which the matter pertains.¹

In the present work, the referenced cross-sectoral matrix is the *Social Accounting Matrix* (SAM) of Campania, updated to 2010² and still representative of the effective regional production structure.

The implementation of SAM Campania returns the effects generated by investments made in the construction industry. The result is synthetically expressed through three indicators: change in regional GDP (GDP = 0.145%), increase of employment (2421 work units) and environmental damage monetized (€10,896,370). Tables 2, 3 and 4 show excerpts from the cross-sectoral matrix used by the first two for economic and employment effects, the last as regards environmental impact.

The *output* obtained expresses the impact over a period estimated to be between three and five years.

¹The *input-output* model, defined by Russian economist Wassily Leontief, provides a schematic representation of certain relations from the production and circulation (purchases and sales) of goods between the various sectors of a national economy (or regional) and among sectors and abroad (imports and exports). Every entity of a productive sector gives rise to an *output* buying and combining some *input* from households or from other production areas. These exchanges give rise to a sort of pulses, generated by a variation of demand that spread in all sectors of the production system with contagion effects. The magnitude of the effect depends on the degree of interdependence of the various industries within the economic system. The *input-output* model considers an exchange economy (at national or regional level) divided into a number of productive sectors identified generally with homogenous type of product produced. Each sector, as a whole, is on the market with a dual role: (1) as a buyer of goods and services from other sectors and factors that employs in the production process; (2) as a seller of the goods it produces.

The possibility of using these models in the field of economic planning is clear, since then enable one to study the effects that changes in demand cause on production levels of various sectors and employment at sectoral level and overall level, and to compare these sizes with the production capacity of the economic system.

The logic of the *input-output* model is structured in a cross-sectoral matrix, an accounting framework summarizing the flows arising from trade in goods and services, which take place between the various productive sectors and between producers and end-use sectors. For more details, see Leontief (1970), Miller and Blair (1985), Guarini and Tassinari (1990) and Abbate and Bove (1993).

²The development of SAM Campania is a collaborative effort among the University of Rome Tor Vergata, the Institute for Industrial Promotion (IPI) and the Ministry of Economic Development.

Table 2 Effects on regional GDP and employment induced by implemented interventions

Codice Ateco	Indice	Investimento (M€)	Impatto (M€)	Occupazione attivata (Unità di lavoro)	ΔPIL
	LAVORO	0.00	55.99		0.145%
	CAPITALE	0.00	63.30		
	FAMIGLIE	0.00	206.45		
	IMPRESE	0.00	46.92		
01	Prodotti dell'agricoltura, caccia e servizi connessi	0.00	1.84	15	
02	Prodotti della silvicoltura e servizi connessi	0.00	0.06	0	
05	Pesca ed altri prodotti ittici; servizi accessori della pesca	0.00	0.15	1	
10	Carbon fossile	0.00	0.01	0	
11	Petrolio e gas naturale; servizi accessori all'estrazione di olio e gas	0.00	0.30	3	
13	Estrazione di minerali metalliferi	0.00	0.00	0	
14	Altri prodotti delle industrie estrattive	0.00	0.08	0	
15	Prodotti alimentari e bevande	0.00	2.02	10	
16	Industria del tabacco	0.00	5.62	4	
17	Prodotti tessili	0.00	0.12	0	
18	Vestiario e pellicce	0.00	2.80	12	
19	Cuoio e prodotti in pelle	0.00	0.14	1	
20	Legno e prodotti del legno e sughero (mobili esclusi)	0.00	1.40	4	
21	Carta e prodotti della carta	0.00	0.32	1	
22	Editoria e stampa	0.00	0.62	4	
23	Coke e prodotti della raffinazione del petrolio	0.00	3.14	4	

(continued)

Table 2 (continued)

Codice Ateco	Indice	Investimento (M€)	Impatto (M€)	Occupazione attivata (Unità di lavoro)	ΔPIL
24	Prodotti chimici e fibre artificiali	0.00	1.02	3	
25	Gomma e prodotti in plastica	0.00	0.34	1	
26	Altri minerali non metalliferi	0.00	2.00	13	
27	Metalli e leghe	0.00	1.13	3	
28	Prodotti metallici, eccetto macchine ed apparecchi	0.00	1.66	9	
29	Macchine ed apparecchi meccanici	0.00	0.18	1	
30	Macchine per ufficio e computer	0.00	0.01	0	
31	Macchine ed apparecchi elettrici	0.00	0.69	3	
32	Apparecchi radiotelevisivi	0.00	0.13	1	
33	Apparecchi medicali, di precisione, strumenti ottici ed orologi	0.00	0.02	0	
34	Veicoli a motore e rimorchi	0.00	0.07	0	
35	Altri mezzi di trasporto	0.00	0.01	0	
36	Mobili ed altri prodotti manifatturieri	0.00	0.19	1	
37	Materiale da recupero	0.00	0.05	0	
40	Energia elettrica, gas e vapore	0.00	3.94	23	
41	Raccolta e distribuzione dell'acqua	0.00	0.61	1	
45	Costruzioni	113.11	165.85	1.166	
50	Commercio, servizi di manutenzione e riparazione di veicoli a motore e motocicli	0.00	2.24	12	

(continued)

Table 2 (continued)

Codice Ateco	Indice	Investimento (M€)	Impatto (M€)	Occupazione attivata (Unita di lavoro)	ΔPIL
51	Commercio all'ingrosso, esclusi veicoli a motore e motocicli	0.00	3.61	24	
52	Commercio al dettaglio, esclusi veicoli a motore e motocicli	0.00	5.39	37	
55	Alberghi e ristoranti	0.00	0.77	8	
60	Trasporti terrestri	0.00	4.00	53	
61	Trasporti marittimi	0.00	0.21	2	
62	Trasporti aerei	0.00	0.22	1	
63	Trasporti ausiliari; agenzie di viaggio	0.00	0.93	7	
64	Poste e telecomunicazioni	0.00	2.53	28	
65	Intermediazione finanziaria, escluso assicurazione e fondi pensione	0.00	6.26	48	
66	Assicurazione e fondi pensione, esclusa previdenza sociale obbligatoria	0.00	1.05	5	
67	Servizi ausiliari di intermediazione finanziaria	0.00	0.77	7	
70	Attività immobiliari	0.00	11.49	8	
71	Noleggio di macchinari	0.00	0.65	0	
72	Computer e servizi connessi	0.00	0.56	8	
73	Ricerca e sviluppo (R&S)	0.00	0.14	2	
74	Attività professionali	0.00	11.99	85	
75	Pubblica amministrazione e difesa; previdenza sociale obbligatoria	0.00	14.32	327	
80	Istruzione	0.00	10.61	340	

(continued)

Table 2 (continued)

Codice Ateco	Indice	Investimento (M€)	Impatto (M€)	Occupazione attivata (Unita di lavoro)	ΔPIL
85	Sanità e servizi sociali	0.00	5.47	57	
90	Smaltimento rifiuti, fognature e servizi similari	0.00	1.52	8	
91	Organizzazioni associative	0.00	0.97	13	
92	Attività ricreative, culturali e sportive	0.00	1.06	9	
93	Altri servizi	0.00	1.66	25	
95	Servizi domestici	0.00	0.50	19	
	GOVERNO	0.00	58.30		
	Totale	113.11		2.421	

Table 3 Economic impact in Campania Region

	Investimento	Impatto investimento
Lavoro	0.0000	55.9851
Capitale	0.0000	63.2960
Agricoltura	0.0000	2.0577
Industria in senso stretto	0.0000	28.6013
Costruzioni	113.1100	165.8494
Servizi	0.0000	88.9075
Totale	113.1100	404.6970
Famiglie	0.0000	206.4451
Imprese	0.0000	46.9250
Governo	0.0000	58.2975
Totale	0.0000	311.6676

Table 4 Environmental impact in Campania (in thousands of tons of pollution and per euro of investment)

Impatto ambientale												
	Investimento	CO ₂	N ₂ O	CH ₄	NO _x	SO _x	NH ₃	NMVOG	CO	PM10	Pb	Impatto investimento
Agricoltura	0.000	0.4216	0.0033	0.0356	0.0062	0.0001	0.0176	0.0021	0.0171	0.0015	0.0000	455,478
Industria in senso stretto	0.000	20.1800	0.0013	0.0321	0.0281	0.0423	0.0000	0.0181	0.0247	0.0036	0.0000	7.063,728
Costruzioni	113.110	3.3960	0.0004	0.0003	0.0254	0.0006	0.0001	0.0779	0.0207	0.0066	0.0000	423,416
Servizi	0.000	3.7958	0.0007	0.0344	0.0217	0.0024	0.0005	0.0068	0.0266	0.0020	0.0000	2,953,748
Totale	113.110	27.7935	0.0057	0.1023	0.0814	0.0453	0.0182	0.1049	0.0890	0.0137	0.0000	10,896,370

3 Conclusions

The educational module of disciplinary and professional immersion that refers to the Antonio Genovesi Prize is able to mobilize multiple synergies, on the public side such as those represented by territorial government bodies and research centers, and on the private side, arising from the knowledge of traders, associations and groups of citizens. Thus, it serves to constitute a common sharing context, important to encourage bottom-up urban-regeneration processes through the implementation of a network of micro-interventions, many of which are achievable through a public-private partnership.

At the base of the concrete success of the initiative, and thus the actual implementation of investment projects, there is a rigorous study of the economic and financial feasibility (Napoli et al. 2017), conducted according to the Cost-Benefit Analysis criteria, sometimes in association with multicriteria assessments. It is noted that for projects that exceed the technical and financial appraisals there is an increase in the likelihood of success of 50% and, therefore, the concrete realization of the interventions. All this involves positive impacts on the construction sector, the productive sectors and the entire neighboring social area. This can be studied through the implementation of input-output matrices, which summarize the patterns of trade in goods and services that occur between various productive sectors and between producers and end-user sectors.

The application of cross-sectoral matrix for the Campania region estimates the effects generated by investments realized in the construction sector, accounting for a significant increase in regional GDP (+0.68%), but also for job growth with over 11,000 new jobs, as well with a monetization of environmental damage. The logical process represented in the study to measure the effects generated by projects across the country— from forecast of investment costs to elaboration an economic methodology of analysis, such as input/output matrices— represents a practice exportable to other regional contexts. In this process, it becomes essential to cover the project under several profiles: financial but also social, cultural and environmental, thus fully sharing the essence of what Pope Francis explained in the Encyclical *Laudato Si'*.

The prize and the results that have ensued have gained public interest, getting the support of the Senate of the Italian Republic and the participation of senators of several parties, extending the range of the investigated actions, possibly creating a national network of universities aggregated under the same mission. This serves to promote the feasibility analysis of trans-regional and national interest, especially in the field of infrastructures and renewable energies. Thus, the validity of the model analysis and study of the economic and financial component of the project is recognized in accordance with article 23 of Legislative Decree 50/16 New Code of Public Procurement and how the European Community has already strongly supported with directives n. 24 and n. 25 in 2014.

The underlying objective remains clear and inherent to capillary action of spreading the estimation and evaluation culture among young professional and in the institutions, in order to increase the capacity to gear research to difficult terrain of investment sources and financing for public works or public utility.

References

- Abbate CC, Bove G (1993) Modelli multidimensionali per l'analisi input-output. Quaderno di Ricerca, ISTAT, Roma
- Banca d'Italia (2009) Mezzogiorno e politiche regionali. Banca d'Italia, Roma
- Borrelli G, Citterio M (2016) Environmental sustainability: from theory to practice. The contribution of the Laudato si' encyclical. *Valori e Valutazioni* 17:9–12
- Bottero M, Mondini G, Oppio A (2016) Decision support systems for evaluating urban regeneration. *Proc Soc Behav Sci* 223:923–928. <https://doi.org/10.1016/j.sbspro.2016.05.319>
- De Mare G, Nesticò A, Caprino RM (eds) (2012) La valutazione finanziaria di progetti per il rilancio del territorio. Applicazioni a casi reali. Franco Angeli, Milano. ISBN: 978-88-204-0446-8
- De Mare G, Forte F, Granata M (2015a) Investing in sports facilities: The Italian situation toward an olympic perspective: confidence intervals for the financial analysis of pools. In: *Computational science and its applications (ICCSA 2015)*, part III, pp 77–87. <https://doi.org/10.1007/978-3-319-21470-2>
- De Mare G, Granata MF, Nesticò A (2015b) Weak and strong compensation for the prioritization of public investments: multidimensional analysis for pools. *Sustainability* 7(12):16022–16038. ISSN: 2071-1050. <https://doi.org/10.3390/su71215798>
- Granata E (2015) Chi semina e chi raccoglie. Per una nuova cultura del territorio. Ecra, Roma
- Guarini R., Tassinari F. (1990) *Statistica economica*. il Mulino, Bologna
- Guarini MR, Buccarini C, Battisti F (2017) Technical and economic evaluation of a building recovery by public-private partnership in Rome (Italy). In: Stanghellini S, Morano P, Bottero M, Oppio A (eds) *Green energy and technology. Appraisal: from theory to practice*. Springer International Publishing, Berlin, pp 101–115. https://doi.org/10.1007/978-3-319-49676-4_8
- IISole24Ore (2016) Qualità della vita. IISole24ORE del 12 dicembre 2016, Milano
- ISTAT (2016) *Bes report (2016)*, Il benessere equo e sostenibile in Italia. ISTAT, Roma
- Leontief W (1970) Environmental repercussions and the economic structure: an input-output approach. *Rev Econ Stat* 52(3)
- Miller RE, Blair PD (1985) *Input-output analysis, foundations and extensions*. Prentice-Hall, Englewood Cliffs
- Nesticò A, Pipolo O (2015) A protocol for sustainable building interventions: financial analysis and environmental effects. *Int J Bus Intell Data Mining* 10(3):199–212. ISSN: 17438187, <https://doi.org/10.1504/ijbidm.2015.071325>
- Napoli G, Gabrielli L, Barbaro S (2017) The efficiency of the incentives for the public buildings energy retrofit. The case of the Italian Regions of the “Objective Convergence”. *Valori e Valutazioni* 18:25–40
- Nesticò A, Macchiaroli M, Pipolo O (2015) Costs and benefits in the recovery of historic buildings: The application of an economic model. *Sustainability* 7(11):14661–14676. ISSN: 2071-1050, <https://doi.org/10.3390/su71114661>
- Pope Francis (2015) *On care for our common home*. Encyclical letter Laudato Si' of the Holy Father Francis. Vatican Press, Rome
- SVIMEZ (2016) *Rapporto sull'Economia del Mezzogiorno*. Il Mulino, Bologna

Territory, Social Capital and Resilience: The Workers' Buy-Out Case



Alberto Maria de Crescenzo, Alessia Mangialardo
and Arcione Ferreira Viagi

Abstract New forms of appropriation of economic activities that had ceased or were in the process of failure, have been recently established in Italy. These initiatives are carried out by the cooperation of laid-off workers and/or workers subsidized by governmental unemployment insurance, and they are inspired by experiences on an international scope, such as South American *empresas recuperadas*. Therefore, former workers organized as cooperatives try to recover the company in which they were previously employed with the acquisition of business units or through purchase agreements, becoming directly involved in the management and leadership of the firms. In this way, the workers become entrepreneurs by resorting to workers' buy-outs (WBO). The aim of this paper is to investigate the phenomenon of WBO initiatives in relationship to the social resilience of the territory. More precisely, in this work, the authors shed light on WBO actions meant as initiatives for companies restoration from the bottom, such as with other bottom-up actions as in the context of public real-estate regeneration. Through a multivariate analysis, the WBO initiatives have been investigated concerning their uneven geographical distribution in Italy.

Keywords Social capital · Economic and social resilience · Workers buy-out

A. M. de Crescenzo (✉)

Dipartimento di Tecnica e Gestione dei Sistemi Industriali,
Università degli Studi di Padova, Stradella San Nicola 3, 36100 Vicenza, Italy
e-mail: albertomaria.decreczenzo@studenti.unipd.it

A. Mangialardo

Dipartimento di Ingegneria Civile Edile e Ambientale,
Università degli Studi di Padova, via Venezia 1, 35100 Padua, Italy
e-mail: alessia.mangialardo@dicea.unipd.it

A. F. Viagi

CSF/CAPES 2015, University of Taubaté, Taubaté, Brazil
e-mail: afviagi@gmail.com

1 Introduction

In recent years, a national economic and international debate highlighted the importance of social factors in influencing the processes of economic development at the local level. To this end, recent studies show that the social cohesion of the community, combined with the diffusion of cooperative and associative actions, may have direct effects on the growth of per capita income. The phenomena of social resilience appears to be decisive factors to actively react to the economic crisis at the local level, contributing vigorously to the revival of regions from the economic and social perspectives.

On the one hand, due to the persistence of the economic crisis, a high level of structural unemployment and a high rate of firm failures have been registered in Italy and in other southern Europe countries (Banzato 2016). On the other, social policy reforms, increasingly restrictive from the perspective of containing public spending, have been carried out by national governments. In this context of economic crisis, cooperative work is particularly promising as a countermeasure on the micro-economic level to the loss of jobs (Vieta 2015; Zevi et al. 2011). In fact, the empirical evidence shows how cooperatives better react to the crisis due to the intrinsic motivation of members (Oakeshott 2000). Moreover, the recent encyclical letter “Laudato Si” of the holy father Francis (2015) highlights that “*current global system where priority tends to be given to speculation and the pursuit of financial gain, which fail to take the context into account*” (§ 56). The consequences of this lack of interest in the social context cause the following result: high unemployment rate, social exclusion and breakdown.

In Italy, the phenomena of companies recovered by the workers, so-called WBO, has recently emerged within the experience of cooperative work as a response to the contingent and enduring economic crisis. Therefore, the aim of this paper is to investigate the phenomenon of WBO initiatives in relationship to some chosen characteristics of the territory, such as social capital, resilience and contingent macroeconomic data.

This work is structured as follows: the next section proposes an overview of the origins of the cooperative movement and WBO phenomena in the international context, with a focus on South America; in the third section, a depiction of the Italian context is given focusing on national characteristics; in the last section, a critical analysis of WBO experiences in Italy is proposed.

2 Origins and Characteristics of WBO Experiences

From the outset, the cooperative movement was more related to socialism than to capitalism, and the great propagator of cooperative ideals was Robert Owen (1771–1858), an English industrialist, considered one of the leaders of “utopian socialism”. He proposed that cooperative villages could be formed around factories where the

means of production would be managed collectively. Misi (2000) hypothesized that the emergence of cooperativism is directly related to the origin of trade unionism, unleashing a violent offensive of the capitalist class against the organizations of the workers. The definition of cooperativism presented by Sales (2010) identifies the main point of the origin of cooperativism as the capacity to face competition and preserve economic and life conditions for a given group of individuals who share common objectives.

Before we analyze in detail the WBO experiences in Italy, a description of the main characteristics of WBO experiences is proposed in this section. First, a WBO initiative is defined as an acquisition or a bailout of a conventional business by employees who worked there in the past. It represents a corporate restructuring, conversion or recovery process in which employees acquire ownership of their entire former company or a part of it (e.g., a business unit). The empirical evidence mainly identifies blue-collar employees as the main actors in these initiatives.

In the literature, three different types of WBOs have been recognized and identified by Vieta (2015):

- “*Labour Conflict WBO*”, this kind of WBO initiative is more likely located in countries characterized by hard and intense clashes between workers, ownership, management, local authorities and central government. Examples are the experiences in Latin America over the past twenty years, such as *empresa recuperada*;
- “*Employee Share Ownership Plan*” is an Anglo-Saxon derivation model developed in the US since the early 1950s and formalized since the early 1970s. It is a mechanism by which workers become an active player in the decision-making processes through the acquisition of shares of their company (Freeman 2007);
- “*Negotiated WBO*” sits between the two extremes identified previously; it represents the result of negotiation between firm ownership and workers, often with the mediation of local, regional and national institutions.

The last one is the most common approach in Italy, thanks to a set of support policies and funding methods that facilitate a collaborative approach between employers, a sector of cooperatives and the government. The main actors in this process, as identified by Vieta (2015), are:

- *Workers*: associated in cooperative organization can purchase or acquire part or the whole company through their own savings or using the resources provided by the government through economic funds, typically the Italian unemployment benefits called “*cassa integrazione*”;
- *Sector of Cooperatives*: the national league of cooperatives, Legacoop, finances and also promotes this type of activity as well as providing technical/administrative support services for the trigger of a WBO, through the mutual fund Coopfond;
- *Central Government*: through the Ministry of Economic Development, *Ministero dello Sviluppo Economico*, the state promotes and supports the

employment level through the “Special Fund for the Protection of Employment Level”, *Fondo speciale per la salvaguardia dei livelli occupazionali*;

- *Institutional Investors*: the cooperative society Cooperation Finance Company, *Cooperazione Finanza Impresa* (CFI). It promotes the creation, development and repositioning of enterprises engaged in innovative projects that are socially relevant and characterized by a sustainable economic and financial profile. It is owned by Ministry of Economic Development and Invitalia, the Italian agency for investment promotion and enterprise development. CFI collaborates with LegaCoop and participates as a sponsoring partner, providing funding according to conditions and limits defined by the legislature.

All these mentioned actors operate in accordance with the Italian regulation framework defined by the Italian Law 57/2001 known as “*Nuova Legge Marcora*”. It is the instrument that grants facilitated loans to cooperative societies in which financial companies have taken equity investments by the Ministry of Economic Development and CFI. The state’s portion of funds from the “Special Fund” has a 3:1 ratio of capitalization in relation to workers’ contributions to the buy-out initiative. The existing institutional framework that supports the WBO initiatives should take into account Italian regional peculiarities in order to achieve homogeneously its aims throughout the national territory.

Starting from the public database of Coopfond and FCI, the authors identified 78 WBO initiatives funded within the *Legge Marcora* framework. The cooperative firms identified are characterized in 70% of cases by a number of employees 10 and 49 workers (see Fig. 1). Sales volume was up to € 5 million in 75% of the cases. The data have been collected in the AIDA BvD—Bureau van Dijk Italian firm database, where data for each firm was gathered during the fiscal year 2014.

The industrial sector of the identified WBO initiatives is characterized by manufacturing and services firms. If we take into account the concept of *service factory*, where a company offers those products, components and services that represent the solution of the customer “problem” and ensures their compatibility

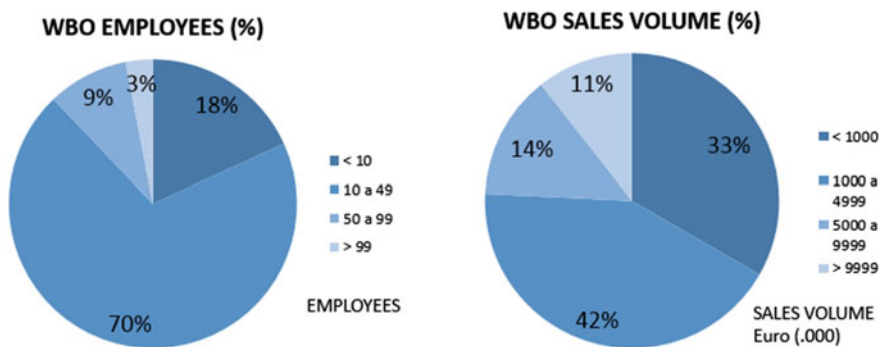


Fig. 1 WBO employees and sales volume. Source AIDA (2014)

and integration, as defined by Panizzolo and de Crescenzo (2015), we can assume that the distinction between manufacturing and service firm is not relevant for our investigation.

3 A Critical Analysis of WBO Experiences in Italy

To obtain a complete overview of this phenomenon in Italy, authors analyzed the WBO presence at regional levels. From this analysis emerged a strong heterogeneity of the WBO distribution, with a higher concentration of these experiences in northern Italy, especially in Lombardia and Veneto, although with some exceptions. The highest presence of WBO is in Tuscany and Emilia, respectively with 15 and 27 new members companies. In the center of Italy, these experiences, although present, are modest. Finally, in southern Italy, with the exception of Sicily and Campania, these phenomena are almost absent. This section aims to identify coherent clusters in order to specify aggregate forms despite their heterogeneous geographical distribution.

Therefore, the present paper aims to investigate this heterogeneous geography, seeking to learn what are the major determinants for the beginning of these initiatives.

Firstly, authors investigated whether the presence of these bottom-up experiences could be related to the number of business failures and the number of regional cooperatives. The strong presence of this phenomenon is located in northern Italy, and the territory is characterized by a significant presence of companies, so consequently a higher percentage company failures has been registered there. This may explain the trigger of these WBO projects. At the same way, as shown for the two regions with the highest rate of WBO experiences recorded, Emilia Romagna and Tuscany, a higher presence of cooperatives in the territory can be a strong indicator of a greater willingness of employees to initiate this type of project. The number of WBO initiatives for each region has been correlated with the number of failed companies and number of regional cooperatives. The correlation index of Pearson, in both cases, is not particularly significant, especially for the data referring to the number of cooperatives, which is inversely related (see Table 1).

Therefore, the WBO phenomenon in Italy does not seem related to macroeconomic factors. One of the main features of this type of initiative is represented by the strong social impact that it generates. The “blue collar” cooperatives are started by a group of workers who would preserve their jobs and invest in their own former

Table 1 Index of Pearson for the variables analyzed

	Number of business bankruptcies (2014)	Number of cooperatives per 100,000 inhabitants (2011)
Cases of WBO	0.38	-0.16

company, willing to get involved collectively and to advance a common project characterized by considerable uncertainties. The great sense of solidarity and social cohesion that is generated within the WBO experiences reconnects these initiatives to social and economic phenomena of resilience, rather than exclusively to economic factors.

On this basis and considering a wide national and international literature, authors investigated whether the WBO phenomenon in Italy can be attributed to the increased presence of a resilient community at the regional level, which is considered a determining factor for development of the territory (Mangialardo and Micelli 2016; Micelli and Mangialardo 2017). According to the literature, the authors sought to learn if these variables can explain the geography that WBO experiences exhibit by searching some clusters—aggregate experiences with similar characteristics and determinants that caused the beginning of the activity. In particular, the social resilience can be understood as the ability of a community to cope with adverse and problematic events. The resilience of a territory depends on the skill of the people to adapt, recover and regenerate it, drawing strength from the negative circumstances that have been imposed on them.

In order to analyze the presence of WBO experiences in relations to the intensity of regional social resilience, three proxies have been used because social resilience is not measurable by quantitative data (Graziano 2013). The first proxy is the presence of social capital: a set of rules and social behaviors based on the strong sense of civic duty, mutual trust and a strong sense of public morality in a territory (Putnam et al. 1993). The presence of a population with high social capital in a territory is an important element in reinforcing social cohesion among individuals.

The second element is the human capital: in economic terms, it is the set of skills, competencies, knowledge and occupational skills acquired through continuing education courses. This aspect is closely linked to economic growth: the higher the human capital is, the more skilled will be the individuals in the territory. The third one is related to the sphere of “Social Infrastructure”: the provision of cultural services, entertainment and health has a positive effect on increasing social resilience (Cutter and Finch 2007).

To analyze whether the WBO phenomenon depends on the intensity of social resilience in the territory, a descriptive statistical multivariate analysis was performed. The cluster analysis, in particular, is the most suitable methodology to create groups with similar characteristics in order to identify common patterns. In order to explain this distinct geography distribution, an agglomerative hierarchical approach was used. The final result is a partition of data grouping clusters by their similarity (Sarstedt and Mooi 2014).

The first step of cluster analysis is the selection of cases and variables to prepare a data matrix. The authors compared the presence of WBOs at the regional level, with the three proxies: social capital, human capital and social infrastructure. The second step involves the selection of the methodology to measure the similarity between variables. For this analysis, the authors used the method of Euclidean distance—the level of dissimilarity—that is measured through the Pythagoras theorem (Sarstedt and Mooi 2014).

Table 2 Summary of descriptive statistics of the variables in each cluster

Cluster	Number of WBO	Percentage of WBO experiences (%)	Percentage of social capital more than national average (%) ^a	Percentage of human capital more than national average (%) ^a	Percentage of social infrastructure more than national average (%) ^a
1	42	54	37	37	25
2	27	34	40	60	40
3	9	12	100	100	100

^aThese percentages refer to the number of WBO experiences in the three clusters; e.g., 100% for the third clusters means that the totality of the experiences represents the variables value more than the national average

Thirdly, the algorithm of the Ward method was chosen to aggregate clusters. This method is based on the association of variables by the reduction of their deviance, ensuring a better cohesion among the groups that emerge. In the last step, before proceeding to the results, the number of the cluster has to be chosen. Data were grouped into three clusters according to the relatively small cross-section. The three clusters that emerged were validated through MANOVA test.¹

The first cluster is the less numerous (see Table 2). This cluster occurs in high social-resilience areas, where there is a high social and human capital with a strong presence of social infrastructures, much higher than the national average, and where the phenomenon of the WBO was more successful (Emilia Romagna and Toscana).

The second cluster, belonging to seven regions, represent areas with medium social resilience, with a medium presence of social infrastructure, social and human capital compared with the national average, and where the WBO phenomenon has been quite successful (Abruzzo, Campania, Lazio, Liguria, Lombardia, Marche, Trentino, Umbria, Veneto).

Finally, the third cluster shows how these processes face more difficulty to occur in low social resilience areas, with a low presence of the variables compared with the national average (Calabria, Friuli Venezia Giulia, Piemonte, Puglia, Sardegna and Sicilia).

4 Conclusion

This study is intended to investigate the fundamental role of social resilience and social and human capital as prerequisites for the enterprise initiatives recovered by the workers, meant as a bottom-up process. This type of initiative involves various

¹It consists in the analysis of the variance that allows the effects comparison on an independent variable (the number of clusters in this analysis). The results demonstrated that the output (p-value) is less than 0.05, confirming the hypothesis of MANOVA test (Sarstedt and Mooi 2014).

actors, from individual workers to institutions, linked to specific territories. Nevertheless, these experiences are weak with a high risk for a successful outcome. The research demonstrates that territories with a high presence of social resilience play a fundamental role in determining a positive development of these processes. Future research will investigate how other elements linked to the territory affect the WBO creation process through bottom-up actions. The determination of specific enablers might help us to better understand this phenomenon and to better define targeted actions within the institutional national framework, enabling the involved institutions to define clear procedures designed to stimulate the critical reflection on management practices and to support the improvement planning for a better impact and positive effect on the institutional national framework.

References

- AIDA (2014) BvD—Bureau van Dijk Italian firm database, source available at: <https://aida.bvdinfo.com/version-2018326/home.serv?product=AidaNeo>
- Banzato D (2016) The use of the digestate from anaerobic digestion: a comparison with the EU countries. *Valori e Valutazioni* 17:73–82
- Cutter S, Finch C (2007) Temporal and spatial changes in social vulnerability to natural hazards. *Proc Natl Acad Sci* 105(7):2301–2306
- Francis P (2015) Encyclical letter *Laudato si'* of the Holy Father Francis on care for our common home
- Freeman S (2007) Effects of ESOP adoption and employee ownership: thirty years of research and experience. Working Paper 07-01, Centre for Organizational Dynamics, University of Pennsylvania
- Graziano P (2013) Vulnerability and resilience of the economic, social and environmental dimensions of Italian provinces. In: Regional studies association European conference, pp 1–28
- Mangialardo A, Micelli E (2016) Social capital and public policies for commons: bottom up processes in public real estate property valorization. In: Paper for the conference on new metropolitan perspectives, Reggio Calabria, Italy, pp 175–180, 18–20 May 2016
- Micelli E, Mangialardo A (2017) Riuso urbano e immobili pubblici: la valorizzazione del patrimonio bottom up. *Territorio* 79:109–117
- Misi MC (2000) Cooperativas de trabalho: direito do trabalho e transformação social no Brasil. LTr
- Oakeshott R (2000) Jobs and fairness: the logic and experience of employee ownership. Michael Russell, Norwich
- Panizzolo R, de Crescenzo AM (2015) Adopting service strategy in manufacturing firms. A framework for services recognition and management model implications. In: Toulon-Verona conference on excellence in services
- Putnam R, Leonardi R, Nanetti RY (1993) Making democracy work. Civic tradition in modern Italy. Princeton University Press (Trad. it. *La Tradizione civica nelle regioni italiane*. Mondadori, Milano)
- Sarstedt M, Mooi E (2014) A concise guide to market research. Springer Texts in Business and Economics, pp 273–324

- Sales JE (2010) Cooperativismo: Origens e Evolução. *Revista Brasileira de Gestão e Engenharia* 1:23–34
- Vieta M (2015) The Italian road to creating worker cooperatives from worker buyouts: Italy's worker-recuperated enterprises and the Legge Marcora Framework. *Euricse Working Papers* 78/15
- Zevi A, Zanotti A, Soulage F, Zelaia A (2011) Beyond the crisis: cooperatives, work, finance: generating wealth for the long term. CECOP Publications, Brussels

Integrated Valorization of Cultural Heritage: A Case Study of the Cammino dei Monaci Route



Alessandra Oppio, Ila Maltese and Ilaria Mariotti

Abstract The convergence between the concept of sustainable development and the theoretical framework of cultural-heritage preservation underlines some key issues: the tangible and intangible nature of benefits associated with cultural capital; intergenerational equity meant as the fair distribution of wealth, utility and resources among generations, in addition to the intra-generational one; the precautionary principle; and the multidimensionality of cultural heritage. As public goods, non-rival and non-exclusive, cultural resources are characterized by the presence of various categories of value that contribute to determining the Total Economic Value (V.E.T.). Given the risk of being under-supplied in the economy if these kind of goods are disregarded from appraisals, specific evaluation methodologies have been introduced with the aim of assigning a monetary value. In this context, the Contingent Valuation Method (CVM) has been applied to estimate the economic benefits generated by the realization of a bicycle and pedestrian trail, considered as a non-marketed and complex good for the wide, and sometimes divergent, range of interests and values (economic, aesthetic, cultural, educational, political) attached to them. Consistently with the guidelines provided by the NOAA Panel, the CVM survey has been developed by the use of the Double Bounded Dichotomous model. In the absence of market prices that express the value of the benefits generated by this slow mobility project, respondents have shown a propensity for the implementation of the hypothetical scenario under valuation, thus demonstrating great awareness of the overall benefits associated with the project.

Keywords Integrated valorization · Cultural heritage · CVM · Slow mobility

A. Oppio (✉) · I. Maltese · I. Mariotti
Dipartimento di Architettura e Studi Urbani, Politecnico di Milano, Milan, Italy
e-mail: alessandra.oppio@polimi.it

I. Maltese
e-mail: ila.maltese@polimi.it

I. Mariotti
e-mail: ilaria.mariotti@polimi.it

1 Introduction

The Encyclical letter “*Laudato si*” represents a challenge for humans, as it deals with the Earth and our common future, too often threatened by wasteful behaviors. In contrast to a technocratic approach, the Integral Ecology paradigm, introduced in the Pope’s letter, calls for a relationship of mutual responsibility between nature and society. This holistic perspective is based on the idea that the Earth was here before us, and it has been given to us. Thus, our duty to “till and keep” the garden of the world, where “tilling” refers to cultivating, ploughing or working, while “keeping” means caring, protecting, overseeing and preserving (§ 67).

As a first consequence, the horizon time of our decisions should be as long as possible, and a further consideration of the correlation between means and goals should be introduced. Without a long term perspective, open to include future generations, the idea of sustainability is going to weaken. Being unable to look at the future means, at the same time, being unable to look at the past. In order to hinder the short-sightedness of present time, ties and connections between the past and future should be strengthened (Appendino et al. 2016). Creating a shared identity, with a story that can be remembered and handed on, can help us to escape from the indifference induced by the short-time consumerism approach (§ 232).

A second consequence is the issue of means and ends. Short-time policies and decisions permit consideration only of a limited set of alternative scenarios without any consideration of their long-term positive and/or negative effects and impacts. Ends are given and they legitimate the means, which are too many compared to only a few insubstantial ends (§ 203). Integral ecology, on the contrary, requires a deep analysis of ends and their general meaning according to relationships with the past.

With respect to the instance of integrating knowledge into a broader vision of reality (§ 138) and improving the transparency of decision-making processes (§ 185), the paper deals with the economic evaluation of both tangible and intangible benefits associated with a slow-mobility, infrastructural project, called “*Cammino dei Monaci*” (Monks’ Route, CdM),¹ a feeder of the longer and well-known pilgrims’ route from Canterbury (UK) to Rome (Italy) via Francigena. This network of pedestrian and bicycle paths, connecting the southern neighborhoods of Milan to the province of Lodi (in the Lombardy region in the northwest of Italy), and to the border with the Emilia Romagna region (in the northeast of Italy), has been planned with the aim of achieving sustainable mobility for local trips and increasing the residents’ “green attitude” (Handy et al. 2005; Ruiz and Bernabé 2014). Furthermore, because of the related historical, environmental and religious heritage, the CdM slow-mobility project could also increase the green and religious tourism demand and improve the connections between all the minor scattered cities, by activating complementary functional and economic relationships.

¹The present paper mainly refers to the findings presented in Maltese et al. (2017).

To this end, two main evaluation approaches can be identified (Krizek 2007): (1) the more traditional one that considers bicycle and pedestrian facilities as other transportation facilities are treated, and (2) the other that includes slow-mobility trails among non-marketed goods. The first relies on cost-benefit analysis, economic impact assessment, and cost-effectiveness evaluation, while the second relies on revealed and stated-preference methods. In this study, the CdM route has been considered as a non-marketed good, as it encompasses various categories of values, such as investment value, direct and indirect use value, option value and non-use value. The quantification of this last category is generally difficult, since it deals with intrinsic, intangible and non-monetary aspects, such as cultural meaning, sense of identity, and landscape perception. The basic rationale for assigning economic values is that they will be under-supplied in the economy if excluded from appraisals. Furthermore, decisions about how much of a good to supply requires that its value is balanced with the costs of providing it, thus involving a kind of policy and project appraisal (Pearce and Özdemiroglu 2002).

The paper is structured as follows. After the introduction, the methodological approach is briefly described with reference to a short, selected literature review on the CVM application to mobility infrastructure evaluation (Sect. 2). Section 3 presents the case study and the model development, while the results of the CVM are provided in Sect. 4. The last section concludes with a discussion and policy recommendations.

2 The Evaluation Methodology

The instance of providing an ex-ante evaluation of the project benefits, to be compared with the construction costs, has encouraged the use of CVM. While the estimation of the investment costs is quite an easy task, the benefits from bicycle and walking facilities are certainly more difficult to assess because their value concerns intrinsic, intangible and non-monetary aspects, such as cultural meaning, sense of identity and landscape perception (Bishop and Romano 1998; Schutt 1998; Fix and Loomis 1998; Moore and Barthlo 1998; Przybylski and Lindsey 1998; Litman 1999; Argys and Mocan 2000; Buis 2000; Nelson et al. 2001; Saelensminde 2002; Lindsey et al. 2003; Vandermeulen et al. 2011; Value 2012; Viaud-mouclier 2012; Wilker and Rusche 2014; Fishman et al. 2015; Blondiau et al. 2016; Gilderbloom et al. 2016; Litman 2016; Rebecchi et al. 2016; Brey et al. 2017).

Among the available evaluation methodologies able to measure the Total Economic Value (TEV) of cultural assets, the CVM has been widely used, and its reliability has been acknowledged by the NOAA Panel (Arrow et al. 1993).

Despite the extensive literature on CVM for measuring the full range of values related to cultural heritage and environmental resources, only a few studies have concerned the assessment of the benefits arising from slow-mobility infrastructures.

CVM is a survey-based, stated-preference method, which creates a hypothetical (“contingent”) market. It implies querying a sample of the population about their

willingness to pay (WTP) for the provision of a given good or service, before it has been implemented. The CVM evaluates a change from the status quo, by asking respondents about a potential scenario, i.e., the project under valuation. In order to directly elicit the value of the non-market good from the respondents, they are asked how much they would be willing to pay for the good, if a hypothetical transaction could take place (Pearce and Turner 1990; Mattia and Bianchi 2000; Stellan and Rosato 1998). It is thus possible to measure all the values that may accrue to users and to non-users. Differently from the market place, where WTP is made up of two components: what is actually paid (the price) and the excess of WTP over the price—consumer's surplus, in a pure nonmarket context, all WTP is consumer's surplus because there is no market price. In practice, some expenditures will often be incurred in securing the non-market good, so the consumer's surplus is again the net gain (Pearce and Özdemiroglu 2002).

According to the NOAA Panel, the Dichotomous Choice approach has been applied in order to limit the bias of open-ended elicitation format. More in detail, the WTP has been estimated by the Double-Bounded Dichotomous Choice model (Cooper and Hanemann 1995; Bishop and Romano 1998), where the respondents are asked how much they would pay ($\text{bid1} = X$) for the good, with follow-up questions doubling ($\text{bid2/yes} = 2X$) or halving the first amount proposed ($\text{bid2/no} = X/2$), according to the first answer being “yes” or “no”, respectively. The demand curve is then defined, based on the expected WTP, through an estimated probability function depending on the price. Actually, the consumers' surplus originating from the good is calculated as the definite integral of the demand curve up to the market-equilibrium price.

3 The Case Study

3.1 Description of the “Cammino Dei Monaci” Project

The CdM project is a slow-mobility infrastructure, mainly built along the 67.2 km of existing roads connecting the South of Milan to the border of the Emilia Romagna region, where it meets the Via Francigena, an ancient road and pilgrim route running from Canterbury (UK), passing through France, and on to Rome. The trail passes through 40 small municipalities with a rich naturalistic, religious and cultural heritage that should attract visitors, tourists and pilgrims, but actually with few tourism commodities.

The aim of the CdM project is twofold: (i) to plan a slow-mobility infrastructure in order to make bicyclists and pedestrians travels safer and more comfortable; (ii) to exploit the complex, as well as promising, network of cultural, religious and agricultural resources.

3.2 *Model Development*

A survey was carried out in 2015 among the families living in the project area. Individuals were asked about the potential realization of the CdM project to explore increasing their utility due to the realization of this project.

The sample of 472 respondents had been identified within a distance of 3.75 km on the left and right sides of the trail, assuming a reasonable daily distance of 15 km covered by bike at 15 km/h. Within this distance, 40 municipalities in four provinces (Milan, Lodi, Pavia, and Piacenza²) were considered. Specifically, the population living in the area around the trail is about 815,000, belonging to about 415,000 family units (ISTAT 2011) and the sample turned out to be representative in terms of age groups, gender and geographical distribution among the 40 municipalities.

The elicitation method adopted was a dichotomous-choice question. The central question on the WTP was based on the WTP mean value of 63 €, resulting from an open-ended pre-test conducted among 74 citizens. Besides, starting from this central value, a price vector (20, 40, 60, 80, 100 €) was defined and then different starting bids generated randomly. Respondents had to say whether they were willing to pay a specific amount (bid1), as a *una tantum* per family unit voluntary donation to a non-profit ad hoc trust fund created to support the realization of the project. If the answer was yes, a new question (the follow-up question) was posed to the respondent, where the starting amount was doubled (bid2 = bidhigh variable); if the answer was no, it was been halved, instead (bid2 = bidlow variable).

The data collected were elaborated through discrete-choice models to estimate a bid function.

4 Results

As concerns the main question about the WTP for the project to be realized, Table 1 shows the distribution of the initial bids among the five groups: as the bid goes up, the probability of a positive answer goes down.

The WTP was estimated both by a Logit and a Probit model (Table 2).

The bid variable is statistically significant and shows a negative value meaning that, as the bid goes up, the probability of a positive answer goes down, thus corroborating the results of the descriptive statistics (Table 1). The variables included in the Logit and Probit models are statistically significant.

²Where Milan, Lodi and Pavia belong to Lombardy region, while Piacenza is in the neighboring Emilia Romagna region.

Table 1 Bid1—frequency

Bid1	Freq.	Percent	Yes (%)	No (%)
20	92	19.49	60	40
40	102	21.61	54	46
60	93	19.7	38	62
80	95	20.13	27	73
100	90	19.07	31	69
Total	472	100		

Source Maltese et al. (2017)

Table 2 Logit and probit models

Variables	Coefficient	
	Logit model	Probit model
Bid 1	−0.023793***	−0.01415***
Pilgrimage	0.520817***	0.316384***
Existence	0.458318***	0.277161***
Option	0.489611***	0.272321***
Cons.	−3.25438***	−1.872737***
Obs.	472	472
Prob.	0.0000	0.0000
Log likelihood	−275.69849	−276.01621
Pseudo R2	0.1420	0.1410

Source Maltese et al. (2017)

*** $P < 0.01$

The respondents who are favorable to using the Cammino dei Monaci for a pilgrimage are willing to pay a larger amount of money; the same is true for those who recognize the importance of the CdM's existence and option values.

Besides, both the bid amounts (bid1 and bid2), which were actually offered, are taken into account, in order to estimate the WTP.³ To do so, a model with no control variables is first developed (Table 3), with beta and sigma estimated using the maximum likelihood. In this case, the WTP is the constant and approximately equal to 47 €.

Moreover, the WTP was estimated in a model including the control variables⁴ (Table 4), showing the value of about 41 € (Table 5).

The model without control variables shows a WTP of about 47 €, while, being the control variables included, the WTP decreases up to 40.88 €. This value multiplied by the number of family units (414,928) of the population within the selected area, gives a value of 16,962,257 € for the positive externalities of the project that outweighs the costs to realize it (8,381,556 €).

³The STATA command `doubled`, developed by Lopez-Feldman (2012), was used.

⁴The control variables with significant result were introduced in the model.

Table 3 WTP (with no control variables)

	Coef.	Std.err	Z	P > z	[95% Conf. interval]	
<i>Beta</i>						
_cons	47.23441	3.128918	15.10	0.000	41.10184	53.36698
<i>Sigma</i>						
_cons	61.17847	3.175142	19.27	0.000	54.9553	67.40163
N.Obs	472					
Wald chi2(3)	.					
Prob.	.					

Source Maltese et al. (2017)

Table 4 Model with explanatory variables

	Coef.	Std.err	Z	P > z	[95% Conf. interval]	
<i>Beta</i>						
Pilgrimage	17.24667	5.999129	2.87	0.004	5.488598	29.00475
Existence	12.79998	3.044169	4.20	0.000	6.833524	18.76645
Option	18.13891	4.713732	3.85	0.000	8.900171	27.37766
_cons	-93.71779	19.61433	-4.78	0.000	-132.1612	-55.27441
<i>Sigma</i>						
_cons	55.05377	2.829831	19.45	0.000	49.5074	60.60013
N.Obs.	472					
Wald chi2(3)	79.16					
Prob.	0.0000					

Source Maltese et al. (2017)

Table 5 WTP for mean values

Answer1	Coef.	Std.Err	Z	P > z	[95% Conf. Interval]	
WTP	40.88071	6.305663	6.48	0.000	28.52183	53.23958

Source Maltese et al. (2017)

Table 6 Total economic value components

Values		1	2	3	4	5
Use	Use (%)	7	13	20	27	33
Potential use	Option (%)	1	2	9	25	63
Non use	Existence (%)	4	8	25	27	36
	Bequest (%)	1	7	16	25	51

Source Maltese et al. (2017)

First-Bid Variable: bid1. Second-Bid Variable: bid2. First-response Dummy Variable: answer1. Second-Response Dummy Variable: answer2.

These results are consistent with the importance assigned by the sample to the various components of TEV (Table 6).

5 Conclusions

In this paper, the CVM has been applied to estimate the benefits associated with the CdM slow-mobility project. The choice of this methodology, which is mainly used for the environmental- and cultural-goods assessment, appeared relevant to assess the CdM, which is not only a slow-mobility infrastructure, but potentially a tourist attraction, being part of a wider environmental, religious and cultural heritage system. Like any cycle and pedestrian path, the CdM is going to generate benefits not only to its users, as a functional and recreational infrastructure, but also to non-users. Furthermore, the direct investigation of the single TEV components shows a very clear preference for the project by the most of the respondents (60% at least for each TEV component, 72% on average), proving that the project reaches a great collective consensus. Besides, the benefits resulting from the development of the CdM slow-mobility project double the construction costs.

The results of the CVM case study suggest putting forward the following policy implications. The CdM project can represent a novelty by fostering the implementation of a modern, comprehensive planning approach, which considers the built, the cultural and the historical, together with the environmental one. Therefore, the traditional spatial planning for a transport infrastructure can integrate the aim to achieve sustainable mobility with the instance of building up a shared cultural identity among the involved municipalities.

Furthermore, assigning a monetary value to non-market goods can be relevant for a sound policy: since consensus for the project seems to be widely granted, local governments are driven to act as soon as possible and through a participatory approach (Hanemann 1994; Mattia and Bianchi 2000; Bentivegna 2016).

Acknowledgements The authors gratefully acknowledge the financial support provided by Fondazione Cariplo. The authors would sincerely like to thank all the respondents and the interviewers, who carried out the in-person interviews. The authors are also very grateful to Pierluigi Marchesini and Fabio Manfredini for the valid support in checking the project details and the population data, respectively.

References

Appendino F, Gilberto F, Labadi S (2016) the role of environmental and heritage impact assessments in liverpool world heritage site. *Valori e Valutazioni* 17:57–72

- Arrow K, Solow R, Portney PR, Leamer EE, Radner R, Shuman H (1993) Report of the NOAA panel on contingent valuation. *Fed Reg* 58:4601–4614
- Bentivegna V (2016) Dialogue and transparency in decision-making. *Valori e Valutazioni* 17:25–28
- Bishop RC, Romano D (eds) (1998) *Environmental resource valuation. Applications of the contingent valuation method in Italy*. Springer Science + Business Media, LLC, New York
- Blondiau T, Van Zeebroeck B, Haubold H (2016) Economic benefits of increased cycling. *Transp Res Procedia* 14:2306–2313
- Brey R, Castillo-Manzano JI, Castro-Nuño M, Lopez-Valpuesta L, Marchena-Gomez M, Sanchez-Braza A (2017) Is the widespread use of urban land for cycling promotion policies cost effective? A cost-benefit analysis of the case of Seville. *Land use policy* 63:130–139
- Buis J (2000) The economic significance of cycling: a study to illustrate the costs and benefits of cycling policy. Den Haag, interface for cycling expertise. Maine Department of Transportation (2001) *Bicycle Tourism in Maine, Economic Impacts and Marketing Recommendations*. Augusta, Maine Department of Transportation
- Cooper J, Hanemann WM (1995) Referendum contingent valuation: how many bounds are enough? USDA Economic Research Search Service, food and consumer economics division, Working Paper, May
- Fishman E, Schepers P, Kamphuis CB (2015) Dutch cycling: quantifying the health and related economic benefits. *Am J Public Health* 105(8):e13–e15
- Fix P, Loomis J (1998) Comparing the economic value of mountain biking estimated using revealed and stated preference. *J Environ Plan Manage* 4(2):227–236
- Gilderbloom J, Grooms W, Mog J, Meares W (2016) The green dividend of urban biking? Evidence of improved community and sustainable development. *Local Environ* 21(8): 991–1008
- Handy S, Cao X, Mokhtarian P (2005) Correlation or causality between the built environment and travel behaviour? Evidence from Northern California. *Transp Res Part D Transp Environ* 10 (6):427–444. <https://doi.org/10.1016/j.trd.2005.05.002>
- Hanemann WM (1994) Valuing the environment through contingent valuation. *J Econ Perspect* 8 (4):19–43
- Krizek KJ (2007) Estimating the economic benefit of bicycling and bicycle facilities: an interpretive review and proposed methods. In: *Essays on transport economics*, pp 219–248. <http://doi.org/10.1007/978-3-7908-1765-2-14>
- Lindsey G, Man J, Pyton S, Dickson K (2003) *Amenity and recreation values of urban greenways*. The Association of European Schools of Planning Congress, Leuven, Belgium
- Litman T (1999) Quantifying the benefits of non-motorized transport for achieving TDM objectives
- Litman T (2016) *Evaluating active transport benefits and costs. Guide to valuing walking and cycling improvements and encouragement programs*. Victoria, Victoria Transport Policy Institute
- Maltese I, Mariotti I, Oppio A, Boscacci F (2017) Assessing the benefits of slow mobility connecting a cultural heritage. *J Cultural Herit* 26:153–159
- Mattia S, Bianchi R (2000) *Il valore dell'ambiente*, Guerini, Bergamo
- Argys L, Mocan, N (2000) *Bicycling and walking in Colorado: economic impact and household survey results*. Colorado Department of Transportation
- Moore RL, Barthlo K (1998) *The economic impacts and uses of long—distance trails*. United States Department of the Interior National Park Service
- Nelson C, Vogt C, van der Woud A, Valentine B, Lynch J (2001). *2000 Midland County recreation needs assessment: The Pere Marquette Rail—Trail*. East Lansing, Department of Park, Recreation and Tourism Resources
- Pearce D, Özdemiroglu E (2002) *Economic valuation with stated preference techniques*. DETRL, London
- Pearce D, Turner R (1990) *Economics of natural resources and the environment*. Harvester Wheatsheaf, London, UK

- Przybylski M, Lindsey G (1998) Economic evaluation of major urban greenway projects: a brief review. Center for Urban Policy and the Environment (98-C13), Indianapolis, IN
- Rebecchi A, Boati L, Oppio A, Buffoli M, Capolongo S (2016) Measuring the expected increase in cycling in the city of Milan and evaluating the positive effects on the population's health status: a community-based urban planning experience. *Annali di igiene: medicina preventiva e di comunita* 28(6):381–391
- Ruiz T, Bernabé JC (2014) Measuring factors influencing valuation of nonmotorized improvement measures. *Trans Res Part A Policy Pract* 67:195–211. <https://doi.org/10.1016/j.tra.2014.06.008>
- Saelensminde K (2002) Walking-and cycling-track networks in Norwegian cities: cost-benefit analyses including health effects and external costs of road traffic. Institute of Transport Economics, Oslo, p 50
- Schutt AM (1998) Trails for economic development: a case study. *J Appl Recreat Res* 23(2): 127–145
- Stellin G, Rosato P (1998) La valutazione economica dei beni ambientali. Metodologia e casi di studio, CittàStudi, Padova
- Value (2012) The value project—final report, South Yorkshire Forest Partnership/Sheffield City Council, available at <http://www.value-landscapes.eu/>. Last access 7 Mar 2016
- Vandermeulen V, Verspecht A, Vermeire B, Van Huylenbroeck G, Gellynck X (2011) The use of economic valuation to create public support for green infrastructure investments in urban areas. *Landscape Urban Plan* 103:198–206
- Viaud-mouclier C (2012) Valuing attractive landscapes in the urban economy— cycling and walking path along the River Vesdre—final report, Mar 2012
- Wilker J, Rusche K (2014) Economic valuation as a tool to support decision-making in strategic green infrastructure planning. *Local Environ Int J Justice Sustain* 19(6 Rescaling Sustainability):702–713
- www.istat.it
- www.asr-lombardia.it

City as Hope. Valuation Science and the Ethics of Capital



Salvatore Giuffrida

Abstract This contribution deals with the relationship between *the spirit of the valuation logic* and the city as capital asset, by considering the space/time asymmetry that concerns the land-resources allocation pattern. Such asymmetries, necessary for the economy, raise relevant issues about solidarity, typically involving the science of valuation committed in the achievement of economic fairness. The ethical content of urban policy cannot be defined outside of the cognitive and heuristic functions that are activated by practicing the judgment over the entire spectrum, ranging from statements of fact, through value judgments, up to the judgments of merit attributed in decision making. The study is in two stages. The first one concerns the “ecology of reality” centered on the ethics of limit. The second one defines the ecology of city, centered on the ethics of capital.

Keywords Hope · Ecology of reality · Value judgement · Ecology of city
Inter-generational justice

1 Prologue

Inter-generational justice is the subject of the rational and emotional functions that we enable when expressing hope. The city is the context for specifying the concrete sense of hope and justice as proposed in this paper. The conflict between policy and economy and the progressive prevailing of the latter, definitely influenced the layout of cities in the context of welfare and feelings of hope, affecting the future of the city as an example of the “common home”. The city, for its part, has always been the ideal center of many utopias and hence the condition of hope.

S. Giuffrida (✉)

Department of Civil Engineering and Architecture, University of Catania,
Via S. Sofia, 64, 95123 Catania, Italy
e-mail: sgiuffrida@dica.unict.it

Shared hope has ever been the guiding principle of the formation of the wealth of the settled communities; therefore, hope is the main reference of the value judgments, which are valid as they refer to economic justice.

The study presents some reflections on hope as a node of the relationship between “human being” and “urban being”, addressing two *Ecologies* both specified in terms of ethics: the relationship ecology/ethics reflects the complementarity of judgments of fact and value judgments that hope connects to the judgments of merit; the latter is the practical area of basic choices and of decisions.

“Ecology of reality” is centered on the *ethics of limit*; the limit is the condition for defining and identifying ontological areas beyond which the cognitive and emotional functions of transcendence are activated; the limit enables hope. This applies both to the boundary between city and territory and to the dividing line separating what can from what shouldn’t be monetized.

“Ecology of city” is centered on the *ethics of capital*; the accumulation of capital is the result of the creative energy that makes possible the formation and the development of society as a resilient entity balancing individual interests and collective values, the first one centered on the power of money as liquidity, the second on money as a rule in the perspective of the social and environmental responsibility.

2 Hope

Hope is the (theological) virtue whose practice localizes the deep center of the individual and collective motivation outside the tangible world. Hope is a mostly inter-temporal tension, which gives rise to the sense of justice in the present.

Hope can be considered the confidence in a better future condition having real roots in the present, in those tangible traces, even partial results of personal commitment, that enable and spread this trust; as such, it gives meaning of acting.

Hope arises from the present and comes back to the present. Out of any relation to the present, hope couldn’t exist or, more properly, it could be confused with some of its lower surrogates: illusion and bets.

One of the main contribution around this issue is Ernst Bloch’s massive work, *Das Prinzip Hoffnung*, edited in 1953–1959 (*The principle of hope* 1986) that extends and focuses this concept, assuming it as the main philosophical category: hope is the “fundamental determination of human beings and reality, the impulse to transcend the present, connecting the human dimension with the structure of being itself” (Fornero 2008).

From this paper’s perspective, i.e., the influence of the Encyclical “Laudato si” (Francesco 2015), on evaluation paths, hope may be taken as an individual determination that activates and connects various and converging layers of existing. It is at the same time: (1) a heuristic-cognitive area; (2) a critical-sceptical attitude; and (3) a principle of action.

1. *A heuristic and ontological area.* Hope is the cognitive area in which the process of progressive identification of *me* and *us* and of *us* and the *world* occurs.

The intersection of these two original relational spheres—relation to the *others* and relation to the *things*—gives rise to *reality* as the effect of comparing, discussing and sharing. D’Agostini (2011, pp. 281–282), recalls the existential-phenomenological tradition, according to which “I” is established in “We”.

Hope is a sense transcending the reality in the world; it is a skill that originates and resides in the individual, but which is typified as expanding up to the consciousness of a “world outside”. *World* transcends mere existence and is the *reference*, the *product* and the *scope* of hope. As such, world has got its essence, its “standing to be”.

According to E. Bloch, the feeling of incompleteness due to the gap between potentiality and actuality enables expectation and hope; it enacts the intentionality that makes objective the connection between human consciousness and reality.

Bloch offers an ontology of human existence: ...*we are already*, as human, what we *are not yet*. ... We exist ‘ecstatically’ in the literal sense of standing out ahead of ourselves toward an open future which we ourselves actively determine and towards which our hoping is addressed. ... Nature ... too exists as what it is not-yet. For Bloch, we freely determine ourselves in and through our actions and so are not merely ... deterministic products of our past. ... Our possibilities are as ontologically real as what, at any present moment, we find ourselves to be. ... We exist as the possibility of becoming something irreducibly and fundamentally new, and ecstatic venturing beyond is just that in which, ad human, we consist. The ecstasy of our hoping is accordingly the ecstasy which we are, and what we are nothing other than the principle of hope itself (Gunn 1987, pp. 4–5).

2. *A sceptical and axiological attitude.* As a critical-sceptical attitude and in an axiological sense, hope is the selection pattern that activates the typical intellectual functions of judgment. It is the ability to exceed common sense and to overcome the systems of probability giving rise to fields of possibility, in which some occurrences, apparently ordinary, assume their own *beyondness*:

Hope is the ability to penetrate in the plots of reality, seeing these scraps, this “not yet” that is really possible, so a concreteness from the point of view of utopia, of hope; not something random by which we cannot produce a change involving the world we live (Cuozzo 2014).

The value judgment is an utterance mostly normative and as such it has a truth-value if related to the perspective of a better world: a normative utterance is true if “it is true” that the world to which it relates is “a better world”. Also, a normative utterance implies hope. Hope expands *reality* in a dimension realistically utopian so establishing the *world*.

3. *A principle of action.* As a principle of action, and in a prospective sense, hope outlines the ground of the most reasonable expectations, which can be considered reasonable insofar as any partial results can be recognized an effective approach to the most desirable condition. In this sense, hope is the “design substance” both in politics and in architecture. It is the external center of social life, the state of being of the communities (human and urban); hope essentially places each occurrence of reality in the scale of human values.

The objects we design when [we experience the gift of hope] are blurred... but they are real, they are born of this world and imply a better world... Our world... is a training ground for a good apprenticeship for realistic dreams; this is not to tap into another world (ib.).

Hope is the driver of heroic behavior that characterizes the enterprise, the commitment in the transformation of reality. Even in the event of failure, a political, social, cultural, urban, economic or entrepreneurial project, motivated by the ability to glimpse glimmers of a better world, does not end with the failure of its author whose heritage is very probably taken up (Pisanty 2014).

3 Ecology of Reality and the Ethics of Limit

1. *Truth*. In the perspective of the *ecology of reality*, the encyclical recalls the fundamentals: relativism, which spread on the basis of “the end of grand narratives” (Lyotard 1979) and the affirmation of the “weak thought” (Vattimo 1983), led to forms of neo-sophism and scepticism in ethics that have questioned the very existence of truth and the possibility to affirm true utterances. The ecology of reality is the whole of our knowledge of it; knowledge is the belief in true propositions; these propositions are true if they say how things are (D’Agostini 2011).

In particular, due to the complexity of real life and to the need to discuss and act on it carefully and in agreement, we are obliged to represent reality with “semi-constructions”: this “second reality” is not free from conflicts, faults and prejudices, gaps that can be filled in various ways by providing a “falsified reconstruction of reality” by using *prefalsehoods* concerning the way to ascertain the truth and persons in charge to do so; this determines the “spread of falsehood to the entire epistemic environment—the *ecofalsehood*” (ib., p. 298–299). The self-referential mass communication (communicating to communicate and communicating about communication) is the most suitable environment for the *eco-falsehood*. This kind of horizontally widespread falsehood extends vertically, as well, because it thwarts the belief in fundamentals and objectives, even affecting values, so that the *eco-axio-falsehood* arises.

Rather than truth, this kind of lie attacks its referent, reality; it is partly the result of epistemicism, a theory of truth according to which “what we know about the way things are” replaces “the way things are”. According to the epistemicism, the truth requires knowledge (demonstration, verification, control, justification) (ib., p. 100), therefore, reality exists as knowable and not as such. Another strain of theories of truth endorsing eco-falsehood is “metaphysical pragmatism”: the truth value of a proposition depends on its scientific (predictive) and practical (utility) success; pragmatism “reduces truth to utility and reality to spirit; at last it assumes that the beliefs themselves produce their own justification” (Abagnano 2008).

2. *Limit*. The alethic foundation of reality – the truth as a constitutive principle of the world – is the discussion context of the subject of limit. Ethical relativism, epistemicism and pragmatism are the basis of: the generalized denial (in fact, not in principle) of the responsibility of the anthropic pressure on environment (*there isn’t any evidence!*); the defense of global inequality as a condition to maintain the geo-political and geo-economic balance (*it is better than chaos ...*).

A naturalistic epistemology of limit would pose the following questions: is there a limit to the carrying capacity of ecosystems and the planet? Is there a limit to the adaptability of the human species to the eco-systemic changes? Is there a limit to

the ability to contain the resulting disparities in these adaptations? Can democracy impose a limit to the depletion of the planet?

A *socio-systemic ethics* of the limit (Luhmann 1990), instead, would pose the following questions: Can the social system maintain a high level of differentiation with respect to the environment, given the current intensification of the entropic flows? What codes and programs should the social system perform in order to contain the progressive diversification and the autopoietic closure of its own different social sub-systems?

From the perspective of inter-generational justice, according to the normative side of the valuation paths supporting city as the “common home”, the above questions can be synthesized into two: There should be a limit on the accumulation of economic capital?; There must be a limit to the expansion of the city?

According to Luhmann, the city can be considered as a unit-difference between A social system and the environment, an entity that is identified as an effect of the *external* communication process that distinguishes the *subjects* (agents) forming the system and the *objects* (environment), excluded from it; a further communication process, *inside* the system, divides it into sub-systems each one performing its own specific code (program) reproducing a sort of internal differentiation towards other sub-systems considered environment.

As such, environment is an ontological condition, in some cases “intermittent”, activated by the direction of the extra-systemic (system *vs.* environment) and intra-systemic (between the different sub-systems) communication processes. More generally, limit is a condition for the individual and social subjectivity, as well as the institutional and territorial entities. Environment has no physical nature or extent; it’s the status of *not a natural being, not a human being, not an urban being*.

3. *The true value.* Valuation science differs from other branches of applied economics because it reverses the relationship between economic theory and its application: it doesn’t apply to a preconceived theory, but rather infers from the judgment on reality (*how things are*) and in the light of a primary goal (*how things should be*), principles and procedures by which we can answer “a well-posed question”.

Traditional *appraisals* identifies relevant estimates such as: generally valid, objective, impartial, present, market-based; otherwise, *valuation science* is committed in “true evaluation of true values” (Giuffrida 2017); such value judgments are asserted according to a heuristic and robust critical path, having authentic values as content; then, they reject at the same time all forms of: dogmatism—the “grand narratives” of Lyotard (1979)—absolute scepticism (solipsism) and relativism.

The idea that the unlimited power to sell and buy can justify the unlimited physical transformation is today due to the prevalence: of individualistic subjectivism on reciprocating interaction, in microeconomics; of nominal variables of the real ones, in macroeconomics; and of the market over the state, in economic policy.

The transformation of the territory underlies the transfer of order (potential) from the outside towards the inside of the system (actual order). It is an irreversible process, and the traces of this irreversibility are usually manifested in what we refer to as pollution. As a consequence, the natural limit to the transformation would

consist in the limited carrying capacity of the ecosystem. In social communication, however, this limit is perceived to be weak (it is definitely ignored), although it refers to a strong foundation (natural).

The “ontology of limit” is based on the concept of action and transformation. The becoming of things is to “dissolve the immediate link” (Severino 2006, p. 23) between them from the natural *continuum* undifferentiated; “... acting is will to achieve purposes and thus is consciousness of the world, that is the dimension in which those purposes are to be achieved... The project depends on what in acting is known of what is going to be transformed” (ib. p. 25). Knowledge identifies and defines what can be changed and how. The transformation moves forward the boundary between: system and environment; inside and outside; order and chance; shape and chaos.

Individualistic subjectivism has prevailed also in the assessment and management of architectural and environmental heritage; this approach to value is based on willingness-to-pay (WTP) and willingness-to-accept (WPA) and therefore on market simulation and negotiation. But, in the presence of significant and growing social polarisation, the WTP is exerted by rich people, the WTA is exercised by poor people, so that the WTP-centered valuation procedures supports the exacerbation of the social and economic differences we are seeing today.

For its part, the market is the place of the “economical communication” (i.e., where social units communicate through economic exchanges) and therefore is an important resource of knowledge and expertise; moreover, it’s an efficient (not always effective and fair) allocator of wealth in many of its forms. In contrast, many contradictions characterize it:

- the trust that competition results in an equilibrium of long-term success;
- the idea that economic justice is the result of a ruthless process of selection of businesses and consumers, which excludes increasingly larger parts of society, the “unworthy”;
- the claim that the profit target resolves in its levelling, lowering and cancellation in the long run;
- the hypothesis that the overall performance of the economic system will improve in a deregulated market as a result of:
 - the lowering of the nominal wealth as a result of greater labor flexibility;
 - the lowering of real wealth as a result of the decrease in the tax burden on profits and the proportional retreat of the welfare state and public spending;
 - the concentration of workload on the elderly, due to increasing the retirement age, with a corresponding increase in youth unemployment.

As a result, the greater the strategies of economical communication, the greater its asymmetries, redundancy and rhetoric, that the few exercise to the detriment of the majority.

Valuation science has the responsibility to attribute the “true value” manoeuvring between redundancy and rhetoric of the economic communication; if “truth is the foundation of the *democracy of thought*” (D’Agostini 2011), the “true value” is

the basis for the sharing of economic and territorial wealth. In a normative sense, an axiology of reality sets the boundary between what can be and what must not be purchased and sold.

4. *Stealing, purchasing, sharing.* Economic goods can be achieved by:

- stealing: i.e., trading in the absence of fair prices;
- purchasing: i.e., trading at market rates: markets exclude non-creditworthy subjects and fail in the case of public and common goods;
- sharing: i.e., exchanging at political and administrative fares, trying to include as many people and businesses in the economic communication sphere.

This is the scale of progress of the civilized community committed to build the “common house”.

The power to buy and sell is based on the process of consensual exchanges by which value is reflected in price. Defining the substance of value: (1) in a positive sense, helps to distinguish the components of value mainly represented by the price; and (2) in a normative sense, indicates which value components need to be internalized in the price system.

Valuation science investigates the correspondence between value and price—then the exchange opportunity—justifying or not substitutability of different references. Two goods are reasonably and stably replaceable if: they share the same substance of value; and the relationship between substance and measure of value has been conventionally consolidated as an effect of economic communication. Thus, valuations science infers, in the objective sense (by the indirect comparison in the income approach), the causes of value, and in the subjective sense (by the direct comparison in the market approach), the rules of evaluation. In the subjective sense, science of valuation enables the exterior and a-critical *observation* of the *preferences*; in the objective sense, instead, it enables the deep *interpretation* of their *motivations*: motivations and preferences aren't the same: the former exceed the latter, as well as the transcendent reality exceeds the phenomenal one.

Selling and buying are the two communicative activities that weave the social link between value and price, between transcendent reality, the cause of the value, and phenomenal reality, the effect of value, its (monetary) measure. They raise and give economic form to the principle of substitution whose foundations occupy different areas of human nature and culture, including the thermodynamic and the psychoanalytic ones.

1. The laws of thermodynamics describe exchanges between different forms of energy and identify in “diffusion”, the dissipative process which makes possible the formation of vital systems, such as entities capable of transforming matter and energy, and organize them into complex shapes, ordered and in disequilibrium. Diffusion characterizes the temporally asymmetric and creative processes concerning auto-poietic and self-referential systems, and it is in some way self-contradictory: it reflects the natural tendency towards equilibrium—the heat death of the universe—but, in the course of this, new and different asymmetries arise. These trigger singularity around which its dissipation

thickens complex entities, recognizable as structured units, capable of giving rise to new and more articulated complexities, new differences, to new types of dis-equilibrium (Prigogine and Stengers 1981).

2. In the context of psychoanalysis, the substitution principle works in the depths of the sublimation processes that transform the undifferentiated psychic energy, in specific—creative or destructive—shaped energy. The limits and the relational structures aimed at organizing psychic energy and oriented towards the formation of the organized community give rise to a dis-equilibrium that is resolved by moving upwards the destination of *jouissement*, from the compulsive layer to the rational one.

In economics, the various forms of substitution can be distinguished referring to two directions, the horizontal one that relates to different goods at the same time and the vertical one that concerns the replacement of the present consumption with a different meta-consumption, i.e., the possibility that the formation of capital today enables us to consume more, and more stably, tomorrow. In the two cases, surpluses are exchanged, but, in the first case the exchange is regulated by the experience about the correspondence of the values of the traded goods, while, in the second case, the deferment is regulated by hope that the future value overcome the present one, which is a desire of temporal asymmetry, a desire for the future.

The principle of substitution is a fruitful category, variously interpreted looking for possible economic justice in environmental and ecological areas.

- (a) *Environmental economics*, mainly anthropocentric and minimalist, has developed the idea of “abstraction in prices” of the environmental externalities to be turned into hedonic prices according to the notorious “polluter pays” principle, by means of taxes and subsidies.
- (b) *Ecological economics*, primarily physio-centric and maximalist, assuming the limit as an intrinsic natural bond legitimized by the internal consistency of the ecosystems, has developed the idea of abstraction in energy–entropy quantities.
- (c) In view of the “*economics of life*”, the encyclical overcomes the dialectic anthropo/physio-centrism affirming the “primacy of *being* on *being useful*”.

According to K. Lowitt, it is possible to overcome the opposition *anthropo/physio-centrism* assuming “an *ec-centric* vision of reality as an antidote to a historicised conception and anthropocentric existence” (Fusaro 2005, p. 56) and therefore potentially relativistic. The idea of a “nature situated beyond history and outside of human being” (ibid., p. 57) returns to humans the attribute of subject, which is and stays that way overtime; consequently, in his collective dimension, a human cannot shirk responsibility for “the sin against the creation” of nature and humanity itself. For the purposes of an *ecology of reality* the primacy of “being” reconnects the three main spheres of knowledge and existence:

- Epistemological, based on *evidence*, in which *science* enlightened by *truth* defines the *things*;
- Logical, based on *inference*, in which *culture* enlightened by *reason* identifies *reality*;

- Praxeological, based on *action*, in which *poiesis* enlightened by *creativity* constructs the *world*.

4 Ecology of the City and the Ethics of Capital

1. *A human city*. From the perspective of an “ecology of city” and in the light of “ethics of capital”, several suggestions about the relationship between nature and culture are found in the encyclical (p. 35):

- (a) in town planning—about the relationship between built and void areas;
- (b) in economics—about the distributive effects of the accumulation of rent;
- (c) in a societal sense—about the relationship between city *space* and human *time*, with a focus on the risks that a dystopian, identity-less and anomic city can be turned from a “center of hope” to the “periphery of despair”. The encyclical repeatedly (pp. 46, 142) shows concern about the growth of distress among the youth and the corresponding widespread recourse to psychotropic substitutes.

According to this solicitation, the city must become again the matrix of personal happiness in its four neurobiological components:

- Motivation, related to dopamine;
- Mood, related to serotonin;
- Membership, related oxytocin;
- Resilience, related to endorphins.

The relationship between happiness and neural structure recalls reflections at first in the sceptical and solipsistic direction, at second, in the naturalistic direction.

1. In the sceptical direction (there is no reality, and even more so, no value), D’Agostini (2013, p. 391) cites the hypothesis that:

We are brains in a vat of physiological saline, connected to a computer that provides us with the experience of reality (Putnam). A trickster demon gives me images of the world as it feels like (Descartes). All other (except me) are zombies ... which simulate emotions but they feel at all (Chalmers) The world, with all its documents in its tracks, myself and my memories, began exactly three minutes ago (Russel).

2. On this basis, the idea of a morality based on the neurobiological component (Churchland 2011) does not raise fewer concerns, if not exceeded by the key idea of “primacy of being”. In particular, the observation of animal behavior, the attitude to parental and alloparental care and the defensive or aggressive disposition seem to be established in the cycles of two hormones, oxytocin in females, vasopressin in males. In addition, these two hormones interact with neurotransmitters like dopamine and serotonin. Dopamine also plays important functions in the field of socioeconomic behavior: it is important in learning; it mediates neural changes in

the reward/punishment system, in the predictive path, in recognition, in the formation of couple partnership and in parental behaviour (Churchland 2011, pp. 20–21). Even the idea that morality is innate raises questions about free will (De Monticelli 2010) and therefore the responsibility, punishment, remedy and policies supporting social cohesion and solidarity (Churchland 2011, pp. 105–107).

Accordingly, the basis of morality can be defined within an emotional and cultural niche (ib. 203) that enables trust in law, in knowledge, in the ability to face to problems and challenges, in the certainty of reward-punishment-benefit mechanism that the city, as an idea, such as utopia and hope, embodies.

2. *City and capital as hope.* The *Economics of Hope* is an economy of values, not price; it is a normative economy, or based on fair prices, not just positive or based only on prices, (Rizzo 2007). It is an economy based on the axiological limit as a condition of growth and redistribution:

The invitation-command to grow and multiply in the context of nature conservation, confirms and reinforces the paradigmatic and illustrative function of the creation of the world in respect of the production processes of economy. They have a cosmic dimension on which the economic orthopraxis is based. Did the great growth of material wealth lead to the globalization of social relatedness, interpersonal reciprocity and human solidarity? No, it didn't. It extended market to the borders of the earth, due to a technology able to compress the space-time coordinates, but no one can affirm that it made the world joyful and safer (ib. pp. 118–119).

The city results from the accumulation of social surplus in resilient forms; it is a *spatial a-symmetry* aimed at a *temporal symmetry*; it's the way of giving a form and a place to hope. The urban shape is constitutively asymmetric, like any organized entity.

The city as a concept, and capital as a category share the autopoietic principle:

- in space: capital exceeds its physical limits by implementing its own self-increasing in volume program by means of various forms of physical colonization:
- in time: urban capital exceeds its conventional duration insofar as the fate of the city becomes its temporal attractor: the “rate of time colonization” is proportional to the capitalization rate;
- in social communication: capital exceeds its economic characterization and takes on an *iconic* and *utopic* feature; this is, for better or for worse, the condition of the resilience of the city: in the unified concept of *city-capital* converge the multiple determinations of persons exercising their own beyondness option.

As well as for the city, capital is an “accumulator of hope”; the formation of city and capital is the basis of the social order as well as of arising of person (De Monticelli 2009). Capital hoarding has an ethical purpose that is achieved in the three dimensions of the economic communication: *intra-temporal*, *inter-temporal* and *meta-temporal*.

3. *Minimal capitalism.* Capital is not a delimited occurrence but a present condition of the human communication and of the “urban being”. Today we see coalescence between hyper-communicative and hyper-capitalist society:

- in the age of rhetoric and redundant communication, it is impossible not to communicate; every action, regardless of the intention and the knowledge of the subject, is a communicative act; its meaning lies in the intertwining of the consolidated syntaxes;
- likewise, in the advanced capitalism, every act of production, consumption and accumulation of wealth is inserted and must be interpreted in the plot of the economic values—predominantly not explicit—that create disequilibrium and market imperfections.

The widespread need for continuity and economic stability and the persistence of a set of attractive investment options encourage the formation of savings that are directed towards primarily conservative uses (productive investments) aimed at defending them from inflationary erosion.

The delicate balance between monetary instability and economic stability—high inflation rate to support investment and employment—breaks down when the savings coming from the growth of income begin to be attracted by speculative investments, especially in urban real-estate capital in the rapidly growing cities. This results in forms of hoarding that steal liquidity from the real economy, so receding in favor of the credit and insurance (monetary) economy.

Nowadays, the financial industry is the protagonist of the stock market swings causing uncertainty despite deflation and the decline of investment and employment, which contrasts with the gradual abstraction and concentration of wealth.

This extreme abstraction—in principle, necessary for the development and advancement of the social and economic communication—has, as a result, the break of the semantic bond between meaning (the value) and referent (the underlying) of the capital assets; the increase in labor productivity causes the fall in employment; the fall in prices is the effect of the increased labor flexibility and of the easy access to new sources of raw materials in unknown areas of the planet, with a high potential for exploitation and high irreversibility: the growing energy demand triggers gigantic chains facilitated by: the evolution of the political-military arrangement to control the sources and the transportation infrastructure, and to enlarge the underground network of waste disposal; the ability to influence the command and control systems about pollution.

Ultimately, the accumulation of capital disperses social (inequality) and environmental (irreversibility) responsibility, acting in three distinct and connected areas:

- within the company, a typical military structure separates workers from the effects of the capital “value chain” (Porter 1985);
- within the corporate, the majority of the shareholders’ doesn’t care about the environmental and social enterprise’s profile unless it affects the return/risk ratio of equity;
- in the social sphere, solidarity is affected by the dissolution of the sense of belonging to social sub-systems, particularly at the base: workers, consumers, older people, families, young people etc., don’t share values and programs, and don’t demand safety, guarantees, services, opportunities, but just more money.

4. *Money and the lords of time.* The monetary language (Rizzo 2002) organizes the accumulation of hope; it is said that money connects the present and the future, but the present exists as a tense between the *experience* of the past and *hope* in the future.

Money has a fiduciary value and is the vanishing point of any economic process (Rizzo 1999, pp. 45–48). Money is a synonym of value, not because everything is quantified in monetary terms, but because the essence of money, liquidity, does not reside in money itself, which loses its iconic value due to inflationary trends. Money is not an object, but an ontological category of the “economic being”; therefore its functions may be performed by goods that more and better than money are capable of encouraging the propensity to hoard.

Conversely to the “*miracle of the money form*”, emerges cash, its dark, compulsive and ungovernable side. According to the approach to the economy by Rizzo (1999, 2016), we deduce that “cash is the energy, money is the information” of the economy.

The “duality between money and cash” suggests some considerations about the corresponding duality between “hope and betting”:

- hope, as ontological principle of reality, it is the shared and effective belief in a desired condition existing today as a real possibility; therefore hope “transcends future in the present” insofar as it encourages us to act today in view of a better world, the desire of which is present; in this sense, hope works in the social reality, as well as money in the economic reality;
- betting, instead, is a dissipative behaviour that dissolves hope; it is driven by an illusory imaginative (neither designed nor projected) condition not having any relation to the present: betting degrades the present in an unlikely future, and the action in unlimited waiting; the bettor does not hope for a better world, but is haunted by random possibility to emerge from a degraded reality, that it doesn’t help to improve; the economy of *production*, in which the expectation is generally abstaining from present consumption in view of future gain, is replaced by the economy of *speculation*, where the expectation is abstention from acting; in this sense, the bet works in the social reality as “cash” in the economic reality;
- accordingly, hope is a “meta-temporal” over-determination, constitutive of present, while the bet is an “a-temporal” sub-determination that rejects present, escapes from it continuing to postpone satisfaction indefinitely, until the extreme form of addiction. Even if ignored, betrayed by history, hope is still a trace in the present, altering the course of future events; the lost bet is instead a semi-certainty that denies that the present can be the place where the future can be created.

The financialization of everything transformed the *economy of money and hope* in the *dis-economy of cash and betting*; the widespread practice of the “repurchase agreements” has also imposed a “credit/debit code” to social life, which in this direction has been reformed. Consequently, while in the light of money hope is shared, in the shadow of cash, time is bought and sold.

Bankers and insurers—the lords of time, for better or for worse—sell and buy time by creating an asymmetry between the “lords and servants of time”. This asymmetry concerns trust, guarantee capacity and solvency, which support the price of time as compensation for waiting (banks) and risk (insurance). The two cases differ since, respectively: the loan is granted in the present and refunded with deferred and continuous instalments; the accident takes place—and is repaid—in an indefinite time and with a certain probability. As a consequence:

- having *money* allows *banks* to sell time: making a loan is like giving time for repayment, in return for interest;
- controlling *time* enables *insurance* companies to buy time: covering the risk means to guarantee the management of the possible accident in exchange for an upfront fee; the insured gets security in exchange of his (payments’) time.

In conclusion, if the city is a spatial asymmetry aimed at a temporal symmetry, money is a temporal asymmetry aimed at the spatial symmetry of the “city as the common home”.

5 Epilogue

The proposed reflections focus on the “iconic” features of the city—as attractor of hope in the logic of the capital-accumulation process. This iconicity is cause and effect of hope that makes the city an emerging form ever new.

This autonomous capacity—superordinate to the will of the individual—to condense undifferentiated wealth in resilient forms provides the contents of the value judgment, i.e., the assertive set of statements (Lombardi and Cooper 2016) coordinated by the axiological predication, the heuristic, cognitive, sceptical-critical and deliberative paths through which we get an idea of reality that we devote to a better world.

A reality-world—i.e., a reality that is condensed in truth in the forms of the shared emotions and reason based on the discussion—is the dense and intense context of social communication, where values are formed in reference to the “pleasure principle”, to the satisfaction of the “Other’s desire”.

This form of value regulates the tendency to exceed, contains the excess within the limit and constantly reconstitutes the social link preventing us from gliding in the “reality of things”. The “reality of things” is an in-human condition, an unreality unrelated, dominated by the absolute individuality and loneliness, in which the unlimited dissipative *jouissement* produces the emptying of the subject.

If hope is the ontological foundation of reality and the “urban being” is the best way for “human being”, the city that we form is ontologically based on the hope we share.

To exist as human is to exist in ... ecstatic and hopeful terms. Blochian utopia becomes humanly concrete inasmuch as his ontology of human existence, itself, goes forward in a utopian mode (Gunn 1987).

References

- Abbagnano N (2008) Pragmatismo. In: Abbagnano N (ed) Dizionario di filosofia. UTET, Torino
- Bloch E (1986) The principle of hope. The MIT Press, Cambridge, Massachusetts
- Churchland P (2011) Braintrust. What Neuroscience Tells us about Morality. Princeton University Press, Princeton
- Cuozzo G (2014) Ernst Bloch e il principio speranza. In: Ferraris M (ed) Speranza: David Hume e Ernst Bloch. Zettel - RAI
- D'Agostini F (2011) Introduzione alla verità. Bollati Boringhieri, Torino
- D'Agostini F (2013) Realismo?. Bollati Boringhieri, Torino
- De Monticelli R (2009) La novità di ognuno. Persona e libertà. Garzanti, Milano
- De Monticelli R (2010) La questione morale. Garzanti, Milano
- Fornero G (2008) Speranza. In: Abbagnano N (ed) Dizionario di Filosofia, UTET, Torino
- Francesco P (2015) Laudato si'. Enciclica sulla cura della casa comune. Edizioni San Paolo, Milano
- Fusaro D (2005) Filosofia e speranza. Ernst Bloch e Karl Lowitt interpreti di Marx. Il Prato, Padova
- Giuffrida S (2017) The true value. On understanding something. In: Stanghellini S, Morano P, Bottero M, Oppio A (eds) Appraisal: from theory to practice, Springer, p. 1–14. ISBN 978-3-319-49675-7, https://doi.org/10.1007/978-3-319-49676-4_1
- Gunn R (1987) Ernst Bloch's the principle of hope. *Edinb Rev* 76:1–9
- Lombardi P, Cooper I (2016) Inter-generational justice: Time to tackle our evaluation practice? *Valori e Valutazioni* 17:19–24
- Luhmann N (1990) Sistemi sociali. Fondamenti di una teoria generale. Il Mulino, Bologna
- Lyotard JF (1979) La condition postmoderne. Raport sur le savoir. Editions de Minuit, Paris
- Pisanty V (2014) Il medico di corte di Per Olov Equist. In: Ferraris M (ed) Speranza: David Hume e Ernst Bloch. Zettel - RAI
- Porter M (1985) Competitive advantage: creating and sustaining superior performance. Simon and Schuster, New York
- Prigogine I, Stengers I (1981) La nuova alleanza. Metamorfosi della scienza. Einaudi, Torino
- Rizzo F (2016) La scienza non può non essere umana, civile, sociale, (E)conomi(c)a, enigmatica, nobile, profetica. Aracne edizioni, Roma
- Rizzo F (1999) Valore e valutazioni. La scienza dell'economia o l'economia della scienza. FrancoAngeli, Milano
- Rizzo F (2002) Dalla rivoluzione keynesiana alla nuova economia. Dis-equilibrio, tras-informazione e co-efficiente di capitalizzazione. FrancoAngeli, Milano
- Rizzo F (2007) Un'economia della speranza per la città multi-etnica. FrancoAngeli, Milano
- Severino E (2006) La filosofia futura. Oltre il dominio del divenire. BUR, Milano
- Vattimo G, Rovatti PA (eds) (1983) Il pensiero debole. Feltrinelli, Milano

A Fair City. Value, Time and the Cap Rate



Salvatore Giuffrida

Abstract The paper deals with some features of the “ecology of value”, centred on the “ethics of valuation”, and of the “ecology of time” centered on the “ethics of time”. In this framework it indicates what influence the encyclical *Laudato si’* exerts on the evaluation processes, starting from the relationship between judgments of fact and value judgments, and between value and price. Referring to the normative function of appraisals, these reflections specify in which sense the capitalization rate is a framework for the representation and the government of the transformation processes concerning the urban housing stock, in a specific sense, and the city, in a general sense. For this purpose, the Keynesian macro-economic model is recalled as a general matrix explaining the constructive role that the monetary and real estate capital plays within the urban policies.

Keywords Value judgement • Real estate ethics • Value and price
Ethics of time and space • Emotional investment

1 Prologue

This contribution develops the topics of the “ecology of value and time” involving respectively the ethics of valuation and cap rate” according to some of the Pope Francesco’s Encyclical issues, consistent with the normative function of the valuation science and more particularly of the capitalization rate.

The first of these two parts addresses the relationship between the concrete component of value, the contents of the value judgment, and price, the outcome of the interpretation process by which the system of the economic communication transcends the concrete substance of value in a monetary dimension exceeding the concept of simple quantitative measure.

S. Giuffrida (✉)

Department of Civil Engineering and Architecture, University of Catania,
Via S. Sofia, 64, 95123 Catania, Italy
e-mail: sgiuffrida@dica.unict.it

The second one addresses the specificity of the urban real estate capital, whose value exceeds its usefulness and its ability to produce income streams; this feature is the basis of the urban real estate capital enhancement process. It begins with some considerations on the speculative-financial approach foundations of Keynesian economics and explains how the three psychological laws are a fundamental conceptual pattern in the economic and urban policy due to the similarity of the abstract wealth, money, and the urban real estate capital. In the perspective of hope, i.e. the expected market value surplus, real estate performs the same functions of money, assuming a marked regulative potential; some reflections about this surplus follow in the framework of the semiotic approach to valuation, according to the articulation in its three fundamental declinations: semantics, syntactics and pragmatics of the value judgement. In this light, the contribution introduces the concept of “emotional investment”, an individual determination connecting individual real estate *axiology* and urban *ethics*, depending on the implementation of an urban policy performing low capitalization rates.

2 Ecology of Value and Ethics of Valuation

1. Facts and values. In the perspective of a possible “ecology of value”, “the true value”—the original and authentic raw material of the value judgment—the ethics of evaluations defines the relationship between *facts* and *values*. According to the theory of truth, in the absence of valuations pattern in town planning:

- (a) the original predominance of the *absolutism of facts* inspired to an alleged “correspondence approach” produced the rigid forms of the functionalist approach;
- (b) the following prevailing of the *relativism of values* implemented the “pragmatism” of the compensatory approach, assuming subsidiarity as the premise of the plan deconstruction.

The moral foundation which justifies the selection and transformation of *natural continuum* in social organizations more and more resilient, is the “peculiar ability of the human species to produce artefacts and institutions” (De Monticelli 2009). It is therefore a fact—but not necessarily a value—the attitude of our species to accumulate artificial capital. H. Putnam has extensively argued against the fact/value dichotomy starting from overcoming the Humean “*is* and *ought*” distinction,—according to which “no ought-judgment may be correctly inferred from a set of premises expressed only in terms of ‘*is*’” (Putnam 2004, p. 42, footnote 31)—and stating that also the value judgement has an objective content, as well as the judgements of fact are permeated by values (ibid., p. 10).

As a consequence, the accumulation attitude justifying the transformation process is a *fact* that is enabled as a *value* in the perspective of the Encyclical, according to which the distinctive traits of human species are (1) subjectivity, (2) novelty and (3) communicative ability (Francesco 2015, p. 64).

1.1 Value and the subject. Within the issues of the human ecology, i.e. ecology of mind, person and community, the psychoanalytic fundamental has several contact points with one of the main concerns standing in the Encyclical: the arise of person as subject. Recalcati (2015) summarizes the main topics of the transition to the hyper-modern conception of the “social bond”. According to S. Freud, the formation of a social Superego, inscribes the subject to the program of Civilization by means of a typical ideal-axiological compensation (ibid., p. 18). The hyper-modern climate is instead featured by the elevation of the dissipative and limitless *jouissance*”, to the level of duty, a *jouissance* that just wants to improve itself.

As a consequence, the emptying of the subject occurs. The dissolution of the structure of values, established in the *pleasure principle*, gives rise to the clinic of the emptiness that forks into subtractive behaviours (anorexia, isolation, depression, self-mutilation), and additives behaviours (bulimia, obesity, drug addiction).

The *pleasure principle* is a practical principle for regulating excesses, to reach a condition of ordered dis-equilibrium that prevents the subject from sliding toward the emotional disorder or imbalance.

1.2 Value and novelty. The emergence of the subject, the individual, from his physiological, environmental and social states, is the phenomenon of the person.

What constitutes the identity of a person is the fact that a person is a whole whose parts are all non-independent – an indivisible whole, not made of “pieces” ... but “moments” ... such as color and surface, or a face and its physiognomy. That’s what makes him an individual who is ontologically a new type compared to the “specific materials” that are eminently divisible. (De Monticelli 2009, p. 356)

The identification of value with novelty, and novelty with shape, internal consistency, indivisibility, interdependence of the components, is quite consistent with the new trends of the theory of value in economics, both in the hedonic direction or subjective, both in the ethical and aesthetic direction or inter-subjective.

1.3 Value e communication. Inter-subjectivity is the space in which value arise and is based on communication. Volli (1994) identifies six meanings of it. The most relevant are:

- (1) Communicating as *sharing*.
- (2) Communication as *inference*: the content of communication is entrusted to clues, which are arranged to valorise what is implied, challenging the inference capability of the recipient.
- (3) Communication as *hermeneutics*: the interpretation of the economic goods as *texts* (Rizzo 1999) connects the way in which wealth is formed with its representation within the “axiological predication” (Giuffrida 2017).

1.4 Judgements. The ecology of value as subjectivity, novelty, communication, defines the ethics of valuation across the triple articulation in judgments of fact (JF), of value (JV) of merit (JM). These contents justify or not the transformation of the

“common home” in view of its maximum social, spatial and temporal unity. In the perspective of the ecology of value, ethics of valuation suggests that:

JF: according “alethic realism” (D’Agostini 2011) the relationship between reality and truth needs to be reversed: *it is not true what is real, but it is real what is true*;

JV: likewise, according to the theory of value and in the perspective of an “axiological realism”, the reality of values is built by “true evaluations of true values”;

JM: action follows the value judgment that usually we associate to the effects we expect from action itself.

2. *Semiotics of value judgement: semantic and syntactic features.* Economy is a form of communication in which the signs (goods) have a consistency also material; the iteration of these communicative actions deposits physical track that accumulate in the form of composite and complex signs (capital goods), symbols and icons whose evaluation typically involves hermeneutical processes.

In a general sense, the assets (architectural/economic) as units with semantic identity, i.e. able to be worth themselves, have no intrinsic value: their value is the result of the complementarity of a “semantic link”, that rules the signification process, and a “syntactic link”, that rules the process of mutual:

- the semantic link is the vertical connection between two dissimilar terms, signifier (the overall performance) and signified (the value), architectural and/or economic and monetary;
- the syntactic link is the horizontal connection between similar terms, the signs, which, as a reciprocal interpretants, give rise to the “semantic chain”, sets of signs bound together by a network of semiosis relations: the semantic relationship of each sign can not be understood unless in relation to the others.

In evaluative sense the relationship between dissimilar entities (Rizzo 1999)—price and characteristics (signified and signifiers)—is given as a contingent fact concerning each specific transaction; the transaction is an exemplary fact that (1) consolidates or (2) amend the overlying relationships between similar entities, capital goods (interpretants) belonging to the same market (the semantic chain). In the case 1 (consolidate), the transaction “is given” as a *probability* condescending to a consolidated semiosis, and the syntactic link prevails over the semantic one; in case 2 (amend), the transaction “arises” as a *possibility* breaking the standard rules, and the semantic link prevails over the syntactic one: in the first case the common sense prevails, while in the latter the individual determination prevails.

In appraisals, “semantics of the economic signs” and “syntax of fields of meaning” are the general and abstract references for the trading choices performed by ordinary economic actors, and the benchmark of any “over/under-estimates”.

The presence of a preference structure, consolidated in a resilient semantic chain, enables the ordinary conditions according to which the horizontal link “sign-sign”

consolidates the vertical link “signifier-signified” instilling the belief in a possible form of stable equilibrium”.

According to D’Agostini (2011), “knowledge is the belief in a true sentence”, thus the knowledge of value (evaluation) is the “belief in a evaluative sentence predicating the true value” (Giuffrida 2017). Consequently, the belief in this stability resists until the next fluctuation in economy and market place.

3. *Pragmatics of value judgements.* Fluctuations affecting the socio-economic system coming from the many imperfections of the capital markets, the monetary phenomena and the resulting “liquidity transmutation processes” (Rizzo 2002), operate scrambling the value references of the economic goods and money itself.

This “axiological disorder” harasses appraisals with the responsibility to restoring the relations between references and values by performing the cognitive functions enabling the value judgement.

Appraisals performs its typical mission in case of “peripheral information contexts” characterized by poor adherence to reality, or “rarefied reality” as to their ability to be represented with the usual simplifications by categories.

As a consequence of the decay of the significance of such abstractions, the bonds of signifiers and signified weaken, the “conventional context” is fragmented, some semantic chains are interrupted and the missed rings are replaced by new events that give shape to a plurality of “conversational co-texts” (sub-markets).

In semiotics, linguistic con-text and situational co-text are considered two distinct syntactic areas (Marello 1994, pp. 180, 196): the first is specified or contradicted by the second in a real contingent situation or in a particular conversation.

In assessments, this distinction is synthesized in the fertile duality of “probability systems and fields of possibilities”.

In the event of economic and financial fluctuations, the *semantic* “conventional and con-textual” arrangement supporting the semantic chains is “jerked” by the *pragmatic* “conversational and co-textual” action coming from the individual investors, subverting the “order of utility” and reversing the sequence value-price.

Furthermore, in between there is money. Money is the mirror through which reality and its image—use value and exchange value—look at each other, the surface reflecting and confusing them: do commodities command money or vice versa?

This is the contact point with the question of the referential fallacy in the signifier/signified relation, the exceeding of capital-value on use/income-value, the prevalence of speculative-financial activity in economy, the greater effectiveness of the income approach in appraisals, the need to specify ad hoc the cap rate.

Why, therefore, a “pragmatic of valuations”? In linguistics: (1) semantic semiotics investigates the relationship between meaning and significance; (2) syntactic semiotics investigates the relations between signs; (3) pragmatic semiotics investigates the relationship between signs and people.

It has been observed that in the housing market (Giuffrida et al. 2015, 2016, 2017; Gabrielli et al. 2017, Napoli et al 2017), one of the most “pragmatic” places

of the “economic communication”, the semantic linkage, i.e. the correspondence between values and prices, is weaker than the syntactic one; nonetheless, the latter, in many cases, is “broken” by speculative events “asserting new semantics, affect the current syntax”.

Now, in such a pragmatic perspective, appraisal needs to focus on the difference between capitalization of *income* and capitalization of *yield* (income + capital gain/loss), whose difference (or constructive ambiguity) arises the “housing wealth”. So: income capitalization performs a semantic retrospect (i.e. in price-taking), yield capitalization performs the pragmatic perspective of “doing things with words” (Austin 1962), which in capital asset economy, is “price-making with countertrend trades”.

4. *Values and prices.* The system of values legitimizes the pattern of settlement, housing and wealth allocation of the local communities. Nonetheless, values are not free from the defects of rhetoric able to manipulate them. The question of their measuring arises.

The advent of money and its progressive affirmation as an absolute comparison term (general equivalent of exchanges) for goods, gradually changed this role, up to giving rise to the “anamorphic inversion” between value (a substance, being the axiological content of the value functions) and its size, price. In “real economy” price depends on value (Naselli et al 2014); in “monetary economy” value depends on price.

About the issues that affect the city, because of its “value-density and tensions in prices” that have accompanied its transformation in the contemporary age:

- *values* are the subject of architecture sciences, oriented “in a *practical* sense” (what to do?);
- *prices* are the subject of the valuations science oriented “in a *critical* sense”: it focuses the *semantic* reasons and the *syntactic* relationships starting from the observation of the behaviours contributing “in a *pragmatic* sense” (what is convenient to do?) to form them; market is the place where values are turned into prices over an asymmetric course.

The reversal of the price-value sequence is the epitome of the inversion of the relationship between *architectural* and *real estate* assets. If building as object has been demoted to a mere material support within the range of values (i.e. if values subsume facts), then science of evaluations takes on a role quite far from “ancillary” in relation to architecture sciences. As a consequence, real estate market becomes a communication place “enabling” individual behaviours and policies.

This is one of the main aims of valuations science committed in recovering the dominance of values on prices. This commitment does not advocates any demotion to forms of pre-monetary or pre-capitalist economy; instead, it recognizes in the wide and deep panorama of values, the human and emotional resources for a moral and civil renaissance of communities affected by disparities that threaten to regress *person* to *individual* and *citizen* to *servant*.

The primacy of value over price does not exclude the role of money, does not prefigure its demotion to a mere “measure of value” (anachronistic and contradictory); instead, this primacy makes it possible to extend the linguistic and communicative function of money according to which society can increase the sovereignty of its institutions as a guaranty of sharing values and reducing the abuses of “cash” against money; money is a *shape*, “cash” is a *strength*.

Valuations science, as a typically normative discipline, is committed to implement, in decision-making, the functions that transform, transcend and transfigure the danger of the “power of cash” in the miracle of “monetary form”.

3 Ecology of Time and Ethics of Capitalization Rate

1. Time as hope. In the perspective of “ecology of time”, the ethics of the capitalization rate presents some topics and targets basing on which hope works in stabilizing the link between the present and future of the city.

In Bloch (1986), hope is the principle by which the individual determination gives completion to reality in the act of its transcendence. If, according to Kant, time is taken as one of the “a priori principles” of sensitivity, hope can be assumed as the condition of the world arise: in this sense, world results as a tension between a spontaneous and random course, and the ability of the subject to improve it.

But behind this there is more. Hope is a principle of order, not as a link between present and future (one excludes the other); hope connects the way we judge the present now, with the way we would like it (or we fear it can become) tomorrow. But in this case, we strive for a better future only in a secondary sense. In the primary sense, in fact, we assume that it is better that things would be different from how they are: time is the container within which we arrange these attributions, different in nature, not (only) by timing, as they are evaluated in the light of the present values, not according to future values, the evolution of which is obscure.

1. In its *ontological* dimension hope connects individuals to “*reality itself*” (things outside our intellectual framework): on one side hope exposes the subject to *reality* (the human representation of the world), on the other, hope fits *reality* in the framework of truth.
2. In its *axiological* dimension, hope connects future to present: future projects its shadow in the present adding new elements to the judgment about world and its course, giving rise to the state of consciousness and to existing values.
3. In its *praxeological* dimension, hope connects present to future: it postpones present, by changing the current behaviour according to what is usually expected. The “constructive connotation” of the “principle of hope” is its implicit reference to “good”, in a broad sense, to “better”, in the strict sense; since “good”, as super-concept, can not be denied (it would be simply contradictory to do it) (D’Agostini 2011), hope that refers to “better”, envisages a

fundamental attitude to appreciate the difference between the two states (one of which is considered the best) and turns it into behaviours. This key attitude to be open to reality gives rise to *world* as constructive unidirectional (not cyclical) process over which human being has power and responsibility.

2. *Hoarding and the “urban being” as an “empty subject”*. In the spirit of “principle of hope” the city can be considered the resilient framework of the “common home”. It is the dense and intense context of social communication where the public/private opposition is dissolved in the “urban being”, an iconic entity, new and emerging (De Monticelli 2009), a “miracle of the shape” (Recalcati 2007) not uninjured by the “sin against creation” (Pope Francis 2005): in this sense, the cumulated and concentrated surplus of value gives rise to a surplus of shape, pushing up the demand and, as a consequence, the real estate market prices, sometimes unsustainable by the “urban subject” that loses part of its unity. The consequent “real estate hoarding” is the effect of the tendency to the auto-poietic closure triggering sub-systemic fragmentations and forms of social exclusion and filtering processes.

The psychoanalytic interpretation proposed by Recalcati (2015, par. 2.1) in relation to the “clinic of emptiness”, and then to the “emptying of the subject”, may clarify the origin and nature of this drift.

The progressive advancement of the market over the state in the organization of social life and city, can be interpreted as an extension of the “empty subject” principle. Even a community, according to the Freudian “masses psychology”, can be considered a subject, in tension between the “Kantian imperative to renunciation, and the Sadian one to dissipation in the compulsive *jouissance*”. In the first case, state, in the second one, market prevails. When capital, in its more or less abstract forms—company, real estate, money—replaces state, a process of limitless renunciation to the stream from capital begins, in favour of its increase in volume and value. A self-referential and self-contradictory process occurs. Even in this case, the renunciation of *jouissance*, has the same compulsive contours.

This process is described by the Lacan “discourse of the capitalist”. Emptied of its practical function, capital strengthens the superego’s command of *jouissance* as a new form of duty. The “discourse of the capitalist” is the production of objects, which rather than satisfy the need, filling in the emptiness, generates new pseudo-lack, indefinitely encouraging demand.

It should be considered, however, that the ability to activate desire typically identifies secondary goods, that contemporary capitalism has recognized as the privileged means to keep the effective demand high; intangibles encourage the desire, which doesn’t turn off with consumption, but persists as a trace of a life experience crossed by the uninterrupted flow of goods ever new.

The “discourse of the capitalist” opens in the subject “artificial holes”, and at the same time gives the illusion that there are goods that can fill these holes. Now:

- in the case of goods, the accelerated obsolescence of objects drives to extreme the compulsive demand, through which capitalist dominates consumers;

- in the case of real estate asset, as the subject is the owner—therefore the capitalist—the clinical of emptiness covers a broader subject, the “urban community as a whole”, attracted into the trap of the “empty city”.

The real estate capitalism creates the illusion of filling the emptiness of the jeopardized suburbs by increasing and expanding the real estate assets by means of the Transfer Development Rights; thereby it accelerates the obsolescence of the less worthy areas, in which the expected market prices are not at least double the costs.

3. *Money and the cap rate.* According to the speculative-financial Keynesian paradigm, the real estate asset has the characteristics of money, of which (mutatis mutandis) typically performs the three main functions. Real estate asset:

- measures the value of wealth, as it can be taken as the opportunity cost of low risk assets, instead of the interest rate on government bonds or other treasuries;
- preserves the value of wealth, as it constitutes a form of productive investment;
- increases the value of wealth, as inasmuch as it is the target of real hoarding.

Rizzo (1987) deduced from analysis Keynesian macroeconomic categories that influence the capitalization rate as summarized below.

1. the price of capital asset depends on the liquidity preference, given the money supply;
2. the demand for money is demand for liquidity, that is the attribute defining the profile yield/risk of a capital asset;
3. the speculative demand for money L_2 depends on the interest rate, on the yield of the liquid assets and on the capitalization factor;
4. the increase of L_2 influences the relative prices of the different assets, according to their liquidity;
5. this liquidity depends on the combined action of the banking sector, and the relationship between expected profits and invested capital;
6. it follows the complementarity between “the amounts of business funded by investors and by banks, that are able to influence the process of valorisation of capital” (ibid., pp. 218–219).
7. the same complementarity occurs between “speculative activity and production of real wealth” (ibid., 129);
8. thus, the different liquidity of the various assets depends also on subjective and psychological aspects that give rise to different expectations.
9. bid prices affect the market prices;
10. capitalization rate becomes a superordinate variable, gathering macro-economic, objective and subjective, micro-economic, monetary and financial items, that determine the informational asymmetries encouraging the speculative investments and affecting the productive ones;
11. the capitalization factor, on the other hand, is a measure of the inter-temporal solidarity, because it equals the capital value to the number of undiscounted incomes; it coincides with simple Pay-back Period, and with the “average period”, i.e., the elasticity of the expected stream as defined by Hicks (1946);

12. the capitalization rate can be considered a variable: (a) *creative*, according to the individual economic personality, which by means of atypical investment decisions tries to emerge from the ordinariness; (b) *normative*, according to the urban intentionality, which leads the individual “irrational exuberance” (Shiller 2000), to the increase of the capital value;
13. as a result, cap rate, outlines the spatial, temporal and social solidarity profile.

4. *The Keynesian pattern and the urban real estate policy.* The Keynesian psychological laws can be taken as metaphors of a normative approach to urban policy.

4.1 *Liquidity preference.* Real estate can be taken as the content of the liquidity preference function. The current extent of the urban real estate capital, on one side exceeds the actual needs of people (compulsive excess), on the other, an insufficient amount is made available for demand (normative failure). The imbalance demand/supply keeps rents quite high, making the adjustment of prices viscous.

Real estate assets, more than the others, benefits those who has high expectation attitude. The latter doesn't depend on physical durability of the underlying, the building, but on the “city effect” which, in combination with the “emerging state” of the investor, extends the economic sustainability of the real estate assets.

The preference for liquidity is the tendency to keep inactive the property when the uncertainty in the system grows, and the income rate falls due to a high risk of affordability. In this case owner prefers to keep the property available for sale.

4.2 *Inducement to investment.* In real estate, the capitalization rate reflects the marginal efficiency of capital; the difference between marginal efficiency and interest rate represents the excess of expectation inducing investment; in the real estate this inducement depends on the excess of the average capitalization rate over the specific one; J. R. Hicks called such an excess “crescendo” and, if the specific cap rate is higher than the average one, “diminuendo”.

As analogous to the marginal efficiency, cap rate is the rate that equals the capital value to the stream of unlimited capitalized incomes. Now: while the marginal efficiency is the rate at which the (subjective) *prospective yield* has to be discounted if it is equal to the (objective) *supply price* of the asset (so being influenced by future expectations about yield), cap rate is the rate at which the (objective) *given yield* has to be discounted if it is equal to the (subjective) *expected capital value*, a sort of “hoped for value”.

Furthermore, in the general case of investment, the entrepreneur is *value taker* and *income maker*, in real estate, the owner is *value maker* and *income taker*.

4.3 *Propensity to consume.* Real asset hoarding significantly influences the urban wealth (properties and their services) allocation. The propensity to consume connects the national income and the effective demand, highlighting that the excess of investment over the full employment level causes the “limitless spiral of inflation”. Furthermore, the analogy between money and property suggests some reflections on the connection between the Keynesian monetary and fiscal policy (Keynes 1936) and the urban housing policy.

In the ground of real estate asset allocation at the urban scale, the excess of properties over the demand for dwellings and investment can be interpreted as a sort of inducement to real estate hoarding.

The Keynesian model sequentially defines the following relationships: direct, between the level of the demand for money and the interest rate; inverse, between the interest rate and the level of investment; direct, between the level of effective demand (consumptions + investments) and national income, according to the multiplier; direct between national income and employment.

This is the conceptual framework of the monetary and fiscal policies aimed at the equilibrium (between aggregate demand and income) in the perspective of full employment, so turning (neutral) equilibrium into (non neutral) economic fairness.

An urban real estate pattern can be assumed as a metonymy of it. In fact, equating:

1. money supply with real estate (built or to be built) supply;
2. interest rate with cap rate;
3. consumption with the properties occupied by owners;
4. investments with real estate for rent;
5. effective demand with the sum of the two previous items (the unavailable part is hoarded) and the part devoted to social housing;
6. the total income with the sum of the three previous items and the unavoidable properties (the hoarded ones);
7. the employment with the properties actually utilized.

In the absence of real estate hoarding, all properties would be occupied, as rents and prices—due to competition—would be balanced, cancelling any market “viscosity” (Giuffrida et al. 2016).

In fact, in situation of economic recession or stagnation, uncertainty increases as well as the risk of insolvency of the tenants; as a consequence “the liquidity preference of real estate” increases, discouraging its productive use in the present, pending future best options of rent and/or sale.

In such a case the liquidity trap occurs at a high capitalization rate, in a pathological form which gives rise to further forms of exclusion from the right to housing.

At the underemployment equilibrium level, the Keynesian model suggests closing the jobs deficit by resorting to monetary and fiscal measures.

Something similar has happened in the context of the social housing policy in Italy since the sixties of the last century. The consequent expansion in the supply of housing has led to a form of “real estate inflation” due to the presence of a huge real estate asset affected by an exponential growth in physical—and consequently also social—obsolescence, impossible to manage by the public entity.

Much of this patrimony was sold at very low prices whose modest financial return is not comparable to the enormous economic damage caused to the Treasury.

Similar objectives expressed policy of moderation in rents started in Italy with the introduction of the “rent-controlled lease”, introduced in Italy in 1978 (L. n. 392) in the rental market, a measure that had as its effects: first, a general fall in real estate prices; then the spread of the “underground rent” until the current regulations governing the liberalization of the contracts and, since 2011, the tax incentives to residential lease (flat rate tax).

Positive signs of a serious fiscal policy are being seen today in two directions: the first—at the level of global equalization—concerns the laborious updating of the valuation rates in the land registry; the second—at the level of the local equalization—concerns the “extraordinary concession charges” designed to internalize the positive externalities arising from the urban renewal processes.

4 Epilogue. “Emotional Investment” and the Cap Rate

1. *Haecceitas*. Based on these concepts, valuation science, by realizing the nature and function of the capitalization rate, is committed to distinguish between those who “love the property” and who “squeeze real estate”. The capitalization rate reflects the ethics of capital, which is the ethics of continuity and inter-temporal solidarity. The capitalization rate is an expression of the empathetic unity between subject and real estate, a measure of this *haecceitas*.

For its part, in fact, an urban property has a social entity, being a constituent part of a “field of shape”, the city; as such it goes beyond the simple economic, functional and aesthetic characteristics of the real estate capital, as usually understood; rather, according to its particular arrangement, it incorporates the *vocations* (intrinsic), the *possibilities* (extrinsic), the *limits* (natural, technical and social) of this field, being a more or less dense core of its value.

The capitalization rate is also a (inverse) measure of this density. In fact, if, at the same income, two assets have different values, the one with the highest value thickens more incomes and has a lower rate of capitalization.

As a result, following De Monticelli (2009, 2010), the “haecceitas” can be considered in this context, the feature identifying the real estate capital units as an entity “emerging and forming”, always new in the encounter with the person who renews or betrays the promise (the investment) of allegiance to it.

2. *Faithfulness*. The concept of “allegiance” in this operational area, refers to two aspects of the theory of capital, involved in the explanation of the transformation processes of urban and territorial entities.

1. The first is the conceptual relationship between the elasticity of a stream of constant and unlimited incomes, defined by Hicks (1946) “average period”, and the capitalization factor. The former is “the average length of time for which the various payments are deferred from the present, when the times of deferment are weighted

by the discounted values of the payments” (ibid., p. 186), the latter is the number of non-discounted annual income at present, corresponding to the capitalized value of a stream of constant and unlimited income. Since both depend on the value of the capital, which is the result of (dis-)investment choices in a market in dis-equilibrium, both measure the “emotional involvement” in the investment.

The purchase is a promise of allegiance that lasts until the dis-investment; the higher the price paid respect to income, the more the promise is firm; the capitalization coefficient is a measure of this firmness.

2. The second concerns the theory of interest by Fisher (1930) as to the optimal duration of an investment. It suggests to dis-invest and re-invest in different asset classes depending on their growth rate. In particular, when the growth rate of the held asset decreases, the entrepreneur shifts the investment to another asset (having a constant yield) in the year in which the growth rates of the two assets are equal. This approach performs an “accounting and short run vision”, mostly indifferent to the axiological variety and to ethical perspective of the urban housing stock.

The search for higher capitalization rates (in the first case) and for flexible investment (in the second) diminish the openness to reality and to the true value, causing a “reduction of feeling” (De Monticelli 2012, pp. 155–156), which lowers the free choice at dissipative compulsion, and drives the individual ethos away from the principle of hope.

3. *Truth and value. Ethos and ethics.* The “true value” is a dimension of the *being worth* extending over the wide space of the city and the long time of the allegiance to it; this is a space-time inspired to the principle of hope, which increases in resilience the eco-socio-urban systems.

There are different reasons to point out that the real estate is a subject in the economic and urban sense; the main of them concerns the destiny of real estate assets in the urban regeneration processes.

In the regeneration approach, urban units are interpreted as “real estate packages” an abstraction that reduces the hope of “widespread property” (one family, one home) that is one of the most relevant conditions of the urban identity, according to a widespread and orderly “real estate affection”.

In fact: (1) the business criterion separates the yield from the axiological specificity of the unity “owner-property”; (2) the criterion of flexibility (in the real options theory) supposes the compulsive and unlimited divestment/reinvestment; (3) the emotional investment, instead, arranges the “desire of home” around its concrete realization, filling the “emptiness of the urban subject” according to a possible *Order of the heart* (De Monticelli 2012), which reconstitutes the “hope of city”.

In the absence of the *order of the heart*, the duality between individual ethos and collective ethics, and between price and (true) value widen.

... *ethos* is the scale of values constituting the personal and moral identity of everyone...; *ethics* regulates what each one owes everyone. Without this distinction it isn't possible to escape the alternative between fundamentalism and scepticism... *Ethics* is the limit and the restriction to *ethos*', if we want to lock the implication from pluralism to relativism ... We state the ethics formula: what each one owes everyone is the same right to live and flourish in accordance with their *ethos*', which they request for themselves. Each *ethos* that violates this "owed" is a priori incompatible with ethics (ibid., pp. 143–153).

Consequently, the individual determination, as far as capable of novelty, should not be confused with ethics, as we do when seek the fair prices in the market.

The ethics of capitalization rate results as the combination of the individual *ethos*' in the collective subjectivity, by means of which it forms a shared axiology, which regenerates itself as "ethics of presence" as a particular "*haecceitas* of the urban subject" in the light of the principle of hope.

Concretely, we wish that a real estate taxation, inspired by the ecology of time, and led by the ethics of capitalization rate, can extend the home ownership as much as possible: the ownership of residential property emerges as a right/duty to be placed at the base of the urban identity design, and of the widespread responsibility for its fate.

References

- Austin JL (1962) How to do things with words. Oxford University Press
- Bloch E (1986) The principle of hope. The MIT Press, Cambridge, MA
- D'Agostini F (2011) Introduzione alla verità. Bollati Boringhieri, Torino
- De Monticelli R (2009) La novità di ognuno. Persona e libertà, Garzanti, Milano
- De Monticelli R (2010) La questione morale. Garzanti, Milano
- De Monticelli R (2012) L'ordine del cuore. Etica e teoria del sentire, Garzanti, Milano
- Fisher I (1930) The theory of interest. Macmillan, New York
- Francesco P (2015) Laudato si'. Enciclica sulla cura della casa comune. Edizioni San Paolo, Milano
- Gabrielli L, Giuffrida S, Trovato MR (2017) Gaps and overlaps of urban housing sub-market: hard clustering and fuzzy clustering approaches. In: (a cura di): Stanghellini S, Morano P, Bottero M, Oppio A (eds) Appraisal: from theory to practice. Springer, pp. 203–219. ISBN: 978-3-319-49675-7, https://doi.org/10.1007/978-3-319-49676-4_15
- Giuffrida S (2017) The true value. On understanding something. In: Stanghellini S, Morano P, Bottero M, Oppio A (eds) Appraisal: from theory to practice. Springer, pp. 1–14. ISBN: 978-3-319-49675-7. https://doi.org/10.1007/978-3-319-49676-4_1
- Giuffrida S, Ferluga G, Valenti A (2015) Capitalisation rates and 'real estate semantic chains': an application of clustering analysis. Int J Bus Intell Data Min 10:174–198. ISSN: 1743-8187. <https://doi.org/10.1504/ijbidm.2015.069271>
- Giuffrida S, Di Mauro S, Valenti A (2016) Cap rate and the historic city. Past and future of the real estate of noto (Italy). Gervasi O et al. (eds) Computational science and its applications—ICCSA 2016. Lecture Notes In Computer Science, vol 9789. Springer, pp. 63–78. ISBN: 978-3-319-42088-2, ISSN: 0302-9743. https://doi.org/10.1007/978-3-319-42089-9_5
- Giuffrida S, Ventura V, Trovato MR, Napoli G (2017) Axiology of the historical city and the cap rate the case of the old town of Ragusa superiore, Valori e Valutazioni, 18:41–55, E-Flow Dei Tipografia del Genio Civile, ISSN: 20362404

- Hicks JR (1946) *Value and capital. An inquiry into some fundamental principles of economic theory.* Oxford University Press, Oxford
- Keynes JM (1936) *The general theory of employment, interest, and money.* MacMillan, London
- Marello C (1994) *Contesto; Cotesto.* In: Beccaria GL (ed) *Dizionario di linguistica.* Piccola Biblioteca Einaudi, Torino
- Napoli G, Giuffrida S, Trovato M, Valenti A (2017) Cap rate as the interpretative variable of the urban real estate capital asset: a comparison of different sub-market definitions in Palermo, Italy. *Buildings* 7(4):80
- Naselli F, Trovato MR, Castello G (2014) An evaluation model for the actions in supporting of the environmental and landscaping rehabilitation of the Pasquasia's site mining (EN). In: Murgante B et al (eds) *ICCSA 2014. LNCS 8581, Part III*, pp 26–41, Springer International Publishing Switzerland. https://doi.org/10.1007/978-3-319-09150-1_3
- Putnam (2004) *The collapse of the fact/value dichotomy and other essays.* Harvard University press
- Recalcati M (2007) *Il miracolo della forma. Per un'estetica psicoanalitica,* Bruno Mondadori, Milano
- Recalcati M (ed) (2015) *Il soggetto vuoto.* Edizioni Centro Studi Erickson S.p.A, Trento
- Rizzo F (1987) *Note sui prezzi di domanda delle aziende di credito.* *Economia e credito*, n. 4, Rassegna trimestrale del servizio studi della Cassa di Risparmio V. E. per le Province Siciliane, Stampatori Tipolitografici Associati, Palermo
- Rizzo F (1999) *Valore e valutazioni. La scienza dell'economia o l'economia della scienza.* FrancoAngeli, Milano
- Rizzo F (2002) *Dalla rivoluzione keynesiana alla nuova economia. Dis-equilibrio, tras-informazione e co-efficiente di capitalizzazione.* FrancoAngeli, Milano
- Shiller RJ (2000) *Irrational Exuberance.* Princeton University Press, Princeton, New Jersey
- Volli U (1994) *Il libro della comunicazione.* Il Saggiatore, Milano

Marginal Opportunities: The Old Town Center in Palermo



Giovanna Acampa and Sergio Mattia

Abstract The article presents the theoretical and methodological basis for structuring a research project aiming at identifying and carrying out micro-actions of urban acupuncture. An actual project has been launched to requalify the neighborhood Vucciria—an existing paradigmatic and highly degraded area in the historic center of Palermo—acting through small architectural, social and cultural interventions. The project, now on-going, and whose various phases are described, involves both residents and regular public-space users. The assessor plays a pivotal role as coordinator between the various entities and groups involved; his coordination efforts are badly needed also when identifying and managing funding sources and re-directing the available resources to new virtuous processes of urban regeneration.

Keywords Urban acupuncture · Public space · Regeneration · Vucciria

1 Research Objectives

Together with the patrimony of nature, there is also an historic, artistic and cultural patrimony which is likewise under threat. This patrimony is a part of the shared identity of each place and a foundation upon which to build a habitable city. (§ 143)

Given the interrelationship between living space and human behaviour, those who design buildings, neighbourhoods, public spaces and cities, ought to draw on the various disciplines...we see how important it is that urban planning always take into consideration the views of those who will live in these areas. (§ 150)

G. Acampa (✉)

Faculty of Engineering and Architecture, University of Enna Kore, Enna, Italy
e-mail: giovanna.acampa@unikore.it

S. Mattia

Department Architecture and Urban Studies, Politecnico di Milano, Milan, Italy
e-mail: sergio.mattia@polimi.it

Along the path shown by Pope Francis in the Encyclical “*Laudato si*”, the research aims to define a methodology to achieve urban renewal integrating it with the social fabric and putting in place projects that can be financed through EU funds.

The idea is to work on micro-areas in cities, via the involvement of residents and users, carrying out upgrading projects by using, as much as possible, available resources.

In order to do so, it is crucially important to create a model to identify a hierarchy among degraded micro-areas and identify indicators that express the quality of the public space. These will allow monitoring and making measurable the effects of the upgrading operations both at the neighborhood and urban scales. They will also make the process replicable in other urban contexts.

The area that gave inspiration to this contribution and that might host a pilot project is the neighborhood Vucciria, in Palermo’s old town. In this quartier, the outstanding historical, artistic, cultural heritage is highly degraded, while the social and functional realities, besides being varied, change very quickly in time and space.

2 Analysis of Urban Redevelopment Phenomena: From Gentrification to Urban Acupuncture

For a long time, words such as redevelopment, rehabilitation and regeneration have belonged to the European cultural repertoire; the concept of gentrification was not born with sociologist Glass (1964), but has roots in the transformation of Paris carried out by Georges-Eugene Haussmann between 1853 and 1870. Then, for the first time in fact, urban regeneration was linked to the political and economic interests of the bourgeoisie (Benjamin 1972); the same can be affirmed for gentrification, which its best known theorist considered as a flow of capital returning to the city (Smith 1996). In both cases, the changes lead to a different use of the area in the present and in the future, to allow the middle class to take advantage of it at the expense of lower-class residents (Jacobs 1961). Anyway, this model reflects a top-down, paternalistic scheme, where someone makes decisions that negatively affect others (Friedman 1974). Gentrification processes, which are often trusted by traditional planning tools (Angotti 2011), do not provide for the participation of citizens (let alone residents) in decisions that affect the processes of urban change (Semi 2015). This means that the most vulnerable urban population is not active subject in the decision-making process: it has to cope with it, or at least adapt to the prescribed change. (Fig. 1 Vucciria: Piazza Garraffello).

But even if “Excluding groups, classes, individuals from the “urban” means excluding them from the civilization process, if not from society” (Lefebvre 1976), it is the dialectical relationship between formal and informal that generates new creative skills (Lombardi and Cooper 2016). Day-to-day life and its problems are



Fig. 1 Vucciria: Piazza Garraffello

actually managed through a whole host of scattered micro-powers; from the observation of dynamics and phenomena which take place during the day, it is possible to draw material for a redevelopment that starts from the informal and will be carried out with small gestures (Focault 1977). This is precisely the reason behind the urban acupuncture theory.

Urban acupuncture is an urban environmentalism theory that uses small-scale interventions to transform the larger urban context (Lerner 2003). Sites are selected through an aggregate analysis of social, economic and ecological factors and developed through a dialogue between designers and the community. Urban acupuncture produces small-scale, but socially catalytic, interventions into the urban fabric. The leading idea behind this approach is that large-scale and expensive interventions often do not have a transformative impact—while, one block, park, or a single person can have an outsized effect on life in the surrounding city. Its basic features should be the following:

- Small scale: the size of the project interventions should be small, not a large urban transformation, but rather the core or the starting point of a network of interventions (Radstaak 2012; Marzi and Ancona 2004).
- Accuracy: the site should be chosen with accuracy “in order to be catalytic of urban renovation, the intervention needs to be precisely located” (Shieh 2006).
- Catalytic for the whole surroundings: this concept captures the essence of acupuncture theory and becomes clear when it is stated that the interventions are

directed at ‘provoking comprehensive reactions that improve the whole organism’ (Solà-Morales 1999; Shieh 2006).

- Implementable within a short period of time: acupuncture interventions must bear an immediate effect and the time to realize them should be brief, “Urban Acupuncture is (created) by the necessity to achieve sensitive affects in shorter time periods with respect to planning.” (Lerner in Marzi and Ancona 2004).
- Low cost: in times of crisis such as these, inexpensive strategies are increasingly appreciated. There seem to be an ‘(...) increased urgency for finding alternatives low cost, (...) strategies that are capable of having a positive impact on the urban habitat’ (Scape 2011).

A pivotal implementation of this approach was carried out by architect and urbanist Jaime Lerner during his three terms as mayor of Curitiba, Brazil, in the 1970s and ‘80s. He was able to transform the city into a global model as a sustainable and livable community, wisely using a small budget to carry out far-reaching and strongly focused projects. From the pioneering Bus Rapid Transit system to parks designed to catch runoff and reduce flooding and the creation of pedestrian-only zones, Lerner has been the driving force behind a host of innovative urban projects.

3 The Old Town Center of Palermo

The urban environment in large European cities in which such projects can be carried out is rapidly changing. Generally speaking, three dynamic processes can be identified as important determinants of neighborhood change: the movement of people, public policies and investments and flows of private capital (Azzolina 2015). These influences are by no means mutually exclusive—in fact they are very much mutually dependent (Zuk et al. 2015)—and each is mediated by concepts of race, class, place and scale. The resulting range of transformations—physical, demographic, political and, economic—strongly affect the people living in the neighborhood, the public space and the building activity even within private houses, and are difficult to cope with.

Palermo is not excluded from these processes. The situation in the old town historic center, one of the largest in Europe, is multifaceted and changes very quickly over time and space. It is a stimulating environment, an ideal area to test urban policies that aim to cope with the deterioration and neglect that affects large parts of it. It used to be affected by a negative net-migration flow, as studies show a decline of nearly 2000 units per year in the last five years. Accordingly, 12–14 thousand inhabitants left Palermo in that period compared to 10–12 thousand that arrived (D’Anneo 2016). Among the newcomers in 2011, some 20,000 were foreign nationals holding proper documents for which the rates of activity and employment exceed that of Italian citizens (Nerozzi 2010). The historic center of Palermo witnesses the phenomenon of shopping streets created by ethnic

minorities, as in New York, Los Angeles and Atlanta (Zukin 1998) and which is now well known in many European cities.

Given the large number of immigrants living now in Palermo, any urban change process in the old center cannot be separated from the integration of histories, cultures and architecture and must also take into consideration social and economic aspects. Therefore, it requires a multidisciplinary approach.

The starting point for observing urban populations could be a special focus on foreigners viewed as a resource (Ciaffi 2013; Bonafede and Napoli 2014).

The Vucciria neighborhood may become a standard-setter. The traditional old market no longer exists and has given way to degradation and to open-air, noisy discotheques open until early in the morning that make daily life complicated (D'Amato 2007). Yet, the neighborhood has such unique features that it may be taken as a *paradigma* (Agamben 2008) of a broader phenomenon, political, economic, ethical and aesthetic, which may be found at a smaller scale also in other cities of Italy and the rest of Europe.

The public space in Vucciria is marked by a heterogeneity of “human types”, a basic feature of the vision of the city as presented by the classics of urban sociology (Simmel 1993; Wirth 1938).

Likewise, we cannot but take into account the pioneering analysis of Michel de Certeau,¹ which dates back to the early 1980s and which, introducing the concept of ‘tactics’, have become the methodological basis for further important research (De Certeau 2010). By tactics he referred to fragmentary phenomena that cannot be disconnected from the situation in which they occur; De Certeau was totally opposed to simplifications that make possible analyzing a phenomenon while isolating it from its scope.

¹In the book *The Practice of Everyday Life* (1984), De Certeau introduces the difference between tactics and strategy: I call a “strategy” the calculus of force-relationships, which becomes possible when a subject of will and power (a proprietor, an enterprise, a city a scientific institution) can be isolated from an ‘environment’. A strategy assumes a place that can be circumscribed as *proper* (*prope*) and thus serve as a basis for generating relation with an exterior distinct from it (competitors, adversaries, “clienteles”, “targets” or “objects” of research). Political, economic and scientific rationality has been constructed on this strategic model.

I call a ‘tactic’, on the other hand, a calculus which cannot count on a “proper” (a spatial or institutional localization), not thus on a border-line distinguishing the other as visible totality. The place of tactic belongs to the other. A tactic insinuates itself into the other’s place, fragmentarily, without taking it over in its entirety, without being able to keep it at a distance. It has its disposal no base where it can capitalize on its advantages, prepare its expansions, and secure independence with respect to circumstances [...]. Many everyday practices (talking, reading, moving about, shopping, cooking, etc.) are tactical in character. And so are, more generally, many ‘ways of operating’: victories of the ‘weak’ over the ‘strong’ (whether the strength be that of powerful people or the violence of things or of an imposed order, etc.), clever tricks, knowing how to get away with things, “hunter’s cunning” maneuvers, polymorphic simulations, joyful discoveries, poetic as well as a warlike [...]. In our societies, as local stability break-down, it is as if, no longer fixed by a circumscribed community, tactics wander out of orbit, making consumers into immigrants in a system too vast to be their own, too tightly woven for them to escape from it. But these tactics introduce a Brownian movement into the system. They also show the extent to which intelligence is inseparable from the everyday struggles and pleasures that it articulates.

A new form of urban planning is required. It should meet the guidelines to obtain financial support for a project such as ours from Italian or European sources, taking into account that these guidelines are not always the same and the underlying assumptions can be different.

In Italy, answers are available before problems: the focus is on identifying degraded areas by means of theoretical numerical parameters.²

Once a degraded area has been identified, specific projects are developed. Thus projects might easily be unrelated to the problems that are to be analyzed.

Besides, redeveloping a space is of little use if this transformative act remains bound to a precise spatial reality. It also loses its deep social meaning if it cannot fit within a development/redevelopment program of a network of public spaces, physically connected or interacting with each other, and able to create a system.

The European legislation³ on the other hand, deals mainly with redevelopment processes based on the analysis of problems that are already evident.

²According to the Italian legislation (DPCM 25/05/2015 pursuant to and implementing subsections 974–978 of the Italian financial act for the year 2016 and the DPCM 15/10/2015), a degraded urban area is a territory that presents: a social disadvantage index (IDS) greater than or equal to 1. The index is a weighted average of the deviations of the values of the following indicators compared to the respective national averages, as measured in the 2011 ISTAT census of, according to the formula:

$$IDS_{ZFU} = 0.40 * (DIS(i) - DISNAZ) + 0.30 * (OCCNAZ - OCC(i)) + 0.15 * (GIOV(i) - GIOVNAZ) + 0.15 * (SCOLNAZ - SCOL(s)).$$

Where: DIS (i) unemployment rate; OCC (i) employment rate; GIOV (i) youth concentration ratio; SCOL (s) schooling rate reported for the six months prior to the year of the survey, and a housing discomfort index (IDE) equal to or greater than 1.

The index compares the state of conservation of the urban area degraded buildings with the national average according to the following formula:

$$IDE = [(ERP + ERM) / Tot ER] / 0.168.$$

Where the weighting coefficient is the national percentage of residential buildings in “bad” or “mediocre” conditions and where: ERP = degraded urban residential buildings in poor condition; MRF = residential urban degraded buildings in poor condition; Tot ER = residential buildings urban Total degraded.

The indicators are also accepted at infra-municipality level, aggregating census particles according to data collected by the 2011 Census.

The social distress index (IDS) and the housing discomfort index (IDE) of the degraded urban area must always be higher than the average of the two indices calculated for the whole municipality.

³The Pact of Amsterdam foresees a cohesion policy of the European community requiring each member country to adopt a “national urban agenda” to identify integrated actions for sustainable development.

Financing is expected to be provided through Urban Innovative Actions: priority is given to innovative aspects and processes favoring research. Results are to be anticipated, identified, described and replicable. The evaluation will be based on the innovation, quality of partnership, measurability, transferability and operational quality of the project.

4 The Proposed Methodology

At the heart of the proposed methodology—essentially interdisciplinary—sits an assessor, having a pivotal coordination role. He integrates the various methodologies in use by the disciplines involved, creating one single operative plan having one sole goal, finds the financial sources and manages them. The underlying idea is that public spaces play a strategic role in finding design solutions for the emerging critical issues in contemporary cities.

The methodology draws a well-defined process divided in various steps, here below listed and described, which is replicable and exportable to other environments.

(1) Analyze the state of-art in urban redevelopment

This deskwork aims at understanding the methodologies used in successful urban-regeneration interventions, pointing out at their strengths and weaknesses. The impact on the surrounding environment is analyzed by choosing parameters that measure the increase in quality of life in the public spaces (Chiodelli 2009). Within this deskwork, skilled personnel examine the vast bodies of scholarship that study urban- redevelopment intervention—urban acupuncture and gentrification, in terms of theoretical analysis and reports and data collection on actual life and real interventions. This step is extremely useful in order to decontextualize phenomena and point out the main elements that affect it, as from, on one hand, acupuncture projects need to be adapted to the specific urban reality. On the other hand, the strong involvement with the social context may bring project managers to deviate from the basics of the original approach and therefore miss the target reached in success stories.

The information gathered in this step will help to:

- make decisions on the basis of the experience accrued through other projects wherever they were carried out, pointing at the similarities and differences and being capable to weigh these elements and their effect vis-à-vis the specific environments in which the projects are carried out;
- define best practices, highlighting their main features and categorizing them accordingly, study in depth the whole process put in place and use it as a reference for the definition and practical execution of the project;
- prepare a list of data to be collected in order to analyze the degradation level in micro-areas;
- prepare a list of acupuncture interventions carried out, highlighting by their main features and categorizing them accordingly;
- create a network to exchange freely ideas on the project, also by means of one-time interviews or meetings with experts in the field;
- set up a scientific committee which, from above and at a distance, can systematically advise on the project, especially at each milestone.

At the end of this phase, the team of skilled personnel, together with the scientific committee, prepares a first version of the list of data to be collected during the project.

(2) Collect available data

Data is collected from available sources, such as Italy's National Statistics Institute (ISTAT), Police, Municipality, Government (Local and Central) and Universities. Furthermore first-hand data might be collected through direct interviews. Two approaches could be followed to evaluate the quality of public spaces in urban areas using the data collected:

- (a) accurate verification of the behavior of certain parameters with respect to values or default indices provisions, laws or standards;
- (b) avoidance of relying on a pre-structured analysis or on existing criteria, but looking at elements that can be controlled and that depend on the context where the experiment is developed.

We have opted for approach b. In fact, in our case it has been interesting to see what elements express quality according to the citizens and consequently how they define degraded micro-areas and the needs that must be satisfied.

We made two different kinds of interviews: (a) to identify micro-areas and the priority of interventions, and (b) to identify the degradation parameters.

(3) Create a database to store and analyze the collected data

Based on the knowledge accrued in phase 1, experts work on the creation of a database to store the data that is envisaged to be collected. It is crucial to design the database as correctly and as in as tailor-made a manner as possible, in order to avoid cumbersome reorganization activities at later stages. The main issue is that part of the data will be qualitative, i.e., collected through semi-structured interviews, and it should be combined with quantitative data. Besides, the database is partially filled automatically through scanning/importing data and documents, which means that data-cleansing procedures and the database itself are prepared accordingly.

Therefore, choosing the software package is a crucial step and has to be made taking into consideration budgetary constraints. To this end, the support of the scientific committee might become especially useful.

(4) Select micro-areas

The analysis of the data already available and stored in the database enables to draw down a short list of micro-areas in which the project will be carried out. The selected areas (like Piazza Garraffello in Vucciria) are those in which the perception of degradation is at the highest and where the impact of the project is at the highest.

(5) Creation of a Local Committee in selected micro-areas

The social groups that are involved in the micro-areas' life and future development have been already identified (historical residents, new residents, immigrants,

shopkeepers, youth associations such as PYC, local cultural and political entities such as FAI, CODIFAS, students, users of existing premises) and a contact person for each group has been selected and the Committee created (Mazzette 2013).

(6) Collect new data by direct interviews with the support of the Local Committee

The aim is to know better the actual degradation conditions in the selected micro-areas according to the opinion of the people living, working or having fun there. To this end, with the actual involvement of the Local Committee, a questionnaire will be prepared, leaving to the interviewed the choice among a number of answers. The test will be carried out by telephone interviews or face-to-face.

(7) Final data analysis and decision making

Once the data collected as per point (6) will be input in the database, a final analysis on all the data available will be carried out. Thus:

- relevant micro-areas will be finally prioritized and selected
- acupuncture projects to be carried out in the various micro-areas will be selected, first with the support of a Scientific Committee and also on the basis of past experience; then the Local Committee will be involved for the final decision

(8) Creation of the baseline to analyze the results of the activities and define indices to measure the decay in social networks, public infrastructures and services

(9) Carrying out acupuncture projects, using as much as possible local resources from the selected micro-areas

(10) Analyze the results vis-à-vis the baseline and the indices

(11) Creation of a model to compare results, define best solutions and prioritize micro-areas in which similar projects can be carried out, given that resources available are scarce.

5 Conclusions

Overall, the project aims at regenerating cities, following the provisions of the European legislation.

This goal will be reached by implementing a set of projects and programs having specific objectives correlated each other and taking to account the impact of improvement in quality of space on human behavior.

Our project, which is useful to reach the overall goal, has the purpose to regenerate public spaces considered highly-degraded.

According to its methodology, it is divided into a series of related and interdependent key steps. Defining the project phases is critical to identify actions and useful information and to divide the tasks among the various players. The implementation of each step is preparatory to the next stage, and overall the project can

be considered cyclical. The experience accrued from it will be transferable to future project interventions.

Since its methodology is participatory (calling for the involvement of all subjects from the planning phase—on what to do, by what means and at what costs) the project is subject to contingencies, the lead times are long, and the dependence on the identification of motivated local partners is very strong.

The project in Vucciria is currently at stage 4, given that the members of the committee of Local Support have already been identified.

References

- Agamben G (2008) *Signatura Rerum Sul Metodo*, Ed. Bollati Boringhieri, Torino
- Angotti T (2011) *New York for sale. L'urbanistica partecipata affronta il mercato immobiliare globale*. Firenze-Catania: ed-it
- Azzolina L (2015) *Il contributo della cultura alla crescita economica della città*. StrumentiRES, 2
- Benjamin W (1972) *Gesammelte Schriften*, Frankfurt a M, Suhrkamp; trad it *Opere di Walter Benjamin a cura G. Agamben*, Torino, Einaudi, 1986
- Bonafede G, Napoli G (2014) *Palermo multiculturale tra gentrification e crisi del mercato immobiliare nel centro storico*. Archivio di studi Urbani e Regionali XLVI:113
- Chiodelli F (2009) *La cittadinanza secondo Henri Lefebvre: urbana, attiva, a matrice spaziale in Politica internazionale*. Sociologia 3(4):353–377
- Ciaffi D (2013) *Adottare Palermo: quali politiche urbane potrebbero contrastare l'abbandono delle città?* StrumentiRes, 3
- D'Amato T (2007) *Palermo museo eterno: attraversare il tempo tra simboli e allegorie*, Ed. Fotograf., Palermo
- D'Anneo G (2016) *Abbandonare o scegliere Palermo, dalla de-urbanizzazione alle nuove migrazioni*. StrumentiRES, 1
- De Certeau M (2010) *L'invenzione del quotidiano*, traduzione Braccianini, Ed. Lavoro Brossura 2010, p 1984
- Focault (1977) *Critica alla vita quotidiana*, vol. I and II. Dedalo, Bari (ed. or. *Critique de la vie quotidienne*, vol. I, Introduction, L'Arche, Paris, 1958; vol. II, *Fondaments d'une sociologie de la quotidienneté*, L'Arche, Paris, 1961)
- Friedman Y (1974) *Utopies réalisables*. Spera trad.it *Utopie realizzabili*, 2003, Quodlibet, Lavis (Tn)
- Glass R (1964) *London: aspects of change*. Centre for Urban Studies, MacKibbon and Kee, London, pp xviii–xix
- Jacobs J (1961) *Vita e morte delle grandi città*. Saggio sulle metropoli americane, Ed. 2000
- Lerner J (2003) *Acupuntura Urbana*. Editora Record, Rio de Janeiro
- Lefebvre H (1976) *La produzione dello spazio*. Moizzi Editore, Milano
- Lombardi P, Cooper I (2016) *Inter-generational justice: time to tackle our evaluation practice? Valori e Valutazioni 17:19–24*
- Marzi M, Ancona N (2004) *Urban acupuncture, a proposal for the renewal of Milan's urban ring road*, Milan, Italy. 40th ISoCaRP Congress
- Mazzette A (a cura di) (2013) *Pratiche sociali di città pubblica*. Laterza, Lecce
- Nerozzi S (2010) *Immigrazione e mercato del lavoro in Sicilia: un'analisi dei dati INAIL*. StrumentiRES, 2
- Radstaak S (2012) *Urban acupuncture in Rotterdam. As an approach towards urban identity*. Master Thesis Landscape Architecture. Wageningen University, pp 72–79
- Scape (2011) *Urban Acupuncture 6(2):90*

- Semi G (2015) *Gentrification. Tutte le città come Disneyland?* Il Mulino, Bologna
- Shieh L (2006) Precedents of the concept. In: *Urban acupuncture as a strategy for São Paulo*. Master thesis in architecture studies, Department of Architecture, Massachusetts Institute of Technology, Cambridge, pp 45–63
- Simmel G (1993) *Excursus sullo straniero*. In: Pozzi E (a cura di) *Lo straniero interno*, Ponte alle grazie, Firenze
- Smith N (1996) *The new urban Frontier. Gentrification and revanchist city*, London, Routledge
- Solà-Morales M (1999) *Quaderni Lotus 23 Designing cities* (Ed) Lotus 1999
- Wirth L (1938) *Urbanism as a way of life*. *Am J Sociol* 44(1):1–24 (University of Chicago Press, trad. it., *L'urbanesimo come modo di vita*, Armando, Roma, 1998)
- Zuk M, Bierbaum AH, Chapple K, Gorska K, Loukaitou-Sideris A, Ong P, Thomas T (2015) *Gentrification, displacement and the role of public investment: a literature review*. University of California, 3 Mar 2015
- Zukin M (1998) *Urban lifestyles: diversity and standardisation in spaces of consumption*. *Urban Stud* 35:825–839

Green SOAP. A Calculation Model for Improving Outdoor Air Quality in Urban Contexts and Evaluating the Benefits to the Population's Health Status



Maddalena Buffoli, Andrea Rebecchi, Marco Gola, Annalisa Favotto, Giulia Palma Procopio and Stefano Capolongo

Abstract Regarding environmental sustainability, the encyclical “Laudato si” considers cities as living laboratories of nature-based solutions, capable of protect and promoting the population’s health status, as well improving sustainable land use and biodiversity. Densely-built urban contexts are affected by high levels of outdoor air pollution, coming from smog and fine particles, caused by vehicular traffic and the combustion processes of buildings’ heating systems. These pollutants cause several health issues, such as asthma, inflammatory and degenerative diseases and respiratory, cardiovascular and stress-related illnesses. At the same time, green areas are capable of absorbing toxic substances and of filtering polluted air.

This paper is a revised and expanded version of a paper entitled **green roofs for reducing air pollution: a calculation tool improving quality of air in urban contexts** presented at the conference “L’INFLUENZA SUI PERCORSI VALUTATIVI DELL’ENCICLICA LAUDATO SI” —SIEV (Società italiana di estimo e valutazione) roma, 14–15th april 2016.

M. Buffoli · A. Rebecchi (✉) · M. Gola · S. Capolongo
Department of Architecture, Built Environment and Construction Engineering (ABC),
Politecnico di Milano, Via Giovanni Ponzio, 31, 20133 Milan, Italy
e-mail: andrea.rebecchi@polimi.it

M. Buffoli
e-mail: maddalena.buffoli@polimi.it

M. Gola
e-mail: marco.gola@polimi.it

S. Capolongo
e-mail: stefano.capolongo@polimi.it

A. Favotto · G. P. Procopio
School of Architecture, Urban Planning and Construction Engineering (AUIC),
Politecnico di Milano, Piazza Leonardo da Vinci, 32, 20133 Milan, Italy
e-mail: annalisa.favotto@mail.polimi.it

G. P. Procopio
e-mail: giulia.procopio@mail.polimi.it

Taking into account the lack of green areas in urban environments, green roofs are delivering excellent alternatives for future implementations. A calculation model, named Green SOAP (Green Solutions for Outdoor Air Pollution), has been developed that quantifies green roofs' capability to reduce air pollutants, with positive benefits on the environment, the population's health status and the economic sustainability of the National Healthcare System. The research work has been structured in three macro-phases. A preliminary phase takes care of the state-of-the-art definition, through comparison with reference scientific bibliography; the proposal phase concerns the calculation model's development; and the implementation phase consists of the application of Green SOAP in the "Città Studi" neighborhood, a case study identified in the city of Milano. The calculation-model application, according to the percentages defined by the morpho-typological analysis of the buildings, has shown that, with the new green roofs' construction, it's possible to reduce the pollutants approximately as high as 18.09 $\mu\text{g}/\text{m}^3$ of PM10, 13.56 $\mu\text{g}/\text{m}^3$ of PM2.5 and 7.24 $\mu\text{g}/\text{m}^3$ of O₃ each year. Nowadays, Green SOAP is being implemented within several contexts to verify its consistency and to increase the sample of case studies.

Keywords Air pollution · Calculation model · Green roofs · Nature-Based solutions · Urban health · Green design

1 Introduction

Today, about 3.4 billion people live in urban areas; by 2030, the urban proportion is expected to rise to 60%, and, by 2050, the amount will grow to 6.3 billion people (Rydin et al. 2012; Talukder et al. 2015). This increasing urbanization is creating a gap between built and green environments, in terms of pollution problems and alarming living conditions. In the most recent years, topics concerning the correlation between green spaces, well-being and health have gained increasing prominence, following the *Urban Health* scientific discipline and fostering the definition of *Healthy Cities* (Fehr and Capolongo 2016).

In this scenario, the encyclical "Laudato SI" of Pope Francis explains that facing the multi-disciplinary issues in a sustainable way means to have "comprehensive solutions which consider the interactions within natural systems themselves and with social systems" (§ 139). Regarding environmental sustainability, the encyclical "Laudato SI" considers cities as living laboratories of nature-based solutions, capable of protecting and promoting the population's health status, as well improving sustainable land use and biodiversity.

Nowadays, the environmental condition of contemporary cities is strongly affected by air pollution and, considering the phenomenon of urbanization, the impacts of the main causes, such as vehicular traffic and buildings' heating systems, are rising. These are the main sources in urban areas, both responsible for noxious substances such as sulphur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide and fine particles.

Several scientific studies have demonstrated that smog and fine particles cause health issues (Baccarelli et al. 2009), such as asthma, inflammatory and degenerative diseases (such as cancer) and respiratory, cardiovascular and stress-related illnesses (IRCCS Foundation 2007).

The population's health-status problems, caused by air pollution, are mainly attributable to three types of pollutants (Table 1). Any increase in PM10, PM2.5 and O₃ causes an increase in respiratory and circulatory symptomatologies. Peak levels are important and dangerous because they are able to generate an increase in hospitalizations.

In this context, there are also an increasing number of scientific studies that investigate the relationship between "green and health". A mere glance at the literature, searching with the keywords "green space and health", shows us that the studies published on the topic from 1990 to 2013 are rising in recent years: two studies in 1990–1999; 34 studies in 2000–2009 and 45 studies in 2010–2013.

It is scientifically proven that trees play a key role in the urban ecosystem since they are natural elements capable of producing oxygen through a spontaneous photosynthesis process (Jo and McPherson 1995; Pugh et al. 2012). They are capable of capturing all the polluting gases in the atmosphere and transferring them into their roots, which in turn release the harmful substances into the ground where there are several microorganisms able to metabolize and detoxify them (Zerbi and Marchiol 2013).

The benefits of green spaces in urban areas are classified into three aspects (Capolongo et al. 2016b): Health: improves air quality; mitigates the temperature; encouraging the practice of sports and physical activity (Rebecchi et al. 2016); and impacts positively on the inhabitants' psychological well-being, in particular of children and elderly people (Coppola et al. 2016). Environment: reduces energy consumption in buildings; and decreases CO₂ emissions. Society: encourages the practice of recreational activities and social interaction, while maintaining mental balance (D'Alessandro et al. 2015). Several studies have shown that people who often occupy green areas are less prone to stress symptoms, such as headaches, insomnia, difficulty concentrating, depression, exhaustion and heart disease (Grahn and Stigsdotter 2003; Romano-Spica et al. 2015).

Table 1 Health's problems caused by air pollution

Pollutants analysed	Afflicted body apparatus	Type of disease
PM10	Breathing apparatus; cardiovascular system	Cause cancer; disorders of the respiratory system
PM2.5	Breathing apparatus; cardiovascular system	Premature mortality in children and adults; systemic inflammation; alteration of heart rhythms; aggravation of asthma attacks; chronic bronchitis; possibility of developing lung cancer
O ₃	Respiratory system	Irritative alterations of the upper airways and lungs

Although the high positive impacts of green areas in urban contexts are well known, these benefits are typically not seriously considered (Vittadini et al. 2015); this is evident in the reduced or incomplete maintenance of existing green spaces.

In metropolitan areas, such as the urban context of Milan, when the maximum concentrations of pollutants are reached, usually during the winter months, it's very difficult to obtain the necessary amount of green capable of activating the cyclic reduction of pollutants, due to the high population density of the city and the lack of greenfield surfaces available for planting trees on street level.

For these reasons, green roofs could be an effective solution for improving outdoor air quality and life in the city, in the face of a reduction of green areas, due to the densification of urban space (Capolongo et al. 2015). The benefits and advantages coming from the green roofs are: reduction of sound pollution; increase of green areas in densely built-up urban areas; improvement of outdoor air quality and, in general, of the quality of life in the cities; reduction of the "urban heat island" effect; containment of buildings' energy leaks; reduction in water-runoff peaks.

In this scientific scenario, the aim of the research is to develop a smart tool capable of quantifying the amount and type of reduced pollutants by newly installed green roofs, reducing, by anticipating the potential health benefits provided to the environment and population health. The final goal is to increase knowledge about the topic and possible strategies for programming, designing and increasing this type of green areas still uncommon in contemporary cities.

2 Methodology

The research work has been structured in three macro-phases:

1. preliminary phase: state-of-the-art definition, through comparison with a reference scientific bibliography;
2. proposal phase: calculation model's development, named Green SOAP (Green Solution for Outdoor Air Pollution);
3. implementation phase: application of Green SOAP in the "Città Studi" neighborhood, a case identified in the city of Milano.

In the preliminary phase, a classification of several typologies of green in metropolitan areas was done to investigate several studies and methodologies of data collecting. MIA Project (Mitigation of Air Pollution—2010) has been helpful to identify specific data regarding the absorption capacity of PM10 by some species, like shrubs and trees, capable of mitigating air pollution in urban and peri-urban environments. Project AirTrap Milan (2007) dealt specifically with experimental studies about the effect of vegetation on the particulate concentration. The research enables defining the PM10-absorption values of categories such as coniferous trees and evergreen or deciduous hardwood. Environmental experimentation conducted by

the Italian city of Forlì (2004) enabled defining the O₃ average absorption of various plant species. Finally, the GAIA project (2010–2013) aimed at seeking solutions to contrast climate change through the planting of new trees, and enabled recording specific data about the CO₂ absorption by several shrub species.

The comparison of these studies, in addition to scientific data coming from the literature analyzed, made possible the development of the calculation model named Green SOAP, which consists of a spreadsheet divided into four progressive sections:

1. Green versus Outdoor air pollution: this section enables the user to find out what green species are more suitable for a green roof, in relation to the building's topology and the pollutants' absorption capacity;
2. Outdoor air pollution and health: the section informs the user about the most common diseases caused by polluting agents that can be reduced through the construction of a green roof with certain tree species;
3. Healthcare-cost analysis: this section makes possible reviewing forecasted savings in health-care costs in relation to the assumed reduction of the occurrence of the already-listed specific diseases;
4. Project evaluation: this is the central design section of the calculation model, which enables estimation of the environmental benefits and health and economic effects of the green roof design (Salvo et al. 2017).

The calculation model Green SOAP provides: specific indications regarding the absorption capacity of the various plant species; design strategies and recommendations for designers with respect to green roofs; indications for optimizing the absorption of pollutants; estimation of the health benefits and health-cost savings for the reduction of hospitalizations; environmental-planning strategies for policy makers.

The tool has a “decision-making” approach, and it can be applied both in the case of the construction of new green roofs or the redevelopment of specific urban areas to identify the surface of flat roofs transformable into green ones.

2.1 Calculation Model Processing: Correlation Between Green Typologies and Their Capacities to Reduce Atmospheric Pollutants

The first section of the calculation model, “Green versus Pollution”, analyzes the main green species' characteristics and their pollutants-absorption capacity, compared to morphological and typological characteristics suitable to green roofs (Rosato et al. 2016). To support this section, the tool acquires the processed data taken from the scientific literature on various tree types of medium height (≤ 400 –500 cm), for greater adaptation to the reduced thickness of the soil necessary for their implantation.

This process enables analysis in detail of each green species (Table 2): coniferous, hardwood (evergreen and deciduous), shrubs (bushes/hedges and creepers), and green grass and sedums that are ideal for extensive green roofs.

In order to ensure the high accuracy to the calculation model Green SOAP, the existence of a relationship between the accumulation of pollutants and the ratio between the surface and volume of plants had been demonstrated. For each tree species has been defined the absorption coefficient in terms of g/year for PM and kg/year for CO₂ (Table 3).

From the comparison between the species, those characterized by a higher LAI (Leaf Area Index) and by an upper-leaf density have revealed a greater deposition to absorb particulates. Furthermore, the sessile or semi-sessile nature of leaves has an important role in the retention of dust because they can possess an adequately large surface for deposition. Finally, several studies show that, in plants with hairy leaves, the amount of accumulated PAHs (Polycyclic Aromatic Hydrocarbons) is higher than in plants with smooth leaves. Even the stomatal density is, potentially, a significant factor. Although its influence has not yet been experimentally verified (Bakker et al. 1999; Saebo et al. 2012).

2.2 Calculation Model Processing: Correlation Between Outdoor Air Pollution and the Population's Health Status

The “Outdoor air pollution and health” section analyzes and quantifies the data processed scientifically by several epidemiological surveys, which have demonstrated that each increment of air pollutants, in terms of $\eta\text{g}/\text{m}^3$, is associated with a specific percentage of increase of illnesses, especially respiratory and cardiac ones. It is widely recognized that fine particles (PM_{2.5}) are among the most harmful to health. An increase of $5 \text{ mg}/\text{m}^3$ corresponds, in fact, to a significantly increased risk of premature mortality, regardless of whether the measured values are below the limit of $25 \text{ mg}/\text{m}^3$ set by the European Community.

Hospitalizations for asthma (Brunekreef and Holgate 2002), chronic bronchitis (VV.AA. 1997), respiratory failure (Asl of Rome 2001–2005), and in the worst cases, lung cancer (VV.AA. 2013a) are specifically related to the increase in pollutants' concentration (PM₁₀, PM_{2.5} and O₃). Regarding the effects on the cardio-circulatory system, the main effects are an increase of hospitalizations for stroke, abnormal heart rhythms and other less-serious cardiovascular issues (Testi et al. 2009).

In addition, concerning the effects on the respiratory and circulatory systems, several researchers have demonstrated an increase in the relative risk for pregnant women due to prolonged exposure to high pollution concentrations: in fact, in cases

Table 2 Matrix of the main properties for the most typologies of common green roofs in Europe

Features	Vegetation type									
	Grassland	Sedum	Pasture	Perennial	Trees	Vegetable garden	Hedges and plants			
Substrate thickness (cm)	15-25	43,016	42,339	42,278	15-35	25-35	35-100			
Weight (kg/m ²)	220-400	120-160	160-300	120-300	220-550	300-550	450-1500			
Runoff coefficient	0.35-0.25	0.50-0.40	0.40-0.30	0.40-0.35	0.35-0.15	0.25-0.20	<0.20			
Maintenance	Medium-high	Medium-low	Low	Medium-low	Medium-low	High	Medium-high			
Water requirements	High	Low	Low	Low	Medium-low	High	High			
Usability	High	/	Low	Medium-low	Medium	Medium	High			
Thermal insulation	High	Low	Medium	Medium-low	High	High	High			
Main pollutants' reduction capacity	Medium	Low	Medium	Medium-low	Medium	Low	High			
Fertilization rate	High	Low	Low	Medium-low	Medium	Medium-high	High			

Table 3 Species' absorption coefficient

Lawn/sedum	
PM10 absorbed	5.28 g/m ² year
O ₃ absorbed	20.00 g/m ² year
CO ₂ absorbed	23.60 kg/m ² year
Shrubbery	
PM10 absorbed	20.17 g/year
O ₃ absorbed	10.00 g/year
CO ₂ absorbed	19.33 kg/year
Small trees	
PM10 absorbed coniferous	141.4 g/year
PM10 absorbed deciduous evergreen	48.5 g/year
PM10 absorbed deciduous	111.1 g/year
O ₃ absorbed	30.00 g/year
CO ₂ absorbed	24.67 kg/year

in which the mother is exposed to high concentrations of PM_{2.5} over the long term, there is the increased possibility of the birth of underweight babies (VV.AA 2013b). Finally, PM_{2.5} particularly affects children's health, as evidenced by a significant increase in asthma attacks equal to 60–70%. The calculation model also considers the percentage increase in mortality due to the increase in the pollutants concentration: for example, 7% increase of mortality for each increase in 10 µg/m³ PM₅ in the air (Steib et al. 2002).

This section also covers the effects on health arising from noise pollution, which could also be brought down through a correct positioning of green species on the roof, in order to create effective noise barriers. It was estimated that in OECD countries (Organization for Economic Cooperation and Development) more than 150 million people are exposed to high noise levels, i.e., more than 65 dB (A), the safety limit set by WHO (EEA 1995). The negative effects on the population's health status are: increased blood pressure, heart problems in general, hypertension and insomnia. If the noise pollution persists for a long time or if the body's defense capabilities are weakened, real psychosomatic diseases could emerge, such as disorders of the cardiovascular system by increased blood pressure and heart rate; problems of the gastrointestinal system, in which there is an increase of acid secretion of the stomach; diseases of the respiratory system such as increased respiratory rate and finally the central nervous system.

2.3 Calculation Model Processing: Economic Sustainability Analysis in Terms of Healthcare Costs Saved

The third section of the calculation model is named "Healthcare-cost analysis" and takes into consideration the sustainability of the healthcare system in relation to the

increase of specific diseases caused by rising concentrations of outdoor air pollutants. The calculation model compares the supposed decrease of illnesses, caused by pollutants specifically reduced by the newly installed green roofs, with the positive effects on the population's health in terms of cost savings by the National Health Service (NHS). In the specific case of Milan, it is possible to achieve a savings of up to 4% of total health spending on hospitalizations for circulatory diseases and up to 2% for respiratory health.

2.4 Calculation Model Processing: Analysis of the Characteristics of the Urban Area Being Investigated

In the "Project evaluation" section, several types of data about the urban context investigated are collected (Table 4).

The section illustrates the roof's type to be achieved by placing the green surfaces, hypothesized in three solutions (Fig. 1) that respond to various designers' needs:

1. extensive green roof, characterized by green areas with grass and sedum;
2. mixed type of green roof, characterized by surfaces of lawn and sedum, but with the addition of shrubs;
3. intensive green roof.

Table 4 Definition of the dimensional and air-quality data for the "project evaluation" section

Object	Description	Measure
Intervention area	Dimension of the surface of the intervention area	m ²
Volume	Dimension of the volume of the intervention area	m ³
Height of the Planetary Boundary Layer (PBL)	Data collected by specific meteorological characteristics	m
Concentration of PM10	Taken by local environmental protection agency	ηg/m ³
Concentration of PM2.5	Taken by local environmental protection agency	ηg/m ³
Concentration of O ₃	Taken by local environmental protection agency	ηg/m ³

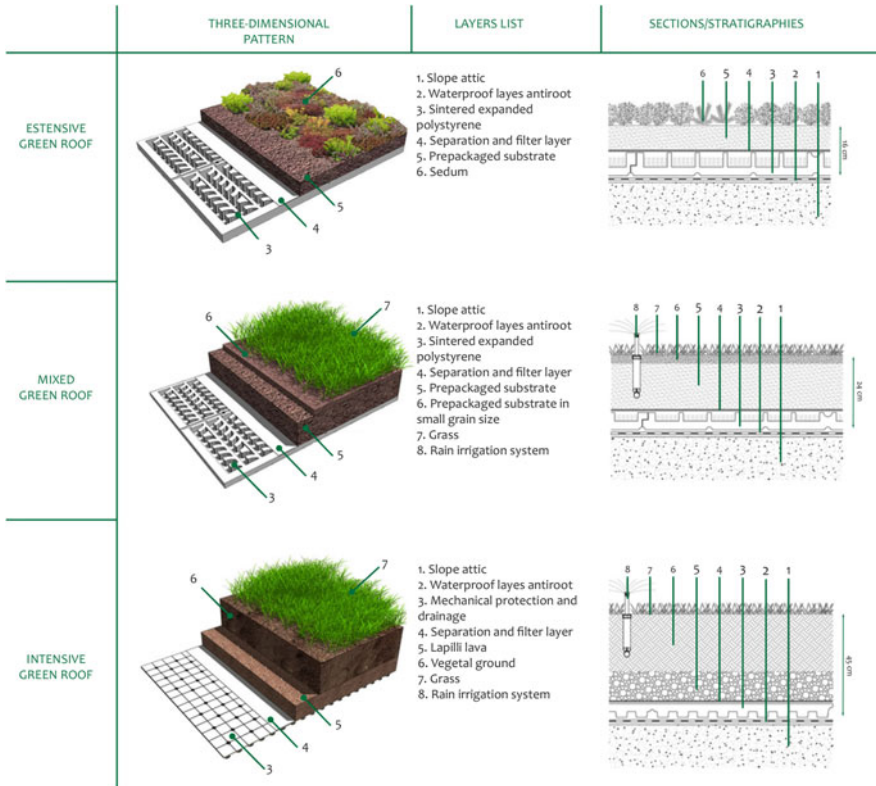


Fig. 1 Green roof’s typologies

3 Results

The first actual testing of the calculation model was conducted applying Green SOAP to “Città Studi”, the university neighborhood of Milano. First of all, the test considered the implementation of green surfaces, where possible, in the urban area taken into account.

After a general study of green surfaces and historical analyses of the buildings, the tool application required a parametric analysis and a classification of the roof types present in the area. The analysis defined several architectures without any structural morphology constraints that should be able to be transformed into green roofs of three types:

- flat roofs, with the introduction of practical intensive green roofs to exploit the potential of the coverage both, in terms of environmental and social points of view;

- semi-inclined roofs, with the introduction of semi-intensive green roofs, characterized by the installation of grass and sedum and small shrubs, with the possibility of limited access to users;
- pitched and/or curves roofs, with the introduction of non-practicable extensive green roofs.

From a first analysis of the results obtained (Table 5), it's possible to compare the investment costs for the realization of the new green surfaces planned and the increased amount of pollutants reduced each day. In addition, Green SOAP is capable of clarifying the benefits related to the population's health status and the estimated costs saved by the National Health System, concerning the reduction of hospitalizations for diseases caused by pollution (Capolongo et al. 2014a, b).

For PM10, a possible lowering has been estimated of the peak in November, below the threshold for the protection of human health of $40 \mu\text{g}/\text{m}^3$, even reducing cases that exceeded the limit of 77 times in one year (the limit established is not more than 35 times a year) (Fig. 2). In the case of PM2.5, a lowering of peaks is expected in March and December, below the threshold limit of $25 \mu\text{g}/\text{m}^3$, with an important reduction in violation cases (Fig. 3). In the case of O_3 , a possible lowering of the peak detected in July is expected, equal to $121 \mu\text{g}/\text{m}^3$, bringing it below the threshold for the safety of humans of $120 \mu\text{g}/\text{m}^3$ (Fig. 4). If the levels of reductions of pollutants were constant, the benefits for the population's health status will be relevant and investment costs to support tax incentives campaigns for the creation of new green roofs would be recovered in a short time, making the nature-based solution of green roofs a sustainable strategy.

These first results outputs may provide useful data to influence decision making in planning, due to the fact that the reduction of air-pollutants' concentration would bring significant benefits to the population's health status.

Table 5 Green SOAP general results

Realization costs	Extensive	Intensive	
	1,422,246.75 €	3,972,748.02 €	
Daily pollution absorbed	PM10	PM2.5	O_3
	$3.90 \mu\text{g}/\text{m}^3$	$2.92 \mu\text{g}/\text{m}^3$	$1.57 \mu\text{g}/\text{m}^3$
Benefits on the population health status			
Respiratory diseases	5.75%	Less per day	
Circulatory diseases	4.06%	Less per day	
Pediatric diseases	13.20%	Less per day	
infants' lower birth weight	96.80%	Less per day	
Mortality risk	1.26%	Less per day	
Healthcare cost savings	Ordinary regime	Day hospital	
	€/day 541,257.93	€/day 101,879.89	

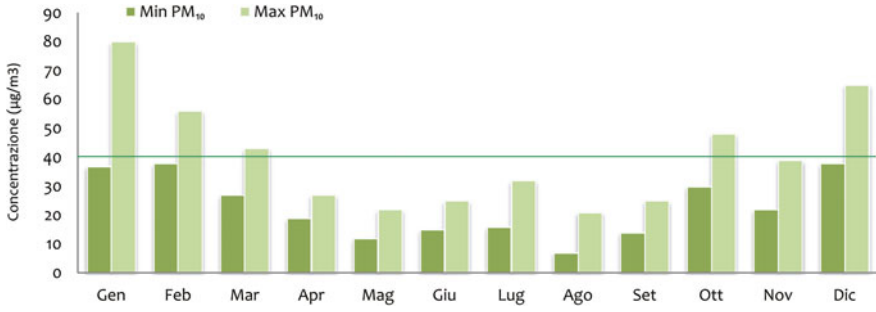


Fig. 2 Forecast reduction of PM10 due to the proposed intervention

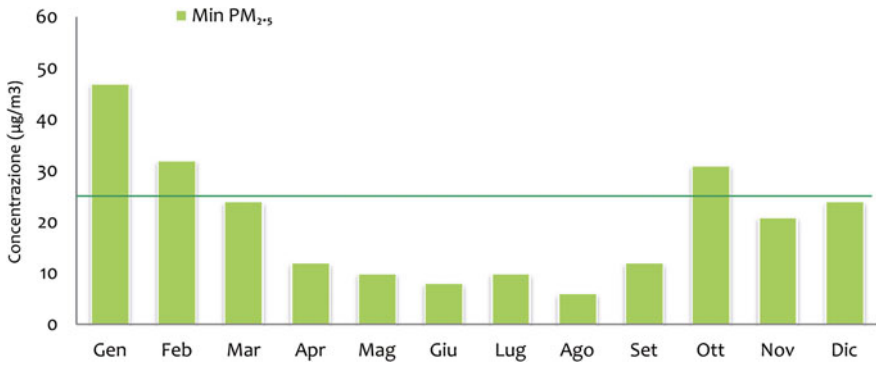


Fig. 3 Forecast reduction of PM2.5 due to the proposed intervention

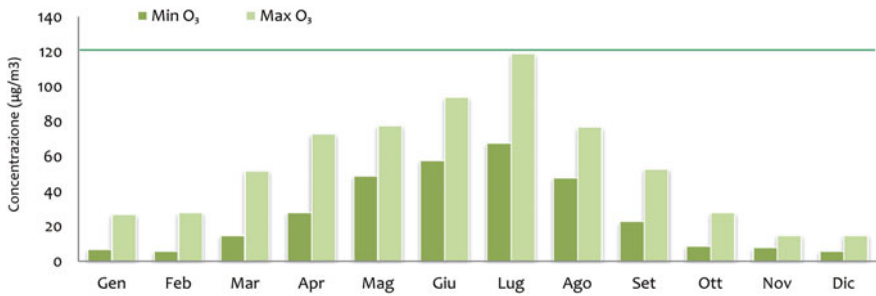


Fig. 4 Forecast reduction of O₃ due to the proposed intervention

4 Discussion and Conclusions

In conclusion, Green SOAP makes possible the evaluation of the psycho-physiological benefits and perception of the inhabitants, with correspondingly positive influences on the city's quality of life (Wolch et al. 2014; Van de Berg et al. 2010), while also considering the other co-benefits that such application could yield: in terms of environmental sustainability, green roofs result in reduced noise pollution, the absorption of electro-smog and the collection of fine particles (Capolongo et al. 2014b; Tzoulas et al. 2007). They are also a great strategy for reducing urban heat-island effects and for improving building energy efficiency, thus lowering pollution caused by heating and cooling systems. They can also mitigate storm water-runoff and, last but not least, attract pollinating species. The calculation model, which was created as an evaluation tool to support designers, is also important for policy makers and planners, in order to create neighborhoods that actively contribute to improvements in the population's health (Hartig et al. 2014; Capolongo et al. 2011) and to plan tax-incentive campaigns to force a positive trend onto society. Moreover, the transparency of the process underlines the efficiency of the tool and its possibility to be broadly applied (Oppio et al. 2016a, b).

The further development of research foresees future applications within the whole city of Milano and in several others national and international contexts, through the identification of case studies of public buildings, such as schools and healthcare facilities available to match the scope (Gascon et al. 2015). Coherent with the Pope's encyclical "Laudato si", more virtuous urban-regeneration experiences must be developed (D'Alessandro et al. 2017) because "Neighbourhoods, even those recently built, are congested, chaotic and lacking in sufficient green space" (§ 44). The presented research work, as the encyclical "Laudato si" emphasizes several times, highlights the need to introduce innovative approaches also capable of recognizing environmental, social and health values in urban-planning processes.

References

- Baccarelli A, Martinelli I, Pegoraro V, Melly S, Grillo P, Zanobetti A, Hou L, Bertazzi PA, Mannucci PM, Schwartz J (2009) Living near major traffic roads and risk of deep vein thrombosis. *Circulation* 119(24):3118–3124. <https://doi.org/10.1161/circulationaha.108.836163>
- Bakker DA, Berger RM, Witsenburg M, Bogers AJ (1999) Vascular rings: a rare cause of common respiratory symptoms. *Acta Paediatrica* 88(9):947–952
- Brunekreef B, Holgate ST (2002) Air pollution and health. *Lancet* 360(9341): 1233–1242
- Capolongo S, Battistella A, Buffoli M, Oppio A (2011) Healthy design for sustainable communities. *Ann Ig* 23(1):43–53
- Capolongo S, Bellini E, Nachiero D, Rebecchi A, Buffoli M (2014a) Soft qualities in healthcare Method and tools for soft qualities design in hospitals' built environments. *Ann Ig* 26(4):391–399. <https://doi.org/10.7416/ai.2014.1998>

- Capolongo S, Buffoli M, Oppio A, Petronio M (2014b) Sustainability and hygiene of building: future perspectives. *Epidemiol Prev* 38(6):46–50
- Capolongo S, Buffoli M, Oppio A (2015) How to assess the effects of urban plans on environment and health. *Territorio* 73:145–151
- Capolongo S, Gola M, di Noia M, Nickolova M, Nachiero D, Rebecchi A, Settimo G, Vittori G, Buffoli M (2016a) Social sustainability in healthcare facilities: a rating tool for analyzing and improving social aspects in environments of care. *Ann Ist Super Sanità* 52(1):15–23. https://doi.org/10.4415/ANN_16_01_06
- Capolongo S, Lemaire N, Oppio A, Buffoli M, Roue Le Gall A (2016b) Action planning for healthy cities: the role of multi-criteria analysis, developed in Italy and France, for assessing health performances in land-use plans and urban development projects. *Epidemiol Prev* 40(3–4):257–264. <https://doi.org/10.19191/EP16.3-4.P257.093>
- Coppola L, Ripamonti E, Cereda D, Gelmi G, Pirrone L, Rebecchi A (2016) 2015–2018 Regional prevention plan of lombardy (Northern Italy) and sedentary prevention: a cross-sectional strategy to develop evidence-based programmes. *Epidemiol Prev* 40(3–4):243–248. <https://doi.org/10.19191/EP16.3-4.P243.091>
- D'Alessandro D, Buffoli M, Capasso L, Fara GM, Rebecchi A, Capolongo S (2015) Green areas and public health: improving wellbeing and physical activity in the urban context. *Epidemiol Prev* 39(5):8–13
- D'Alessandro D, Appolloni L, Capasso L (2017) Public health and urban regeneration: a powerful alliance to be enhanced in Italy. *Ann Ig* 29(3) (in press)
- EEA (1995) Europe's environment—the Dobris assessment. European agency for the environment. <http://www.eea.europa.eu/publications/92-826-5409-5>. Accessed 08 Jan 2017
- Fehr R, Capolongo S (2016) Healing environment and urban health. *Epidemiol Prev* 40(3–4):151–152. <https://doi.org/10.19191/EP16.3-4.P151.080>
- Gascon M, Triguero-Mas M, Martinez D, Davdand JF, Plasencia A et al (2015) Mental health benefit of long-term exposure to residential green and blue spaces: a systematic review. *Int J Environ Res Public Health*. 12:4354–4379. <https://doi.org/10.3390/ijerph120404354>
- Grahn P, Stigsdotter U (2003) Landscape planning and stress. *Urb For Urb Green* 2(1):1–18
- Hartig T, Mitchell R, de Vries S, Frumkin H (2014) Nature and health. *Annu Rev Public Health* 35:207–228. <https://doi.org/10.1146/annurev-publhealth-032013-182443>
- IRCCS Foundation (2007) Progetto di Ricerca E.S.S.I.A. Effetti sulla salute degli inquinanti aerodispersi in Regione Lombardia. <http://www2.arpalombardia.it/qariafiles/varie/ESSIA.pdf> Accessed 08 Jan 2017
- Jo HK, McPherson EG (1995) Carbon storage and flux in urban residential greenspace. *J Environ Manag* 45:109–133
- Oppio A, Buffoli M, Dell'Ovo M, Capolongo S (2016a) Addressing decisions about new hospitals' siting: a multidimensional evaluation approach. *Ann Ist Super Sanità*. 52(1):78–87
- Oppio A, Bottero M, Giordano G, Arcidiacono A (2016b) A multi-methodological evaluation approach for assessing the impact of neighbourhood quality on public health. *Epidemiol Prev* 40(3–4):249–256
- Pugh TAM, MacKenzie AR, Wyatt JD, Hewitt CN (2012) Effectiveness of green infrastructure for improvement of air quality in urban street canyons. *Environ Sci Technol* 46:7692–7699. <https://doi.org/10.1021/es300826w>
- Rosato R, Valcovich E, Stival CA, Berto R, Cechet G (2016) Horizontal extensive green roofs in existing buildings. Part two-economic features. *Valori e Valutazioni* 16:3–24
- Saebo A, Popek R, Nawrot B, Hanslin HM, Gawronska H, Gawronski SW (2012) Plant species differences in particulate matter accumulation on leaf surfaces. *Sci Total Environ* 427:347–354. <https://doi.org/10.1016/j.scitotenv.2012.03.084>
- Salvo F, Piro P, Nigro G, De Ruggiero M (2017) Economic appraisal model of green roofs in residential buildings. *Valori e Valutazioni* 18:81–88
- Steib DM, Judek S, Burnett RT (2002) Meta-analysis of time-series studies of air pollution and mortality: effects of gases and particles and the influence of cause of death, age, and season. *J Air Waste Manag Assoc* 52(4):470–484

- Rebecchi A, Boati L, Oppio A, Buffoli M, Capolongo S (2016) Measuring the expected increase in cycling in the city of Milan and evaluating the positive effects on the population's health status: a community-based urban planning experience. *Ann Ig* 28:381–391. <https://doi.org/10.7416/ai.2016.2120>
- Rydin Y, Bleahu A, Davis M et al (2012) Shaping cities for health: complexity and the planning of urban environments in the 21st century. *Lancet* 379:2079–2108
- Romano-Spica V, Macini P, Galeone D, Liguori G, Signorelli C, Marensi L et al (2015) Adapted physical activity for the promotion of health and the prevention of multifactorial chronic diseases: the erice charter. *Ann Ig* 27(2):406–414. <https://doi.org/10.7416/ai.2015.2028>
- Talukder S, Capon A, Nath D, Kolb A, Jahan S, Boufford J (2015) Urban health in the post-2015 agenda. *Lancet* 385(9970):769. [https://doi.org/10.1016/S0140-6736\(15\)60428-7](https://doi.org/10.1016/S0140-6736(15)60428-7)
- Testi R, Rizzini P, Dal Negro RW, Mangiacavallo A, Viegi G (eds) (2009) *La salute del respiro. Fattori di rischio, epidemiologia, costi e impatto sociale delle malattie respiratorie nella realtà sanitaria italiana*. Franco Angeli, Milano
- Tzoulas K, Korpela K, Venn S, Yli-Pelkonen V, Kazmierczak A et al (2007) Promoting ecosystem and human health in urban areas using green infrastructure: a literature review. *Landsc Urb Plan* 81:167–178. <https://doi.org/10.1016/j.landurbplan.2007.02.001>
- Van de Berg AE, Maas J, Verheij RA, Groenwegen PP (2010) Green space as a buffer between stressful life events and health. *Soc Sci Med* 70:1203–1210. <https://doi.org/10.1016/j.socscimed.2010.01.002>
- Vittadini MR, Bolla D, Barp A (eds) (2015) *Spazi verdi da vivere. Il verde fa bene alla salute*. Il Prato, Saonara
- VV.AA (1997) Air pollution and daily admissions for chronic obstructive pulmonary disease in 6 European cities: results from the APHEA Project. *Eur Respir J* 10(5):1064–1071
- VV.AA (2013a) Air pollution and lung cancer incidence in 17 European cohorts: prospective analyses from the European study of cohorts for air pollution effects (ESCAPE). *Lancet Oncol* 14(9):813–22. [https://doi.org/10.1016/s1470-2045\(13\)70279-1](https://doi.org/10.1016/s1470-2045(13)70279-1)
- VV.AA (2013b) Ambient air pollution and low birthweight: a European cohort study (ESCAPE). *Lancet Respir Med* 1(9):695–704. [https://doi.org/10.1016/s2213-2600\(13\)70192-9](https://doi.org/10.1016/s2213-2600(13)70192-9)
- Wolch JR, Byrne J, Newell JP (2014) Urban green space, public health, and environmental justice: the challenge of making cities “just green enough”. *Landsc Urb Plan* 125:234–244. <https://doi.org/10.1016/j.landurbplan.2014.01.017>
- Zerbi G, Marchiol L (eds) (2013) *Il ruolo del verde urbano nella mitigazione dell'inquinamento atmosferico*. Forum, Udine

The Protection of Territory from the Perspective of the Intergenerational Equity



Maria Rosa Trovato and Salvatore Giuffrida

Abstract Natural disasters are some of the major causes of intra-generational disparities. Nevertheless, their more remote causes must be sought in the difficulty local and national communities experience implementing inter-temporal allocation policies. The consequent failures of the territorial policies trigger new inter/intra-generational disparities whose effects will eventually accumulate as causes of further entropy decay. The latter cannot be metabolized by the social system and remains an environmental trace. Due to pressing budget constraints, it is increasingly difficult to generalize proactive behaviors: this has an impact on the individual tendency towards temporal continuity, resulting in a further reduction of the resilience of urban territorial systems (cities and infrastructures) whose allocation policies are strongly imbalanced towards the present. The contribution focuses on the issue of intergenerational solidarity in the context of disaster prevention and management and therefore on the indicator of this solidarity, the social discount rate. Finally, it presents a summary of two case studies on floods and earthquakes.

Keywords Damage from disasters · Imputed expenditures · Social discount rate
Social capital · Proactive policies · Intergenerational solidarity · Flood
Earthquake

M. R. Trovato (✉) · S. Giuffrida
Department of Civil Engineering and Architecture, University of Catania,
Via S. Sofia, 64, 95123 Catania, Italy
e-mail: mtrovato@dica.unict.it

S. Giuffrida
e-mail: sgiuffrida@dica.unict.it

1 Introduction. Legacy Interrupted

Several issues of intergenerational justice are involved in natural disasters; in fact, even in such cases, individual security and access to minimum care depend on the socioeconomic status. But above all, the effects of the destruction of the territories involved are accumulating, becoming new causes of inequality and poverty.

The production and maintenance of social overhead capital is one of the main forms of the intergenerational allocation of social surplus, which is a fraction of the total social product (Lee and Jo 2011). Its various forms can be distinguished according to their inter-temporal profiles: the ratio between capital value and the income stream and the duration of capital capability to provide a steady income stream.

Even in the optimistic perspective of integral reconstruction, damage to real estate, infrastructure and business assets results in a net loss of value before and after the disaster.

Environmental fluctuation interrupts the cultural continuity of the tradition ensured by the natural inertia of capital, which we consider a “legacy” and is characterized by a certain degree of iconicity. When, due to the disaster, this iconicity is lost, the result is an “interrupted legacy”. This locution highlights the temporal dimension of the “*integrated* social overhead capital”—predominantly “*iconic*”, public or private—whose social value depends on its ability to reduce the distance between the various social strata, and thus to generate consensus.

Proactive policies are an effective tool against the “poverty trap” because of the positive effects on value added (employment, entrepreneurship, tax revenue) and the supply chain that new branches in the construction industry activate, especially in high unemployment-rate areas (Rizzo 1989).

In the field of environmental externalities (damage) assessment the evaluation science typically addresses some delicate issues of economic justice in the insurance estimates. Finance and insurance are the economic industries most involved in the issue of the legacy continuity; they act in synergy by performing opposite and complementary tasks.

2 Materials. Solidarity and the Damaged Territories

This paragraph focuses on two convergent items, the law supporting welfare, currently in force (for both reducing vulnerability and restoring the damaged territories) and some of the valuation paths we experienced concerning two different kinds of calamities, earthquake and flood.

The former concerns the fairness of the public funding for post-calamity reconstruction, as well as the equalization tools that can be implemented in order to reduce urban and land vulnerability. In such cases, both *intra-* and *intergenerational* solidarity are involved: the first one concerns the complementarity of individual and

collective wealth (rich/poor state, poor/rich country); the second one concerns the complementarity of prevention (before) and intervention (after calamity). The latter concerns the case of the Messina district flood in October 2009 and two earthquake cases, in the fields of both prevention (the formation and implementation of the Emergency Limit Condition—ELC) and intervention (the formation and implementation of the Reconstruction Plans in one of the small old towns in Abruzzo).

Solidarity and welfare. The combination of the variety of the Italian geographical and geographical-climatic characteristics, the state and the evolution of the infrastructure system and communications, the geography of employment and training opportunities, the system of identity values and human relations, and the structure of real estate and land ownership give rise to a specific localization pattern. The latter instead takes little account of the risk (seismic, hydrogeological etc.), generating forms of social disparity that emerge whenever a calamity occurs. The generalized lack of disaster training, the vulnerability of territories and cities too quickly modified, and the indefinitely long reconstruction periods accumulate, multiplying the effects of the disasters and generating “states of permanent destruction” with long-term or definitive effects on the affected communities. The complexity of the reconstruction process, due to the need of transparency and efficiency of the public expense, weakens the spirit of “city-less citizenries”.

Italy stands out from many other European countries in regards to solidarity. Here the damage from disaster is covered by insurance companies whose policies—often mandatory—include this type of damage (Gaita 2016). Art. 2 of the D.L. (Decree Law) 59/2012—reforming of the Civil Protection Department (CPD)—provided for: the voluntary insurance coverage of damage from disasters; the related incentives and land mapping measures; the estimation of the stakeholders; the estimation of the effectiveness of public intervention; and the simulation of the insurance premiums per type of coverage to be successively defined by a special regulation. This article was entirely repealed in the Conversion Law (100/2012) and never restored. The emergency is funded by the “Fund for national emergency” (Law 119/2013), determined by the Stability Law. Due to the evident convenience of the proactive policies, the CPD action has been extended to include the strategies of risk mitigation.

Finally, while proving the importance of public-spending efficiency, the recent calamities in central Italy highlighted in some cases the permanent conflict between efficiency and effectiveness and between economy and fairness.

Two case studies. These reflections help define the sense of some valuation experiences in (1) earthquake, (1.a) prevention, (1.b) reconstruction and (2) flood damage assessment, all of them involving the intergenerational dialectic.

1.a *Earthquake proactive policies:* the Emergency Limit Condition (ELC) enables the urban area to continue to carry out its main functions after the seism, preserving accessibility and the connection with the surrounding territory. It supposes the works concerning the nearby buildings, in order to reduce their own vulnerability

and to increase the resilience of the urban area. The extension of the urban area included in the ELC is defined by combining need, opportunity and economy.

Referring to the case study of Fossa (AQ), one of the 57 municipalities included in the seismic crater in Abruzzo (Italy), a detailed study has been carried out about the status of the whole urban fabric before the seism (Carocci et al. 2015).

On these grounds, the vulnerability of the façade of each building has been calculated (Giuffrida et al. 2015a). To reduce these vulnerabilities, a range of interventions (from the light one to the heavy one) has been defined by means of an algorithm associating to each façade unit (potentially collapsing) some set of corrective measures each of them corresponding to a specific degree of safety (ranging from 60 to 100%). The costs of each bundle of works have been calculated, based on the elementary unit costs listed in the bill of quantities for public works by the Abruzzo Region. Therefore, 25 strategies for intervention have been sorted by combining the five safety degrees with five degrees of intervention, necessity or opportunity; the lowest/highest degree strategy supposes very light/heavy degree interventions aimed at the minimum/maximum safety degree. The overall building cost ranges from 1.3 to 11.0 million euro. This amount can be considered as an “intensive cost”, in theory to extend the ELC to the whole old town area and establish ranges of the intensity of the intervention. A further simulation concerns programming. The given budget can be allocated basing on the relevance of each building for the ELC by considering their location and vulnerability. Therefore, all buildings have been ranked by relevance, and a new bi-parametric function has been drawn up, connecting the total cost (depending variable) to the ELC extension and safety.

Figure 1 shows: (a) the mono and bi-parametric cost functions; (b) the trade-off between degree of safety and opportunity, the cost-revenue comparison and the map of the intervention sorted by urgency.

1.b *Post-seism reconstruction.* The Reconstruction Plan (RP) of Fossa (Andreani and Carocci 2013), completed in October 2012, includes the Technical-Economic Framework (TEF) for estimating the reconstruction total cost, based on parametric unit costs (Carbonara et al. 2015) depending on the degree of damage and other conditions established by several Orders of the Special Commissioner for the Reconstruction and Decrees of the Prime Minister (ib.). Figure 2 compares the results of Fossa and Villa Sant’Angelo TEF. Some further reflections concern the different historical-architectural values (Giuffrida et al. 2017) and the post-seism status of the two urban centers (Fossa values are higher) and the concern about the impact of the reconstruction on the immaterial and incommensurable values.

2. *Flood-damage assessment.* The flood in the hills and coastal areas of the urban centers located alongside the torrents of the Ionic seaside of the Province of Messina (Italy), which occurred on October 1, 2009, is another typical case of low intergenerational solidarity. This was caused by insufficient management of the territory, over-exploitation of the hydro-geologic foundations, and underrating of the possible consequences of the increasing tampering of the delicate balance

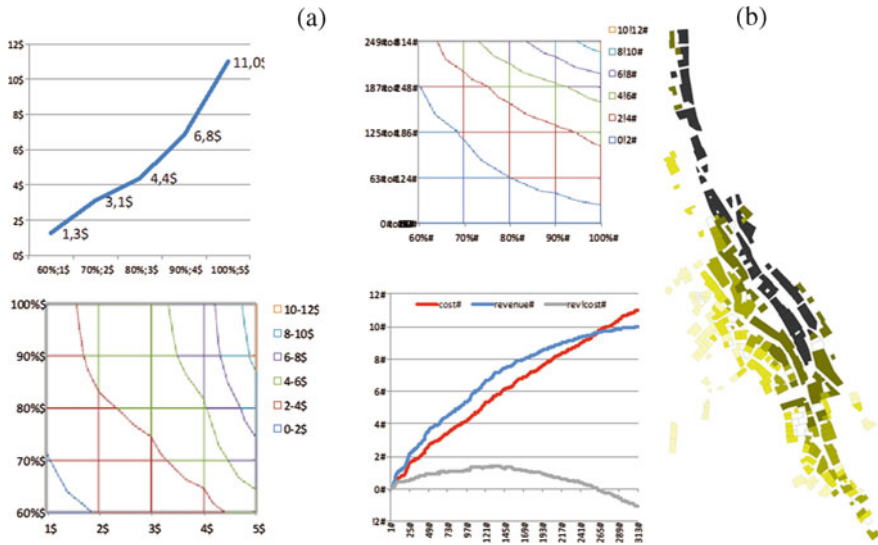


Fig. 1 Results of the analysis, valuation and programming of the ELC

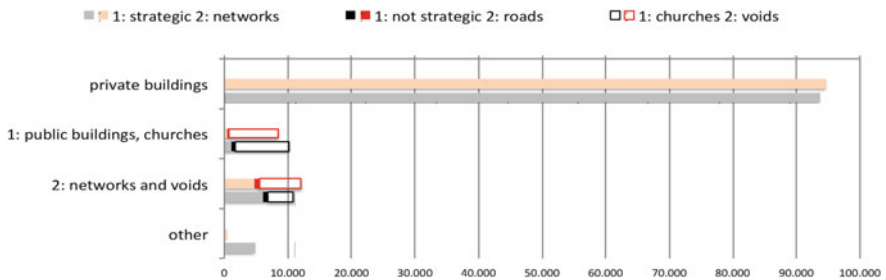


Fig. 2 Expenditure of the RP of Fossa (up) and Villa Sant'Angelo (down) (thousands euros)

between bearing capacity of the natural systems, probability of exceptional events, and urbanizations. Based on the Sicilian region's Hydrogeological Arrangement Plan, we carried out the economic evaluation of the damage (Giuffrida et al. 2015b) according to the method of *imputed preferences*. The model is based on the account of the public expense stream in a defined span (21 y) and imputes the total amount to the portion of the territory involved, based on its landscape and environmental value. The results enabled us to perceive the gap between the commitments of the competent authority to the protection of the territory and the amount of the rehabilitation cost. The imputed value of the territory involved was calculated by summing up the items of expenditure coming from the balance sheets of the regional departments committed to the environment protection: presidency, agriculture and forests, balance and finance and territory and environment.

Table 1 shows the calculation of the “imputation index” by comparing the value of the involved basin (n. 102) to the same type of values in the whole regional territory from some relevant perspectives: extension, length of the hydrographical network, land uses, presence of Communitarian Interest Sites and Special Protection Areas. The imputation index is 0.0095; therefore the expense stream is about 0.1% of the public expense total amount.

3 Intergenerational Fairness. Methods and Approaches for Calculating the Social Discount Rate

The choice of the discount rate has sustainability and inter-temporal efficiency implications for the intergenerational fairness.

Assuming r as an appropriate discount rate, a future amount V_t related to a generic time t can be discounted as: $V_0 = V_t e^{-rt}$, where V_0 is the present value. In the more general case of a stream over a time horizon T , the present value is: $V_0 = \int_{t=0}^T e^{-rt} V(t) dt$.

The present value is strongly influenced by the discount rate, so that:

- the greater r , the smaller the present value of a future amount;
- a near zero r makes also future amounts appreciable;
- a zero r definitely ignores the time lapse, making directly comparable also the amounts related to very different points in times.

Hence, if we assume the discount factor as the weight of a future amount, the discount factor of a present amount is 1. This highlights the strategic importance of r in any evaluation process involving spans, as well as in the land-transformation processes involving issues of social fairness.

Furthermore, the longer is T , the more V_t is sensitive to changes in r , and the more the perception of the inter-temporal dialectic within T changes.

Typically, in the field of monetary estimates of public investment, the social discount rate is lower than the financial interest rates commonly used in private valuations. Among the various approaches considered in the literature, two main methods can be considered as most relevant for public choices (Pearce and Ulph 1999); Fugitt and Wilcox 1999; Young 2002):

1. the Social Rate Time Preference method (SRTP);
2. the Social Opportunity Cost method (SOC).

The SRTP is the rate at which society is willing to exchange the present consumption for the future one (Pearce and Ulph 1999; Fugitt and Wilcox 1999; Young 2002; Kohyama 2006).

The SOC method assumes that public investment “crowds out” the private one, so that the social return needs to be at least equal to the marginal, private alternative option (Fugitt and Wilcox 1999; Pearce and Ulph 1999).

Table 1 Sample of calculation of the imputation indexes for each sicilian hydrological basin

Id	Denominazione bacino	Superficie bacino mq	Sviluppo reticolo idrog ml	Quota superficie (%)	Quota sviluppo (%)	Merito uso suolo	Merito SIC	Merito ZPS	Quota imputata (%)
1	Area tra Capo Peloro a T.te Saponara	85,264,758	108,990	0.34	0.38	0.49	0.65	0.65	1.20
2	T.te Saponara	31,299,203	40,967	0.12	0.14	0.49	0.54	0.54	0.39
3	Area tra T.te Saponara e F.ra Niceto	34,783,244	27,995	0.14	0.10	0.45			0.09
4	F.ra Niceto	81,725,113	87,520	0.32	0.31	0.50	0.36	0.13	0.42
5	T.te Muto (Gualtieri)	40,202,768	44,044	0.16	0.16	0.49	0.17		0.13
6	T.te Corriolo(Floripotema), Area tra T.te Corriolo e T.te Muto	65,379,636	42,093	0.26	0.15	0.43	0.03		0.16
102	Area tra T.te Fiumedimisi e Capo Peloro	174,508,907	157,020	0.69	0.55	0.45	0.03	0.19	0.95
100%									

The wide-ranging debate about the best method for choosing the social discount rate consolidated the evaluation process based on the SRTP, mostly due to some criticalities of the SOC:

1. private investment mostly concerns the credit market, so that it is not definitely true that public investments “crowd out” the private ones (Arrow et al. 1995);
2. the SOC can be hardly deduced from the market-return rates without making the necessary adjustment of financial rates (typically including the risk premium) and the rates of inflation and taxation, as well (Morrison 1998);
3. the social structure of preferences for well-being returns produced by public goods is different from the financial markets one;
4. the SOC method does not take into account the inter-temporal preference.

Due to the increasing pressure of the environmental issue, the scientific community has proposed new approaches to the appropriate social discount rate and econometric algorithms, capturing and displaying the inter-temporal and intergenerational dialectics of the values of public goods and services, according to the evolution of the sustainability pattern (Trovato and Giuffrida 2014; Naselli et al. 2014).

The social discount rate—Ramsey’s formula. About the SRTP, welfare economics proposes the well-known method based on the formula of Ramsey (1928) intended to optimize the inter-temporal choice by maximizing an objective function:

$$U_0 = \int_{t=0}^T e^{-\rho t} U[C(t)] dt$$

where: U_0 is the present utility; $e^{-\rho t}$ is the exponential function of the discount rate of inter-temporal preference; $U[C(t)]$ is the utility at time t at the level of consumption $C(t)$, i.e., the average per capita consumption at the time t ; T is a time horizon overcoming the generations, at least unlimited, thus the most suitable to intergenerational solidarity; ρ is the inter-temporal pure preference rate at which individuals discount utility (impatience rate).

The rate of inter-temporal pure preference ρ measures the importance the society attaches to the utility (or welfare) of the current generation compared to the utility (or welfare) of future generations. It is the rate at which to discount the well-being of future generations just because they are in the future, and, as such, it is often defined as “inter-temporal rate of discrimination”. The ethical significance of ρ allows us to identify the intergenerational equity and the intertemporal efficiency. According to Pigou (1948), Pearce et al. (2003) and Rizzo (2006), the present generation consumptions are preferred, equated or not preferred to the future generation ones, if $\rho > 0$, $\rho = 0$ or $\rho < 0$.

The “Ramsey equation after F. Ramsey”, and beyond. Ramsey (1928) proposed a modified expression (“Ramsey equation” after F. Ramsey) of the SRTP,

based on the constant elasticity of the utility function with respect to the consumption and aversion to risk factors:

$$SRTP = \rho + \theta \cdot g_C(t)$$

where: $\theta = [dU(X)/U(X)]/[dX/X]$ is the elasticity of the marginal utility of consumption, which expresses the aversion of individuals to incur fluctuations of consumption (income); $g_C(t)$ is the expected growth rate per capita of consumption.

SRTP is generally assumed greater than zero because at least one of its components $[\rho, \theta, g_C(t)]$ is positive (Pearce et al. 2003; Oxera 2002).

In this approach, real-income growth is however expected over time, so that the greater value of SRTP corresponds to an optimistic perspective in economy and welfare, and above all, the decrease of the marginal-utility function is assumed, so that both present and future generations will prefer present consumption (Pearce et al. 2003; Stern et al. 2006).

This approach, mostly individualistic and hedonistic, needs to be reformed to take into account the structural growing of global inequity.

From this perspective, the dichotomy descriptive/prescriptive approach can be recalled:

1. according to a *descriptive* or *positive* approach, SRTP is assumed to be a financial market rate of return, so that the combination of ρ and θ depends on SRTP;
2. according to the *prescriptive* or *normative* approach, ρ and θ are chosen based on ethical issues, so that, in a defined span, the SRTP depends on $g_C(t)$; for this reason, the normative approach is defined “ethical”.

A further contribution in the direction of intergenerational solidarity comes from Pearce and Ulph (1999), suggesting to attenuate ρ by taking into account the increase in life expectancy l : $SRTP = (\rho - l) + \theta \cdot g_C(t)$. The approach is, however, descriptive inasmuch as it considers $\rho > l$.

Overcoming the deterministic approach. Some of the methods overcoming the exponential discounting approach, like Gamma discounting, hyperbolic discounting and decreasing discount rate, aim at pointing out the limitation of the deterministic approach. In the inter-generational solidarity perspective, the social discount rate needs to decrease to:

- reconcile the growth expectations of welfare with the principle of prudence that is justified by the uncertainty due to the long time distance of some events, the discount rate, the future growth and life expectancy, when the time horizon is too long;
- balance for the best the principle of intergenerational equity;
- take into account some evidence about individuals’ choices.

These approaches take into account the uncertainty about the future size of the discount rate (Newell and Pizer 2003; Weitzman 1998, 2010; Hepburn and Groom

2007), and the future of the economy in general (stability and income growth) (Gollier 1999; Rochet and Gollier 1998; Gollier 2002, 2010).

Risk-based models. Gollier (2008) proposed a declining discount rate to take into account uncertainty about the growth rate $g_C(t)$ and the dynamics of precautionary savings related to individual risk aversion, according to the prudence principle.

In particular, in the absence of recession expectations, the relative risk-aversion index tends to decrease over time when income increases; the decrease of the risk index aversion, consequently, reduces the social discount rate.

These factors are relevant in case of large investments that can affect the consumption dynamics, such as those related to significant environmental damage.

Fisher and Krutilla (1984) showed that the individual willingness to pay (WTP) for certain public goods and services, such as the environmental ones, tends to grow over time as a result of economic development. This phenomenon can motivate the adoption of a declining social discount rate.

In presence of consumption externalities, Weitzman (1994) highlighted the need to assume the social discount rate is lower than the market rate, as society should distinguish the marginal return on investments in consumption and investments in environmental protection. Then, a socially efficient rate would be declining over time when the environmental costs increase, income grows and environmental resources are considered luxury goods.

In this regard Weitzman (2001, 2010) proposes the *Gamma discounting approach* supposing the *rate uncertainty* to be referred to a definite equivalent rate that is calculated as the probabilistic average of the expected rates r_j .

The traditional approach based on a single social discount rate, implicitly calculates this rate as a direct probabilistic weighted average of rates, $\sum r_j \cdot \rho_j$, using as weights the probability of occurrence ρ_j ($\sum \rho_j = 1$) associated with each of them.

More properly, the average rate can be derived indirectly, by calculating, at first, an average probabilistic weighted-discount factor.

If uncertainty about the rate is defined based on the choice among n discount rates r_j , ($j = 1, 2, \dots, n$), then the discount factor at time t is:

$$a_j(t) = e^{-\int_0^t r_j(s) ds}$$

It follows that the definite equivalent discount factor is:

$$A(t) = \sum_j \rho_j \cdot e^{-\int_0^t r_j(s) ds}$$

The definite equivalent discount rate at a given time t is (Groom et al. 2005):

$$r(t) = -\frac{1}{t} \ln[A(t)]$$

Accordingly, therefore, to increase the time horizon T and equal r_j to ρ_j , it is possible to adopt an equivalent, definite declining rate converging to the value of the lowest expected rate ($r_j \min$).

At the operational level, this approach enables us to balance the needs of various generations, using low rates for effects far in the future, and market-related rates for the effects nearest in time.

Empirical models. A series of psychological studies have been carried out to connect the discount function to the individual choice pattern as an alternative to the exponential functional form $e^{-\rho \cdot t}$. Such approaches (Nesticò et al. 2015) synthesize experimental evidence and investigate the validity of ρ as a unique value.

These studies have shown that the behavior of individuals seems to be driven by discounting transactions of future events based on higher rates in the short term, gradually declining as the time horizon extends, with a trend of the discount factor that is more flexible (almost hyperbolic) than the exponential one. Among the methods included in this approach, hyperbolic discounting can be recalled.

Whereas, in the case of an exponential function, the weight d_t ascribed to the amounts included in the same period is constant and equal to the factor $e^{-\rho \cdot t}$, in the case of hyperbolic function, such a weight declines with respect to t :

$$d_t = \frac{1}{(1 + kt)^{\frac{h}{k}}}$$

where:

- h expresses the individual's perception over time, so: if $h = 0$, then the perception of time is infinitely fast, the discount factor is 1 and the discount rate is 0, and that means considering all future values at the same time; if $h = \infty$, then the perception of time slows down to a halt, the discount factor tends to 0 and the discount rate tends to infinity; that means to not perceive future amounts that are infinitely distant in time and to consider only the present amounts;
- k expresses the deviation of the hyperbolic function from the exponential function; they tend to equalize when k tends to 0.

This methodology is more dynamic and realistic, since it considers the individual perceptions of the time dimension of investments and allows for greater flexibility in the sizing of the discount rate.

4 Discussion

4.1 Approaches to the Social Discount Rate

Each of the approaches to the social discount rate outlined above shows a different sensitivity to time solidarity, intergenerational ethics and sustainability. Furthermore, it should be remarked that, despite the significant scientific efforts, the values of the social discount rate used in the euro area are different as well. The choice of the social discount rate is entrusted to the discretion of each country, is conditioned by the level of wealth, and levels of environmental sensitivity and intergenerational ethics (Gollier 2002).

The European Commission currently recommends the use of a social discount rate obtained as a benchmark of financial rates observed in Member States: 5.5% in the cohesion countries and 3.5% in the more advanced ones (European Commission 2008, 2014). Furthermore, EC acknowledges the use of various rates that can be justified according to specific socioeconomic conditions.

In particular, the United Kingdom legislation has accepted the use of discrete (“step”) declining discount rates (HM Treasury 2003, 2008). The level of intergenerational ethics of the processes implemented by the current generations and thus the approaches to the social discount rate in support of the corresponding evaluations cannot be arbitrary or optional. In fact, “We can no longer speak of sustainable development apart from intergenerational solidarity”, which can’t be considered “not optional, but rather a basic question of justice, since the world we have received also belongs to those who will follow us” (Papa Francesco 2015, V 159).

The above-mentioned models imply the perspective of a generalized economic growth of the countries, but the economic crisis which started in 2008 has seen a decrease of about 10% in Italian GDP (Lopes 2016), resulting in an increase of the poverty rate. This weakens the assumption that economic growth is a continuous function (Ackerman and Heinzerling 2002), which the methodologies of SRPT are based on. The likely perspectives of disasters, wars and climate changes that characterize the present generation encourage a different vision, broader than the merely utilitarian one (Ackerman 2008). Although the “declining rate approaches”—inspired by the principle of prudence—attenuate the effect of time on inter-temporal solidarity, they however accept the substantive difference between future and present value.

Now, can the value of an environmental asset be different between generations? Can the existence of a current or future generation be guaranteed even in the absence or change of availability of a specific environmental resource?

Perhaps it’s more appropriate to focus on the value that an environmental resource has for the present generations and it should have for the future ones.

Although the notion of “common good” itself (Papa Francesco 2015, IV §156; 158) concerns intra-generational ethics, involving the *space* dimension, in reality it strongly implies inter-generational ethics, involving the *time* dimension.

The discount rate issue emphasizes the complementarity between time and space solidarity; nonetheless, policy and political economics should be committed to turning this *complementarity* into *convergence* (Rizzo 1994), overcoming the trade-off constraint, which methodological individualism is based on (Sen 1987).

The common good is the main conceptual reference of human ecology; the convergence of space and time dimensions is the basis of integrated ecology IV (§ 137; 162) assuming sustainability as the ethical outcome and a precondition for life in our own planet.

As a consequence, the intergenerational redistribution shouldn't affect the entire present generation, but just the part where the planet wealth is mostly concentrated. Therefore, rather than erase the discount approach: (a) the notion of weight associated to the discount factor encourages the prescriptive approaches; and (b) the possibility to modify the discount rate overtime mainly ascribes this economic category to the solidarity issues instead of the financial market mechanisms.

These two conditions outline a sort of "super-prescriptive value-based" approach to the commons' assessments, enveloping time and space redistribution issues, and considering present and future as phases of the same process involving the same subjects and objects.

The values of the integrated ecological system, based on ethical considerations, cannot be subject to fluctuation; at most, since the future is characterized by uncertainty and risk, in order to guarantee the convergence of ecological and socioeconomic systems, it is necessary to consider these factors with the determination of a single SRTP, at least (less than) 0, according to the value that the good/resource has for any generation, and that is at any stage of the life of that system.

4.2 *Operational Issues; Economies and Diseconomies of Time*

The comparison of the up-front cost for prevention and the deferred cost for reconstruction in the cited case studies, is just a simplification of the wider issue we can call "economies and diseconomies of time". In fact, prevention and reconstruction costs can be compared if social discount rate, probability of disaster (e) and time horizon (T) are defined. Otherwise, if e is assumed to be 1, r and T can define the bi-parametric profile of the Net Present Value (NPV).

1. Earthquake. An illustrative calculation of the value of the proactive policy was carried out by comparing the current prevention costs (11 million euro) to the future reconstruction savings (about 85 million euro). Assuming scenarios about the range of r and T , the corresponding trade-off between them is defined (Fig. 3).

2. Flood. The comparison between 0 and 3% discount rate streams (Fig. 4, left) shows the difference between the hypotheses of full ($V_{0(r=0\%,T021y)} = 126.5$ M euro) and moderate ($V_{0(3\%,T021y)} = 95.75$ M euro) intergenerational solidarity ($T = 21y$).

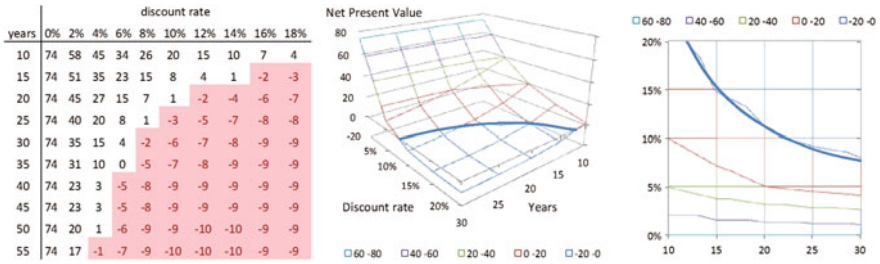


Fig. 3 Trend of NPV (M euros) and trade-off between discount rate r and time horizon T . The thicker curves describe the two values for $NPV = 0$

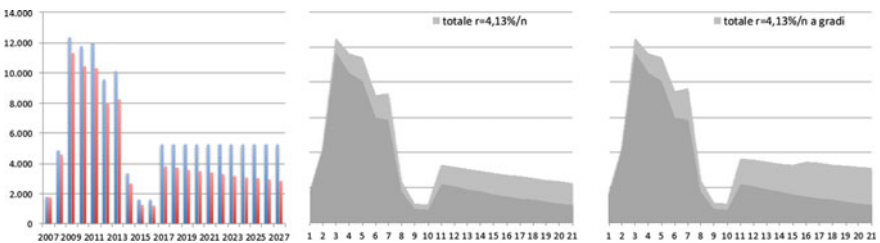


Fig. 4 Public-spending stream and comparison between non-discounted and discounted streams

Applying the main methodologies for the discount rate calculation: $NPV_{\bar{r}}$ (constant discounted rate) is 63.3 M euro; NPV_{r_h} (hyperbolic decline) is 84.0 M euro; NPV_{r_s} (decline by step) is 91.5 M euro.

Summarizing, the difference between the imputed expenditure and the estimated cost for the restoration measures the gap between the public commitment and the pressure of the environment on territory. This pressure increases with decreasing attention by local communities and investments in prevention.

5 Conclusions

The contribution focuses on the issue of intergenerational justice in disaster management, investigating the approaches to the social discount rate in literature, and the role that the discount rate can play as an indicator of intergenerational solidarity from the perspective of the encyclical “Laudato si” by Papa Francesco.

The analysis of these methodologies highlighted: the discretion of the various countries in the choice of the social discount rate, related to the local level of wealth and a various graduations of the environmental sensitivity; the prospect of greater wealth of the future generations; the partial absence of factors of uncertainty and risk, whose effects are as significant as the period of time considered is longer; the introduction of declining—and, however, different—rates to evaluate the same

investment project as acceptance of a prescriptive approach; the issue of the real possibility of the same discount operation in the context of an approach to “human ecology” and “integrated ecology”, in which the value of a good/resource transcends time and space, and which is foundational to implement that principle of sustainability that is a precondition for life on our planet.

This analysis encourages to assume a “value-based super prescriptive” approach to the evaluation of common goods for all generations, where value is the guiding principle of the same intergenerational ethics.

Within such an approach, the values of the integrated ecological system cannot be affected by negative fluctuations reducing the resilience of the social-ecological system, and they must be considered invariants for all generations, at least as a minimum threshold value.

S RTP in the context of this approach is inferable from the value that the social-environmental resource has for any generation, and it is helpful to introduce the uncertainty and risk associated with the modification of this value at any stage of the life of that integrated ecological system.

In the two proposed case studies, basing on detailed estimates and appraisals carried out according to the imputed preferences appraisals approach, and by using different hypotheses about the social discount rate, we respectively compared: the prevention and reconstruction programs of Fossa (AQ), one of the ancient urban centers of the seismic crater in the Abruzzo region; the social value of the land-environmental heritage of the hydraulic basin of Messina and the repair cost for the 2009 flood-damaged areas: in both cases we tried to highlight the *asynchrony* between facts, values and policies.

Acknowledgements Maria Rosa Trovato edited paragraphs 3 and 4.1; Salvatore Giuffrida edited paragraphs 1, 2 and 4.2; both the authors edited paragraph 5.

References

- Ackerman F (2008) Critique of cost-benefit analysis, and alternative approaches to decision making. A report to friends of the Earth England, Wales and Northern Ireland
- Ackerman F, Heinzerling L (2002) Pricing the priceless. Cost-benefit analysis of environmental protection, Georgetown Environmental Law and Policy Institute Georgetown University
- Andreani F, Carocci CF (2013) Urban fabric, construction types and the art of city-building. Approaches and methods for postearthquake reconstruction plans. *IJPP Ital J Plann Pract III* (1):69–89. ISSN: 2239-267X
- Arrow K, Bolin B, Costanza R, Dasgupta P, Folke C, Holling CS, Jansson BO, Levin S, Maler KG, Perrings C, Pimentel D (1995) Economic growth, carrying capacity, and the environment. *Science* 268:520–521
- Carbonara S, Cerasa D, Sclocco T, Spacone E (2015) A preliminary estimate of the rebuilding costs for the towns of the Abruzzo Region affected by the April 2009 earthquake: an alternate approach to current legislative procedures. In: Gervasi O, et al (eds) *ICCSA 2015, Part III, LNCS 9157*, pp 269–283. https://doi.org/10.1007/978-3-319-21470-2_19

- Carocci C, Giuffrida, S, Scudero A (2015) Post-earthquake restoration in Abruzzo. Planning, programming and management of reconstruction in the Municipalities of Villa Sant'Angelo and Fossa (AQ). In: Castellini A, Devenuto L (eds) *Il danno. Elementi giuridici, urbanistici e economico-estimativi*. Proceedings of the XLIV Meeting Ce.S.E.T. Bologna, 27–28 November 2014, pp 227–259. ISBN 978-88-99459-21-5
- European Union (2008) *Guide to cost benefit analysis of investment project*
- European Union (2014) *Guide to cost benefit analysis of investment project*
- Fisher AC, Krutilla V (1984) Resources conservation environmental preservation and the rate of discount. *Q J Econ* 88:2
- Fuguitt D, Wilcox SJ (1999) *Cost-benefit analysis for public sector decision maker*. Greenwood Publishing Group, Westport
- Gaita L (2016) *Terremoto Centro Italia, Chi paga i danni da calamità. E perché è così poco diffusa l'assicurazione. Il Fatto Quotidiano/Economia*, 27 August
- Giuffrida S, Ferluga G, Ventura V (2015a) Planning seismic damage prevention in the old towns value and evaluation matters. In: Gervasi O, et al (eds) *ICCSA 2015, Part III, LNCS 9157*, pp 253–268. https://doi.org/10.1007/978-3-319-21470-2_18
- Giuffrida S, Trovato MR, Ferluga G (2015b) Economic valuation of the environmental damage in the flooded area of Messina's territory. In: Castellini A, Devenuto L (eds) *Il danno. Elementi giuridici, urbanistici e economico-estimativi*. Proceedings of the XLIV Meeting Ce.S.E.T. Bologna, 27–28 Nov 2014, pp 129–170. ISBN 978-88-99459-21-5
- Giuffrida S, Ventura V, Trovato MR, Napoli G (2017) Axiology of the historical city and the cap rate. The case of the old town of Ragusa Superiore. *Valori e Valutazioni*, 18/2017: 41–45
- Gollier C (1999) Time horizon and discount rate. Mimeo, Université de Toulouse
- Gollier C (2002) Discounting an uncertain future. *J Public Econ* 85(2):149–166
- Gollier C (2008) Discounting with fat-tailed economic growth. *J Risk Uncertainty* 37:171–186
- Gollier C (2010) Ecological discounting. *J Econ Theory* 145(2):812–829
- Groom B, Hepburn C, Kondouri P, Pearce D (2005) Declining discount rates: the short and the long of it. *Environ Resour Econ* 32(4):445–493
- Hepburn C, Groom B (2007) Gamma discounting and expected net future values. *J Environ Econ Manage* 53(1):99–109
- HM Treasury (2003) *The green book. Appraisal and evaluation in Central Government*, London
- HM Treasury (2008) *Intergenerational wealth transfer and social discounting: supplementary green book guidance* (red. da Lowe J.), London
- Kohyama H (2006) *Selecting discount rates for Budgetary Purpose*. Brief paper on Federal Budget Policy, Harvard Law School
- Lee F, Jo TJ (2011) Social surplus approach and heterodox economics. *J Econ Issues* 45(4): 857–876
- Lopes V (2016) *Perché dal 2008 il Pil dell'Italia ha perso il 10%*, Sole 24 Ore, 4 marzo 2016
- Morrison ER (1998) Judicial review of discount rates used in regulatory cost-benefit analysis. *Univ Chicago Law Rev* 65:1333
- Naselli F, Trovato MR, Castello G (2014) An evaluation model for the actions in supporting of the environmental and landscaping rehabilitation of the Pasquasia's site mining (EN). In: Murgante B, et al (eds) *LNCS, 8581*. Springer, Switzerland, pp 26–41
- Nesticò A, De Mare G, Conte A (2015) *Approcci teorici ed empirici nella stima del saggio sociale di sconto. La formula di Ramsey per un valore nazionale aggiornato*, Valori e valutazioni, 14, DEI, Roma
- Newell RG, Pizer WA (2003) Discounting the distant future: how much do uncertain rates increase valuations? *J Environ Econ Manage* 46(1):52–71
- Oxera A (2002) *A social time preference rate for use in long-term discounting*. The office of the Deputy Prime Minister, Department for transport and Department for the Environment, food and rural affairs, London
- Papa Francesco (2015) *Laudato si'*. Enciclica sulla cura della casa comune. San Paolo, Milano

- Pearce DW, Ulph D (1999) A social discount rate for The United Kingdom. In: Pearce DW (ed) *Environmental economics: essays in ecological economics and sustainable development*. Edward Elgar, Cheltenham, pp 268–285
- Pearce DW, Groom B, Hepburn C, Koundoury P (2003) Valuing the future. *Recent advances in social discounting*. *World Econ* 4(2):121–141
- Pigou AC (1948) *Economia del benessere*, U.T.E.T. Torino
- Ramsey FP (1928) A mathematical theory of saving. *Econ J* 38(152):543–559
- Rizzo F (1989) *Economia del patrimonio architettonico-ambientale*. FrancoAngeli, Milano
- Rizzo F (1994) Conservazione e valutazione del patrimonio architettonico-ambientale nelle aree urbane a rischio sismico. *Genio Rurale*, 11/94
- Rizzo F (2006) *La dinamica dei capitali*. FrancoAngeli, Milano, pp 240–243
- Rochet JC, Gollier C (1998) *Discounting an Uncertain Future*. Université de Toulouse, Mimeo
- Sen AK (1987) *On ethics and economics*. Blackwell, Oxford
- Stern N, Peters S, Bakhshi V, Bowen A, Cameron C, Catovsky S, Crane D, Cruickshank S, Dietz S, Edmonson N, Garbett SL, Hamid L, Hoffman G, Ingram D, Jones B, Patmore N, Radcliffe H, Sathiyarajah R, Stock M, Taylor C, Vernon T, Wanjie H, Zenghelis D (2006) *Stern review: the economic of climate change*. HM Treasury, London
- Trovato MR, Giuffrida S (2014) The choice problem of the urban performances to support the Pachino's redevelopment plan. *Int J Bus Intell Data Min* 9(4):330–355. <https://doi.org/10.1504/ijbidm.2014.068458>
- Weitzman ML (1994) On the environmental discount rate. *J Environ Econ Manage* 26(2):200–209
- Weitzman ML (1998) Why the far distance future should be discounted at its lowest possible rate. *J Environ Econ Manage* 36(3):201–208
- Weitzman ML (2001) Gamma discounting. *Am Econ Rev* 91(1):260–271
- Weitzman ML (2010) Risk-adjusted gamma discounting. *J Environ Econ Manage* 60(1):1–13
- Young L (2002) *Determining the discount rate for Government Projects*, New Zealand Treasury Working Group, 0/2/21

Generational Equity in Italian Urban-Planning: Urban Standards



Claudia de Biase and Salvatore Losco

Abstract The paper recounts the evolution of Italian urban planning, starting from 1150/42 Act, which was restricted to the technical procedures to plan local public facilities. In order to achieve the above aim, three milestones are considered: the National Planning Act, the 765/67 Act and the Territorial Government Acts, approved by regions after the 3/2001 Constitutional Act. How does one measure the local public facilities in the General Municipal Plan (GMP)? Is the diversity of different needs of the various populations groups considered? The GMP views the population demand as a *unicum*, ignoring almost completely age, gender, religion and social differences. The local public facilities, also called *Urban Standards*, have been sized and allotted based on a hypothetical demand in the various Homogeneous Territorial Zones (HTZs). Is this a further limitation of rational-comprehensive urban planning? By a critical interpretation of the regional acts, approved after the year 2000, arise various different interpretations of Urban Standards: These range from the perspective of solely quantification to quality indicators needed to respond to the new land demand, expressed by a changed (socio-economic) morphology of the communities, defined over the past two decades. Could the performance standards make a contribution to solving the problem of the various population in anthropized territories? The paper will try to make a contribution, after a description of the current state of the art, to the disciplinary discussion.

Attributions: This paper has been written by both authors, with it being possible to divide it as follows: *Planning standards: from 1150/1942 Act to 2000* (Salvatore Losco), *Planning standards in regional Acts over the last seventeen years* (Claudia de Biase), *Abstract and Towards new standards* (both authors).

C. de Biase (✉)

Polytechnics and Basic Sciences School, Architecture and Industrial Design Department,
University of Campania Luigi Vanvitelli, Aversa (Ce), Italy
e-mail: claudia.debiase@unicampania.it

S. Losco

Polytechnics and Basic Sciences School, Engineering Department,
University of Campania Luigi Vanvitelli, Aversa (Ce), Italy
e-mail: salvatore.losco@unicampania.it

Keywords Environment · Rational-comprehensive planning · Urban standards
Performance standards

1 Planning Standards: From the 1150/1942 Act to 2000

1150/42 Act (National Planning Act-NPA) introduced neither the HTZs¹ nor the Standards; only the 7 Article (contents of the GMP) defines the public-use spaces and the areas of public interest, in general. These regulation have not been implemented yet: the areas designated by the GMP for public spaces remain marginal. In 1966, a series of catastrophic episodes highlighted how the absence of an effective territorial government induces unacceptable disasters: Vajont (9 October 1963), Agrigento (19 July 1966) and Florence and Venice (4 November 1966). Waiting for an Act reform, the 765/67 Act changes the NPA, introducing some improvements and new factors in planning instruments, especially the Urban Standards and the HTZs. In the 1960s, the process of changing the NPA had already started. The first act was 167/62 Act, which made the Popular and Economic Housing Plan to the Implementation Plan² equal. A few years later, in 1967, following social pressures, Act 765/67 was enacted. This Act, also acknowledging the contribution of the scientific community, modernized the NPA, adapting the Act to the ICMA' (International Congress of Modern Architecture) requests to the Athens Charter of 1933.

¹The HTZs, introduced by art. 2 of 1444/68 ID, are parts of the territory covered by urban areas that are of historical, artistic or of particular environmental value, or portions thereof, including the surrounding areas, which may be considered an integral part, for these characteristics the clusters themselves (HTZ A); the parts of the territory totally or partially built-up, different from the zone A: are considered partially built-up areas in which the covered surface of existing buildings is not less than 12.5% (one-eighth) of the surface of the land area and in which the site density is greater than 1.5 cm/m² (HTZ B); the parts of the territory totally or partially built-up, different from the zone A: are considered partially built-up areas in which the covered surface of existing buildings is not less than 12.5% (one-eighth) of the surface of the land area and in which the site density is greater than 1.5 cm/m² (HTZ C); parts of the territory intended for industrial plants or assimilated (HTZ D); parts of the land intended for agricultural use, excluding those in which— notwithstanding the agricultural character of the same—the division of property requires settlements to be considered as zone C) (HTZ E); parts of the territory allocated to equipment and facilities of general interest (HTZ F).

²The NPA provides three levels of planning instruments: Regional and/or Provincial, Municipal and sub-municipal plan; the hierarchy is referred to as the territorial dimension. At the first level, we find Territorial Plans, at the second Municipal Plans and at the third level Implementations Plans. The contents of these levels refers to specific areas of the city. There was only one instrument provided by the NPA called *Piano Particolareggiato di Esecuzione* that had the aim to realize the contents of the urban municipal plan only by the municipal authority. Since 1942 this level has been modified by adding, according to the various emerging needs, in 1962 the *Piano per l'Edilizia Economica e Popolare*, introduced because of the needs of poor people and in 1978 the *Piano di Recupero* because of the need to revitalize historical city centers and degraded areas.

Some taxonomic clarifications are useful to properly frame the issue of Urban Standards and, in particular:

- The distinction between *services, facilities* and *infrastructures*: the first include all of the elements that serve to provide a particular service (staff, management regulations, funding); the latter are the physical structures in which the services take place; while the last are the physical structures necessary to transmit traffic flows, energy, water, and information, also defined as technical urbanization;
- The distinction between *primary and secondary urbanization*—urbanization is the set of physical facilities (equipment and infrastructure) necessary to make a site urbanizable according to a model of life and urban activities and are divided into primary and secondary; the first form the preconditions for the urbanisation: basically the infrastructure and the working of the ground (also called technical-urbanization); the latter are essentially the facilities: schools, markets, clinics, sports fields, churches etc. (also known as social urbanization);
- The difference between *public/private* and *collective/individual*—public is what is owned by the public administration or is entrusted to its management; private is what is owned by private individuals or is entrusted to their management; and collective (or shared), i.e., designed, managed and organized in relation to use by a group of citizens; individual is what refers to a use by the individual or family.

The debate dealt with a wide range of themes including housing, services for children and the young, networks for services, coordination of time and space, as well as the city as a whole and urbanism. The changes introduced by 765/67 Act contribute to a better definition—or more control, some might say—of the contents of the GMP. The Act defines both the technical planning of zoning, through the division of the territory into HTZs and the Standards, distinguished in local and general interest. The first, also called Urban Standards, are designed as a tool/guide for the correct delimitation of HTZs, through the checking of the existing and project equipment, in the individual HTZ from which was detached the municipal territory resulting from the application of zoning.

The Urban Standard is a minimum quantity, considered as the obligatory level of provision and as a minimum quantitative threshold below which the regulatory provisions cannot be considered satisfied.³ The word *standard*, which originally had the meaning of the flag and derives from the sign of recognition of the riders, is still used today in English to indicate something known, not questionable, and which can be used as an element of comparison in numerous fields of technology and science. The characteristic of the standard, to be tied to a benefit, to a reached and experienced working level, is evident in numerous disciplines, in which the term is used with this meaning.⁴

³Iasm, *Manuale delle opere di urbanizzazione*, F. Angeli, Milano, 1983.

⁴L. Falco, *Gli standard urbanistici*, Edizioni delle autonomie, Roma, 1978, p. 23.

The 1444/68 Interministerial Decree-ID prescribes Standards for two types of equipment:

- standards of *local interest or Urban Standards*, that is, as having to be directly accessible by users along walking paths or at least reachable in a short period of time (no more than 20–25 min);
- standards of *general or territorial interest* that, by their nature or required functional size, must be located in relation to wider catchment areas.

For the *facilities of local interest, or neighborhood, or urban standards*, the decree stipulates that every citizen is entitled to a minimum of 18 m²/inhab of public space, as follows: 4.5 m²/inhab (for kindergartens, nursery and compulsory schools); 2 m²/inhab for equipment of public interest (cultural, welfare, administrative, religious, social, health); 2.5 m²/inhab for public car parks; and 9 m²/inhab for the green, recreation and sport.

For the *general level facilities* (HTZ F), the decree establishes the need for a further allocation of 15 m² of territorial parks, 1 m² for hospital facilities and 1.5 m² for higher education, which then refers to local cases and the decisions of the planning tools in relation to the amounts of services that require space.

Local facilities are quantitatively regulated (m²/inhabitant for HTZ A, B, C and E, m²/gross floor area of commercial buildings and industrial shall not be less than 10% of the total area for the HTZ D) with the imposition of the same parameters throughout the national territory, regardless of varying local characteristics.⁵ The rigidity of certain plans determined by the new legislative provisions has been the subject of strong criticism, some justified, others instrumental. It is certainly arguable that the choice of the legislature to prescribe identical land-use decisions to diverse settings, population size,⁶ socioeconomic status and settlement density. However, instrumental in the long run, has been the criticism of those who, by appealing to the excessive rigidity, tended to weaken any regulation of land uses. The 765/67 Act has also been accused of lacking respect for the Constitution. However, on this front, it should be noted, first, that in 1967 the transfer of legislative power for urban planning to the regions had yet to be started, while, on the other hand, it was not possible to predict exact timing.⁷ Due to widespread uncertainty, the legislature could not merely dictate general principles, but had to issue a law that was actually feasible. Finally, it had a negative impact on the assessment of the restrictive reading of the zoning Act, interpreted, in most cases, as a mere instrument of representation and division of the territory, often

⁵See art. 4, 1444/68 ID, the decree implementing 765/67 Act.

⁶Only in HTZ C possessions of a municipality whose population does not exceed 10,000 inhabitants, the minimum amount of space required is 12 m², of which 4 m² are reserved for school equipment. The same provision applies to residential settlements in municipalities with a population of more than 10,000 inhabitants, when new settlements for which the building-to-land ratio does not exceed 1 mc/m².

⁷The transfer began in 1972 with the Presidential Decree 8 and ended in 1977 with the Presidential Decree 616.

predominantly mono-functional while zoning *in the will of the legislator—is—essentially one monitoring the implementation of the (Urban) standard tool*,⁸ it has become the central element of the plans, with the result that it has gradually developed ... *consolidating an urban design concept based on the rigid mono-functionality of the various parties and on the denial of the complex character typical and specific of the urban organism*.⁹ In this sense, though, what ... *must be criticize[-d is] the superficiality of its application in the majority of professional practice*,¹⁰ more than the definition of the text Act. The rest cannot be neglected since, while the areas selected to be Urban Standards acquired the legal form of the preordained constraint expropriation, with the sword of Damocles of the five-year decay and the calculation of a monetary compensation too,¹¹ the forecasts in HTZ, anti-symmetrically, conformed indefinitely, until the approval of a new GMP, the property right, without the need for any kind of payment and/or compensation.

As noted by Stella Richter, *the introduction of the obligatory principle than the predetermined (Urban) standards represented—as is obvious—an event of great civilizations, but the not short time that as passed has highlighted the serious institute limits that are still waiting to be overcome*,¹² generalized homogenization to minimum quantities, up to the lack of any attention to the performance problem.

It was believed that the 1444/68 ID, whose design is a direct descendant of the modern movement in architecture, could provide the solution for the needs of society through a purely quantitative answer, which, of course, did not prevent associating performance criteria with predetermined amounts.¹³ Experience shows, however, that when an Act does not impose good behavior, it is difficult that it will be activated. It is no coincidence that the outcome of the application of the ID in the Plans of the time had the exclusive tendency to quantify the necessary facilities. Moreover, the qualitative performance, whether allowed or possible, was particularly costly and complex, both from a procedural point of view and, perhaps above all, on a political level. The non-application of an action not required by the Act cannot therefore be exclusively attributable to an operational deficiency. It should also include the frequent lack of implementation of the provisions of the plan that has a disruptive effect on the restricted areas for the realization of the local public facilities or urban standards. These provisions, after five years from the approval of the GMP instruments, as constraints of planning or destination or functional, pre-ordained to expropriation, decay, thus creating the so-called white areas, or those parts of the territory devoid of planning instruments that they should be reclassified as partial variants of the planning instrument, under penalty of compensation to

⁸E. Salzano, *Fondamenti di Urbanistica*, Editori Laterza, Roma-Bari 2005, pg. 140 and following.

⁹*Ibidem*.

¹⁰*Ibidem*.

¹¹Judgment of Italian Constitutional Court n. 55, 29-5-1968.

¹²P. Stella Richter, *op. cit.*, 2002, pg. 56 e sgg.

¹³<http://www.eddyburg.it/article/articleview/1765/0/43/>.

private owners of the areas involved.¹⁴ The design effort required by the Act was therefore ignored: almost always, the random localization of facilities was carried out, which just as often was not followed the implementation of interventions. In conclusion, it can be said that the responsibility of applying the so-called failure of the 765/67 Act should be evenly divided between the limits of the regulatory text, the limits of the administrative capacity of the local authorities and the limits of the professional competence of the technicians who drew up the plans. To synthesize, the strengths of the standards can be summarized as follows: for the first time, the right of citizens to benefit from a certain amount of public space was stated and for the first time it was determined that some urban areas were to be assigned to common functions. The limitations in the practical application can be summarized in the bureaucratic interpretation of homogeneous areas, a lack of attention to the quality of equipment and a lack of attention to public-space systems. The new Regional Acts since the 2000s have sought to correct these shortcomings.

2 Planning Standards in Regional Acts Over the Past 17 Years

Even if urban standards have tried to guarantee—through mandatory localization in every HTZ—a fair treatment for all the subjects, their rigidity has been broadly criticized.¹⁵ As a matter of fact, fairness related to urban standards stands for a general approach that, as such,—does not refer to the local specificity. Urban standards, by definition, should regulate the various local areas¹⁶ without making differences between areas. Act fairness can be read as a fair distribution of services in various areas: it can be seen as a spatial fairness—in terms of quantitative aspects—readable as accessibility that does not stand for real fairness.¹⁷ Also, Orioli wrote that national standards have ... *determined an excessive homogenization of planning instruments where instead territorial differences should allow for planning that is*

¹⁴The Constitutional Court with the ruling 12–20 May 1999, n. 179 (in the Official Gazette first S. S. 05/26/1999, n. 21) declared the *unconstitutionality* of the provisions of Articles. 7, numbers 2, 3 and 4, and 40 of Act 17 August 1942, n. 1150 and 2, first paragraph, of the 19 November 1968 n. 1187 Act (Amendments and additions to the Planning Act 17 August 1942, n. 1150), insofar as it allows the Administration to reiterate expired planning constraints, preordained expropriation or which involve the building ban, without providing compensation. Art. 38, 16/2004 Regional Act amended.

¹⁵L. Ricci (2009) (edited by), *Piano locale. Nuove regole, nuovi strumenti, nuovi meccanismi attuativi*, Franco Angeli/Urbanistica, Milano, p. 232.

¹⁶*Ibidem*, p. 236.

¹⁷R. Albano, E. Confinenza, G. Confinenza (2009) *Territori di ricerca. Ricerche del territorio. Atti dell'8° Convegno nazionale rete interdottorato in pianificazione urbana e territoriale*, Alinea Firenze, pg. 202.

closer to local needs and reality.¹⁸ In fact, there were numerous regional Acts that posed the problem of the regulation of new forms of Standards. The effort made by Italian regions, since the 1990s, and consisting of moving urban standards from the quantitative to the performance-related basis, only deals with environmental aspects.

The *Marche* region, for example, sought the ability to return to a *new* executive instrument (Services Implementation Plan—SIP), the list of areas to be allocated to urban standards, as well as imposing in detail procedures for sizing. In particular, the region considers an additional standard for green areas in new residential zones (at least 3 m²/inhab). This exceeds what is established in the 1444/1968 ID and does not include the athletic equipment. In this case, the standard is still quantitative even if green areas are defined differently.

In the *Emilia Romagna* region, the significant innovation was the presence of two categories of standards, *territorial facilities* (art. A22) and the *ecological and environmental facilities* (art. A25). Both combine to ensure the *total* quality of the territory. The territorial allocations recall the wording of the 1444/68 ID, enriching it with the introduction of urbanization (art. A23) and, above all, with the inclusion of the necessary performance characteristics (art. A6). The ecological facilities, however, provide integrated interventions aimed at mitigating the environmental impacts of the projects and actions (Articles. A6 and A25). In this vein, it was necessary to introduce a SIP. Through this instrument, the Emilia Region does not deny NPA but overcomes the quantitative aspect since it establishes also some aspects linked to functionality, accessibility and usability. The same stands for ecological and environmental aspects were meant as areas that can improve the environmental quality and reduce negative aspects.¹⁹ The SIP is a whole instrument (both qualitative and quantitative) of new urban standards.

Since 1995, the *Tuscany* region has tried to introduce performance-related standards. The 1/2005 Act confirms the *Structure Plan* and Elementary Organic Territorial Units-EOTU (art. 92) which substantially changed the traditional content, while leaving the wording relating to national planning standards unchanged. The 1/2005 Act adds the cycling mobility (art. 95) as an adjunctive standard to the traditional equipment. The *Structure Plan* identifies *quantity, with reference to the EOTU, systems and sub-systems to be observed in the urban-planning regulation, as well as the relative performance levels to be ensured in the progressive implementation of the territorial development strategy.*²⁰ The Implementation Regulations²¹ of the Tuscany Regional Act fully recalled the 1444/68 ID and transferred to the *Urban Regulation* the opportunity to establish the quantity and

¹⁸V. Orioli, *op. cit.*, 2004, pg. 74 e sgg.

¹⁹M. M. Sani, *Dallo standard quantitativo allo standard qualitativo, nel quadro della nuova legislazione urbanistica della Regione Emilia Romagna*, readable at http://cst.provincia.bologna.it/ptcp/_eventi/sabati_urb/061104/PdS%20MO.pdf.

²⁰C. Perrone, G. Gorelli (2012) (a cura di), *Governo del consumo di territorio. Metodi, strategie, criteri*, Firenze, University press, p. 65.

²¹Regional Decree n. 3/R del 9/2/2007.

quality standards.²² *Even the location and sizing of individual building provisions are entrusted exclusively to the Urban Regulation, which the Structure Plan reserves as a plurality of area-planning options, coherent and compatible with the statutory and strategic content of the Plan.*²³

In 2014, the Region with 65 Act modified the Law that had been enacted in 2005. The EOTU and the traditional standards are confirmed but new standards able to improve the quality of establishments (art. 62) that have been introduced. The Act adds some green areas, pedestrian itinerary, commercial zones and equipment for selective waste. Quality, instead, is linked to specific performances (first, in reference to resilience, climatic changes, usability and safety, and, second, in reference to collective spaces and public works).

In the *Calabria* region, the classification of the area no longer takes place using the HTZs but, as in other regions, in the urbanized area, *in areas zoned for urbanization, agriculture and forestry*. For each type, dimensioning of the standards alongside the identification of ... *natural and anthropized resources with their problems*²⁴ and the division into areas, urban and suburban ... *for each of which they are established ... even the qualitative and quantitative requirements and the related parameters.*²⁵ In the art. 53, paragraph 2, the Act establishes how to measure the quality of standards: *The quality standards, in particular, are expressed by defining: (a) the amount and type of such facilities; (b) the performance characteristics, in terms of accessibility, the full usability and security for all citizens of all ages and conditions, the balanced and rational distribution in the territory, functionality and technological adequacy, simplicity and cost management.* This is the only one region which provides a specific measure for the quality of standard.

The *Umbria* region with 11/2005 Act for the GMP acted to amend and supplement for what the 31/97 Act provided for the same scale of intervention. The *regulations on territorial government: municipal urban planning* confirmed the GMP as a planning tool, but assign the purpose of the *realization of sustainable local development [and] mode for the valorisation of the environment and landscape*. The innovations in the system of the equipment are explicated in the wording that requires the *structural part* of the identification of the ... *existing functional and infrastructure settlement elements as well as the design elements which together make up the minimum urban structure* (art. 3, c. 3), the configuration of the system of the main urban and regional activities and functions as well as the definition of possible scenarios of qualitative-quantitative development.²⁶ The *operational part*, in turn, has the task of identifying and regulating ... *interventions related to conservation, valorisation and transformation actions of the territory,*

²²art. 4 e 5, c. 4, Regional Decree 3/R 9/2/2007.

²³art. 8, Regional Decree 3/R 9/2/2007.

²⁴art. 20, c. 3, 19/2002 Regional Act.

²⁵art. 20, c. 3, letter g, 19/2002 Regional Act.

²⁶art. 2, c. 1, letter a and letter i, 31/97 Regional Act.

considered strategic in the structural part, in compliance with quality and quantitative scenarios defined by the latter and specific attention to the social, economic, environmental and morphological and functional interventions.²⁷ In particular, the operational part is the legal support of the structural one, motivates the feasibility of the provisions and integrates the structural part, in the cases expressly provided for by this.²⁸ The innovative content of the second phase of the GMP that, unlike the structural part, does not provide for the subdivision into three systems, are also obviously related to the environmental components²⁹ of services³⁰ and mobility.³¹ Nevertheless, the Act, while adjusting the parameters, indices and compensatory discipline (art. 30), omits planning standards³² that are sent to the *municipal plan of services—MPS*.³³ In 2010, when the regional regulations were enacted (25 March, n. 7), the contents of MPS were determined, and the performance-related criteria were defined (art. 8). In particular, there is a special focus on the regional ecological network (comma 1, letter d).

In the *Liguria* region, the GMP regulates the topsoil and subsoil, protects the physical and cultural integrity of the territory, valorizing the environmental resources and local economies, favoring the governing of the territory in its various components. To fulfill these functions, the instrument consists of four acts: the *foundational description*, the *document of the objectives*, the *structure of the plan* and the *regulatory compliance and congruence*.³⁴ The *structure* also addresses the problem of urban standards, proposing a solution to the perennial problem of how

²⁷art. 2, 11/2005 Regional Act.

²⁸art. 4, 11/2005 Regional Act.

²⁹art. 4, 11/2005 Regional Act: *the GMP, the operational part, finally, can be defined, for agricultural areas and only for the purposes of direct intervention, the minimum unit of intervention, the plane-volumetric configuration, the urban-type settlement building, the uses prevalent and compatible, areas for territorial and minimum functional facilities and public infrastructure, and not the works of urban furniture; if not proceeding with this mode of operation, the definitions of the GMP operating part have only indicative value.*

³⁰art. 4, c. 1, letter (f), 11/2005 Regional Act: *The size and capacity of the settlement areas for new settlements is planned in time with the GMP, operational part, and by drafting subsequent variants, also in relation to the service plan that assesses the feasibility in relation to the facilities of the technological networks, the infrastructures of mobility and territorial and environmental risks.*

³¹*The size of the rewarding of development rights is contained within limits such that the overall development rights do not entail a territorial capacity utilization rate greater than 1.5 m/m including existing volumes. In the face of public interests to be pursued in terms of higher allocations quantitative equipment and public spaces, or in terms of improvement of environmental quality, are eligible any reward increments of development rights that exceed the aforesaid limits, which may be exercised also outside the scope concerned, in the areas concerned and sold by the common priority among those acquired by it pursuant to paragraph 5: art. 4, c. 1, letter (e), 11/2005 Regional Act.*

³²*The reference to the standards and the density was, however, explicitly in the 31/97 Regional Act to Articles. 16, 26 and 34.*

³³art. 5, 11/2005 Regional Act.

³⁴art. 24, 36/97 Regional Act.

to calculate the share of private facilities present in a territory: The 36/97 Act, art. 32 establishes that those private facilities, ... *of which is regulated the public enjoyment [contribute]* ... in no more than 50%, the determination of the amount of areas for public services ...³⁵ In 2015, (LR 11), revising the previous law, local equipment that municipalities had to determine in order to qualitative rather than quantitative aims were defined. As a matter of fact, the new Act includes new categories of standards, such as public housing, pedestrian itineraries, beaches and so on (art. 39). The same Act introduces new standards such as educational centers and public offices for research and technological innovation (art. 39). It is important to underline that the new Act fixes some parameters able to define the size of services in relation to the area of Liguria region. In this way, the so-called standardized approach established by ID 1444/68 is over.

The Regional Act on the Governing of *Lombardy*, 12/2005, confirmed and reorganized *the trend already started by the previous regional 23/97, 1/2000 and 1/2001 Acts, aimed at the simplification and liberalization of construction projects on the territory. It is divided into two parts, one devoted to planning and the other to land management.*³⁶ The regional council subsequently approved the document on the implementation criteria,³⁷ governing, in particular, the ways for municipal planning, which contains guidelines for the implementation of the new *Territorial Government Plan* (TGP). Even in this case, the instrument consists of several acts—the *Document Plan* (DP), the *Services Plan* (SP) and *Regulations Plan* (RP)—each with its own thematic independence, but conceived all within a single, coordinated planning process. In support of the three acts, there are three additional instruments: the *Geographic Information System—GIS*, the *Permanent Observatory of territorial planning and environmental assessment of the plans* (PO) and *Strategic Environment Assessment—SEA*, the latter to make predictions when preparing the DP.³⁸ The set of three acts, which has as its denominator a common strategic vision, helps to define and articulate a single instrument to orient local policies: the *Territorial Government Plan*. The organization of the settlements and system of services and public facilities is entrusted to the *Service Plan* (SP). As well specified in the *municipal planning methods*, the RP and SP ... *even so designed as to have autonomy in the processing, forecasting and implementation, have to interact among themselves and with the Document Plan, ensuring mutual coherence and synergies, but especially should define actions for the implementation of strategies and desired objectives in the Document Plan, within the oneness*

³⁵art. 32, cc. 3 and 4, 36/97 Regional Act. We are before an anticipation of the problems that will be dealt with a few years later by the Lombardy Region.

³⁶A. Travertini, *Lombardia: approvata la nuova Legge urbanistica regionale*, consultabile in <http://www.strategieamministrative.it>.

³⁷Regione Lombardia, Direzione Generale Territorio e Urbanistica, Unità Organizzativa Pianificazione territoriale e urbana, *Modalità per la pianificazione comunale* (art. 7, 12/2005 Regional Act), DGR. n. 8/1681 del 29/12/2005.

³⁸12/2005 Regional Act in articles 7, 8, 9 and 10, as previously mentioned, introduces the three acts that comprise the GMP, further specified in the Regional Council Resolution 8/1681.

of the planning process³⁹ Even the *Services Plan*⁴⁰ (that was already present in the regional legislation of the specific text of the GMP⁴¹) becomes an autonomous act that has the objective of equipping the common areas for public equipment and... *ensuring, through the service system, the integration between the different components of the built fabric and ensure adequate and homogeneous access to the different services to the entire local population....*⁴² The innovations introduced by the new Act are different. First, it pursues the integration between the *Services Plan* and the provisions of the *General Municipal Plan of Services in the Underground*⁴³ and try to find the connection with the three-year program of public works.⁴⁴ However, the main innovations are registered as standards: the concept of public service⁴⁵ and public or general interest is extensive and also includes areas for public housing, as well as ... *the services and facilities, including private ones, to use for the public or general interest, regulated by a specific act of subservience or regulations governing its use.*⁴⁶ In addition to this innovation, related to the need for *strengthening of the offer* through private intervention operations, there is the idea that *the improving of the offer can be achieved through better management of existing equipment, focusing on the organizational and functional aspects (performance standards) rather than the physical and building ones (quantitative standards).*⁴⁷ In fact, it has been determined that the *Services Plan* must, as a priority, consider the facilities of the territory ... *including with regard to the quality factors, usability and accessibility, and having established the adequateness*

³⁹*Ibidem.*

⁴⁰art. 9, c. 2, 12/2005 Regional Act: *The services plan must be sized according to criteria established by Act: the population settled in the town, which benefits from different types of services to the population to be set up according to the plan document provisions, divided by type of services also according to territorial distribution, the gravitating population in the territory, estimated according to the employed in the municipality, students, users of supra-relief services, and also on tourism. Where the municipality of attractor pole characteristics identified by the spatial plan of provincial coordination, in relation to the flow of commuters for work, study and use of services and municipalities characterized by significant tourist numbers, the service plan contains the provision of public services Additional, in relation to the needs expressed by the floating population.*

⁴¹1/2001 Regional Act.

⁴²Regione Lombardia, Direzione Generale Territorio e Urbanistica, Unità Organizzativa Pianificazione Territoriale e Urbana, *op. cit.*, 2005.

⁴³The Plan aims to identify *guidelines for infrastructure development ... their paths and types ...* art. 38, 26/2003 Regional Act.

⁴⁴art. 9, c. 4, 12/2005 Regional Act.

⁴⁵art. 9, c. 10, 12/2005 Regional Act.

⁴⁶The inclusion of *private services* had already been anticipated by the Ligurian Act of 1997. While Liguria limited the possibility of calculating to 50%, Lombardy only states that they are counted as *to the extent that ensure the conduct of activities which are intended to help the people living in the municipality and the resident may not be served* and regulates the relationship through an act of servitude or regulations governing its use.

⁴⁷Regione Lombardia, Direzione Generale Territorio e Urbanistica, Unità Organizzativa Pianificazione territoriale e urbana, *op. cit.*, 2005.

or appropriateness of the same facilities—to quantify—the costs for their adaptation and identify ways of intervention.⁴⁸ The concept of performance standards is therefore explicitly stated: the *Plan* not only defines the size and location of the facilities, but also evaluates the performance they offer and determine their costs.⁴⁹ It can be said that, in the Lombardy region, there has been a passage from a quantitative to a qualitative standard.⁵⁰

Finally, there is the Regional Planning Act n. 11 of *Veneto* (modified by 33/2016 Act) requiring the articulation of the GMP in Structural Rules (or the Territory Plan—TP) and Operative Provisions (or the Interventions Plan—IP).⁵¹ Even in this case, as in Liguria and Lombardy, the standards can be guaranteed... *through forms of concessions with privately owned areas*.⁵² The most significant innovation is, however, integration with sectorial Plans, art. 13, in fact, makes it clear that the TP *elaborates the structural rules in application of regional Acts in other sectors*,⁵³ defining, in particular, the criteria for the application of the procedure for production activities,⁵⁴ for the identification of networks and electronic communication services⁵⁵ and preferential areas of location of large retail outlets and other facilities to the same assimilated.⁵⁶ In this case, there are interesting innovations compared to the original text of the NPA, deriving both from the specific requirements of the region, as well as industry Acts that, even if not directly, require adaptation of the municipal instrument. Focusing on the issues of sector planning and programming, the TP of the Veneto Region was set up as an instrument of *actual* territorial government, which tries to organize all the components that affect the general set-up and have an impact on urban organization. The TP identifies new categories of public facilities, in particular elements finalized to urban upgrading and urban safety. This instrument provides that the urban standards can achieve by public-private partnership (art. 31, paragraph 5), and it can join all urban standards categories to ascertain the territory and community needs (art. 31, paragraph 6). So the Urban Standards of Veneto Region remain only quantitative.

The other Italian regions, except for a few exceptions, do not modify the 1444/68 ID.

⁴⁸art. 9, c. 3, 12/2005 Regional Act.

⁴⁹In fact, in a circular approved by the Regional Council under resolution no. 6/44,161 of 09/07/1999, it was outlined through interpretation the institution of so-called quality standards.

⁵⁰A. Chierichetti, *Gli standard urbanistici qualitativi nell'attività di governo del territorio*, in: S. Civitaresse Matteucci, E. Ferrari, P. Urbani (edited by S.), *Il governo del territorio. Atti del Sesto Convegno Nazionale AIDU*, Milano, 2003, p. 290 ss.

⁵¹<http://www.inuveneto.it/Il-processo-di-riforma-urbanistica>.

⁵²art. 31, c. 5, 11/2004 Regional Act.

⁵³art. 13, c. 1, lettera (r), 11/2004 Regional Act.

⁵⁴The one-stop procedure was introduced by Presidential Decree 20 October 1998, n. 447.

⁵⁵As stipulated in the *Code of Electronic Communications*, see Decree 1 August 2003, n. 259.

⁵⁶art. 13, c. 1, lettera (j), 11/2004 Regional Act.

3 Towards New Standards

The Italian Episcopal Conference (CEI) promoting a shared initiative, effective interpretation and practical implementation of the encyclical—*Laudato si'*—invited everyone to understand that design and transforming the territory is an activity that includes huge responsibility ... *The CEI having at heart the future of cities and for future generations, and focusing on Beauty, called upon by Pope Francis, invites all those who pursue sustainable development objectives to join to the Manifesto which is based on the three pillars of Social Inclusion, Economic Impact and Urban Ecology*⁵⁷ and ... *designing, building and managing beautiful places, sustainable and inclusive: that affirm the dignity and centrality of the person and of the relationships, which improve the quality of life, promoting dynamic and supportive social relationships, that do not sacrifice beauty for profit, which is the best answer to the needs and expectations of the people, that are sustainable and measurable effects in the environment.*

In the encyclical, it continues, then you “need to protect those common areas, visual landmarks and urban landscapes which increase our sense of belonging, of rootedness, of “feeling at home” within a city which includes us and brings us together” (§ 151); “Efforts to promote a sustainable use of natural resources are not a waste of money, but rather an investment capable of providing other economic benefits in the medium term” (§ 191); “the economic and social costs of using up shared environmental resources are recognized with transparency and fully borne by those who incur them, not by other peoples or future generations” (§ 195).⁵⁸

At the current time, one sees a changed picture of social conditions, a scenario of migration and environmental risks, a strong fragmentation of life cycles and needs, the progressive aging of the population and the dramatic reduction of public resources. Faced with increasing attention on the city, where there are central issues such as adaptation to climate and social change, risk prevention strategies, the importance of networks, tangible and intangible that constitute a public city in every respect, a renewed declination of the Standard is required. It is time to move from standards designed for the growth of the city to the facilities for the quality of the various urban forms. This is integrated with the quantitative measure of quality and performance parameters used to generate public value, to ensure the eco-systemic functionality of environments conducive to the holding of anthropic activity, in response to new needs. From the above review, it emerges that quality—in most Italian regions—is meant from an ecological-environmental perspective. This means that a fair standard—able to guarantee accessibility to services to all the people—is far from having been achieved. Heterogeneous and diversified needs

⁵⁷CEI—Servizio Nazionale per l’Edilizia di Culto: Manifesto sulla cura della casa comune *Progettare città per le Persone*, Roma, 2015.

⁵⁸Pope Francis, encyclical letter *Laudato si'*, of the Holy Father Francis on the care of the common house, (nn. 151; 191; 195), Roma, 2015.

still have to be satisfied in a proper way. A step forward has been made by Tuscany region which tries to connect time-related and local policies. This is a meaningful step since it might enable controlling the achieved performance.

New public facilities are ecological networks that host slow mobility and allow for the reproduction of biodiversity, land reclamation and conservation of soils, social housing services, energy production, the spaces that serve to reduce the heat-islands effect and those to be left free to handle emergencies, those which are used for air and water, for reforestation and for the agriculture of the city. The possibilities for action on the environment must result from its convertibility, i.e., through its susceptibility to change, which can be conceived in an evolutionary sense or in the sense of recovery.

Part IV
How to Enhance Dialogue and
Transparency into Decision Making
Processes

The Value of Our Common Environment



Stefano Pareglio and Alessandra Oppio

Abstract The Encyclical Letter “Laudato Si” (“Praise be to you”) gives space to an important reflection on the social and environmental development dimensions as well on the relationship between economic growth and human progress. The Letter proposes an explicit critique to the current economic system, based on the neo-classical paradigm, and it claims some not strictly traditional economic issues. Starting from this critical analysis, the Letter offers an in-depth reflection that moves from the decisions making processes and the objectives of economic policies up to the evaluation tools, which should be able to support an effective care of the Earth, dubbed as a “Common Home”. In order to overcome prejudices and the traditional perspectives and to seriously tackle the environmental and social challenges, the Encyclical Letter tries to broaden the concepts of value and progress. There are several causes for reflection: from the critique to methodological individualism (and the consequent representation of choices based on preferences not structured as needs) to the lack of recognition of the special harmony between humans and nature. Similarly to the Marxian thought of men’s alienation, it underlies the identity value of places, so to make the reduction of environmental and public goods to mere commodities controlled by the market unacceptable. The answer to this challenge cannot be vague ecology. For this reason the Letter calls for a new definition of the relationship between human beings and nature, starting from the Judeo-Christian anthropocentrism, which recalls that kind of reciprocity and which doesn’t assign to man the role of lord of the universe, but rather of responsible administrator. This new definition is based on some deep-rooted principles: the limits of resources and technology’s power, the social limits of affluent

S. Pareglio (✉) · A. Oppio

Department of Mathematics and Physics, Università Cattolica del Sacro Cuore,
Brescia, Italy

e-mail: stefano.pareglio@unicatt.it

A. Oppio

e-mail: alessandra.oppio@polimi.it

S. Pareglio · A. Oppio

Department of Architecture and Urban Studies, Politecnico di Milano,
Milan, Italy

societies, the acceptance of the steady state condition, the attention to diversities, capabilities, willingness to participate by local communities, the individual character of well-being and life projects, the exhortation for a distributive justice into and between generations. The change of paradigm should be radical and subjected to mediation. In this framework the Encyclical Letter assigns to the Appraisal discipline a fundamental role for pursuing the envisaged changes and it outlines some operational assumptions to make the evaluation activities a real support to policy making.

Keywords Economic growth · Value and progress · Social and environmental sustainability

1 Introduction

In the economic literature, the difference between the price (objective) and the value (subjective) of a good or service is known, as well as the theoretical and operational recommendations for assigning a monetary value to environmental goods and services, even not usually practiced (Anelli 2016; Pareglio 2016).

This is one of the essential arguments emerging from the “*Laudato Si*” (“Praise be to you”) Encyclical Letter (Enc. Lett., Holy Father Francis 2015; VV.AA. 2016), concerning the criticism to the contemporary economic mainstream based on the neoclassical approach (Penza 2016). The centrality assigned to the environmental dimension inevitably raises some non-orthodox profiles of the economic thought.

To argue this interpretation, it is enough to reflect on those sections of the Enc. Lett. that have a relationship with the theoretical and operational dimensions of the Economic science. Furthermore, the discussion is supported by two great merits of the Enc. Lett.: it speaks to everyone and it overcomes the theological barriers and the conformism of public debate on many issues.

More in detail, the relationship with Economics is clear right in the title “Care of the common home”. The term Economics derives from *Oikonomia* (home affairs, house administration and management), crisis of *Oikos* (home, land ownership, and also race, native place) and *Nomos* (custom, precept, rule). In the Enc. Lett. the administration is not that of the house or of the each own heritage, but of what we have in common: Earth.

The Enc. Lett. addresses (also) the themes of the economic debate: “the intimate relationship between the poor and the fragility of the planet; the conviction that everything in the world is intimately connected; criticism of the new paradigm and the forms of power that derive from technology; the invitation to look for other ways of understanding the economy and progress it will be more explicitly stated that it is necessary to “end the modern myth of unlimited material progress” [§ 78];

the value of each creature; the human sense of ecology; the need for sincere and honest debates; the grave responsibility of international and local politics; the culture of waste and the proposal of a new lifestyle [§ 16].

The Enc. Lett. offers important interpretative keys for the notion of a common environment: a more correct interpretation of the anthropocentrism coming from the Judaeo-Christian matrix (ergo, proposing a more appropriate scale of values about the relationship between man and nature) [see from § 63 to § 78], the relevance of the effects of environmental degradation on the poorest (the need for a fairer distribution of costs and benefits of human choices), the evidence of an irresponsible use (and sometimes abuse) of environmental resources (the need for a more efficient use and proper ethics).

Starting from Benedict XVI (2007), the Enc. Lett. also identifies a very clear objective: “to eliminate the structural causes of the dysfunctions of the world economy and to correct the patterns of growth that seem incapable of ensuring respect for the environment”. A goal that can only be achieved with respect to the notions that “the book of nature is one and indivisible”, but above all that “the degradation of nature is closely related to the culture that shapes human coexistence”. Thus, according to Patriarch Bartholomew [§ 9], “seek solutions not only in technique, but also in a change of human being, for otherwise we would only address the symptoms”. Thus, the environmental crisis is linked to clear concepts: dialogue, collaboration, urgency, sustainable and integral development.

Furthermore, additional aspects of the relationship between man and environment are pointed out as main issues of a renewed economic perspective: the contrast of the speed of human actions with respect to the natural slowness of biological evolution [§ 18] (Tiezzi 1984); circular instead of linear production [§ 22]; climate as a common good and the recognition of the anthropogenic nature of climate change; the urgency of mitigation policies and the severe difficulties of the poorest countries to adapt to change [§ 23]; the right to water; the loss of biodiversity [§ 32], the uniqueness and value of each species [§ 33, § 34], the myth of the nature technical substitution [§ 34], the risks linked not only to loss but also to habitats’ fragmentation [§ 35], the difference between short-term benefits and long-term costs [§ 36]. The most relevant part of an effective radical reflection is the link between the quality of human life deterioration and the social degradation [§ 48]. Economic growth and social progress are often conflictual [§ 46] and the debate on the subject is increasing among economists. The Enc. Lett. calls for reconsidering the paradigm of global economic growth that passively accepts the negative effects of such a growth on the weakest classes: “... today we cannot ignore that a true ecological approach always becomes a social approach, which must integrate justice in the discussions about the environment ... [§ 49]”. There is, in fact, a kind of “ecological debt”, especially between the North and the South, linked to trade unbalance and to the disproportional use of local resources [§ 51, § 52].

2 Nature as a Common Good

Starting from Boulding (1996), Georgescu-Roegen (1971), Meadows et al. (1972) and (Jonas 1990) a promising perspective focuses on the “human root of the ecological crisis” in order to individuate responsibilities, values and awareness in relation to technology. Indeed, from a social point of view, it is important to recognize the limits and the potential negative effects that the extreme power of technology has on human beings, when it is used recklessly. Thus, the fundamental problem is the worldwide spread of an undifferentiated and one-dimensional technology-based paradigm that is linked to the idea of unlimited economic growth, supported by mainstream economists (Guardini 1984). Such a belief means assuming that there is an infinite endowment of resources and that the negative sides of technical manipulation of nature can always be overcome. Furthermore, it is worth recognizing that technology has relevant social consequences since its products are not neutral, rather, they strongly affect lifestyles, orient social possibilities according to the interests of power elites and make it “anti-cultural” choosing not to depend on technical developments. Thus, the challenge of promoting a cultural paradigm that considers technology as a mere instrument is nowadays a difficult task, since we are dependent on it, on its costs and its power to make us all the same. As a result, technology has reduced our capacity of making decisions and, accordingly, our most authentic freedom and creativity. Overall, an unconditional faith in the technological progress for profit creation dominates affluent societies, where the established *laissez-faire* implies disregarding the pain of the excluded. In such societies, the availability of positioning goods contrasts with that of relational ones and determines an impasse (Hirsch 1977). In order to change the dominant perspective on technology, it is crucial to acknowledge the positive and sustainable progresses that have been made, but also recover the values and the great goals swept away by our unrestrained delusions of grandeur [§ 114].

3 For an Integral Ecology

The market by itself cannot guarantee human development as well as social inclusion. The awareness of it clarifies the need of a new development model and of reshaping the relationship of humans with nature according to an integral approach, or rather, to an integral ecology, addressed to human and social instances [§ 137]. The magnitude of the changes needed for this purpose implies that it is no longer possible to find a specific response to each single part of the problem. It is crucial to look for integral solutions, which consider the interactions between natural and social systems. Indeed, it is not a matter of two separate crises, an environmental and a social one, rather one single complex socio-environmental crisis. Hence, the interdependence of social and environmental spheres forces us to consider the world as a common project where multiple visions on ecology coexist

[§ 164]. Given the multifunctional character of ecosystems and their potential to be regenerated, the integral approach recognizes the importance of several values, both use and not use ones.

Specifically, there is an economic ecology in which environmental protection is an integral part of the development process and cannot be considered apart [§ 141], as already stated in 1992 by the Rio de Janeiro Summit Declaration on the Environment and Development.

There is a social ecology in which the role of institutions is essential “from the primary social group, the family, to the wider local, national and international communities,” [§ 142].

There is also a cultural ecology, which asks to pay attention to local cultures [...] by reinforcing the dialogue between the language of technique and science and that of people [§ 143]. The notion of culture embedded in this kind of ecology is not only that of the monuments and the past, but especially the one that refers to a dynamic and participatory idea of cultural values (Ostrom 1990; Sen 1982, 1985; Sen et al. 2009).

There is even an ecology of everyday life, full of “practical” attention to the issues of urban planning [§ 150, § 151], housing [§ 152], transports [§ 153], services in rural and peripheral areas [§ 154].

The practical consequences of the integration between the social perspective and the environmental dimension call for a broader reflection on private property: the principle of subordination of private property to the universal purpose of goods, and thus the right of everyone to their use, is a golden rule of social conduct and the first principle of the whole ethical and social order. The Christian tradition has never recognized the right to private property as absolute or inviolable and has stressed the social purpose of all forms of private property [§ 93]. Likewise does the article N° 42 of the Italian Constitution. In other words, the Church defends the legitimate right to private property, but it also teaches that there is always a social mortgage on all private property (AAS 71, 1979, 209). Such arguments call into serious question the principle of common good, meant as the sum of those conditions of social life that allow social groups and their individual members to thoroughly and readily access to their own fulfilment (*Gaudium et Spes*, 26). Moreover, on this matter the *Enc. Let.* recalls the notions of subsidiarity and intragenerational justice [§ 156]. From a social perspective, the instance of justice should be faced according to the principles of equality and distribution, especially for disadvantaged people (Rawls 1971; Mondini 2016).

In addition to the considerations on distributional justice within the current generation, the *Enc. Let.* underlines the instance of intergenerational justice. The latter represents an essential pillar of sustainable development and, under a strict economic view, a reason for the market failures, due to the lack of expression of future preferences (Brundtland 1989). This is a central issue, since the inability to think seriously about future generations is linked to the inability to broaden the scope of present interests and to give consideration to those who remain excluded from development [§ 162].

4 Conclusions: The Role of Evaluation

How to achieve the envisaged changes? The Enc. Lett. highlights the role of complex evaluation methodologies, for their capability of investigating alternative strategies in the light of multiple criteria and conflicting priorities, ensuring planning procedures to be flexible, transparent, open and as much comprehensive as possible (Voogd 1983; Bottero et al. 2016; Oppio and Torrieri 2018). This claim for truth and honest decisions [§ 183] implies an evaluation of risks and benefits, both tangible and intangible, of all the potential alternatives with respect to a long duration horizon time [§ 183]. Furthermore, in line with the notion of value in use (Smith 1776), the social specifications of value in exchange (Marx 1887) and the non-use values (Pearce and Turner 1990), the Encyclical letter points out distortions and biases due to the profit maximization without any internalization of environmental and social costs. Thus, environmental protection is not effective when only financial costs and benefits are considered (Bator 1958), as the market fails when it has to safeguard and enhance the natural resources. Time, uncertainty, intangible values are still the challenging issues of evaluation both with respect to a theoretical perspective and to an operational one. Starting from the idea of inappropriateness of traditional assessments and measures, a change of paradigm should be supported by integrated evaluations. On this topic, there is a broad aims' concurrence between the Encyclical letter suggestions and the scientific claims (VV.AA. Nature 530 2016): the analysis of the Encyclical letter out of any prejudice has shown that we need a common effort for a sustainable tomorrows' world.

References

- Address to Indigenous and Rural People, Cuilapán, Mexico (29 Jan 1979), 6: AAS 71 (1979), 209
- Anelli F (2016) La natura come creazione e le responsabilità dell'uomo, in «Vita e Pensiero»
- Bator F (1958) The anatomy of market failure, in «Q J Econ» 72(3):351–379
- Bottero M, Mondini G, Oppio A (2016) Decision support systems for evaluating urban regeneration. In *Procedia: social and behavioural sciences*, vol 223, pp 923–928. ISSN:1877-0428. <https://doi.org/10.1016/j.sbspro.2016.05.319>
- Boulding KE (1996) The economics of the coming spaceship earth. In Jarrett H (ed) *Environmental quality in a growing economy. Resources for the future*/Johns Hopkins University Press, Baltimore, MD, pp 3–14s
- Brundtland GH (1989) *Our common future: the world commission on environment and development*. Oxford University Press, New York
- Georgescu-Roegen N (1971) *The entropy law and the economic process*. Harvard University Press, Cambridge
- Guardini R (1984) *La fine dell'epoca moderna*. Morcelliana, Brescia
- Hirsch F (1977) *Social limits to growth*. Routledge and Kegan Paul, London
- Holy Father Francis (2015) *Laudato si'... sulla cura della casa comune. Custodire la terra, coltivare l'umano*, Società Cooperativa Sociale Frate Jacopa, Roma, available at https://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

- Jonas H (1990) *Das Prinzip Verantwortung* (trad. it. a cura di Portinaro PP *Il principio responsabilità. Un'etica per la civiltà tecnologica*, Einaudi, Torino)
- Marx K (1887) *Capital*, vol I (trans: Moore S, Aveling E). Sonnenschein, London
- Meadows DH, Meadows DL, Randers J, Behrens W III (1972) *The limits to growth. A report for the club of rome's project on the predicament of mankind*. Universe Books, New York
- Mondini G (2016) Integrated assessment for the management of new social challenges. *Valori e Valutazioni* 17:15–18
- Oppio A, Torrieri F (2018) *Public and private benefits in urban development agreements, Green energy and technology*. Springer, Berlin
- Ostrom E (1990) *Governing the commons: the evolution of institutions for collective action*. Cambridge University Press, Cambridge
- Pareglio S (2016) *Il Valore dell'ambiente commune*. In: Giuliadori C, Malavasi P (eds) *Ecologia Integrale. Laudato Si'. Ricerca, Formazione, Conversione, Vita e Pensiero*, Milano
- Pearce D, Turner R (1990) *Economics of natural resources and the environment*. Harvester Wheatsheaf, London, UK
- Penza G (2016) *Pope Francis: The Laudato si' encyclical and the urban issue*. *Valore e Valutazioni* 17:5–8
- Rawls J (1971) *A theory of justice*. Harvard University Press, New York
- Sen AK (1982) *Choice, welfare and measurement*. Basic Blackwell, Oxford
- Sen AK (1985) *Commodities and capabilities*. North-Holland, Amsterdam
- Sen A, Stiglitz J, Fitoussi JP (2009) *Report by the commission on the measurement of economic performance and social progress*. http://www.insee.fr/fr/publications-et-services/dossiers_web/stiglitz/doc-commission/RAPPORT_anglais.pdf. Accessed on December 2017
- Smith A (1776) *An inquiry into the nature and causes of the wealth of nations*, vol I, Book V, Sect II
- Tiezzi E (1984) *Tempi storici, tempi biologici. La Terra o la morte: i problemi della "nuova ecologia"*, Garzanti, Milano
- Voogd H (1983) *Multicriteria evaluation for urban and regional planning*. Pion Ltd, London
- VV.AA. (2016) *Laudato si'. Un aiuto alla lettura*, Libreria Editrice Vaticana, Città del Vaticano
- VV.AA. (2016) *Nature* 530(7591)

An “Urban Mending” Case Study: Designing a New Social-Housing Complex



Riccardo Renzi

Abstract The case study described here is part of an urban-regeneration project in Calenzano, one of the peripheral municipalities that form part of the metropolitan area of Florence. It is considered in the light of some observations made by Pope Francis in his encyclical, *Laudato si'*. When the Pope argued that “It is not enough to seek the beauty of design” (§ 150), he attributed a wider role and greater responsibility to the architect, who must take into account people’s quality of life, the ways in which they adapt to their environment, their social life and their need for mutual assistance. At the same time, the encyclical suggested that experts should take account of the limits of the “technocratic paradigm” (§ 101), which leaves the solution to environmental problems to technocrats and market forces. Renzo Piano devised the concept of “urban mending” as a means of renewing the urban periphery, and it seems to go in the same direction as the encyclical. This paper describes how the project was carried out, with particular attention to how decisions were made in line with the Pope’s encyclical and Renzo Piano’s vision.

Keywords Urban and architecture design • Plot mending • Collective space

1 Introduction

The urban question is one of the central themes of Pope Francis’s encyclical *Laudato si* (Penza 2016). As Bentivegna (2016) observed, «Urban degeneration is presented as a social issue, showing the need to understand the city as a common good». From the point of view of the designer, the encyclical made some interesting points. It argues that public interest should prevail over private interest. The encyclical invites the reader to abandon the myth of progress (§ 60) and the illusion that technology and the market, combined in the “technocratic paradigm”, are capable of solving the environmental problems of our cities § 109. The Pope argued

R. Renzi (✉)

Department of Architecture (DIDA), University of Florence, Florence, Italy
e-mail: riccardo.renzi@unifi.it

that «Merely technical solutions run the risk of addressing symptoms and not the more serious underlying problems» (§ 144). The chapter on the «Ecology of daily life» is even more relevant here. In this, the Pope argued as follows: «Authentic development includes efforts to bring about an integral improvement in the quality of human life, and this entails considering the setting in which people live their lives. These settings influence the way we think, feel and act. In our rooms, our homes, our workplaces and neighbourhoods, we use our environment as a way of expressing our identity» (§ 147).

This statement puts great responsibility on the shoulders of designers, whose role the Pope delineate with great clarity, as follows: «Given the interrelationship between living space and human behaviour, those who design buildings, neighbourhoods, public spaces and cities, ought to draw on the various disciplines which help us to understand people's thought processes, symbolic language and ways of acting. It is not enough to seek the beauty of design. More precious still is the service we offer to another kind of beauty: people's quality of life, their adaptation to the environment, encounter and mutual assistance. Here too, we see how important it is that urban planning always take into consideration the views of those who will live in these areas» (§ 150).

The case history described here is a single example presented in descriptive form (Berni 2014). Rather than concentrating on formal results, functions and achievements, this paper offered a careful description of how a research project conducted by the Department of Architecture of the University of Florence, in association with the Municipality of Calenzano, followed the principles enunciated by Pope Francis and Renzo Piano. The latter has argued that in the present day the role of the architect is to: «work at transforming the city, especially its most fragile part, which is the periphery, where the great majority of the urban population lives. I believe that the great project of our land is that of the urban fringe. This will be the city of the future that we will leave to those who come after us. It is rich in humanity. Here the energy is concentrated, and here live the young people who are full of hope and desire for change. But the urban fringe is always described with denigrating adjectives. The plan I have in mind is to make it a happy and productive place. This is the urban challenge of the coming decades: will the periphery be a true part of the city or will it not? Will we be able to make it urban, which should also mean civilized? Our urban centers are already protected and safeguarded, but the periphery stands for beauty that does not yet exist» (Piano 2014).

The subject of the case study is a large residential complex of social housing with more than 70 apartments (Renzi 2013). The complex was built in the 1970s and 1980s and since then has suffered serious decline. The surrounding developments have recently undergone an intense process of functional transformation. In the immediate vicinity, the following have been built: a set of university buildings, a public library, a community center, student lodgings and related services and a residential complex. The last of these structures, of medium to high quality, is equipped with squares, footpaths and cycle paths which form a system of accessible, public open space.



Fig. 1 Case-study area, aerial picture, 2003 (left) and 2011 (right)

At the center of this new and vibrant urban fabric is the social-housing complex, which is composed of two elongated buildings, each five storeys high, and which are perceived, not only as a physical barrier, but also as a social one. The inhabitants of the social housing probably feel that they are separate from the people who live in the new residences. At the same time, they are aware of the increasing physical inadequacy and lack of functionality of the buildings in which they live. The negative feelings about their own living conditions are aggravated by the comparison with the new developments around them (Fig. 1).

2 Evolution of the Project

Given the disadvantageous state in which the inhabitants of the social housing find themselves, the local administration has adopted what we may consider to be the traditional approach to such a problem (Berndt and Colini 2013). It has commissioned a study of the potential for urban renewal, both on behalf of the inhabitants and to improve the environment.

The case study thus begins with a typical example of “top-down” decision making, in which the municipal council took note of the disadvantaged living conditions of a sector of the population and presumed to interpret their interests and needs (Bentivegna 2016). In so doing, it asked the Department of Architecture at the University of Florence to undertake a study to formulate proposals for major improvements to the environment of the 70 apartments that make up the social-housing complex.

In this phase, the objectives specified by the municipal government were as follows: to find a solution to the problem of the physical and functional decay of the buildings; to integrate the social housing into the rest of the development on the estate in question; and to create new public spaces that would help promote social activity and connect the various parts of the development.

On the basis of documentation provided by the municipality and a series of site visits, in 2011, the working party conducted a preliminary analysis of the potential to renew the existing buildings. This strategy was considered both to quantify the economic cost of light modifications and to avoid subjecting the inhabitants to the discomfort of having to move out, even if only for a short period. This strategy turned out to be impracticable, first and foremost as a result of the advanced level of decay of the buildings caused by the use of sub-standard construction materials and subsequent maintenance problems. Secondly, there was a lack of flexibility in the design of the buildings that mitigated against adapting them to the needs of modern nuclear families. Simple adaptation of the buildings would have been extremely costly and would not have served make them better connected to the rest of the estate. The research thus took the direction of designing new social housing of a kind that responds to two main objectives: (a) the creation of public spaces connected to services on the estate and provided with places for public gatherings; and (b) the design of residential units that are commensurate with modern needs, using construction technologies that are capable of guaranteeing both environmental compatibility and internal flexibility (Fig. 2).

We began with a study of the evolution of the composition of the nuclear family (ISTAT 2011). In order to increase the level of social interaction in the buildings, the research planned a heterogeneous distribution of the types of residential unit,



Fig. 2 Case-study area, existing buildings

floor by floor, creating in this way an appropriate “project system”. In line with the specifications provided by the municipal government and also with the results of the analysis, the working group formulated ten different proposals for the overall plan of the new neighbourhood.

This initial phase ended in 2014 with a public meeting that was open to organizations, experts, financial backers and ordinary citizens. The meeting was used to present the project’s analysis of the evolution of social housing in Italy from 1945 until the present day, with special reference to the birth of the concept of “periphery”. The ten proposals for the design of the new neighborhood were presented, along with a new publication (with a forward by the Ministry for Infrastructure) that brought together all the materials produced to date during the project. During the meeting, a lively debate developed between public administrators, technical experts and ordinary citizens. In particular, the residents of the social housing brought the discussion to a practical plane by presenting their points of view and their specific needs. For example, they requested facilities for public assemblies, more green space and more parking spaces.

The active interest by the inhabitants of the social housing and other local residences in the future of their own neighborhood could have been the beginning of a participatory form of decision making, but this did not happen. Instead, the municipal government decided to interrupt the planning process in its initial phase to ascertain whether any of the plans were financially viable. Some months later, it became clear that the municipality did not have the resources to fund the entire project and therefore intended to make use of private finance. This resulted in a structural modification to the research. Even though the municipal government was then unable to confirm the participation of any source of private funding, it asked the research team to substantially increase the size of the project by adding private housing and commercial premises. The group was also required to add more public housing (Fig. 3).

This decision deserves some reflections. It should be emphasised that no one from the private sector was involved at this point, nor could they be. Despite this, the public actor felt it necessary to embrace the “logic of the market” by increasing the size of the development to provide an incentive to possible investors, given the lack of sufficient public funds to complete the work. It is important to note that this approach signifies an implicit acceptance of market forces, as the Pope’s encyclical repeatedly observes. Technology is not devoted to the efficient use of land on the basis of the needs and interests of ordinary inhabitants but is principally orientated towards economic and financial efficiency, thus reducing individuals and groups of people to the level of “consumers”, who create demand to be satisfied.

The project developed initially at the scale of individual buildings, but it then had to bear the burden of planning and social issues connected with the scale of the entire urban development. This new phase of research, which took place in the period 2015–6, was no longer focused on the individual buildings but on the reorganization of urban space for the entire development. For the planner, the central point had become the architectural quality of the plan, because, in the words of the Pope, «the quality of human life is conditioned by the setting in which people

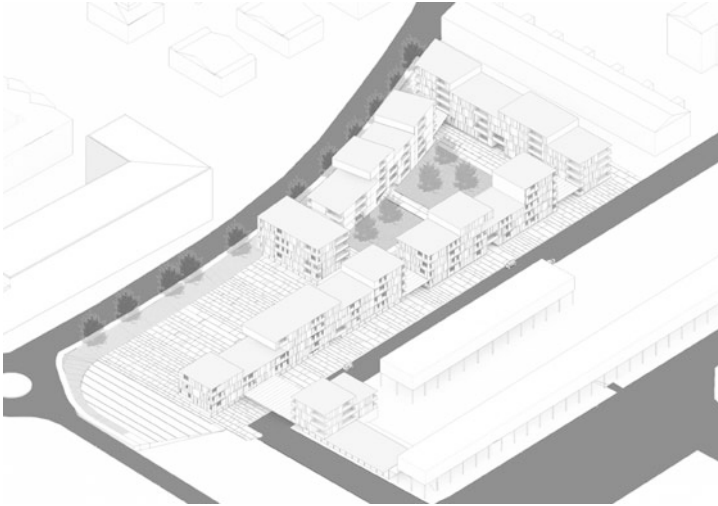


Fig. 3 General view of the new development

live their lives» [147]. In other words, “ugly” places reduce social interaction and discourage the citizen from participating in social life (Piano 2014). Clearly, it is not the job of the architect to create citizenship, but architects can favor its development by designing places that help favor social interaction and a sense of belonging to a community, helping to give identity to the inhabitants of the city’s periphery (Piano 2014).

This new direction of planning led to the formulation of new objectives for the quality of the project. For the residential buildings, it was important to ensure that energy performance would be high and the residents would be able to interact socially and culturally. With respect to the spatial organization of the development, and taking account of the aesthetic quality of the buildings and their relative sizes, attention was focused on the design of public spaces in order to ensure that they were recognizable and accessible. It is easy to reconcile these objectives with the terms of the encyclical, given that the Pope writes as follows: «How beautiful are those cities which overcome paralyzing mistrust, integrate those who are different and make this very integration a new factor of development! How attractive are those cities which, even in their architectural design, are full of spaces which connect, relate and favor the recognition of others!» (§ 152). He emphasizes that «Interventions which affect the urban or rural landscape should take into account how various elements combine to form a whole which is perceived by its inhabitants as a coherent and meaningful framework for their lives» (§ 151).

Particular attention was given to the inclusion of the values of collective identity because, as the Pope notes, «There is also a need to protect those common areas, visual landmarks and urban landscapes which increase our sense of belonging, of

rootedness, of “feeling at home” within a city which includes us and brings us together» (§ 151).

The new plan was developed in relation to the following terms, which will be briefly illustrated:

- collective space,
- “permeability”,
- urban quality,
- architectural language,
- residential units,
- social function.

Collective space. With respect to collective space, the plan provides for the creation of two squares, each of which would demonstrate high social and environmental quality so as to favor social interaction between residents. The first square would have a more intimate scale than that of the second. It would be a green space connected to the residential units around it. It is designed to be a “social extension” of private domestic space, in which the residents can meet and spend time together. It includes play areas for children and green space. The second square, which faces the public library, the university buildings and the church, is designed to be “collective public space”. It can be used as the site of a street market and for open-air events.

Permeability. Ground-floor spaces are planned in such a way as to favor movement in every direction, and this allows both internal access to the buildings movement among them. Thus, the ground floors of all buildings have large passageways to the squares and to the periphery of the development, so that they are well connected to adjacent urban functions (Fig. 4).

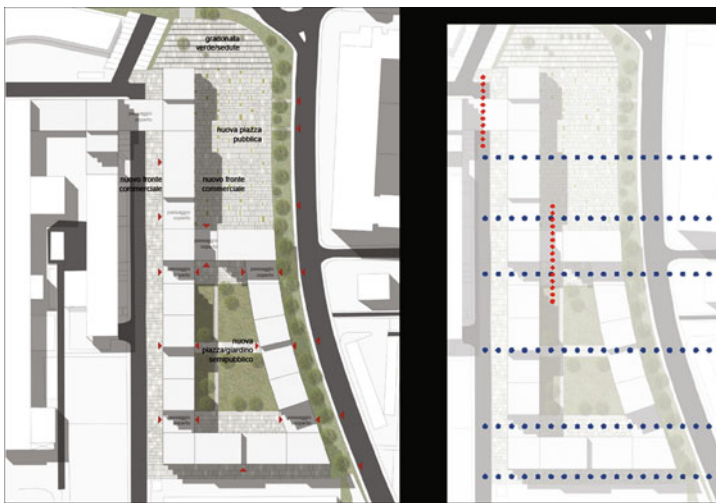


Fig. 4 General plan and permeability diagram

Urban quality. The plan was specially designed to give a good impression of the quality of the urban environment. The buildings would be constructed with a high proportion of wood, which has the double advantage of ease of construction and good energy values. This is in harmony with the paragraphs of the encyclical which warn against the development of a depersonalized city periphery, in which «megastructures and terraced houses express the spirit of technical globalisation, in which the permanent novelty of the product is united with a heavy sense of boredom» [113]. The overall plan distributes the masses of buildings in an articulated way that reduces their visual impact and the amount of shade they provide to streets and squares.

Architectural language. The volumetric arrangement of the buildings seeks to avoid the sense of anonymity and loss of character that are inherent in repetitive forms. The elevations of buildings have been designed to be heterogeneous. Fenestration alternates with loggias and curtain walls in order to ensure that the façades are not monotonous. Wooden cladding alternates with white rendering and the green vegetation within the loggias so as to create a sense of chromatic variation.

Residential units. These are designed to respond to the need for flexibility with respect to new configurations of the nuclear family. To address the need to encourage a mixing of generations and social backgrounds, the adjacent apartments are diverse in form and size. The development would include apartments for young couples, families of various sizes, students and the elderly.

Social function. Small public areas have been planned for the internal spaces of the buildings, including laundries, meeting rooms, music practice rooms, play-rooms, newspaper reading rooms, indoor games rooms and small gymnasias (Fig. 5).



Fig. 5 View of the main public space

3 Conclusions

The case study described here is typical of modern urban developments in Italy. Problems of urban decay at the margins of cities are usually tackled by regeneration, improvement and reconnection. However, whether they are large, medium or small, local authorities rarely have enough money to follow the plans through to completion. The need to involve the private sector may force a local authority to embrace “market logic” which subordinates public good to private gain. In his “Laudato si” encyclical, Pope Francis invited those who design buildings, neighborhoods, public spaces and cities not to have blind faith in the market and in technology, but to solve the real problems that afflict our cities, not merely by following ideas of aesthetic beauty but by working to improve the lives of the inhabitants. In such a situation, the architect who creates a plan can make a contribution to the improvement of the periphery by creating spaces for social activity within an economically viable urban environment.

The research on a disadvantaged neighborhood described in this paper highlights some important issues. In the first place is the “permeability” of new neighborhoods, or, in other words, the ease with which they are approached and traversed by means of pedestrian paths with plenty of green foliage. This is one way in which the isolation of the urban periphery can be reduced. Secondly, the quality of social space is fundamental to the reversal of urban decay at the periphery. This is true at the level of squares and streets, as well as at that of areas for repose, neighborhood meetings, domestic life etc. From the scale of the single apartment block (whether or not it consists of social housing) to that of the entire urban development, the answer is to create a functional connection among the various internal spaces, by means of laundries, meeting rooms and so on. All of these spaces may offer opportunities for meeting and for the reduction of the diffidence that is so sadly characteristic of urban life. The desired outcome is to create a coherent and significant context for living.

References

- Bentivegna V (2016) Dialogue and transparency in decision-making. *Valori e Valutazioni* 17:25–28
- Berndt M, Colini L (2013) Exclusion, marginalization and peripheralization. Working paper, Leibniz-Institut für Regionalentwicklung und Strukturplanung. Available at: <http://d-nb.info/1035196859/34>
- Berni M (2014) L’approccio del caso-studio nell’estimo e nella valutazione: aspetti metodologici. *Valori e Valutazioni* 12:79–105
- ISTAT (2011) Censimento della popolazione, Approfondimenti su nuclei familiari, migrazioni interne e internazionali, acquisizioni di cittadinanza. Available at: <http://www.istat.it/it/files/2014/07/approf-nuclei-popolazione.pdf?title=Censimento+della+popolazione+2011+-+30%2Fflug%2F2014+-+Testo+integrale.pdf>

- Penza G (2016) Pope Francis: the Laudato si' encyclical and the urban issue. *Valori e Valutazioni* 17:5–8
- Piano R (2014) Diversamente politico. Periferie. Diario del rammendo delle nostre città. Available at: <http://www.bellissimo1998.com/media/PERIFERIE.pdf>
- Renzi R (2013) *Abitare Sociale. La cultura del progetto in Italia dal Dopoguerra ad oggi. Verifiche progettuali per un nuovo insediamento sociale nel Comune di Calenzano*. Edifir, Firenze

World Café Method to Engage Smart Energy-District Project Partners in Assessing Urban Co-benefits



Adriano Bisello, Tatjana Boczy and Jessica Balest

Abstract Urban energy-district projects introduce outstanding technological innovation in buildings and energy systems increasing sustainability in city neighborhoods. Such projects generate additional co-benefits for the city beyond changes in physical elements and development of social and institutional relationships (e.g. local employment, environmental quality, public health, property values, innovation attitude, etc.). Since exceeding main declared goals or not always clearly foreseen in the early project phase, these co-benefits are often not properly understood and considered. However, only their explicit recognition will make possible their inclusion in the assessment of the whole project's performance. From these considerations, this study faces the issue of engaging project partners in assessing co-benefits in order to consider a broad spectrum of relevant, positive effects in the evaluation process. Group knowledge and group thinking of this complex topic are investigated through the world café method, providing an atmosphere of trust and open discussions among participants. This empirical work lays the foundations to go beyond the mere economic measure as the sole criterion for assessing project effects, also including changes in end-user behavior and intangible assets.

Keywords World café method · Co-benefits · Smart energy-district projects SINFONIA project · Stakeholder engagement

A. Bisello (✉) · J. Balest
Eurac Research, Institute for Renewable Energy, viale Druso 1, Bolzano, Italy
e-mail: adriano.bisello@eurac.edu

J. Balest
e-mail: jessica.balest@eurac.edu

T. Boczy
Department of Sociology, Institute of Urban and Land Planning,
University of Innsbruck, Innrain 52, Innsbruck, Austria
e-mail: tatjana.boczy@uibk.ac.at

1 Introduction

Co-benefits are positive outcomes of a project or policy, both intentionally or not, exceeding the main goal (Ürge-Vorsatz et al. 2014; Mayrhofer and Gupta 2016). The concept entered in the environmental policies rhetoric in the '90, trying to balance long-term, global and less attractive climate targets with short-term, local and more tangible benefits, to increase the commitment and acceptance toward them (Bell et al. 2008; Mayrhofer and Gupta 2016).

In practice, regardless of the locution used (co-impacts, externalities, co-benefits, etc.) the questions around what sort of difference and how much of a difference we are making with a certain project are the same (Nicholls et al. 2012). In climate-energy projects the same outcome can be positively interpreted as a co-benefit or on the contrary as a rebound effect, depending on project scale, related stakeholders, time and interlinkages (Ürge-Vorsatz et al. 2016). Setting a common reference scale, approach and shared co-benefits list is, therefore, crucial to building up any project assessment tool, ranging from cost-benefit analysis to multi-criteria evaluations, and developing a rational decision-making process (Bisello et al. 2017). Many studies on climate-energy policies and projects face the issue of identification, measurement, and evaluation of co-benefits related to a particular sector (e.g. environment, human health, economy), while harder to find are comprehensive studies (see for instance US EPA 2011; Copenhagen Economics 2012; IEA 2014).

The need for a deeper consideration of socio-economic and environmental effects, going beyond the solely accounting for CO₂ emissions reduction and energy saving achieved by urban energy-district projects has been long recognized (Di Nucci and Spitzbart 2010). In particular, Di Nucci and Spitzbart (2010) developed a bottom-up approach to assess them, involving the project coordinators and international experts in a workshop series. They came out with a core set of eight criteria sorted by the three sustainable development dimensions: social, economic and environmental. Discussing project results, they argue that because in most cases this *“is a subjective issue determined by individuals’ perceptions, it is advisable to attempt to measure quality of life by using indicators appraising the environment in which people live, documenting the way they perceive it and their understanding and expectations”* (Di Nucci and Spitzbart 2010). In concluding the study, they also point out how a *“notable conflict between individual short-term quality of life benefits and collective longer term needs for sustainable development (...) is a key open challenge that next (...) projects and future programmes and initiatives like smart cities will have to cope with”* (Di Nucci and Spitzbart 2010). Thus, first of all, it is crucial to raise awareness about co-benefits among project partners involved in a smart energy-district project. By making their expectations explicit and setting a common discussion platform, it will be possible to define appropriate indicators and methodologies to investigate co-benefits and to include them in the assessment phase. In this context, a research started in 2014 (Bisello 2017) developed a list of

19 key urban co-benefits analyzing dozens of smart and sustainable energy-district project. The key urban co-benefits were the central issue in World Café involving partners of SINFONIA project.

2 SINFONIA: A Smart Energy-District Project

In mid-2014 started a five-year “smart cities and communities” project, called SINFONIA, funded by the European Union under the FP7 program. The acronym stands for “Smart INitiative of cities Fully cOmitted to iNvest In Advanced large-scaled energy solutions”. This project involves more than 30 partners representing multiple stakeholders (research centers, public institutions and service providers, energy companies, social housing agencies, and local governments) from eight different European countries. In its first stage, SINFONIA is going to develop smart measures within two pioneer cities: Bolzano in Italy and Innsbruck in Austria. There, it faces the issue of providing a deep-energy retrofit of publicly owned residential buildings, coupled with the implementation of innovative energy generation and distribution technologies at district level. Other activities are related to smart power grids, and planning the development of an innovative urban-information infrastructure (smart points and totems). Successfully implemented measures will later be adapted for replication in five selected European cities, called “early adopters”. A specific task aims to provide a clear understanding of the socio-economic aspects connected to the sustainability measures in the smart cities. Eurac research, the project partner responsible for task coordination, decided in January 2016 to approach these issues adopting the co-benefits paradigm, as developed by Bisello (2017).

3 World Café Method

In an effort still, to hold a workshop in 1995, Brown and Isaacs introduced World Cafe Method (WCM) as management communication tool and social work method in organizations and groups. The idea of communication similar to conversations in an informal atmosphere of cafes marks key characteristics of World Cafe approach: small sized tables, nicely decorated, comfortable and relatively free conversations about the topic at hand. Indeed, the WCM aims at connecting collective knowledge as well as trigger innovative thinking in organizations and groups, changing their approaches. At the same time, it allows for adapting the method to specific contexts and research questions.

To assess group knowledge and group thinking of complex topics, it is vital to provide an atmosphere of trust, purpose and open discussions. Such group

discussions should then spark new ways of acting, thinking and communicating (Brown et al. 2005; Chang and Chen 2015). Each table (6–8 people) is regarded as a small conference (Seliger 2008, 105) or dialogue that discusses the topic, introduces perspectives and solutions to problems. WCM follows few essential principles (Brown and Isaac 2007), reported in Table 1: (i) Safe and informal space; (ii) Topic-oriented; (iii) Questions that Matter; (iv) Everybody's contribution is needed; (v) Connecting different perspectives thanks to facilitator; (vi) Bigger picture, and (vii) Collective insights. The facilitator must ensure (a) the comfort of participants in space and discussion, the focus on (b) topics and (c) questions that matter (Kühn and Koschel 2011, 142). Furthermore, the facilitator ensures that (d) everybody is heard in the discussion, to keep conversation alive, (e) statements are connected with each other, and (f) an agreement upon asked questions or tasks given is found (Table 1).

Like with other conference-style methods, e.g. Future conference, Open Space, Real-Time-Strategic-Change-Conference (RTSC), Appreciative Inquiry Summit (Seliger 2008), WCM wants to provide a less formal attempt to answering complex questions to trigger meaningful conversations within groups and organizations. Where Open Space has almost no formal rules and involves the whole group at once, WCM allows the breaking down into smaller units, making it easier for each participant to contribute to conversations. Other group conference methods approach specific topics like the future of an organization (Future conference), particular challenges (Appreciative Inquiry Summit) or a common strategy towards a collective goal (RTSC). For our purpose, WCM fitted better because, although our participants already were bound by a common goal, their organizational strength is looser than in a typical company, as they work within different organizations and are from different cities in Europe. WCM gave participants time to get to know each other in the beginning of the tasks. Some components of focus group were added for inquiring in a targeted manner and investigating the groups' collective knowledge and insight of smart energy-district project co-benefits.

4 Practical Use of WCM in Other Studies and Adaptation to SINFONIA Project

Broom et al. (2013) used WCM to access collective knowledge and experiences of neonatal staff. Their results formulated key recommendations for redesigning a new Neonatal Intensive Care Unit and sparked an important discussion among staff, exploring comprehensively what the group can contribute with their specific insights to new neonatal care and facility design. Ritch and Brennan (2010) used WCM to gather data on financial needs of seniors. Their approach used WCM as "circulating focus groups" with a theatrical play in the beginning to set a frame for the topic at hand. Their findings reinforced the assumptions of relaxed

Table 1 Essential principles of WCM

<i>1 Safe and informal space</i>
Creating a safe and comfortable space for participants is key in the attempt of meaningful conversations. In terms of physical environment as well as invitations and discussion process, it is vital to strive for informal structures. When participants feel comfortable it sparks creative thinking, speaking and listening, which is at the heart of WCM
<i>2 Topic oriented</i>
Laying down a clear goal of the discussion helps to guide the conversations and the whole inquiry. Although World Café has an informal set-up, this does not mean it is just a conversation. Keeping a clear topic is important to collect relevant data or come up with innovative ideas
<i>3 Questions that matter</i>
Interesting concepts and compelling questions attract more attention and discussion. Therefore, WCM relies on meaningful questions that help attract collective energy, knowledge, and action. Depending on the setup, WCM may explore a single question in depth or use a progressively deeper line of inquiry through several rounds
<i>4 Everybody's contribution is needed</i>
In every discussion, more dominant and secure participants take up more speaking time. In a World Café, it is the role of each table moderator to make sure that everybody's voice and ideas are heard. A discussion that enables participants to contribute is key for enlightening new ideas and group dynamics
<i>5 Connecting different perspectives</i>
Moving between tables enables participants to meet new people, learn new perspectives, link new insights and present new ideas to widening circles of thought. As one of WCM's major features, this provides for the opportunity to exchange perspectives and spark new ideas for the problem or question at hand
<i>6 Bigger picture</i>
Listening to different perspectives and putting emerging patterns together helps to see a bigger picture collectively. Through practicing shared listening and paying attention to themes and insights, a sense of connection can be established. Presentation, reflection and discussion are key to this endeavor in WCM
<i>7 Collective insights</i>
Conversations held at one table reflect a pattern of wholeness that connects with the conversations at the other tables. The last, plenary phase of WCM involves making common patterns visible to everyone in a large group conversation. There should be time to reflect on patterns, themes and deeper questions discovered in the discussions, in order to call them out to share with the larger group. This step recommends preparing graphic records such as poster material

Source Brown and Isaacs (2007)

conversations exploring meaningful topics in depth through shared experiences and knowledge. Participants of this study who agreed on the suitability of WCM found that it “enabled the sharing of experiences on a sensitive subject” (Ritch and Brennan 2010, 410).

In other studies, WCM is used to access dialogue patterns and understand how new interactions and insights translate into real action. Applying this, Takahashi et al. (2014) found in their study of energy saving actions in a company, that a

quantitatively more active dialogue leads to a more positive feeling about the conversations. However, more importantly, their findings indicate, that a more active and positively connoted dialogue increased real actions taken by participants afterward. Similar to our study, this inquiry understood the endeavor of energy saving action comprehensively, complex and connected. WCM was a way for “[...] engaging the hearts and minds of every person” (Takahashi et al. 2014, 88) in the issue at hand. Based on these examples and the considerations reported in Sect. 3, we decided to implement a participatory approach among project partners during the SINFONIA second annual meeting organized in June 2016 in Seville. This meeting offered the opportunity to start the “clear understanding phase” of the socio-economic aspects connected to project development.

First, a general presentation about the co-benefit concept was given to project partners, explaining those related to the seven smart city dimensions detected in European Funded projects, as reported in Box. 1. Later on, partners were asked to fill a questionnaire for ranking the co-benefits by importance individually. Once briefly presented the outline and recalled the rules of WCM, participants were organized and seated in already outlined small groups of 7–8 people with a facilitator at each table. Groups were composed in the most diverse way possible (cities and professional affiliations were mixed) to reproduce composition of partners network, gain meaningful discussions and produce new insights.

Each table had the previously presented co-benefits as cards on their table, blank cards for writing new co-benefits they could come up with, and poster materials prepared for them. To establish an informal atmosphere, participants could get coffee or snacks anytime. Three questions (or tasks) were given to be developed through the WCM: (i) among those listed, what do you think are the most important co-benefits for your cities? (ii) If the co-benefit expresses itself in all its potential, what would be the situation in your city at the end of the project? (iii) Find consensus and rank the top five important co-benefits for your cities. After discussing for about one hour, stimulated and guided by the facilitators, each table created a poster which one person for each group presented to all participants at the plenary session. The whole process was audio recorded, including the final presentations.

5 Discussing Results

The activity developed in Seville involved 38 participants, organized into six groups, lead by as many facilitators. At the end of the session, six posters were collected, as many audio recordings, and later on facilitator’s notes.¹ This practical application got us interesting results concerning the adaptation of the

¹Two facilitators did not follow our request to hand in reflections of the discussion as notes, and after it became clear that audio recordings were unusable.

Box. 1 List of nineteen key urban co-benefits detected in EU projects (based on Bisello 2017)

Smart natural environment	<ol style="list-style-type: none"> 1. Local air quality improved. Shifting heat and power production from fossil fuels to renewables, and decreasing energy needs, reduces air pollutants (e.g. SOx, NOx, particulate matter), with positive effects on human health. 2. Environmental resources management improved. Establishing a better way to manage environmental resources reduces the environmental footprint of human activities, with positive effects on ecosystems.
Smart services	<ol style="list-style-type: none"> 3. Health and well-being of residents increased. Improving the indoor thermal comfort and spatial quality in dwellings increases living and psychological conditions of occupants.
Smart community	<ol style="list-style-type: none"> 4. Fuel poverty tackled. Reducing energy expenses to an affordable level, even for low-income people, can lower harmful effects to health, caused by indoor thermal shocks (in summer as in winter). 5. Users awareness on energy-related issues increased. Educational and communication activities change positively stakeholders and tenants energy behaviour and acceptance of new technologies. 6. Neighbourhood identity enhanced. Creating new neighbourhood relationships and sense of place will lead to the formulation of dense social networks and ultimately better economic and social outcomes.
Smart governance	<ol style="list-style-type: none"> 7. Innovation in processes and decision-making. The exchange of experiences introduces innovation, with a positive improvement of the quality and effectiveness of decision-making. 8. Territorial attractiveness increased. An exemplary smart and sustainable district attracts visitors interested in innovative and green solutions (e.g. institutions, public officials, researchers or green tourists). 9. Institutional relationship and networks created. Creating and strengthening existing relationships between partners and cities leads to further joint activities and collaboration.
Smart economy	<ol style="list-style-type: none"> 10. Positive change in local tax revenue. Creating new jobs and economic activities will positively affect the local public revenues. 11. Softer loan conditions. Large scale interventions financially supported by the European Union can be interesting for banks and other investors and therefore negotiate better financial conditions. 12. Local labour market stimulated. New direct or indirect job positions are created from the implementation of construction activities, project management and other intervention measures. 13. Local energy supply chain established. Developing new energy supply chain using local renewable sources or by-products (e.g. waste-to-energy, bio-energy) generate additional revenues. 14. Energy services developed. Developing innovative energy schemes allow us to cover refurbishment intervention costs without additional expenses for tenants or owners. 15. Innovation in technology development and adoption. Companies involved in the project will be frontrunners in the adoption of innovative solutions and therefore have an advantage over their competitors on the market. 16. Professional skills development. An increase in knowledge and know-how of professionals and practitioner on innovative processes and energy technologies augment productivity and competitiveness.
Smart built environment	<ol style="list-style-type: none"> 17. Property value increased. Green (new and retrofitted) buildings with attractive features and high energy performance have a property value premium exceeding the expected economic value of energy saving. 18. Costs reduction of buildings life cycle. Large scale interventions which introduce efficient technologies, lower construction costs (allowing economy of scale) and reduce maintenance, repair and operation costs. 19. Resilience of energy infrastructures increased. Better response to loads peaks (the ability to prevent and react to them) and to adverse climatic events increases efficiency and safety in energy systems, reducing interruptions and blackouts.

WCM to the case study, as a successful collective opinion-building tool. Moreover, it delivers noticeable information about discussion dynamics among project partners and finally the co-benefits joint ranking, as reported in the poster session.

5.1 Adaptations

The four main changes introduced in the usual WCM setting concerned table composition, freedom of movement, plenary poster session, and audio recording. Instead of letting participants free to approach the desired table, we introduced a pre-defined table composition, aimed at a mixture of affiliation and represented

cities. Variety within the groups was necessary to spark diverse and lively discussion in a short time.

Secondly, participants were divided into varied composed groups and stakeholders were invited not to change table during the session, as our purpose was to reproduce the composition of partners' network of the project. In our particular study, this proved preferable, as we found in facilitator's notes, that participants needed some time to warm up to the tasks at hand and each other.

Third, each table appointed a speaker, presenting results during the plenary session. Instead of exchanging insights by switching tables, we asked our participants to present each table's findings in the last step to the whole group. Borrowing from focus group methods, we were also interested in how each group discussed the given questions and their answers as a group, instead of one common result.

The last point concerned the attempt to an audio recording of group discussion, as usually done during a focus group session. Since the audio recording of the group discussions did not work out, due to the noise of many people in one room, facilitators were asked to hand in reflection notes on their table's discussion. These notes gave insight into group dynamics, as well as how the group responded to questions and tasks. To understand the results (posters) and group conduct, it proved necessary to have data on the process of finding an agreement within each group.

5.2 Group Discussion Dynamics

In each discussion interlocutors influence each other, but also opinions are not always voiced (e.g. lack of commitment, silent protest) and views might change over the course of a conversation (Krueger 1998, 20f.). To assess these dynamics, we asked table moderators to provide notes directly after the WCM about what the discussion on their table was like and what interesting dynamics they observed. These notes showed that the groups were uncertain about how to start, what they had to do at the beginning of the discussion or had long debates about certain issues that seemed more relevant in some cities (or to some stakeholders) than others. Different perspectives and city specifics were noticed between stakeholders from demo cities, early adopters and different socio-political contexts in the discussions.

Highlighting, that cities and experiences of particular contexts often were contrasted with each other, rather than stressing similarities between them. However, some notes also show, that after a while, and forced by the task to find a jointly ranking, participants did find similarities, became friendlier with each other and exchanged their particular experiences for common, long-term objectives of making cities more sustainable. In the discussion of group C for example, the facilitator noted, that based on an experience within one particular city, an issue was highlighted, relevant to other stakeholders and cities for their retrofitting endeavor. This group managed to come up with a "portfolio" for what they thought to be one of the most important issues within a project like SINFONIA.

[...] participants were focusing on “health and well-being of tenants increased” (they decided to precise that this concern[ed] only occupants of refurbished buildings). They stressed how (based on the experience of Innsbruck), the energy efficiency issues seem to be not so relevant, in comparison with improving living conditions by adding balconies or lifts to quite old buildings. [...] Then most of the time was spent debating among three co-benefits: they grouped them into a “portfolio” related to social capital: “institutional relationships, new procedures, innovation in technology”. They pointed out how relevant is the contribution of such projects in increasing trust among partners, personal contacts and forcing companies to find new solutions to overcome complex situations. (Group C, facilitator’s notes)

This group’s interpretation of the co-benefit “health and well-being increased” encountered two qualifications as (i) tenants, not residents were defined as a target group and (ii) retrofitting measurements were not seen as enough to argue for tenants’ improvement of life. This concept is related to another co-benefit, suggested by group D: “Degree of satisfaction of the end-users”.

Qualifying presented co-benefits as a group indicates an active and lively engagement with the questions and tasks of this WCM. Group F, for instance, came up with the slogan “from grey to green” to capture a common objective within each city. This group also thought of the new co-benefit “transforming innovation to mainstream life”, which summarized their objective to transforming and linking “user awareness and behavior [particularly regarding energy consumption], innovation and technology development”. Networks between partners, innovators, and end-users become strategically important. Indeed, effective networks support changes towards social, technological, governance and other kinds of innovation to “mainstream life”:

In involved institutes in SINFONIA something is changing because different offices or parts of institutes have to talk one each other and have to discuss with external stakeholders. (Group D, facilitator’s notes)

Other interesting insight offered reflections from facilitators for group F and C, as they noted that sometimes particular or more experienced participants dominated the discussion, while moderator for group D stressed, “A real agreement was not found”. Still, the discussions and tasks of WCM can be seen as successfully bringing together stakeholders, exchanging early experiences, problems and overcoming barriers between them, as the same facilitator for group D pointed out in the notes.

5.3 Joint Ranking

Moreover, it was interesting how the groups managed to come up with a joint ranking of most relevant co-benefits. According to group C and D facilitators’ notes, the co-benefit “increasing assets value” was debated in the group sessions, although it did not end up in one of the rankings in the end. In both discussions, this was a disputed issue as there are different contexts in which the project is set in.

Groups not only discussed one particular co-benefit in detail but also questioned how to measure some co-benefits and their direct connection to the SINFONIA project within its lifetime: e.g., “improvement of the local air quality”, “local labor market stimulated” (group E). Group E acknowledged the importance of these issues (ranking them) but questioned whether the project could be concerned with such long-term goals that reach beyond the project’s grasp.

Most prominent themes were those concerned with improving living conditions, technical and governance innovation, building social capital (institutional networks, relationships) and skills. Many groups and participants connected or even paired co-benefits together. Group F debated the value of “softer loan conditions” and argued that investment is important to get activities started. Still, the group ended up ranking “Institutional relationships and networks created” instead of “Softer loan conditions”, as they felt that this was the much-needed baseline for improving relations between partners and—in the end—tackling environmental issues. Networks, personal contact, better organization and institutional barriers were often topics of discussion according to facilitators’ notes. Exchanging specific contexts of these issues common goals most often featured improvement of residents’ well-being and social components. As reported by group E, facilitator’s notes “If we had to summarize the session, we could say that the impact on people was considered the most important and measurable among the co-benefits”.

Aside from “smart services”, the ranking of co-benefits dealing with other smart city categories shows a diverse picture at first. As displayed in Fig. 1, almost all groups were focused on co-benefits falling within at least three different smart city categories, while group B had a clear focus on only two. In general, co-benefits referring to the smart governance, smart economy and smart services appeared as most important and desirable aspects of the SINFONIA project.

Moreover, three out of the six groups mentioned smart community aspects and smart build environment only concerned two of them. Just one group ranked smart

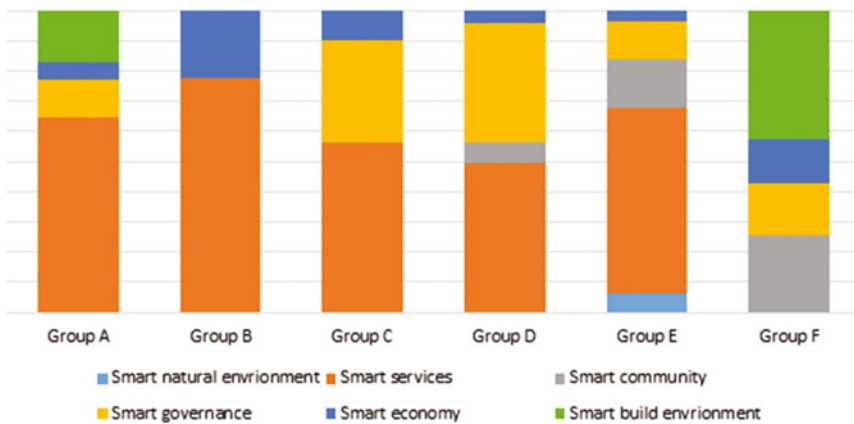


Fig. 1 Poster session results: distribution of co-benefits among smart city categories

natural environment aspects. For our study, this indicates that economic (smart economy) benefits, improving political and organizational networks (smart governance/community) and overall enhancing of resident's/tenant's life (smart services) are seen more important than direct effects on building structure (smart build environment) or natural resources (smart natural environment).

6 Conclusions

Creatively mixing WCM with other methods and introducing the topic beforehand proved successful in previous studies, as did its use for understanding collective insight of complex issues. Thus, adopting WCM fitted our specific aim of bringing together various perspectives in an informal setting to define collective insights, exchange ideas and grasp the cooperative attitude (Brown and Isaacs 2007) towards co-benefits of the SINFONIA project.

Merging WCM with the approach of focus groups (Morgan and Bottorff 2010; Morgan and Scannell 1998) enabled us to access group dynamics, and deal with the challenge of the diverse backgrounds and unfamiliarity of participants of this inquiry. Discussions were sometimes long and difficult at the start, as moderators indicated. However, the questions and tasks given in WCM brought out at least smaller agreements and positive conversations between different positions. Participants were understood as a group(s) and became to understand each other and themselves as a collective with common goals (co-benefits) to strive for; even if geographical belonging and social, political and economic contexts influence discussions on co-benefits.

Anyway, at the end of this practical application, preference emerge towards co-benefits involving end-user behavior and intangible assets became clear. Overall indicating a higher interest in social aspects of co-benefits from the retrofitting endeavor, an essential concept to bear in mind during the next project phases.

A further research step will be to reassess the same group in a similar way after the project has finished. Introducing this additional element, we will borrow the logic from Delphi method, which lets participants predict future events or compare them later on with an earlier investigation in order to cope with unknown (problems) (Häder and Häder 2000, 12f.; Linstone and Turoff 1975). In this step, we plan to present the results of our first WCM to the same participants. We are going to ask which of their anticipated co-benefits came true, which failed, and what proved to be vital. By letting our participants reflect ex post, a threefold goal is achievable: understand our group's collective evaluation of co-benefits, compare it to their individual answers in a questionnaire and—in the last instance—see if they can report how expectations of co-benefits have met with reality. The purpose of this paper is finally to suggest the adoption of additional non-monetary criteria in assessing projects, suitable to measure and estimate ethics and social effects in cooperation with stakeholders. This way we interpret the message of the encyclical letter "Laudato si", that provides the reference point of the annual SIEV

Symposium 2016, as an invitation to overcome profit as the sole criterion for valuation and to offer an enhanced stakeholder participation in the definition of the valuation metrics. Moreover, the encyclical letter suggestions can be considered in the definition of weights, which can be attributed to the different objectives.

Acknowledgements Authors would like to acknowledge the colleagues and the SINFONIA project partners involved in the World Cafè. The research leading to these results has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No. 609019. The European Union is not liable for any use that may be made of the information contained in this document, which is merely representing the author's view.

References

- Bell ML, Davis DL, Cifuentes LA, Krupnick AJ, Morgenstern RD, Thurston GD (2008) Ancillary human health benefits of improved air quality resulting from climate change mitigation. *Environ Health Glob Access Sci Source* 7:41
- Bisello A (2017) Smart and sustainable projects at the energy-district level. How to assess them based on the co-benefits paradigm. Ph.D. thesis, University of Padua
- Bisello A, Grilli G, Balest J, Stellin G, Ciolli M (2017) Co-benefits of smart and sustainable energy district projects: an overview on economic assessment methodologies. *Green Energy Technol* 127–164
- Broom M, Brady B, Kecskes Z, Kildea S (2013) World Cafè Methodology engages stakeholders in designing a Neonatal Intensive Care Unit. *J Neonatal Nurs* 19(5):253–258
- Brown J, Isaacs D (2007) *Das World Cafe: Kreative Zukunftsgestaltung in Organisationen und Gesellschaft*. Carl-Auer, Heidelberg
- Brown J, Isaacs D, World Cafe Community (2005) *The World Cafè: shaping our futures through conversations that matter*. Berrett-Koehler Publishers Inc., San Francisco
- Chang W-L, Chen S-T (2015) The impact of World Cafè on entrepreneurial strategic planning capability. *J Bus Res JBR* 68(6):1283–1290
- Copenhagen Economics (2012) Multiple benefits of investing in energy efficient renovation of buildings. *Impact on Public Finances*, Copenhagen
- Di Nucci RM, Spitzbart C (2010) *Concerto socio-economic impact assessment report*. Wien
- Häder M, Häder S (2000) Die Delphi-Methode als Gegenstand methodischer Forschungen. In: Häder M (ed) *ZUMA-Publikationen. Die Delphi-Technik in den Sozialwissenschaften. Methodische Forschungen und innovative Anwendungen*. Westdt. Verl, Wiesbaden, pp 11–31
- IEA (2014) *Capturing the multiple benefits of energy efficiency: a guide to quantifying the value added*. IEA, Paris
- Krueger RA (1998) *Analyzing & reporting focus group results*. Focus group kit, vol 6. SAGE, Thousand Oaks
- Kühn T, Koschel K-V (2011) *Gruppendiskussionen: Ein Praxis-Handbuch*. SpringerLink: Bücher. VS Verlag für Sozialwissenschaften, Wiesbaden. Springer Fachmedien Wiesbaden GmbH, Wiesbaden
- Linstone HA, Turoff M (1975) Introduction. In: Linstone HA, Turoff M, Helmer O (eds) *The Delphi method. Techniques and applications*. Addison-Wesley, Reading, Mass, pp 3–12
- Mayrhofer JP, Gupta J (2016) The science and politics of co-benefits in climate policy. *Environ Sci Policy* 57:22–30
- Morgan DL, Bottorff JL (2010) Advancing our craft: focus group methods and practice. *Qual Health Res* 20(5):579–581

- Morgan DL, Scannell AU (1998) Planning focus groups. Focus group kit, vol 2. SAGE, Thousand Oaks
- Nicholls J, Lawlor E, Neitzert E, Goodspeed T (2012) A guide to social return on investment. The SROI network
- Ritch EL, Brennan C (2010) Using World Café and drama to explore older people's experience of financial products and services. *Int J Consum Stud* 34(4):405–411
- Seliger R (2008) Einführung in Grossgruppen-Methoden. Carl-Auer-Systeme-Verl, Heidelberg
- Ürge-Vorsatz D, Herrero ST, Dubash NK, Lecocq F (2014) Measuring the co-benefits of climate change mitigation. *Annu Rev Environ Resour* 39(1):549–582
- Ürge-Vorsatz D, Kelemen A, Tirado-Herrero S, Thomas S, Thema J, Mzavanadze N, Hauptstock D, Suerkemper F, Teubler J, Gupta M, Chatterjee S (2016) Measuring multiple impacts of low-carbon energy options in a green economy context. *Appl Energy* 179: 1409–1426
- US EPA (2011) Assessing the multiple benefits of clean energy. A resource for states
- Takahashi M, Nemoto K, Hayashi N, Horita R (2014) The measurement of dialogue: from a case study of the workshop using world café as a collective dialogue method. *J Inf Process* 22(1):88–95

An Integrated Assessment Framework for the Requalification of Districts Facing Urban and Social Decline



Francesca Abastante and Isabella M. Lami

Abstract The ecologic issue highlighted by the Encyclical letter *Laudato Si'* (Francesco 2015) is a complex problem involving environmental, economic and social aspects. The aim of this paper is to propose an Integrated Assessment (IA) framework based on the systematic application of the Stakeholders' Analysis (SA), the Strategic Choice Approach (SCA), the MACBETH Multicriteria Analysis and the Discounted Cash Flow Analysis (DCFA) to support the decision process related to the requalification of districts facing urban and social decline. In the proposed approach, the SA is used to determine the key actors involved in an urban and territorial transformation. While the SCA is used to identify potentialities and constraints of an urban area to define a master plan, the MACBETH method is applied to compare various alternative projects, and the DCFA aims at evaluating the economic performance of the proposed intervention. As a case study, the IA framework has been applied to a simulated academic process for the transformation of the Tür und Taxis district near the Molenbeek district in Brussels (Belgium). During the research, we interfaced with many real stakeholders involved in the transformation of those areas.

1 Introduction

In recent years, urban and territorial transformations are at the core of a huge debate that focuses on the multidisciplinary sustainability concept and involves economic, environmental and social aspects. As a matter of fact, the growing consumption of natural resources, the global financial crisis and profound social changes highlight the need for a radical improvement in urban transformation approaches. In this sense,

F. Abastante (✉) · I. M. Lami
InterUniversity Department of Regional and Urban Studies
and Planning (DIST), Politecnico di Torino, Turin, Italy
e-mail: francesca.abastante@polito.it

I. M. Lami
e-mail: isabella.lami@polito.it

the human factor has become fundamental to pursue the integration of various social groups and the improvement of their living conditions (Lami and Abastante 2017). In this respect, one of the main argument of the Encyclical letter *Laudato Si'* (2015) is the “disintegration of our cities” (p. 49) understood as physical and social wounds. In the aforementioned Encyclical letter, Pope Francesco I underlines that “The social dimensions of global change include the effects of technological innovations on employment, social exclusion, an inequitable distribution and consumption of energy and other services, social breakdown, increased violence and a rise in new forms of social aggression, [...] and the loss of identity. These are signs that the growth [...] has not always led to an integral development and an improvement in the quality of life. Some of these signs are also symptomatic of real social decline” (p. 46) [...]. [In order to face this complex problem] to “have access to adequate and reliable information in order to make decisions for the common good [...] it calls for a comprehensive approach which would require [...] interdisciplinary research capable of shedding new light on the problem” (p. 135).

This concept requires qualitative and quantitative methodologies able to support the urban and territorial transformations considering environmental, economic and social aspects in an integrated perspective. According to Bryman (2006), “combining quantitative and qualitative research has become unexceptional and unremarkable in recent years” to pursue the concept of “knowledge generation” (Te Brömmelstroet and Bertolini 2010). This concept is essential to find planning solutions not only coming from “expert knowledge”, but also legitimated by “common knowledge” (Cerreta and Del Toro 2012).

The present research contributes by proposing an Integrated Assessment (IA) framework (Lee 2006; Creswell et al. 2011) in which the concept of “evaluation” is conceived as deeply embedded in urban–transformation, decision processes, affecting and evolving with them. The IA framework proposed is based on the systematic application of the Stakeholders’ Analysis (SA—Ackermann and Eden 2010), the Strategic Choice Approach (SCA—Friend and Hickling 2005), the Multicriteria Analysis (MCDA—Figueira et al. 2005) and the Discounted Cash Flow Analysis (DCFA—DeFusco et al. 2015).

As a case study, the IA framework has been applied to a simulated academic process for the transformation of the Tür und Taxis district near the Molenbeek district in Brussels (Belgium). Despite this area being located near Brussel’s city center, it is characterized by physical and social decline. The great discomfort felt by the people living there has contributed to the recent exacerbation of the existing, difficult social relationships, resulting in the international terror phenomena. It is important to underline that the IA framework proposed does not intend to solve terrorism issues, but it can constitute a useful method for assessing complex urban and territorial problems.

The reminder of this paper is organized as follows: Sect. 2 overviews the proposed IA framework. In addition, the main principles of the four methodologies applied are represented. Section 3 illustrates the simulated academic process in which the IA framework has been tested, and, finally, Sect. 4 discusses the results and possible developments.

2 Integrated Assessment Framework

Among the different IA methods (Creswell et al. 2011), the multiphase one has been chosen since it makes possible structuring the subsequent phases of the problem formulation based on a dataset comprising the results of the previous one (Creswell and Plano Clark 2011; Bottero 2015). The SA, the SCA, the MCDA and the DCFA are powerful methods of analysis and evaluation that can inform each other and foster synergies. The IA framework proposed is represented in Table 1 highlighting the strengths and weaknesses of each adopted method.

The SA is used to explore the social relationships' contexts and to identify the key actors involved in the urban and territorial transformation. The SCA can be applied to structure a workshop aimed at identifying potentialities and constraints of an urban area and defining a masterplan's proposals. The MCDA can be utilized to compare various alternative projects and to define the main criteria to be considered for an effective project. Finally, the DCFA aims at evaluating the economic performance of the proposed intervention.

2.1 Stakeholders' Analysis (SA)

In territorial transformations, the stakeholders are understood as the individuals or organizations that take actions able to influence the decisional outcomes (Dente 2014). They represent the core of any possible theoretical model because they have access to various resources, they can play different roles, and they pursue multiple goals regarding the problem under examination and its possible solutions. Therefore, the first step of a decision process consists of the identification of the stakeholders and their objectives. To this end, many stakeholder-mapping techniques exist (Ackermann and Eden 2010).

The present research focuses on the "power/interest grid" technique revised by Ackermann and Eden (2010). Through this SA technique, it is possible to answer the following questions: Who are the stakeholders? Are there any coalitions or conflicts among them? What are the stakeholders' interests? How can the stakeholders' reach their goals? The "power/interest grid" enables analyzing four categories of stakeholders according to their potentials to affect the decision process. The stakeholders are identified as "Subjects" and "Players". In fact, while the "Subjects" have low influence in the transformation under study, the "Players" have a high degree of power to support (or sabotage) the project. The two remaining categories can be seen as "potential" stakeholders: the "Crowd" is a potentially infinite category since it exhibits neither interest in, nor power to, influence the process. On the contrary, the "Context Setters" could have greater power to influence the process, but they have not showed interest to it.

Table 1 The characteristics of the adopted methods

	SA	SCA	MCDA	DCFA
Input	Stakeholders involved	Positive and negative impacts, qualitative and quantitative data	Positive and negative impacts, qualitative and quantitative data, utility functions, weights	Costs and revenues, discounted rate
Output	Strategy to adopt	Strategy to manage uncertainty	Ranking, compatibility judgment	Judgment of private convenience
Participation	Fundamental	Fundamental	Fundamental	Possible
Strengths	It enables identifying powers and interests of the stakeholders	It decomposes complex problems	It represents a decision process with high plausibility	Communicative results
Weaknesses	It requires an effort to identify the stakeholders	It requires a huge amount of information	Subjectivity, sometimes it gives variable results	It does not consider externalities

2.2 Strategic Choice Approach (SCA)

The SCA is a decision-centered methodology for “planning under pressure” (Friend and Hickling 2005). It enables dealing with the uncertainty of problematic situations and decisions being carried out to assist a group of stakeholders in deciding on which strategy to follow, showing the relationships between seemingly unconnected sectors. Through the SCA, the stakeholders try to clarify situations and resolve uncertainties by raising and comparing alternatives for making decisions of a strategic nature and discussing solutions. According to Friend and Hickling (2005), the SCA decomposes the decision process into four cyclical modes: (1) In the *shaping mode*, the stakeholders establish which are the decision areas and the decision links in order to decide which areas are urgent. A decision area is an opportunity for choice in which two or more courses of action can be considered. A decision link is a relationship between two decision areas expressing a belief that it could make a difference to consider them jointly instead of separately; (2) In the *designing mode*, the most urgent decision areas are analyzed in detail in terms of various decision options and their interconnectedness. During this phase, the Analysis of Interconnected Areas (AIDA) is applied in order to identify the incompatibilities among the options involving the various feasible combinations; (3) In the *comparing mode*, the various combinations of the decision options previously identified are compared, based on the key criteria; (4) In the *choosing mode*, the stakeholders develop considerations about the uncertainties affecting the most promising schemes of decision options. Moreover, they try to identify stepwise decisions in order to deal with the uncertainties that have emerged.

2.3 *Multicriteria Decision Analysis (MCDA)*

The Multicriteria Decision Analysis (MCDA) is a widely used tool in territorial transformations context (Figueira et al. 2005). MCDA makes it possible to take several criteria into account simultaneously in a complex situation and to make comparative assessments of alternative options or heterogeneous measures. They are designed to help the stakeholders to integrate the various options in a prospective or retrospective framework (Abastante 2016; Lami et al. 2014; Lami and Abastante 2014). As the MCDA approaches are countless, it is necessary to reflect on the most suitable method for the decision context at hand (Roy and Slowinski 2013). In the present research, we choose to apply the MACBETH method (Measuring Attractiveness by a Categorically Based Evaluation Technique) (Bana y Costa et al. 2010), which is based on the Additive Value Model and requires only qualitative judgments about differences of value to help a group of stakeholders quantify the relative attractiveness of the options. Starting from qualitative judgments, the MACBETH method enables the construction of quantitative-values model supporting an interactive learning process about the problem and the elaboration of recommendations.

The application of the MACBETH method can be divided into three main phases: (i) During the *Model Structuring* phase, the options and their performances, as well as the values of concern, are identified and organized in a visual overview; (ii) In the *Evaluating* phase, the MACBETH involves a series of pairwise comparisons, in which the stakeholder is asked to specify the difference of attractiveness between the alternatives and the criteria according to the following semantic categories: Extreme, Very Strong, Strong, Moderate, Weak, Very Weak and No (no differences between the elements); (iii) the *Analysis of the results* involves discussing the results in the form of ranking, to identify the attractiveness of the problem's criteria and/or alternatives.

The choice of this particular MCDA methodology is based on several reasons. First, the MACBETH is a simple and understandable methodology even by those who are not experts in the decision process. Second, its technical parameters have a clear and easily explicable, substantive interpretation allowing the processing of difficult problem of the relative importance of criteria in a precise way. Third and last, the M-MACBETH software employed and the interaction protocol are compatible with the way of reasoning of the people interviewed and with their understanding of useful results.

2.4 *Discounted Cash Flow Analysis (DCFA)*

The DCFA is a very well-known economic and financial analysis tool, which aims at the maximization of the monetary income that can be obtained from an investment. The DCFA identifies the full range of costs and incomes of a project to enable

the stakeholder to understand if minimum objectives are achievable (Bottero 2015). Generally speaking, the realization of a territorial transformation is not an immediate monetary operation: the costs and incomes connected with the transformation at stake are distributed over time and are not homogeneous. Therefore, it is necessary to address two different problems: to evaluate the transformation's costs and incomes related to each year of the project and to homogenize all those values so as to actualize them to the present time.

A DCFA involves four main steps: (i) defining the cash-flow (cash payment and disbursement) period; (ii) determining the final value; (iii) choosing the period of the analysis; and (iv) determining the economic and financial performance criteria. The fourth step is crucial to enable the stakeholders to interpret the indicators and understand if the transformation is feasible or not. The most-used performance criteria are the Net Present Value (NPV) and the Internal Rate of Return (IRR). The NPV is the principal profitability indicator representing the difference (in monetary terms) between the costs and revenues. The IRR is the interest rate at which the net present value of all the cash flows from a project equal zero. It is possible to state that the transformation at stake is feasible if the IRR is greater than a pre-determined threshold.

3 Case Study

The IA framework presented has been applied to an academic process¹ for the transformation of the Tür und Taxis district in Brussels (Belgium). However, the case study has been subject to a real discussion with the Municipality of Brussels about the possible transformation of the area under study. Tür und Taxis is located in the city center near the notorious Molenbeek district. Despite they're being normatively separated, they are considered as one big district in the hypotheses of the new masterplans of the Brussels municipality. In this sense, the aforementioned districts are social-mix collectors characterized by the presence of many bottom-up social initiatives. Nevertheless, it is possible to recognize three different architectural and social sections: (i) the area of the larger streets and the middle class; (ii) the area of small, single-family houses in which the quality of life is still quite good; and (iii) the crumbling area configured as a slum in which most of the immigrants live and which is characterized by a high unemployment rate.

¹The figures contained in Sect. 3 are the result of the work conducted by the students participating to the decision process presented here and attending the Master class of "Project Appraisal" (Prof. Isabella M. Lami), part of the Design Unit "Living social and sustainable", Politecnico di Torino, 2015.

These elements contributed to physical, architectural and social discomforts that caused the current frustration of the second-generation immigrants living in the districts and providing a breeding ground for radical elements.

The academic research presented provides an IA framework to propose effective masterplans considering the complexities of the districts under study (Table 2). The physical and social discomfort characterizing the districts can be tagged through the keywords recognizable in the Encyclical letter *Laudato Si'* (2015). The physical discomfort can be identified as: (i) a lack of policy governance; (ii) a problem in the affordability of houses; and (iii) the poor quality of the buildings. The social discomfort can be identified as: (i) the social rage and violence; (ii) the fragmentation of various ethnicities; and (iii) economic privation. In line with the Encyclical letter *Laudato Si'*, the ecologic issue has been considered as both a cause and a result of both physical and social discomforts.

Operatively, the students participating in the present research have been grouped. This resulted in different applications of the IA framework proposed and dealing with the identified keywords in an integrated perspective.

3.1 *Application of the SA*

To identify the main actors involved in a transformation of the TÜR und TAXIS district, we first propose the application of an SA (Dente 2014). Despite our proposal of an academic application of the IA framework, we interfaced with many stakeholders, such as: the municipality of Brussels, citizens, private investors, associations, experts on the territorial context and the Community Land Trust. Understanding the dynamics of the stakeholders within the decision process and the available resources was fundamental to focusing on one element in particular of physical discomfort (defined as “policies” in Table 2) and several elements of social discomfort (“environment”, “violence” and “fragment” in Table 2) of the area, characterized by the overall complexity of the Belgian system, to harmonize the three communities that form the country, and some critical situations that connote the particular site.

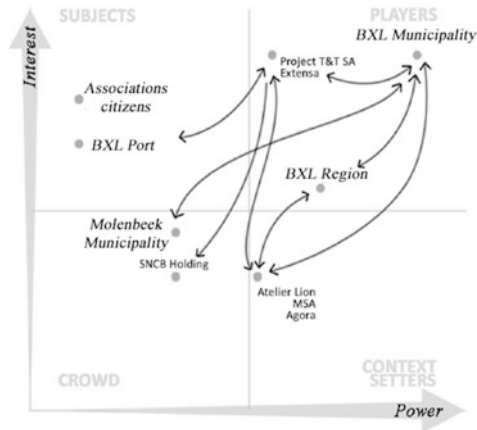
Following the theory of Ackermann and Eden (2010), each group of students analyzed the stakeholders, providing a “power/interest grid” (Fig. 1). The stakeholders in this case were all the individuals or entities/institutions related to or affected by a new masterplan for the TÜR und TAXIS district.

The development of the SA enabled that the stakeholders be declared and that their interest/power be discovered. In this sense, the SA has been used as a tool to create a knowledge base for the definition of the following steps of the IA framework.

Table 2 Physical and social discomfort

	Physical discomfort				Social discomfort		
	Policies	Affordability	Quality	Ecologic	Violence	Fragment	Debt
SA	X			X	X	X	
SCA	X	X	X	X		X	
MCDA	X			X	X	X	
DCFA		X	X	X			X

Fig. 1 Example of power/interest grid for the Tür und Taxis district



3.2 Application of the SCA

Starting from the SA, the second step of the IA framework proposed involves the application of the SCA approach to structure the problem situation and to discuss possible solutions through workshop.

Following the SCA methodology, the groups of students first identified the decision areas (i.e., transport, affordability, parking, functions), as well as the links between them. Second, starting from the most urgent areas, the group of students proposed various decision options. During this phase, they applied the AIDA to identify the incompatibilities and to design feasible sets of options. Finally, the combinations of decision options identified have been compared, based on the various criteria.

The SCA in the present application of the IA framework has been very useful to make possible a deep analysis of the territory under study, taking into account various perspectives and focusing on the elements of physical discomfort. The SCA largely contributed to reducing the projects' uncertainty, supporting the definition of the guidelines of the main strategic masterplan.

3.3 Application of the MCDA

After having defined various proposals for the masterplan, the IA framework provides an alteration in the transformation scale: from the strategic level of the master plan to the architectural level of the buildings. This step is fundamental to tackle the aspects concerning physical discomfort, i.e., the affordability of houses and the quality of the buildings. Starting from the directions of the municipality of Brussels, each group of students was asked to define the best architectural characteristics of a specific building typology. For the sake of simplicity, we report here the analysis conducted for the “heavy houses”, which are massive multifunctional buildings characterized by an external hard shell and a flexible use of internal spaces. In order to support this step in the process, the third phase of the IA framework provides the application of the MACBETH method.

First, each group of students proposed three alternatives of “heavy houses”, starting from the strategic guidelines identified in the previous steps and to be evaluated and ranked according to the main criteria that characterize the problem, namely: economic values, building design, energy envelop performance and accessibility. Second, the criteria have been structured and compared to come to a priority ranking, both of the criteria and the alternatives (Fig. 2).

The results of the MACBETH method show that the buildings’ design and the economic values of the transformation are the most important aspects to design a sensible architectural project able to contribute to solving the physical and social discomfort of residents in the Tür und Taxis area.

Fig. 2 Example of MACBETH priority ranking



3.4 Application of the DCFA

The last step of the IA framework is related to the DCFA that has been developed for the best-performing alternatives resulting from the MCDA application.

In this phase of the analysis, each student worked independently, paying particular emphasis to the energy performance of the buildings. Each student's project is the result of a preliminary study in which various energy-saving solutions have been tested in terms of: technology to be adopted, costs of the energy technologies, maintenance/disposal costs and the energy requirements of the building. In this sense, the DCFA is a tool able to correlate aspects of both physical and social discomfort according to Table 2. For the solution showing the best energy and economic performances, the NPV and IRR have been calculated. In order to do that, each student determined the costs related to her/his own project (such as land costs, technical expenses, and building costs), as well as the incomes deriving from the future sale of the buildings.

4 Conclusions

This research complements the Integrated Assessment (IA) studies (Creswell et al. 2011; Creswell and Plano Clark 2011) with a proposal for an IA framework based on the systematic application of the Stakeholders' Analysis (SA), the Strategic Choice Approach (SCA), the Multicriteria Analysis and the Discounted Cash Flow Analysis (DCFA) to support the decision process related to the requalification of districts facing urban and social decline. The experiment reported in this paper represents one of a series of the IA framework's application in various case studies of urban transformations during the Master's courses at the Politecnico di Torino (held by the second author), which enable us to make some generalizations. Through the various steps presented, we are better equipped to affirm that this IA framework is able to tackle the issue of the "disintegration of our cities" (p. 49) taking into account the social exclusion, the growth of violence and rage and the loss of the social identity emphasized by the Encyclical letter *Laudato Si'* (2015). In fact, the IA framework proposed can contribute to making the decision processes more transparent and open to the dialog to produce sensible solutions shared among the parties involved in the transformation at stake (Encyclical Letter *Laudato Si'*, 2015). In this sense, the systematic integration of qualitative and quantitative methods is suitable to identify and tackle the physical and social elements of discomfort at a different scale and with technical perspectives (due to the architectural nature of the problem).

The further research direction will improve the IA framework proposed through the integration of Information and Communication Technologies (ICT), with particular reference to the visual representation. This would enhance the quality and quantity of the information available, helping the stakeholders "getting on the same page" and having a collective insight about the issue involved in the decision process.

References

- Abastante F (2016) Multicriteria decision methodologies supporting decision processes: empirical examples. *Geingegneria Ambientale e Mineraria (GEAM)* 149(3):5–18
- Ackermann F, Eden C (2010) Strategic options development and analysis. In: Reynolds M, Holwell S (eds) *Systems approaches to managing change: a practical guide*. Springer, London, pp 135–190
- Bana y Costa CA, De Corte JM, Vansnick JC (2010) MACBETH: measuring attractiveness by a categorical based evaluation technique. In: Cochran JJ (ed) *Encyclopedia of operations research and management science*. Wiley, New York
- Bottero M (2015) A multi-methodological approach for assessing sustainability of urban projects. *Manag Environ Q: An Int J* 26(1):138–154
- Bryman A (2006) Integrating qualitative and quantitative research: how it is done? *Q Res* 6(1): 97–113
- Cerreta M, Del Toro P (2012) Integrated spatial assessment (ISA): A multi-methodological approach for planning choices. In: Burian J (ed) *Advances in spatial planning*; ISBN: 978-953-51-0377-6
- Creswell JW, Plano Clark VL (2011) *Designing and conducting mixed methods research*. Sage, Thousand Oaks, CA
- Creswell JW, Klassen AC, Plano Clark VL, Smith KL (2011) *Best practices for mixed methods research in the health sciences*. National Institutes of Health, Bethesda, MD
- DeFusco RA, McLeavey DW, Pinto JE, Runkle DE, Anson MJP (2015) *Quantitative investment analysis*, 3rd edn. Wiley, London
- Dente B (2014) *Understanding policy decisions*. Springer, New York
- Figueira J, Greco S, Ehrgott M (eds) (2005) *Multiple criteria decision analysis. State of the art survey*, Springer, New York
- Francesco I (2015) Encyclical letter *Laudato Si'*. Tipografia Vaticana, Roma
- Friend J, Hickling A (2005) *Planning under pressure: the strategic choice approach*, 3rd edn. Elsevier, Amsterdam
- Lami IM, Abastante F (2014) Decision making for urban solid waste treatment in the context of territorial conflict: can the analytic network Process help? *Land Use Policy* 41(1):11–20
- Lami IM, Abastante F (2017) Social housing evaluation procedures: literature review and step forward. *Geingegneria Ambientale e Mineraria (GEAM)* 150(1):15–28
- Lami IM, Abastante F, Bottero M, Masala E, Pensa S (2014) Integrating multicriteria evaluation and data visualization as a problem structuring approach to support territorial transformation projects. *EURO J Decis Process* 2(2):281–312
- Lee N (2006) Bridging the gap between theory and practice in integrated assessment. *Environ Impact Assess Rev* 26(1):57–78
- Roy B, Slowinski R (2013) Question guiding the choice of a multicriteria decision aiding method. *EURO J Decis Process* 1(1):69–97
- Te Brömmelstroet M, Bertolini L (2010) Integrating land use transport knowledge in strategy-making. *Transportation* 37(1):85–104

Innovative Participatory Evaluation Processes: The Case of the Ministry of Defense Real-Estate Assets in Italy



Marcellina Bertolinelli, Luigi Guzzoni, Stefania Masseroni,
Lidia Pinti and Gianni Utica

Abstract The introduction of Public Deliberative Practices approach is not recent among all decision-making processes that are—directly or through associations representing collective interests—oriented to community involvement. Although the use of these practices is consensus-oriented, the pursuit of specific knowledge and choice democratization, involving communities and their territories together with man-made environments, become ever more important since it offers opportunities for discussions that designers, planners, promoters of processes are often reluctant to undertake. Now that Pope Francis claims that “*A consensus should always be reached between the different stakeholders, who can offer a variety of approaches, solutions and alternatives*”, the evolution of decision-making processes, forged over the past 10–20 years finds a new opportunity for legitimation. The theme of the Ministry of Defense’s actions concerning the disposal and development of the built heritage—widely debated during recent years—is likely to be one of the paradigms of transparency within the declined decision-making process, in particular, in relation to the Participatory Spaces Planning. The goals of the Ministry of Defense for the property sector are the rationalization and development of military infrastructures—in line with art. 26, DL 133/2014, so-called “Sblocca Italia”—through the optimization of the ones still needed and the allocation to other purposes of those not essential anymore. Once accepted, this scenario for urban and economic regeneration, aimed at increasing social welfare

M. Bertolinelli (✉) · L. Guzzoni · S. Masseroni · L. Pinti · G. Utica
Department of Building Environment Science and Technology,
Politecnico di Milano, Milan, Italy
e-mail: marcellina.bertolinelli@polimi.it

L. Guzzoni
e-mail: luigi.guzzoni@polimi.it

S. Masseroni
e-mail: stefania.masseroni@polimi.it

L. Pinti
e-mail: lidia.pinti@polimi.it

G. Utica
e-mail: gianni.utica@polimi.it

and quality of life, is necessary to establish a path for transformation, including participatory-planning processes starting from citizens' involvement. The recent and quick progress of Information Construction Technology (ICT) Systems that facilitate a successful organization of information allows the optimization of the decisional process and the achievement of more readable and, if possible, more sharable results between public entities and private citizens.

Keywords Accessibility · Participation · Communication · Alternative hypotheses · Rehabilitation · BIM · Public deliberative · Deliberative democracy

1 Introduction

*“A consensus should always be reached between the different stakeholders, who can offer a variety of approaches, solutions and alternatives. The local population should have a special place at the table; they are concerned about their own future and that of their children, and can consider goals transcending immediate economic interest”*¹ stated Pope Francis in his Encyclical letter *Laudato Si*.

The Holy Father used words such as consensus, perspectives and economic interest, which recall citizens' involvement models, known as participatory processes or participated design. Nowadays, participatory models and processes can involve *“the local population”* in public decisions, increasing the dialogue and transparency within the decision making. As Pope Francis stated: *“An assessment of the environmental impact of business ventures and projects demands transparent political processes involving a free exchange of views. On the other hand, the forms of corruption which conceal the actual environmental impact of a given project, in exchange for favours, usually produce specious agreements which fail to inform adequately and to allow for full debate”*.² The noun *participation* can have various meanings. The first is *“the action of taking part in any kind of activity, simply with the presence, with the accession, with the direct involvement, giving an actual contribution to the completion of the activity”*.³ At present, participatory processes have already included several national and international experiences. For some years, participatory practices have also been introduced in the Italian legislation, mainly within the urban regeneration context.⁴

¹Encyclical letter *Laudato Si*, 2016, p. 141 [183].

²Ibid. p. 140 [182].

³Treccani Dictionary.

⁴Bobbio and Pomatto (2007).

2 Participatory Models in Italy and Worldwide

Among the most-cited international best practices, there is participatory budgeting.⁵ Initiated in 1989 in the Brazilian city of Porto Alegre⁶, it was aimed at involving citizens in the destination of municipality's investments and in the distribution of transparent and balanced funds among the 16 neighborhoods of the city.⁷

In the early 1970 s, the topic of citizens' involvement had already been addressed by Ned Crosby⁸ in the USA and by Peter Dienel⁹ in Germany.¹⁰

In 1974, Ned Crosby founded the Jefferson Center in Minneapolis. He coined the term "citizens' jury", in order to describe citizens' formal involvement in topics of public interest, such as climate change and renewable-energy sources.

In France—following citizens' protests against the high-speed line of the TGV—the government decided to propose, in advance, the design of major works to a "*débat public*" among the various stakeholders. In 1995, the Commission Nationale du Débat Public was established—from 2002 an independent administrative authority—with the aim to promote and provide for public participation to the development process of infrastructure projects of national interest.¹¹

In Italy, the pioneer in this direction is the Fondazione Dioguardi—founded in 1991 by Gianfranco Dioguardi¹²—the objective of which is the application of the urban theory of "*quartiere laboratorio*": "...*territorial maintenance should be intended as a real cultural phenomenon, to realize through the use of new instruments experimentation...urban workshops of scheduled maintenance to place in quarters, historic city centres, suburbs. Furthermore, by reason of completion and support, it is necessary to reintroduce the concept construction site-event, to improve the communication on the urban territory*".¹³ The concept of 'construction-site event' takes inspiration from citizens' perception of major public works as lacerations of the urban fabric. By the way, they often imply having to coexist with long-term discomfort.

In this way, the construction site becomes a dark zone isolated from the context. The idea of the construction site-event intends to reverse the trend of making construction sites usable for communities "*It is necessary to change construction sites from disturbing elements into meeting and knowledge places. Across the*

⁵Albergo et al. (2005); Allegretti (2010); Carson (2006).

⁶Allegretti (a cura di) (2010)

⁷Bobbio and Pomatto (2007) p. 4.

⁸Ned Crosby, the American creator of the Citizens Jury process, in April of 1971.

⁹Peter Dienel, the German inventor of the Citizens Jury process.

¹⁰Ned Crosby and Peter Dienel stated that they had become aware of about each other's research only in 1985.

¹¹Bobbio and Pomatto (2007), p. 6.

¹²Gianfranco Dioguardi (Bari 1938), Italian academic and businessman. Among the founders of Management Engineering in Italy. In 1991, he founded Fondazione Dioguardi.

¹³Dioguardi (2001), Donzelli editore, Roma, 2001, p. 36.

knowledge, it is possible to build education and maintenance consciousness in citizens, that means in work in progress end users".¹⁴

In this regard, the construction site-event experience implemented in 1994, during the construction of the Lyon park auto in Place des Célestins, is a good example. A communication activity accompanied the work, addressed to the residents of the quarter, to students and young unemployed.¹⁵ Citizens' participation was put into practice with the construction of a balcony, a location from which the work can be safely observed. Informational letters were periodically placed in mailboxes and in shops. The physical symbol of integration between the city and the construction site was the parking timber model to scale 1:20 available for viewing—for the whole duration of the work—by construction site workforces, residents and students.¹⁶ Using scheduled maintenance laboratories and construction site-event, it is possible to carry out the operations, which Dioguardi defines "*socio-technical*", to continuously monitor the works and obtain interactive feedback in return.

Interaction in participatory processes could also be obtained using innovative technologies, such as the Building Information Modeling (BIM).

By the way, Dioguardi Foundation is adopting BIM tools as a "*creative tool for the construction site-event*"¹⁷ for the Restoration Project of the Lyric Theatre in Milan.¹⁸

3 Valorization of Unused Defense-Built Heritage

In the late 1990 s, a process for the disposal of military built heritage was launched to rationalize and re-functionalize the armed forces in better-equipped areas.¹⁹ The disposal reasons should be identified in the fact that defense built heritage was not supposed to answer to strategic aims in terms of location anymore. Moreover, these goods imply huge sums for maintenance and compliance with existing standards.

The Disposal Program of the Military built heritage started in 1997. Agenzia del Demanio—which acquired Ministry of Defense asset—launched in 2007 the first census of the government's buildings. After that, it was proposed to dispose of about one thousand buildings for a total amount of about four billions euros

¹⁴Dioguardi (2001), Donzelli editore, Roma, 2001, p. 37.

¹⁵To young unemployed has been offered the opportunity to follow a work-experience path in the construction site.

¹⁶Fondazione Dioguardi (2003).

¹⁷F. Maggiore, BIM: strumento creativo per il cantiere-evento, presentazione 15/09/2016, Milano.

¹⁸Lyric Theatre Restoration Project, executed by the Municipality of Milan through the use of BIM tools, supported by the Department of Architecture, Built Environment and Construction Engineering (ABC) of Politecnico di Milano.

¹⁹Turri (2012), p. XVIII.

(Fig. 1). Some years later in 2014, there was the task force for the valorization of “*Government buildings disposed because of their usefulness to military needs*” was established.

In April 2014, the Minister of Defense Roberta Pinotti underlined: “*they are buildings that citizens see in their cities not usable anymore, otherwise they could become source of employment, liveability spaces, richness and growth for the country*”.²⁰ These number some 1500 buildings²¹—a mixture of barracks, airports, arsenals, warehouses and training areas—of some 5000 thousand in 2014 that were part of the Ministry of Defense built heritage. These buildings—once being perceived as big holes—are little known and studied because of impassable boundaries that divide them from their surrounding social contexts. From an economic and financial point of view, the rehabilitation of barracks and areas occupied by other military functions implies the valuation of direct and indirect clean-up costs. Furthermore, they imply the simultaneous valuation of the economic sustainability and profitability of the Property Action. Moreover, underlining this, the rehabilitation of these buildings could affect the value of the surroundings and being itself influenced by that value. Then, the topic of the reintegration of military areas in the urban circuit occurred. This circuit is comprised of places experienced by citizens as an important and meaningful—even if not essential—part of their own lives.

Accordingly, the principle should be the valuation of the increase in social welfare, even before the asset-value growth. In this way, the revenues from their locations, accumulated because of the city changes, will be transferred only to private actors.

4 Building Information Modeling as a Tool to Improve the Participatory Process

As far as Pope Francis encourages us not to be suspicious and to embrace without fear the new information-technology systems, it is evident that we should promote and obtain a greater involvement, a greater learning opportunity and a comparison between various options. ICT and informative cutting-edge tools such as BIM make possible the simulation of alternative scenarios easily understandable even by non-technical people. They provide for transparency, data availability and verifiability. Those are necessary conditions in order to support consistent decision and participatory processes about the revaluation of social, economic and urban degraded areas.

Prof. Dioguardi expresses the need to conceive new design and planning methodologies: “*In the context of today’s daily reality, urban scheduled*

²⁰Ministry of Defense website www.difesa.it.

²¹Ministry of Defense (2015) Gruppo di Progetto “Valorizzazione degli immobili pubblici. Opportunità per il territorio”, Milan, 10 April 2015.

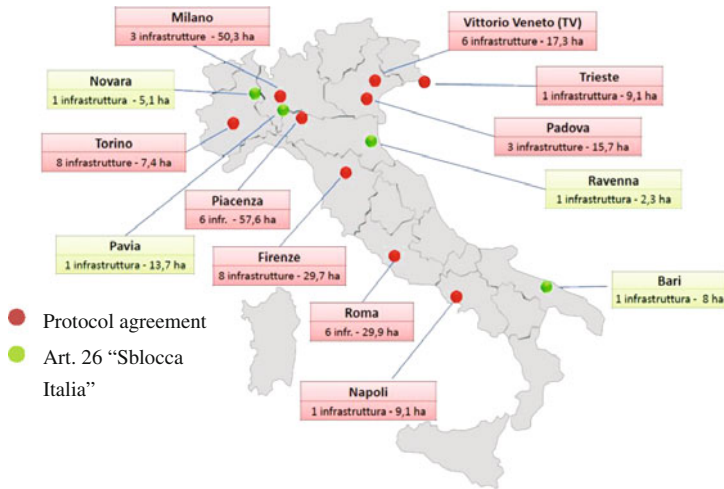


Fig. 1 Location of the buildings disposed, subjected to Protocol Agreement among the Ministry of the Defense, Agenzia del Demanio and some Municipalities included in art. 26 of “Sblocca Italia”. *Source* Ministero della Difesa, Gruppo di Progetto «Valorizzazione degli immobili pubblici. Opportunità per il territorio», 2015

*maintenance is a too often neglected concept. It should be re-considered and re-proposed to the attention of all citizens. It is necessary to conceive a new way to consider maintenance, using ICT tools through programming processes able to involve residents to a better use of the city. We should consider the scheduled maintenance in a socio-technical way for the city, just because it is addressed to citizens as an educational moment of individual and social life...”*²²

During the past years—in the period devoted to citizens’ observations—it is customary in public administration to include tables and design plans in institutional websites. The project is often “readable” just by technical experts in the field, and this could be a barrier to the full, informed participation of the community. This critical issue affects—or could affect—even the discussion among various actors during the public debates. This problem could be resolved through the adoption of ICT and informative tools such as the Building Information Modeling (BIM). Which elements can assist the participatory process and how? The use of a BIM model in public debates will make the project more understandable. It would increase the perception of both the dimensions and proportion of the work, even for non-technical people and also the changes it would bring to the context in which sits. A participatory process is implementable at all design levels. In fact, you can share a BIM model on specific virtual spaces, accessible and interrogable by all citizens, through virtual navigation in every part of the up-to-date model. During the preliminary stage, conceptual volumes would show citizens the project

²²Dioguardi (2001), Donzelli editore, Roma, 2001, p. 33.

extension. Thus, the definition of the project would involve both a more detailed graphic representation of the 3D model and the characterization of all elements with specific information. Indeed, a BIM model, apart from the undoubted communicative tool of the 3D graphic, makes it possible to select any element within the model (for instance, the wall with each single layer, windows frame, urban furniture etc.) getting information related to the typology, quality and quantity of the chosen material, plus related costs. From the design phase, the model moves to the construction site with all its components (equipment, supplies etc.). In the end phase, the project displays details on the use and maintenance. Thanks to this collaborative platform, on which the BIM model is stored, at any time, citizens can contribute their comments and observations.

Those opportunities make the decision process clearer and more proactive, since they contribute to:

- decreasing corruption and concussive phenomena in public works;
- increasing citizens' confidence in public administration;
- facilitating comparisons between the various proposed design solutions in order to choose the better arrangement balancing end users' and public administrations' needs²³;
- improving the process for the project's approval, since all the citizens have the opportunity to be involved in a well-informed and simple way;
- improving and facilitating the monitoring of the works, both in the execution and the maintenance phases; also concerning the costs to be paid by the community.²⁴

5 Barracks in Milan as Economic Resources

The Government Plan of the Territory (PGT) of the Municipality of Milan identifies within the fields of transformation the *“dismantled or divested areas to be redeveloped, whose design is of interest to the entire territory of Milan”*. The document devotes a specific section—Casing System Sub-Fund—to some dismantled military properties. These are significant areas for both extension and location (Table 1).

“Wide urban voids often subject to constraints, former barracks are critical points which catalyse interests and conflicts and the possible financial, legislative, procedural strategies for their recovery have been at the center of attention for

²³“...In the face of possible risks to the environment, which may affect the common good now and in the future, decisions must be made “based on a comparison of the risks and benefits foreseen for the various possible alternatives” [184].

²⁴“...The participation of the latter also entails being fully informed about such projects and their different risks and possibilities; this includes not just preliminary decisions but also various follow-up activities and continued monitoring” [183].

Table 1 Barracks sector systems: identifying urban transformation areas (ATU)

Barracks	Land area (LA)	Gross floor area max ^a	Services of public interest	Green area
8-A Piazza d'Armi Magazzini Baggio	618,075 m ^{2b}	432,652 m ²	≥ 50% LA	≥ 50% LA
8-B Montello	71,683 m ²	50,178 m ²	≥ 50% LA	≥ 30% LA
8-C Rubattino	81,881 m ²	57,316 m ²	≥ 50% LA	≥ 30% LA
8-D Mameli	105,988 m ²	74,192 m ²	≥ 50% LA	≥ 30% LA
8-E XXIV Maggio-Magenta-Carroccio	41,262 m ²	28,884 m ²	≥ 50% LA	≥ 20% LA

Source Documento di Piano, Allegato 3—«Schede di indirizzo per l'assetto del territorio» e tabella dati quantitativi, Comune di Milano, 2012

Notes ^aIndicative quantitative data, defined within the procedure of the Program Agreement

^bIt includes also Santa Barbara area, still used by the Ministry of Defense; actually, it should be considered a Land Area of about 416,000 m²

long time".²⁵ Moreover, interests are numerous when considering also real estate sub-markets in which these barracks are located. In this respect, as better explained in Table 2: from 1800/2400 €/m² of peripheral OMI zones, to 2350/3600 and 3300/4000 €/m² for the semi-central areas.

Some abandoned barracks have been the object of specific agreements and, in this sense, they can be considered to have "exited" from the private or public-private valorization circuit. It has to be remembered that over the years, for these properties, several refunding projects have been elaborated both at the university level (including those of the workshops and theses of Polytechnic of Milan) and by associations of citizens. We refer, in particular, to Piazza d'Armi and the neighboring Magazzini Baggio. This is a very large area (416,000 m²) with expected values of the housing market (see Table 3) that are also significantly different in relation to the newly-built sub-sector reference line—this is the case of the properties of Via delle Forze Armate—or from the 1960 s—via Olivieri.

"...But it does mean that profit cannot be the sole criterion to be taken into account, and that, when significant new information comes to light, a reassessment should be made, with the involvement of all interested parties..."²⁶ And it is just in the proposals of certain groups of citizens that the words of Pope Francis are highlighted. Significant in this sense is the activity carried out by the Parco Piazza d'Armi—Le Giardiniere Association, which has been engaged, for a long time, in the regeneration of this area.

²⁵Milan (2015).

²⁶Encyclical letter *Laudato Si*, 2016, p. 143 [187].

Table 2 House prices of civil dwellings in normal conservative status by homogeneous territorial area (OMI)

Barracks	Location	Range/Zone OMI	OMI values	
			Min	Max
Piazza d'Armi Magazzini Baggio	Via delle Forze Armate, Via Olivieri	Suburban/ Lorenteggio, Inganni, Bisceglie	1,800.00 €/m ²	2,250.00 €/m ²
Montello	Via Caracciolo, 29	Semicentral/ Cenisio, Farini, Sarpi	2,350.00 €/m ²	3,600.00 €/m ²
Rubbattino	Via Tanzi, 5	Suburban/ Lambrate, Rubbattino, Rombon	1,850.00 €/m ²	2,200.00 €/m ²
Mameli	Viale Suzzani, 125	Suburban/ Niguarda, Bignami, Parco nord	1,900.00 €/m ²	2,400.00 €/m ²
XXIV Maggio-Magenta-Carroccio	Via Mascheroni, 26	Semicentral/ Sempione, Pagano, Washington	3,300.00 €/m ²	4,000.00 €/m ²

Source Agenzia delle Entrate, banca dati delle quotazioni immobiliari, Anno 2015, 2 semestre

Table 3 Expected values about the real-estate market for dwellings (three-room flats) in the sector of Piazza d'Armi/Magazzini Baggio

Barracks	Location	Period of construction	Values (€/m ²) ^a		
			Min	Max	Media
Piazza d'Armi	Via delle Forze Armate	2012–2014	3,500.00	3,755.00	3,658.00
Magazzini Baggio	Via Olivieri	1960	1,238.00	1,809.00	1,538.00

Note ^aCorrected values, considering the ratio between the paid price and asking price by the seller

Instead of what PGT requires, this citizens' association propose a variant of the document to unify the entire green area and reuse the barracks for social, educational and cultural purposes. The aim is to protect the territory and promote sustainable urban development. Obviously, this area attracts the interest of other stakeholders and other intentions. If applied, the BIM could help to make a more informed assessment of the intervention to be implemented. The development of a model, using conceptual masses, would enable us to analyze different proposals from citizens/contractors/public administrations/investors/owners points of view.

Various stakeholders—above all the citizens—can find in BIM a new way of conscious and active confrontation. This should be particularly significant in the areas of abandoned barracks, for which a future of “peaceful places” might begin.

6 Conclusions

Pioneering ICT systems and informative tools, such as Building Information Modeling (BIM), can be employed as “*participatory tools for new peaceful places*” since they allow managing a huge number of data, improving the stakeholder collaboration and increasing information accessibility. BIM simulates various scenarios, easily understandable even to non-technical people. In this way, it provides for transparency, accessibility and data verifiability. The application of this methodology implies a change of attitude in the construction industry sector; it encourages the training of a working group including all the stakeholders involved in the entire design process, from the earliest design stages. The rehabilitation of Piazza d’Armi and Magazzini Baggio area in Milan could become a starting point for the promotion of citizens’ participation at a territorial level. Specifically, barracks are very densely distributed over the national territory and divided from the surrounding social context. Citizens perceive them as big holes to be included again in the urban fabric. Not only barracks but even railway terminals or brownfield industrial sites should be more and more repurposed using innovative participatory tools such as BIM. Finally, the action of barracks disposal also approaches the theme of peaceful places in a singular form. Military areas turn into new civil places to live, but they could also represent a new way to create a “peaceful place”, as constructive and positive discussion.

References

- Albergo D, Lotrecchiano E, Moini G (2005) *Pratiche partecipative a Roma. Le osservazioni al Piano regolatore e il Bilancio Partecipativo*. Comune di Roma, Roma
- Allegretti U (2010) *La democrazia partecipativa in Italia e in Europa*, Associazione Italiana dei Costituzionalisti rivista n. 01/2011
- Allegretti U (a cura di) (2010) *Democrazia partecipativa: esperienze e prospettive in Italia e in Europa*, ISBN 978-88-8453-530-6 (print), Firenze University Press
- Bobbio L, Pomatto G (2007) *Modelli di coinvolgimento dei cittadini nelle scelte pubbliche*. Meridiana 58:45–67
- Carson L (2006) *Improving public deliberative practice: a comparative analysis of two Italian citizens Jury projects in 2006*. J Publ Delib 2:2–4
- Dioguardi G (2001) *Ripensare la città*, Saggine, n. 53
- Documento di Piano (2012) *Allegato 3—«Schede di indirizzo per l’assetto del territorio» e tabella dati quantitativi*, Comune di Milano
- Fondazione Dioguardi (2003) *L’esempio di Lione, Place des Célestins*, Dossier October 2003, pp 20–29

- Milan L (2015) Ex caserme, strategie, progetti di valorizzazione. Urbanpromo 2015. Giornale dell'architettura, 30/11/2015
- Ministero della Difesa (2015) Gruppo di Progetto «Valorizzazione degli immobili pubblici. Opportunità per il territorio»
- Turri F (2012) Dismissione e valorizzazione delle caserme, Costruire in laterizio n. 135

The Sustainable Management of Flood-Risk Areas: Criticisms and Future Research Perspectives



Francesca Torrieri, Alessandra Oppio and Sergio Mattia

Abstract In Italy, the Legislative Decree 49/2010, issued according to the European Directive 2007/60/EC, introduced the Flood Risk Management Plans (PGRA) as a mandatory requirement for the flood-risk areas to reduce the impact of flooding on human health, environment, cultural heritage and economic activities. The PGRA plays a crucial role for the prevention and sustainable planning for risk areas, through the identification and evaluation of appropriate interventions, in contrast to the traditional approach based on emergency actions. Starting from the analysis of the PGRA requirements and contents, this paper aims to highlight the role of evaluation with respect to the plans implementation and the multidimensional issues emerging when laws and standards are applied. Many evaluation issues are still open, such as: (i) the uncertainty due to the long-term perspective generally used within this kind of investment decision; (ii) the estimation of the complex social impact of vulnerable areas; and (iii) the definition of a social discount rate able to reflect the intertemporal preferences of today's generation over future ones.

Keywords Risk management plan · Project sustainability · Multidimensional evaluation

F. Torrieri (✉)

Department of Industrial Engineering, Università degli
Studi di Napoli Federico II, Naples, Italy
e-mail: fitorrie@unina.it

A. Oppio · S. Mattia

Department of Architecture and Urban Studies, Politecnico of Milano,
Milan, Italy
e-mail: alessandra.oppio@polimi.it

S. Mattia

e-mail: sergio.mattia@polimi.it

1 Introduction

In Italy, floods are a relevant problem both from a social and economic perspective. About 17 million people are subject to hydrogeological risk, as well as 1,642,000 local businesses, and a great number of transport infrastructures and sites of cultural heritage are located in hazardous areas (ISPRA 2015a, b). Thus, any prevention policy or program should be established according to an integral approach, able to consider the mutual relationships the environment, society and economic growth.

A first effort to mitigate flood risk is represented by the Legislative Decree 49/2010, issued according to the European Directive 2007/60/EC. It introduced the Flood Risk Management Plans (PGRA) as a mandatory requirement for the flood-risk areas to reduce the impact of flooding on human health, environment, cultural heritage and economic activities.

The PGRA, in accordance with the Law 183/1989 and then with the Law 267/1998, plays a crucial role in the prevention and sustainable planning of risk areas, through the identification and evaluation of appropriate interventions, in contrast to the traditional approach based on emergency actions.

The operational guidelines for PGRA have been defined by the Directive PCM N. 49/2015 that specifies the aspects a PGRA should cover include management, prevention, protection, preparation, restoration and post-event recovery. Moreover, the abovementioned directive stresses the importance of identifying the interventions and their priorities, namely with respect to a Cost/Benefit Analysis. Public participation and active involvement of stakeholders is also required (see Article 10.2) in the various phases of PGRA definition. According to the CIS Guidance Document N. 8, public participation is enacted at three levels: providing information, implementing consultation and encouraging active involvement for defining risk prevention and mitigation alternatives. Within this context, valuation plays a crucial role for supporting the definition of intervention scenarios (*problem-setting phase*), as well as their evaluation, according to a multidimensional approach able to capture multiple values at stake, i.e., ecological, social, cultural and economic (*problem-solving phase*).

Since flood-risk management has been recognized as a continuous, adaptive management process (Hall and Penning-Rowsell 2011; Sayers et al. 2013), ‘dynamic sustainability’ concepts, approaches that involve adaptation of interventions to achieve the best possible outcome through continuous learning and problem solving (Newman 2012), can be adopted.

Starting from a comparative meta-analysis of the PGRA currently adopted by the Italian basin districts, this contribution aims to highlight the role of evaluation with respect to the implementation of plans and the issues emerging when law and standards are applied, especially in contexts with high social vulnerability, as exist in territories where social and economic aspects overlap. These represent the most critical situations, because, in the case of dangerous events, direct damages to the properties should be considered, in addition to the indirect ones, such as the loss of income sources.

The overlapping of economic and social dimensions, which is often seen as an opportunity and a territorial strength, should be seen at the same time as a cause of fragility, since an adverse event is potentially capable of affecting all the resources available to families: the ones related to the properties and to income producing activities. Past experiences have shown that after floods many small companies have problems in resuming their business due to the difficulty of owners coping with the costs related to the emergency.

With respect to this problem, the research aims to develop an integrated, flood-damage assessment framework based on a procedure for identifying and ex-ante estimating direct and indirect costs and benefits of risk prevention/mitigation interventions (§ 184, Encyclical Letter). In particular, the risk-management model will be developed by GIS with the participation of key stakeholders to be able to reflect specific local needs.

Many considerations are still open about the role of evaluation in providing effective responses to issues, such as: (i) the uncertainty due to the long-term perspective generally used within this kind of investment decision; (ii) the estimation of the complex social impact in vulnerable areas; and (iii) the definition of a social discount rate able to reflect the inter-temporal preferences of today's generation over future ones. According to the idea of replacing the purely utilitarian paradigm with sustainability principles (Borrelli and Citterio 2016), intergenerational equity becomes a question of basic justice, since environmental resources are considered as a loan to each succeeding generation (Bottero et al. 2013; § 159, Encyclical Letter).

In the face of possible risks to the environment that may affect the common good now and in the future, decisions must be based on an holistic analysis of risks and benefits, anticipating the various potential alternative and scenarios. With respect to this instance, the paper provides an overview of the risk-management planning practices currently developed in Italy (Sect. 1) to point out the role played by evaluation (Sect. 2). Section 3 suggest an integrated, flood-damage assessment framework and Sect. 4 outlines new research perspectives.

2 The Flood-Risk Management Plans: The Italian State of the Art

In Italy, the Flood Risk Management Plans (PGRA) have been developed for the eight National Drainage Districts (1. Alpi Orientali; 2. Padano; 3. Appennino settentrionale; 4. Serchio; 5. Appennino Centrale; 6. Appennino meridionale; 7. Sardegna; and 8. Sicilia). The main goal of the PGRA is to define objectives and actions for minimizing the negative impacts of floods on public health, environmental and cultural resources, as well on economic activities. Risk maps are used to define interventions and their priority. In addition to sustainable land use, improvement of water retention and controlled floods, the PGRA promote

non-structural interventions meant to reduce, as preventive elements, the flood risk: protection, preparation and reconstruction.

The category of prevention includes: (i) land-use management and planning, as well as: (ii) relocation policies and (iii) interventions for reducing the vulnerability of properties, services and facilities.

Protection deals with actions that affect the probability of flooding by: (i) reducing flood-water flow; (ii) regulating outflows; (iii) enhancing the water outflow during the flood; (iv) improving the urban environment drainage; and developing maintenance programs.

Preparation covers intervention for improving population awareness and the capacity of the government's response to floods by education, alert systems and information activities.

Reconstruction and post-event evaluation are those interventions for solving critical conditions resulting from a flood event. Moreover, risk assessment, information and data collection on the extent of flooding and damage are included.

Once defined, the interventions should be ranked according to their priority, time precedence and funds availability. In addition to the cost, the rank is defined by considering the expected benefits with respect to a multidimensional evaluation framework (ISPRA 2015a, b).

More specifically, the total score of an intervention is given by the following formula:

$$\text{Total MCA Score} = \text{TW} * \text{MCA Score} \quad (1)$$

where: TW is a Technical Weight = 1+ Technical Feasibility and Sustainability Score, given by the following dichotomous variables: adaptability to future climate or land-use changes; effectiveness with respect to various kinds of floods; non-structural measures; reduction of flooding likelihood; limited maintenance interventions. TW is ≥ 1 , since it is = 1 when none of the abovementioned criteria is achieved.

MCA score is defined according to a set of four Objectives that constitute the risk reduction for health, environment, economic activities and cultural heritage. The objectives are hierarchically divided into 12 Sub-objectives: two for health; three for environment; five for economic activities and two for cultural heritage (see Table 1).

A Global Weight (GW) and a Local Weight (LW) weight objectives and Sub-objective's according to their social value, respectively. Then the S score define how the measures reaches the targets set.

Therefore, the MCA Score is defined by the following formula:

$$\text{MCA Score} = \sum_{i=1}^{i=12} (\text{GW} * \text{LW} * \text{S}) \quad (2)$$

Table 1 Evaluation framework for MCA score (GW)

Objectives	Sub-objectives	GW
Health	Human health	50
	Public facilities	25
Economic activities	Services	15
	Transport	10
	Retail and industry	20
	Agriculture	5
	Real estate	15
Cultural heritage	Architectural and historical goods	35
	Landscape	15
Environment	Water ecology	10
	Pollution	20
	Protected areas	10

The Total MCA Score provides a quantitative evaluation, although not monetary, of the interventions' benefits. Furthermore, when MCA Score > 0 , it could be compared to the costs, thus supporting decisions about the most satisfying alternative by a Benefit-Cost Ratio measure.

3 The Role of Evaluation in Flood-Risk Management

In accordance with the methodology proposed by Ispra, an integrated, flood-damage assessment framework is proposed and illustrated in Fig. 1.

The framework is developed following the traditional phases of a decision-making process (Simon 1972):

- The analysis or identification of the decision problem
- The development of alternative scenarios
- The evaluation of the alternative scenarios
- The sensitivity analysis of the rank order obtained and the monitoring of the action plan.

Due to the complexity of the territory at risk, a multidimensional and multi-methodological approach is proposed in order to enable the integration of the evaluation framework within each phase of the risk-management planning process. In the planning process, integrations are meant as a dynamic interaction between various dimensions of the context, as has been highlighted by the Ispra methodological framework described in the previous section. Furthermore, such a multidimensional evaluation framework is able to identify values, stimulate strategic thinking and enable the participation of all the stakeholders involved.

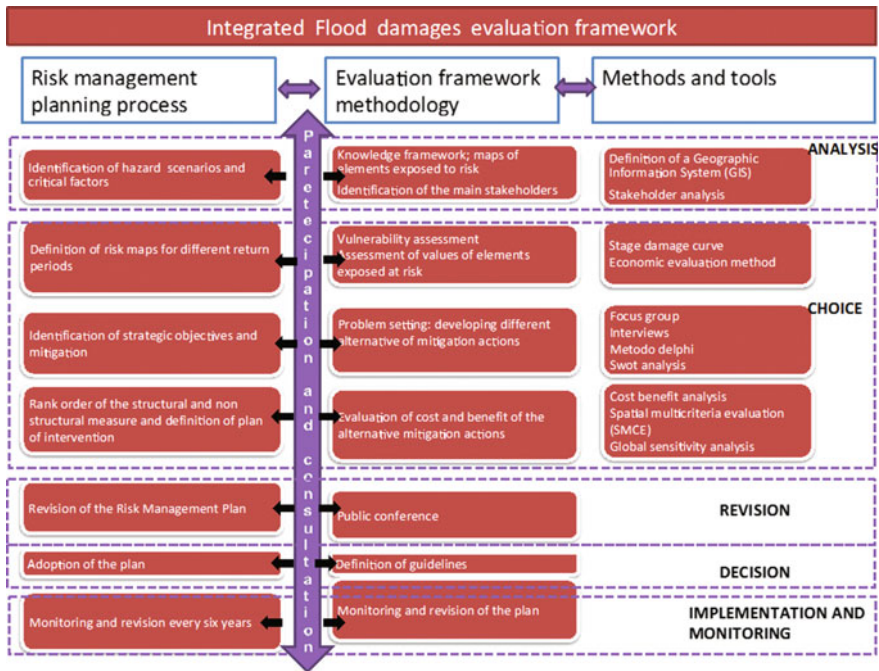


Fig. 1 Integrated flood-damage evaluation framework

In accordance with the Geodesign approach (Steinitz 2012), a Geographical Information System (GIS) method is proposed as a useful tool to support the analysis and the identification of the decision problem, starting from the understanding of the study area (representation) and moving to the analysis of the possible changes (intervention) and the evaluation of the impacts (assessment process). The Geodesign framework can be seen as a collaborative facilitator, as well as valuable support, for organizing and solving complex design issues (Sophronides 2016). Actually, Geodesign is an iterative design method that uses stakeholder’s inputs, geospatial modeling, impact simulation and real-time impacts to facilitate holistic design and smart decisions.

In the first phase of the analysis, thinking through complex values coincides with the recognition of multiple knowledge levels, such as expert, common, implicit, explicit, formal and informal (Zeleny 1982) and with the need to explicit criticalities and potentials of the territory with reference to any probable flood events. Actually, through the GIS, it is possible to represent various layers of knowledge using spatial information and data of various types. As shown by Fig. 2, GIS models make possible the correlation of information and data of various types, regarding hydrogeological hazard scenarios and elements exposed to flood risk. The risk is estimated in accordance with the provisions of European law (Directive 2007/60) and Italian law (DL 49/2010), depending on: (i) the frequency of possible

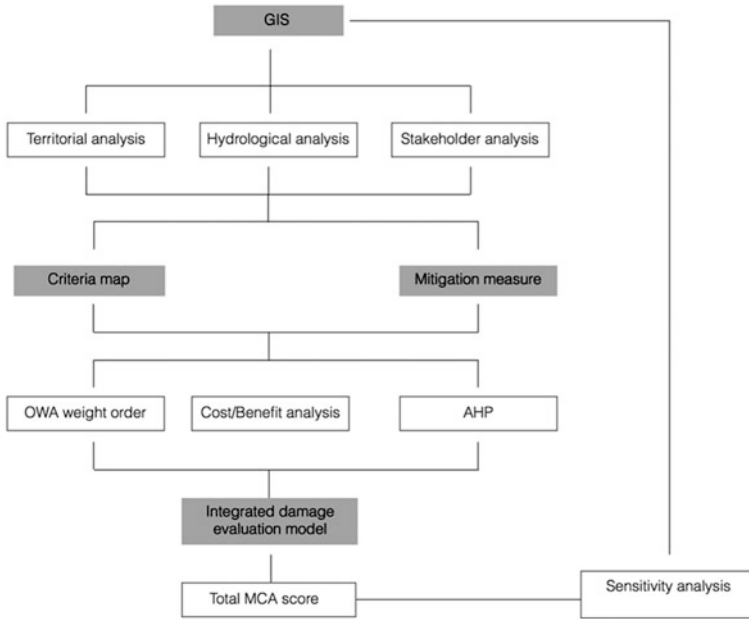


Fig. 2 The evaluation framework

occurrence; H, (ii) the typology of territorial elements (buildings and productive activities) present in the flooding area; and (iii) by their degree of vulnerability, V, according to the equation:

$$R = H * E * V \tag{3}$$

where:

H = Hazard, that is, the probability of occurrence of the flood event and the extent of flood-prone areas;

E = Value of the exposed elements in the flood area

V = Vulnerability of the exposed element, i.e., the percentage of loss of the reactive elements.

Thus, the damage:

$$D = E * V \tag{4}$$

and therefore

$$R = H * D \tag{5}$$

This formulation shows that the damage caused by a flood is a function of the intensity of the event, and it mainly depends on the value of the goods exposed and their vulnerability.

Moreover, the stakeholder analysis (Dente 2014) can support the development of alternative scenarios for the mitigation of flood risk, referring both to structural and not structural measures, in accordance with local objectives, needs and values.

Actually, the stakeholders' analysis plays a twofold role:

- On the one hand, the aim is to identify an "Actor Map" of those who perform relevant actions and have specific interests in the decision-making process to describe their goals and resources with respect to the project's realization.
- On the other hand, the objective is to integrate the "expert" knowledge with a "common knowledge" of stakeholders and actors to support the construction of strategic socioeconomic scenarios and design choices.

According to Lindblom (1968), public-policy decisions are co-produced by a plurality of actors with various values, goals and logic. Thus, decision makers should take into account the preferences and resources of actors and stakeholders to minimize the emergence of complex conflicts and reach a compromise solution that achieves the maximum consensus between the parties.

The assessment phase (choice) is then carried out following the Strategic Evaluation Assessment (SEA) approach proposed by the European Commission (Directive 2001/42/EC) by considering the categories of elements identified by the Ispra and proposing a spatial multicriteria evaluation to obtain a final ranking of the alternatives.

Spatial multicriteria evaluation (SMCE) are techniques that integrate GIS methods with multicriteria analysis for identifying and comparing various solutions to a spatial problem (Comino et al. 2016). These methods are based on the combination of multiple factors that can be represented by maps (Malczewski 2006).

One of the most critical phases in SMCE is represented by the aggregation of the various criteria that express the values of the territory affected by the catastrophic event. Ispra identifies 12 macro categories of elements for evaluating the total damages and how the changes introduced by mitigation measures can lead to safer scenarios. These categories have been selected in our model as main assessment criteria, to be better specified according to each specific case.

Many methods exist in the literature to perform such aggregation of the criteria maps (Malczewski 2006). Here we propose the integration of two evaluation methods, namely the OWA method (Yager 1988) and the AHP analysis (Saaty 1980, 2008). The integration of the latter two methods enables assessment of both the technical weights in the MCA score proposed by Ispra and the risk perception of the stakeholders involved in the evaluation process.

Actually, the key characteristic of spatial OWA is that it expresses the spatial heterogeneity of risk preferences in the decision-making process, while the AHP method enables assessment of the technical weights (TW) associated with the alternatives by the stakeholders.

Finally, the sensitivity analysis is carried out to assess the robustness of the rank order obtained, with specific reference to the input score defined and the local weight evaluated.

In Fig. 2, the details of the evaluation framework are recounted.

4 Conclusions and Future Research Perspectives

The paper has presented a framework for integrated, flood-damage assessment as a decision-support system for defining risk-management plans (Mondini 2016) and evaluating the consequent mitigation measures according to a perspective focused on sustainability.

The analysis of Italian experiences has shown that there is a need to develop an homogenous framework for risk-management plans, by integrating the planning process with the Strategic Evaluation Assessment procedure introduced by European Commission in order to assess the mitigation measures, as well as the environmental and social impacts.

There is a need to define a new process for plan design that is able to deal with complex values and stakeholder interests, starting from risk management and uncertainty as essential conditions for creating development opportunities, rather than merely as a threat to local populations.

Moreover, there is a need for a toolbox of integrated assessment techniques (Environmental Impact Assessments, Cost/Benefits Analysis, Multicriteria Evaluations) that can support a transparent decision-making process responsive to various needs and assessment challenges.

Emphasis is placed on the involvement of public and private stakeholders in raising awareness of risk perception and the ability to adopt new cultural models to adopt effective, cost-effective and environmentally friendly, ecologically sound security measures.

References

- Borrelli G, Citterio M (2016) Environmental sustainability: from theory to practice. The contribution of the Laudato si' encyclical. *Valori e Valutazioni* 17:9–12
- Bottero M, Comino E, Duriavig M, Ferretti V, Pomarico S (2013) The application of a multicriteria spatial decision support system (MCSDDSS) for the assessment of biodiversity conservation in the province of Varese (Italy). *Land Use Policy* 30:730–738
- Comino E, Bottero M, Pomarico S, Rosso M (2016) The combined use of spatial multicriteria evaluation and stakeholders analysis for supporting the ecological planning of river basin. *Land Use Policy* 58:183–195
- Dente B (2014) Understanding policy decision. *Polimi Springerbrief in Applied science and technology*

- EC, European Commission (2007) EU Directive of the European Parliament and of the European Council on the estimation and management of flood risks, 2007/60/EU. Brussels. European Commission, Belgium
- Hall J, Penning-Rowsell MA (2011) Setting the scene of flood risk management. In: Flood risk science and management. Blackwell Publishing Ltd, New York
- ISPRA Istituto Superiore per la Protezione e la Ricerca Ambientale (2015a) Dissesto idrogeologico in Italia: pericolosità e indicatori di rischio, Rapporto 233/2015
- ISPRA (2015b) Note sulla compilazione del Database Access conforme agli schema per il reporting della Dir. 2007/60/CE art. 7: Piani di Gestione del Rischio Alluvioni
- Lindblom CE (1968) The policy making process. Prentice Hall, New Jersey
- Malczewski J (2006) GIS-based multicriteria decision analysis: a survey of the literature. *Int J Geogr Inf Sci* 20:703–726. <https://doi.org/10.1080/13658810600661508>
- Mondini G (2016) Integrated assessment for the management of new social challenges. *Valori e Valutazioni* 17:15–18
- Newman L (2012) Basics of social research: qualitative and quantitative approaches, 3rd edn. Pearson Publishing, Upper Saddle River
- Saaty TL (1980) The analytic hierarchy process. McGraw-Hill, New York
- Saaty TL (2008) Decision making with the analytic hierarchy process. *Int J Serv Sci* 1:83–98
- Sayers P, Galloway Y, Li G, Penning-Rowsell E, Shen F, Wen K, Chen Y (2013) Flood risk management: a strategic approach. Le Quesne. Published in 2013 by the United Nations Educational, Scientific and Cultural Organization 7, place de Fontenoy, 75352 Paris 07SP, France © UNESCO 2013 in association with Asian Development Bank, WWF-International and the GIWP, China. ISBN 978-92-3-001159-8
- Simon HA (1972) Theories of Bounded Rationality, in Simon (1982), pp 408–423
- Sophonides P (2016) Decision support systems for participatory flood risk and disaster management. Ph.D. thesis, Athens
- Steinitz C (2012) A framework for geodesign. Esri Press, Redlands
- Yager RR (1988) On ordered weighted averaging aggregation operators in multicriteria decision making. *IEEE Trans Syst Man Cybern* 18:183–190
- Zeleny M (1982) Multiple criteria decision making. McGraw-Hill, New York

The Role of the Social Entrepreneur in Bottom-up Enhancement of Italian Public Real-Estate Properties



Alessia Mangialardo and Ezio Micelli

Abstract Recently in Italy, new enhancement forms of real-estate property based on grass-roots participation came to light. The development of these initiatives enabled bottom-up valorization to become a viable alternative to the current forms of reuse of the public assets promoted by the public authorities. On closer look, some experiences are more successful than others that fail in a short time. This seems to depend on the presence of the social entrepreneur, a specific actor able to efficiently coordinate and manage the bottom-up, value-creation process. The aim of this paper is to investigate the role of the social entrepreneur and the way in which he/she promotes the public real-estate properties' enhancement through grass-roots participation. Comparing two emblematic case studies in Italy, distinguished by the presence-absence of the social entrepreneur, the paper points out the role and the importance of this actor, a catalyst able to seize the economic and the social opportunities gathering around the initiative; to design an overall business strategy; and to involve the citizenry to strengthen these bottom-up initiatives.

Keywords Public real estate property · Social enterprise · Social entrepreneur
Grass-roots participation

A. Mangialardo (✉)

Dipartimento di Ingegneria Civile, Edile e Ambientale, Università di Padova,
Via Venezia 1, 35100 Padua, Italy
e-mail: alessia.mangialardo@dicea.unipd.it

E. Micelli

Dipartimento di Architettura Costruzione e Innovazione,
Università IUAV di Venezia, Dorsoduro, 2206, 30123 Venice, Italy
e-mail: ezio.micelli@iuav.it

1 Introduction

The enhancement of Italian public real-estate properties represents a topic widely debated by academics and public authorities. The considerable amount of assets no longer useful for public purposes in need of being rationalized and upgraded necessitates the search for efficient solutions ensuring asset enhancement (ANCE 2015; Coscia et al. 2015; Antonucci and Marella 2014, 2017; Mangialardo and Micelli 2016, 2017a).

The numerous deserted auctions and sales at prices below the expected values have made very evident the unsustainability of traditional development solutions. New market conditions have highlighted opportunities for solutions promoted by groups and associations involved in the most diverse undertakings (Colomb 2014; Campagnoli 2015; Crosta 2011; Inti et al. 2014; Németh and Langhorst 2014).

Recent studies (Micelli and Mangialardo 2016) argued that these processes represent a valid alternative to traditional enhancement procedures, but their successful outcome depends on several factors. The presence of a community capable of self-organized processes, the location of the buildings in urban centers, specific building features in terms of type and state of preservation, the presence of a party—other than the public administration—with the ability to independently develop a managerial function for the promoted activities and the flexible juridical relationship between the administration and private parties are all factors predicting the successful outcome of bottom-up developments.

The aim of the paper is to investigate the management formulas of successful bottom up processes, in particular, the role of the social entrepreneur and the way in which he/she creates the conditions for the enhancement of public real-estate properties through grass-roots participation.

The research is divided into three parts. The first one explores the role of the social entrepreneur to enhance public real-estate properties. The second describes the outcome of two emblematic case studies in Italy. Finally, the third part offers an interpretation of the case studies.

2 The Role of the Social Entrepreneur in Bottom-up Enhancement Processes

In Italy, bottom-up processes to enhance the abandoned real-estate properties are increasingly common and supported by local authorities. Actors operating in various fields and with social purposes carry out almost all grass-roots participation experiences, and they may be classified as social enterprises (Manganelli 2017). Despite a strong similarity of initial approach, the evolution of these organizations is quite different: some of these develop into a territorial landmark becoming a real factor of social innovation for the territory, which lasts over time, while others cease and quickly fail.

A broad international literature (Aiken et al. 2008; Bailey 2012) identifies the presence of a specific character, the social entrepreneur, as the key element to guarantee an effective and durable social-innovation process. This actor is able to strategically coordinate these social projects, continuously innovating the initiative throughout new ideas and entrepreneurial resources. An in-depth investigation is necessary to understand if also in Italy his presence could be decisive to guarantee a successful outcome of a bottom-up initiative in public real-estate properties.

To verify this hypothesis, starting from previous studies by the authors writing on this topic (Mangialardo and Micelli 2017b; Micelli and Mangialardo 2016), the management formulas were analyzed in fifty bottom-up experiences in Italy. These case studies¹ represent a large fraction of Italian bottom-up development cases by quantity and relevance.

Considering all the experiences, three management typologies were observed: the “social entrepreneur” (Bailey 2012), when a single character or party coordinates and manages the entire redevelopment operation; the “consortium”, when two or more organizations and/or persons are involved in the project’s implementation; and finally the “direct assignment”, when the local authority directly entrusts the areas to the buildings’ end users.

Figure 1 shows in quantitative terms the results of the analysis. Of the cases analyzed, 64% are coordinated by the social entrepreneur, 22% are managed by the municipality and only the 14% employ the consortium model.

One relevant conclusion emerges from national and international surveys: the presence of the social entrepreneur plays a relevant role for the development of bottom up processes. He/she is able to aggregate and incorporate economic and social value throughout bottom-up initiatives, regulating all the activities hosted in the building (Aiken et al. 2008; Bailey 2012; Mangialardo and Micelli 2016, 2017).

Although many of Italian bottom-up processes start with a self-organized management model, many of these initiatives end very quickly. One of the main reason the absence of an actor able to coordinate and to promote these activities over time. The most successful operations confirmed that a coordinating actor is necessary to make these processes endure over time and be considered authentic social-innovation experiences.

¹For each case study, information was collected throughout documentations, observations and interviews.

Typology of management formulas in 50 Italian bottom up initiatives

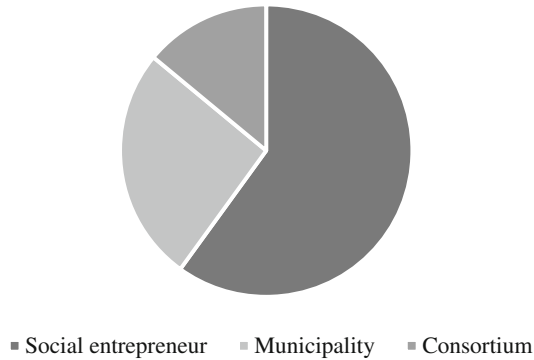


Fig. 1 Typologies of management formulas in 50 initiatives. Analogies and differences of the two bottom-up initiatives. *Source* Elaboration from the authors

3 Two Experiences for in-Depth Analysis: The Zo Center and Viaduct Gronchi

Despite a strong similarity of initial approaches, the evolution of these initiatives was very different. After measuring in quantitative terms the presence of the social entrepreneur in bottom-up processes, this section recounts them in detail. It aims to highlight and to exemplify the relevance of the social entrepreneur in bottom-up experiences in total by analyzing two emblematic experiences in Italy. These two were chosen from among the 50 case studies, which differ in their presence and/or absence of the social entrepreneur: the “Zo Center”² located in Catania and “viaduct Gronchi”³ in Rome.

The first experience took place in 2010, situated within a defunct sulphur refinery in Catania. Originally used for the processing of sulphur from Sicilian mines, the complex represented the most important industrial activity of Catania. The building is located in the city center, in a strategic position close to the railway station. For its architectural typology, The Zo Center can be considered one of the most representative historical industrial buildings on the entire island. Since having fallen into disuse, the property passed to the Municipality of Catania.

A group of young professionals and local entrepreneurs decided to return home from abroad to repurpose the abandoned factory. The project was to create a public

²To learn more about the story and the activities carried out at the Zo Center, please visit their official website: <http://www.zoculture.it/>.

³A more thorough history of viaduct Gronchi is available at this website: <http://www.romatoday.it/politica/viadotto-presidente-green-street.html>.

space to house an innovation center for the arts and contemporary culture. The main initiators and curators are three young entrepreneurs who conceived of the “Cooperativa Officine”, a company able to coordinate activities in a broad range of domains. The project was funded in part with public funds dedicated to younger entrepreneurs—in conjunction with self-financing operations—and authorized to entirely rehabilitate the structure. The Zo Center is at the center of an economic and social community-based network, based on horizontal cooperation and exchange. The economic sustainability of the social enterprises derives from the sale of products and services—such as a restaurant/café, training courses, festivals and cultural events. The “Observatory Enterprise and Culture” awarded a prize to the cultural Zo Center as ranking among the top 30 Italian cultural institutions that distinguished themselves for the value of the business idea.

After seven years, the valorization process yielded surprising results. The Zo Center became a social and cultural center that is nationally and internationally known within an international network of projects.

The second case study concerns a public space located in the outskirts of Rome. The “viaduct Gronchi”, constructed in the 1990s to connect the light-rail systems from the north and south of Rome, is one of many Italian public works left unfinished. After years of negligence and abandonment, the area was included in the national project for “mending of Italian suburbs”, conceived by the national government. The redevelopment plan was to redesign the area under the viaduct through operations that could serve as a flywheel for the revival of the local economy through the involvement of the inhabitants in the transformation processes, while stimulating their sense of belonging to the city and neighbourhood.

Through participatory processes with the citizens, professionals in charge redesigned the future of the place with the local residents. The project involved the creation of a public space for the local community connecting—ideally and spatially—two neighborhoods that, until then, had been divided by an impenetrable area, no longer by light-train tracks, but by an unused public space.

The redevelopment project “Under the Viaduct” was inaugurated in 2014. Active citizenship, local associations and public authorities actively attended the project’s implementation. The initiative was also supported by various local profit and non-profit entities willing to settle in the area. The activities designed were all related to improve the welfare of the neighborhood, promoting a civic sense of belonging in a formerly abandoned area.

Despite the fame of the professionals involved and the wave of initial success, the viaduct reverted to the same conditions of neglect prior to its enhancement, with the new structures for the project totally destroyed.⁴

⁴The current state of conservation is described in: http://www.ilmessaggero.it/roma/cronaca/roma_viadotto_presidenti_sterpaglie_rifugi_senzatetto_piazza_rengo_piano_degrado-1109209.html.

4 The Importance of the Social Entrepreneur

The two cases analyzed in the previous section reflect a significant change of perspectives compared to the public authorities' traditional enhancement attempts. Through collaborative dynamics, the abandoned or underused public buildings became a physical place in which a wide set of mutually cross-fertilizing activities takes place, simultaneously creating new social and economic value.

The two experiences, although begun with the same purpose, distinguished themselves by their outcomes. On the one hand, the Zo Center has grown into a well-known reality nationwide. On the other hand, the viaduct, despite the excellent premises, crashed at the beginning of the trail. The causes underlying two different outcomes are mainly rooted in the activities and on the actors involved in the process.

The economic sustainability of the activities that take place in the public underused or abandoned assets represents a crucial variable. In the majority of bottom-up processes, all the activities are experimental and present a high-risk, as far as their success is concerned. In the absence of a clear sustainable business model—even if it's risky—a sound grass-roots valorization process cannot take place and develop.

The interaction between various actors and activities generates an ecosystem in which individuals cooperate to form a self-sufficient organization (Bloom and Dees 2008). To increase and maintain balance in the ecosystem, it is necessary to form a mix of activities able to self-sustain. The noble goals of ensuring social projects are not enough. The activities must be economically viable without necessarily generating margins and profits. In this regard, the Zo Center was exemplary. The “Cooperativa Officine” realized a mix of social and cultural projects with a solid entrepreneurial profile. On the contrary, the viaduct contained activities related to social welfare that, in the absence of public support, failed in less than one year.

Considering the actors involved in the development of the initiative, the social entrepreneur represents the main responsible for a successful outcome of the bottom-up enhancement processes. The social entrepreneur is mainly an entrepreneur, because he/she promotes a business idea formed by a mix of heterogeneous projects but, at the same time, he/she has a clear social connotation, because he/she does not distribute profits but just ensures the economic sustainability of the overall initiative. The social entrepreneur represents a catalyst of social and economic coordination, providing common ground for all the experiences and ensuring unified management. Consistent with this, Jacobides et al. (2016) theorize the same concept stating “*absent good coordination with the ecosystem, innovations will fail*”.

By the way, the necessity of a global coordinator to manage a complex real-estate asset highlights a close analogy with, for instance, shopping malls or with airport facilities, whose complex mix of activities needs a sole manager in charge to create the best conditions to develop all the business initiatives sharing a common space (MacCallum 2003).

Table 1 Analogies and differences of the two bottom-up initiatives

	Viaduct Gronchi	Zo Center
Promoter	National government	Young local entrepreneur
Basic concept	Development through participation	Economic development through a social and entrepreneurial idea
Main purposes of the project	To generate a place of social development	To develop new cultural enterprises in the city
Stakeholders	Local associations and single individuals	Local associations and single individuals
Mode of management of the initiative	Grass-roots management promoted by the associations	Centralized coordination through the social entrepreneur
Activities	Social and cultural activities	Social and cultural activities

In the viaduct (see Table 1), the ecosystem of the initiatives was not consolidated. Despite the initial intention, the high degree of uncertainty of the activities, without a sound business model, and the absence of a coordinator decreed the operation’s collapse. The self-organization of the activities made this model very weak and caused its failure in a short time. The lack of an actor capable of creating an internal balance in an already precarious system was the main cause of failure of this experience, although it had been initiated in the best manner.

On the contrary, in the Zo Center, many high-risk activities took place. Nevertheless, in this case, there was an actor, the “Cooperativa Officine” who promoted the economic and social development of the site. The social entrepreneur, with the ability to manage complexity and the uncertainty, which are distinctive features of grass-roots valorization processes, is decisive for the success of these projects.

5 Conclusions

The grass-roots valorization processes are becoming more and more consolidated in Italy, proving to be a viable alternative to the ordinary provisions promoted by local authorities and traditional real-estate operations.

The 50 case studies analyzed and, in particular, the focus on the two experiences show the different effectiveness of these processes and examine the role of the social entrepreneur, widely recognized internationally, acting as a catalyst for grass-roots participation.

In both cases, bottom-up social processes were started, aiming at a regeneration process in an abandoned public property. Nevertheless, the results have been contrasting. The viaduct project in Rome started with excellent bases, but the self-managed interaction of various actors proved to be the main reason of its failure. On the contrary, the Zo Center shows that, even in areas featuring low

social capital, despite the high risk of the activities involved, it is possible to launch social enterprises generating new economic and social value for the local community.

In order to promote social-innovation processes, public authorities have to consider this aspect. Public policies must consider an actor capable of coordinating these organizations to make them qualifying elements of value creation. The social entrepreneur is necessary to design a common business strategy, to seize the opportunities offered by the territory and to cultivate social relations to strengthen the initiative. The activities also needs a self-sustainable business model in order to acquire the necessary resources to support themselves over time.

Future research will focus on various aspects. It would be useful to evaluate the intensity of the economic and social-value creations that these processes are able to generate in the valorized asset. Considering the issues related to urban policies, the issue is the impact of these processes on a larger scale in order to understand if the evolution of similar experiences can effectively contribute to resolve the wider problems of urban regeneration.

References

- Aiken M, Cairns B, Thake C (2008) Community ownership and management of assets. Institute for Voluntary Action Research, London
- ANCE (2015) Osservatorio congiunturale sull'industria delle costruzioni—December 2015, text available at this website: <http://www.ance.it/search/SearchTag.aspx?tag=scenari&id=48&pcid=30&pid=27&docId=23138>. Last access 22 Mar 2016
- Antoniucci V, Marella G (2014) Torri incomplete: i costi di produzione della rigenerazione urbana in contesti ad alta densità. *Ital J Reg Sci* 13:117–124. <https://doi.org/10.3280/SCRE2014-003007>
- Antoniucci V, Marella G (2017) Immigrants and the City: the relevance of immigration on housing price gradient. *Buildings* 7(4):91. <https://doi.org/10.3390/buildings7040091>
- Bailey N (2012) The role, organization and contribution of community enterprise to urban regeneration policy in the UK. *Progr Plann* 77:1–35
- Bloom PN, Dees JG (2008) Cultivate your ecosystem. *Stanford Soc Innov Rev* 2008:46–53
- Campagnoli G (2015) Riusiamo l'Italia da spazi vuoti a start up culturali e sociali. *Il Sole 24 Ore Libri*, Milano
- Colomb C (2014) Pushing the urban frontier: temporary use of space, city marketing and the creative city discourse in 2000s Berlin. *J Urban Aff* 34:131–152
- Coscia C, Fregonara E, Rolando D (2015) Project management and briefing: supporting tools for territorial planning. The case of disposal of military properties. *Territorio* 73:135–144
- Crosta P (2011) Riuso temporaneo come pratica che apprende la cittadinanza? *Territorio* 56: 82–83. <https://doi.org/10.3280/TR2011-056011>
- Inti I, Cantaluppi G, Persichino M (2014) Manuale per il riuso temporaneo di spazi in abbandono, in Italia. *Altrecconomia*, Milano
- Jacobides MG, Cennamo C, Gawer A (2016) Paradigm shift or label profusion? A critical examination of ecosystems in strategy research. In: ICRIOS seminar, Università Bocconi, Milano, 05 Oct 2016

- MacCallum SH (2003) The entrepreneurial community in light of advancing business practices and technologies. In: Foldvary FE, Klein DB (eds) *The half-life of policy rationales*. New York, UP, New York, pp 227–242
- Manganelli B (2017) A proposal for a synopsis in real estate appraisal between the Italian doctrine and international valuation standards. *Valori e Valutazioni* 18:9–16
- Mangialardo A, Micelli E (2016) Social capital and public policies for the commons: bottom up processes in public real estate property valorization. In Calabrò F, Della Spina L (eds) *Procedia —social and behavioural sciences*, vol 223, pp 175–180
- Mangialardo A, Micelli E (2017a) Simulation models to evaluate the value creation of the grass-roots participation in the enhancement of public real-estate assets with evidence from Italy. *Buildings* 7(4):100
- Mangialardo A, Micelli E (2017b) New bottom-up approaches to enhance public real/estate property. In: Stanghellini S, Morano P, Bottero M, Oppio A (eds) *Appraisal: From theory to practice*. Springer International Publishing AG, Green Energy and Technology, Cham, pp 53–62
- Micelli E, Mangialardo A (2016) Riuso urbano e immobili pubblici: la valorizzazione del patrimonio bottom up. *Territorio* 79:109–117
- Németh J, Langhorst J (2014) Rethinking urban transformation: temporary uses for vacant land. *Cities* 40:143–150. <https://doi.org/10.1016/j.cities.2013.04.007>

“Impact Investments” in Real Estate: Opportunities and Appraisal



Maria Rosaria Guarini, Fabrizio Battisti and Anthea Chiovitti

Abstract Following the events of the still unfolding economic and financial crisis involving real estate, there has been a growing awareness of having to formulate proposals and scenarios (in real estate) that have the characteristics of socially responsible investments; therefore, in line with the papal Encyclical *Laudato Si'*, these proposals and scenarios must aim at growth based on a development that is “sustainable”, both environmentally and socially. Settlement production processes are starting to be carried out in the form of “Impact Investments”, responsible investments related to ethical finance. Based on these premises, this paper will: (i) briefly analyze the nature of an “Impact Investment” and what characterizes and sets it apart from “Traditional Investments”; (ii) then, based on the analyses made, it will be possible to identify the elements for formulating a procedure (of the multicriteria type) aimed at assessing an “Impact Investment” in real estate. Lastly, the procedure will be applied to a case study involving a social-housing initiative in the Municipality of Ladispoli (Rome).

Keywords TOPSIS · Impact investment · Socially responsible investments/funds

Author Contributions: The paper must be attributed in equal parts to the three authors.

M. R. Guarini (✉) · F. Battisti · A. Chiovitti
Department of Architecture and Design (DIAP), Faculty of Architecture, “Sapienza”,
University of Rome, Via Flaminia 359, 00196 Rome, Italy
e-mail: mariarosaria.guarini@uniroma1.it

F. Battisti
e-mail: fabrizio.battisti@uniroma1.it

A. Chiovitti
e-mail: anthea.chiovitti@uniroma1.it

1 Introduction: Ethical Finance and Socially Responsible Investment

The financial and economic crisis that began in 2007 and is still (2016) underway has cast doubt on the efficiency of the modern models of economics and the capitalist market and has encouraged paying new attention to the prospects for investments that supplement the principles of conventional finance with those of an ethical nature. The spread¹ of ethical investing developed at a moderate pace until the early 2000s, and then it saw rapid growth following the current financial crisis (Basso and Funari 2010). Among others, Pope Francis, in his 2015 Encyclical *Laudato Si'* (hereafter, Encyclical), reflected upon the structural causes of the dysfunctions in the economic world and encouraged the definition of new objectives geared to the common good and to integral and sustainable human development (§ 17–19).

In this setting, new interest may be devoted to Social Responsibility Investments (hereafter, SRIs) in businesses and organizations (public and private) whose aim is not exclusively to create value for the investor/shareholder, but rather to provide an opportunity to produce benefits (Napoli et al. 2017) extending to various other categories of stakeholders, as well. In brief, SRIs are geared towards a practical “ethics” in which: (i) the investor’s profit, however admitted, is fair; (ii) economic and financial equilibrium is guaranteed over the medium/long term; (iii) corporate and social risks are reduced; and (iv) environmental sustainability is insured. SRIs are based on a set of practices adopted “voluntarily”—and increasingly expected and demanded on a global level—by civil society and the financial world. In recent years, the growing attractiveness of these forms of investment has led to the establishment of a significant number of funds geared towards SRIs, referred to as “Socially Responsible Funds” (SRFs). In general terms, SRFs allocate capital (to public and private businesses and organizations) both based on financial profit (in line with the conventional processes of financial assessment) and with a view to meeting social and environmental demands (Morano and Tajani 2017). Among the most significant approaches (e.g., Exclusions, Norms-based Screening, Engagement/Voting, Impact Investment) the most flexible for various types of initiatives including Real Estate (RE) is Impact Investment (Eurosif 2016): responsible investments in businesses and organizations (public and private) that, in their activities, alongside a financial return, are able to generate a beneficial (and measurable) social and/or environmental impact (Camoletto et al. 2017).

Upon examining the investment sectors of a sample of 40 SRFs (see the next paragraphs), we may observe the marginal nature of investments in RE, limited to sporadic initiatives in social housing. Currently (2017), RE investments are still held in check due to their relationship with the RE bubble triggered by the

¹The first investments considered as “Ethical Finance” were seen in the 1920s in the USA. Between the 1970s and 1980s, the concept of Ethical Finance became widely recognized; in 1976, the OECD published the first guiding principles for the field of corporate social responsibility.

overvaluation of the RE assets put up as collateral for loans (the “subprime crisis”), which generated the current economic and financial crisis. The ability to resort to financial levers with loan to value ratios (LTV) of up to 100% (of overestimated values) triggered a proliferation of RE initiatives that the market could not always absorb. On the one hand, these initiatives brought about useless land consumption, while, on the other, they had a negative impact on the credit system, harming investors of all kinds (institutional, qualified, ordinary).

Although in recent years building production in many Western countries has exceeded and/or been disconnected from the “real” market (Tajani and Morano 2017), there are still various opportunities for RE development that is connected to: an ageing population; failure of urban-decentralization models; savings in the costs of managing the properties; and, more generally, environmental sustainability of interventions and urban ecology.

In this setting, operators are becoming increasingly aware of having to formulate RE proposals and scenarios that do not have profitability as their only criterion (§ 187), but whose objective is growth based on an “integral ecology” (§ 138–142) that prioritizes “sustainable” development from the environmental standpoint (safeguarding increasingly “rare” resources, such as land, energy and natural elements) (De Mare et al. 2015), as well as from the social one (protecting the population and raising its level of well-being). They thus pertain to what is known as Ethical Finance, in contrast and in place of pure “speculative” investment. Consequently, RE initiatives that pursue these objectives may become Impact Investments and thus be included in the SRFs’ investment basket (Cortez et al. 2009; Sandberg et al. 2009). By relying on “alternatives” to the investment channels by which RE renovation and development are traditionally financed (banks, traditional investment funds, club deals, crowdfunding), businesses operating in RE can increase the likelihood of initiating responsible and sustainable housing transformations. This brings consequent beneficial effects, connected both with the related business generated by this sector and the effects of the RE’s physical regeneration/revitalization.

2 Aims of the Work

With a view to the Encyclical’s recommendations for transparency in decision-making (Encyclical Chap. V, part III), this paper aims proposes an assessment procedure that makes it possible to verify when and if a RE initiative may be considered, given its properties, an Impact Investment or a traditional-type investment. The choice was made to construct a procedure of the multicriteria type, since the criteria and indicators related to the principles of “Ethical Finance” (cf. Sect. 1)—and that, in specific terms, allow an Impact Investment to be thought of—are heterogeneous in nature (financial, social and environmental), and may be measured in both qualitative and quantitative terms.

As the paper continues, a significant sample of 40 SRFs will be analyzed to determine the assessment criteria and properties of Impact Investment in RE and will illustrate the phases and the mathematical/assessment operations in the proposed assessment procedure; then, the assessment procedure will be applied to a social-housing project in the Municipality of Ladispoli (Rome); at the end, the results of this work are summarized.

3 Impact Investments and Traditional Investments in Real Estate: Assessment Criteria and Definition of Properties

As already pointed out, SRIs are voluntary practices of now recognized importance. However, at least on the European level, they have no precise regulatory context of reference. In general, they are referred to “soft laws”—which is to say flexible laws with no direct binding effect, capable of adapting to the rapid development that are characteristic of certain sectors of economic or social life (Gangi 2010). In Italy, SRIs are mentioned only by article 117-ter of the Consolidated Finance Law (“TUF”—Legislative Decree no. 58/1998, emended by Law no. 161 of 30 October 2014), which tasks *Commissione Nazionale per le Società e la Borsa* (Consob) with determining regulations for the disclosure and reporting obligations that qualified parties and the insurance companies that promote products and services qualified as ethical or socially responsible are held to. Consob consequently adopted the “Intermediaries Regulation” (Decision no. 16,190 of 29 October 2007, amended by Decision no. 19,548 of 17 March 2016). This regulation indicates (Book VII “Provisions in the matter of ethical or socially responsible finance”) “Disclosure objectives” under art. 89 and, under art. 90, the “Reporting obligations” for the legal subjects—SRFs—proposing “ethical investments,” among which Impact Investments are also listed. In brief, SRFs must indicate—with the obligation to disseminate the information over the internet as well—assessment criteria and properties for the promoted investments.

In this paper, to identify assessment criteria and properties of Impact Investments in RE, an analysis of the sectors and of the procedures for choosing the investments was made. This kind of analysis was implemented over a sample of 40 SRFs² that, in allocating their own resources, set aside a portion of their managed assets for

²The significant sample of 40 SRFs was identified by the report entitled *Investimenti socialmente responsabili: la mappa dei fondi* (Available online: <http://www.lamiafinanza-green.it/analisi/1496-per-cominciare/19763-investimenti-socialmente-responsabili-la-mappa-dei-fondi>; accessed on 31 March 2017). The site lists 34 international SRFs offering subscription opportunities to investors in Italy. This list of SRFs was supplemented with six more SRFs of the asset management company *Investire*, identified through an online survey of the websites of the leading asset management companies operating in Italy.

Impact Investments. This analysis showed that the sectors most addressed by SRFs are wearable and smarttech (18), followed by renewables (17), watertech and agritech (13) and waste and edutech (11); investments in RE are marginal: only a restricted number of SRFs (six) include social-housing (SH) initiatives among their Impact Investments. An in-depth examination of the SRFs whose investment sectors include SH cast light on how investment choices are made considering the properties that the initiatives connected with them have, with regard to: mode of access to the housing asset (purchase or rental) and sustainability in management for the various population segments (including the weakest); increased employment; support for education and professional training. Since it is deemed that SRFs may deal not only with SH, the: (i) criteria, (ii) sub-criteria and their indicators including their relevance, (iii) thresholds that the indicators must attain (properties) to be considered “impact” or “traditional,” were defined in consideration of the following (see Table 1): (i) assessment criteria and sub-criteria used by the six SRFs, among those considered, whose investment sectors include SH (sub-criteria 1, 2, 4, 5, 7, 8, and 10); (ii) some urban quality-assessment criteria and sub-criteria more pertinent to the purposes of this paper, proposed by Associazione Aree Urbane Dismesse (AUDIS). These criteria were formulated with the aim of identifying, in settlement transformations, the aspects suited to guarantee the quality of the city and of the life of its inhabitants (sub-criteria 6, 11, and 12); and (iii) regulations and “good practices” (sub-criteria 3, 9, and 13).

The sub-criteria were defined in a number suitable for: (i) taking into account all the main aspects characterizing a RE initiative (Nesticò et al. 2015); and (ii) enabling quick, effective implementation of the MCDA. Table 1 also indicates the properties that, if considered together, become the conditions for which an investment may be considered acceptable as: (i) a “Traditional Investment” solution (TS); or (ii) an “Impact Investment” solution (IS). The property values associated with each indicator have been defined³ considering regulatory parameter, consolidated practices, information and yield data obtained from SH initiatives already started or concluded. In particular, the properties of the traditional financial investments were deduced from the performance levels ordinarily found in traditional RE initiatives by exploring a sample of initiatives documents available at: (i) municipalities where initiatives have been carried out; and (ii) financing banks; the properties of the Impact Investments were expressed by translating the principles underpinning this type of approach, deduced from the analysis of prospectuses of some of 40 SRFs, into performance.

³In the future, these values may have a different definition in relation to market, regulatory and praxis conditions.

Table 1 (continued)

Criteria (C)	Sub-criteria (SC)	Indicators (I)	Objective functions	Relevance impact investment SC	Features impact investment	Relevance traditional investment SC	Features traditional investment
Environmental	11	Land use	% free areas compared to transform land area	↓	VH	L	70%
	12	Urban fabric requalification	% Degraded areas and/or abandoned rehabilitated than those to be redeveloped within the territory in which the initiative has influences	↑	L	VL	0%
	13	Preservation of resources	Compliance/non-compliance with the LEED parameters	↑	M	M	B

4 Assessment Procedure

As already pointed out, the proposed assessment procedure, based on the use of the TOPSIS method, has the objective of assessing when one or more RE initiatives may be considered an Impact Investment. The proposed assessment procedure provides an operational declination using the TOPSIS method which can effectively organize the initiative(s) being assessed with regard not only to the ideal and non-ideal solutions (that TOPSIS is able to create), including those that are hypothetical and unlikely to be repeated, but also with regard to viable reference solutions named: Impact Solution (IS) and Traditional Solution (TS). The properties related to the analysis of the Traditional and Impact Investments (Sect. 3) are assumed as two TS and IS solutions “of reference,” and used as a term of comparison for the initiative(s) being assessed. The TOPSIS method (Ishizaka and Nemery 2013) makes it possible to order the initiative(s) being assessed with respect to the solutions “of reference,” verifying, overall, the distance that exists between them; depending on the distance of the initiative(s) being assessed from the TS and IS, it is possible to define whether or not the same initiative can be assessed as an Impact Investment.

The proposed assessment procedure is organized as follows: (a) analysis of the initiative(s) being assessed; (b) construction of the assessment matrix; (c) normalization of the assessment matrix; (d) definition and attribution of weights to the assessment matrix; and (e) aggregation of data and results of the assessment.

- (a) The analysis of the initiative(s) being assessed takes place by examining the available documentation (technical and descriptive documents, administrative records on the adoption and approval procedures), and is aimed at extrapolating the main data regarding the initiative’s general and dimensional aspects. These data must be processed in order to determine the impacts related to the financial, social, and environmental sub-criteria, to be inserted into the evaluation matrix.
- (b) The assessment matrix [two-dimensional ($SC * A$), in which one dimension is represented by the SC_j sub-criteria ($j = 1, \dots, j$) and the other by the alternative A_i [initiative(s) being assessed and solutions of reference] ($i = 1, \dots, i$)] is constructed by inserting the impacts [$i(SC_n)$] (which express the performance) of the initiative(s) being assessed and of the two solutions of reference, referring to each individual assessment sub-criterion (Guarini and Battisti 2014a);
- (c) To proceed with the comparison between the data entered into the assessment matrix, it is necessary for them to be “normalized”—which is to say rendered homogeneous and comparable—by assigning each impact [$i(SC_n)$] a coefficient [$c(SC_n)$], while applying a linear function of the “Row maximum” type. This enables the coefficients to be determined by comparing, for each sub-criterion, each alternative’s impact with the impact having the best performance;

- (d) Each of the sub-criteria (SC_n) is then given a weight obtained by the pair-comparison method on the basis of the average relevance assigned to the sub-criteria, based on the importance given them in the two hypotheses of reference. Normalized and weighted coefficients [$w_c(SC_n)$] can then be obtained by multiplying each input data transformed into coefficients, as present in the assessment matrix [$c(SC_n)$], by the respective weights [$w(SC_n)$], using the formula:

$$w_c(SC_n) = c(SC_n) * w(SC_n) \tag{1}$$

- (e) In compliance with TOPSIS, the results are aggregated by identifying:

- (i) the ideal solution, by selecting, for each sub-criterion, the best impact [$i(SC_n)$] recorded among the various alternatives (initiative(s) being assessed and the TS and IS solutions of reference), following the formula:

$$i(SC)^+ = \max_y i(SCx; Ay) \quad \text{where } x = SC_1, SC_2, \dots, SC_n; \tag{2}$$

$$y = A_1, A_2, \dots, A_n$$

- (ii) the non-ideal solution, by selecting, for each sub-criterion, the worst impact recorded among the various alternatives, following the formula:

$$i(SC)^- = \min_y i(SCx; Ay) \quad \text{where } x = SC_1, SC_2, \dots, SC_n; \tag{3}$$

$$y = A_1, A_2, \dots, A_n$$

Thereafter, the Euclidean distance of each i -th alternative to the ideal solution must be estimated using the formula:

$$d_{Ai}^+ = \sqrt{\sum_{x=1}^n [i(SCx_{Ai}) - i(SC)^+]^2} \quad \text{where } x = 1, 2, \dots, n \tag{4}$$

and to the non-ideal solution using the formula:

$$d_{Ai}^- = \sqrt{\sum_{x=1}^n [i(SCx_{Ai}) - i(SC)^-]^2} \quad \text{where } x = 1, 2, \dots, n \tag{5}$$

Finally, the proximity of each alternative to the ideal solution must be estimated using the following formula:

$$v_i = \frac{d_i^-}{d_i^+ + d_i^-} \tag{6}$$

Having estimated the proximity of the initiative(s) being assessed and of the TS and IS solutions of reference to the ideal solution, the position with respect to the TS and IS solutions of reference must be verified for each initiative being assessed. Then, three cases may be verified: the initiative(s) being assessed has a proximity to the ideal solution that is: (i) closer, both to the IS and to the TS solutions; in this case, the initiative(s) may be considered Impact Investment; (ii) less close to the IS solution and closer to the TS solution: in this case, it is appropriate to assess which of the two solutions—IS and TS—it is closer to; if it is closer to the IS solution, it may be considered as tending towards an Impact Investment and, where applicable, it may be adjusted; if it is closer to the TS solution, it may be considered a “traditional” investment, but not an Impact Investment; or (iii) less close to both the IS solution and the TS solution: in this case, the initiative(s) cannot be considered Impact Investment, nor does it have the prerequisites for a traditional-type investment. If a number of initiatives are being assessed, they may consequently be ordered with respect to the ideal solution.

5 Assessment Procedure: Application to a Case Study

The assessment procedure was applied to an HS initiative planned in the Municipality of Ladispoli (RM) with the *Rimessa Nuova* Area Plan, aimed, on the one hand, at satisfying the housing demand of the weaker segments of the population residing in the Municipality and, on the other hand, at reorganizing the peripheral urban setting between the A12 motorway and the SS1 Via *Aurelia* national road.

This setting currently (2016) appears as a widespread sprawl of scattered residential building and spontaneously arisen production plants. The re-organization takes place thanks to areas and buildings of public interest at the service of the entire *Rimessa Nuova* urban quadrant. The initiative benefits from a public grant of about € 6 million, for the building of 201 housing units in small buildings and villas functionally linked to one another by green spaces, a school service facility, and a multi-purpose sport complex. In addition to the approximately € 30,000 grant for housing, the units' sale prices are controlled and aligned with the maximum sale prices set for facilitated construction by the Lazio Region (about € 2000/m²).

The analysis of the intervention's documentation made it possible for the main data regarding the initiatives general and dimensional aspects to be extrapolated (Table 2) and the assessment procedure to be implemented, as described in Sect. 4 (Table 3). The procedure was able to show that the *Rimessa Nuova* SH initiative is therefore characterized by lower values when compared to the IS and is superior to

Table 2 Data for the “Rimessa Nuova” initiative

Intervention area	sqm	45,895
Building potential	cm	56,434
Residential	cm	50,918
Non residential	cm	5516
Land for building	sqm	15,069
Land for standard	sqm	17,516
Per capita	sqm	25
Public road	sqm	13,310
Private buildings	Type	Residential palaces; villas
Public buildings	Type	Sport center
Building features		Energetic class “A”
Profitability of initiative		9.54%
Trend market value in last 5 year		-35%
Tax benefits		None
Type of final users		Vulnerable part of population
Type of housing demand in the municipality of Ladispoli		First house principally
Costs (estimated) for operating (maintenance, utilities) per year	€	3200
New permanent jobs	n	25
Unemployed population in the municipality	n	1700
Regional non-repayable contribution	€	6,000,000

the TS. Subsequently, it is appropriate to assess which of the two solutions—IS or TS—it falls closer to. Considering the median distance of the two IS and TS reference solutions, the *Rimessa Nuova* SH initiative has a greater proximity to the IS than to the TS reference solution. Therefore it may be considered next to an ethical investment; with modifications making it conform even more to Impact Investment, it may thus be considered for inclusion in the SRFs’ investment basket.

Table 3 Summary results derived from implementation of the procedure

SC	W	OF	SH (Social housing Rimessa Nuova)	IS (SR impact investment)	TS (SR traditional investment)	Normalized impacts			Normalized and weighted impacts			Ideal solution	Non-ideal solution
						SH	IS	TS	SH	IS	TS		
1	12.33	↑	9.54%	8%	10%	0.9540	0.8000	1.0000	11.7616	9.8630	12.3288	12.3288	9.8630
2	9.59	↑	Decrease	Stability	Stability	0.0000	0.5000	0.5000	0.0000	4.7945	4.7945	4.7945	0.0000
3	10.96	↑	No tax	No tax	Tax	0.0000	1.0000	0.0000	0.0000	10.9589	0.0000	10.9589	0.0000
4	8.22	↑	VH	H	H	1.0000	0.8000	0.8000	8.2192	6.5753	6.5753	8.2192	6.5753
5	8.22	↑	16%	10%	15%	1.0000	0.6250	0.9375	8.2192	5.1370	7.7055	8.2192	5.1370
6	8.22	↑	25	30	18	0.8333	1.0000	0.6000	6.8493	8.2192	4.9315	8.2192	4.9315
7	5.48	↑	0.015%	0.050%	0%	0.3000	1.0000	0.0000	1.6438	5.4795	0.0000	5.4795	0.0000
9	9.59	↑	25%	20%	0%	1.0000	0.8000	0.0000	9.5890	7.6712	0.0000	9.5890	0.0000
10	5.48	↑	Absent	Present	Absent	0.0000	1.0000	0.0000	0.0000	5.4795	0.0000	5.4795	0.0000
11	8.22	↓	33%	0%	70%	1.0000	0.0000	0.4714	8.2192	0.0000	3.8748	8.2192	0.0000
12	5.48	↑	0%	10%	0%	0.0000	1.0000	0.0000	0.0000	5.4795	0.0000	5.4795	0.0000
13	8.22	↑	H	H	L	1.0000	1.0000	0.8000	8.2192	8.2192	6.5753	8.2192	6.5753
SH (Social housing Rimessa Nuova)													
Distance from ideal solution			32.4849		Distance from non-ideal solution				29.6384	Vicinity			0.4771
IS (SR impact investment)													
Distance from ideal solution			17.3288		Distance from non-ideal solution				44.7945	Vicinity			0.7211
IS (SR traditional investment)													
Distance da ideal solution			48.4198		Distance from non-ideal solution				13.7035	Vicinity			0.2206

6 Conclusions

The appraisal procedure enables the recognition of when one or more RE initiatives can be considered as an “Impact Investment”; these initiatives may produce beneficial effects related to “integral” development effects through a fair distribution of costs and benefits (financial, social and environmental) between stakeholders (Guarini and Battisti 2014b) involved (§ 85). The appraisal procedure makes transparent the decision-making process (§ 182–184), through the comparison of properties attributed to the evaluation criteria, related to the RE initiatives of both traditional-type and socially-responsible type. RE initiatives that pursue aims related to ethical finance can be included in the SRIs (also in SRFs).

By relying on “alternatives” to the investment channels by which RE renovation and development is traditionally financed (non-socially responsible banks, investment funds, club deals, crowdfunding), businesses operating in RE can increase the possibility of initiating responsible and sustainable housing projects. Thereby, if adopted by the promoters of RE initiatives, the proposed procedure can increase the funding channels helping to stem the malfunctions of this sector through the identification of the initiatives that protect the environmental quality, the socio-economic context and, consequently, improve people’s living conditions (§ 147, 150, 153, 184).

References

- Basso A, Funari S (2010) Relative performance of SRI equity funds: an analysis of European funds using data envelopment analysis. Department of Applied Mathematics, Series of working paper, vol 201/2010, University of Venice, Italy, pp 1–27
- Camoletto M, Ferri G, Pedercini C, Ingaramo L, Sabatino S (2017) Social housing and measurement of social impacts: steps towards a common toolkit. *Valori e Valutazioni* 19:11–39
- Cortez MC, Silva F, Areal N (2009) The performance of European socially responsible funds. *J Bus Ethics* 87:573–588
- De Mare G, Granata MF, Nesticò A (2015) Weak and strong compensation for the prioritization of public investments: multidimensional analysis for pools. *Sustainability* 7(12):16022–16038. <https://doi.org/10.3390/su71215798>
- Eurosif (2016) European SRI study. <http://www.eurosif.org/wp-content/uploads/2016/11/SRI-study-2016-LR-.pdf>. Accessed 31 May 2017
- Gangi F (2010) La finanza etica durante le crisi finanziarie nel nuovo millennio. Modelli teorici ed evidenze empiriche. Guida Editori, Naples, Italy
- Guarini MR, Battisti F (2014a) Benchmarking multi-criteria evaluation: a proposed method for the definition of benchmarks in negotiation public-private partnerships. In: Murgante B et al (eds) *Computational science and its applications—ICCSA 2014*. ICCSA 2014. Lecture notes in computer science, vol 8581. Springer, Cham, pp 208–223. https://doi.org/10.1007/978-3-319-09150-1_16
- Guarini MR, Battisti F, Buccarini C (2014b) Rome: re-qualification program for the street markets in public-private partnership. A further proposal for the Flaminio II street market. In: 2nd global conference on civil, structural and environmental engineering (GCCSEE 2013):

- Shenzhen, *Advanced materials research*, pp 838–841, 2928–2933. <https://doi.org/10.4028/www.scientific.net/AMR.838-841.2928>, 28–29 Sept 2013
- Ishizaka A, Nemery P (2013) *Multi-criteria decision analysis. Methods and software*. Wiley, Chichester
- Morano P, Tajani F (2017) The break-even analysis applied to urban renewal investments: a model to evaluate the share of social housing financially sustainable for private investors. *Habitat International* 59:10–20. <https://doi.org/10.1016/j.habitatint.2016.11.004>
- Napoli G, Gabrielli L, Barbaro S (2017) The efficiency of the incentives for the public buildings energy retrofit. The case of the Italian regions of the “objective convergence”. *Valori e Valutazioni* 18:25–40
- Nesticò A, Macchiaroli M, Pipolo O (2015) Costs and benefits in the recovery of historic buildings: the application of an economic model. *Sustainability* 7(11):14661–14676. <https://doi.org/10.3390/su71114661>
- Sandberg J, Juravle C, Hedesstrom TM, Hamilton I (2009) The heterogeneity of socially responsible investment. *J Bus Ethics* 87:519–533
- Tajani F, Morano P (2017) Evaluation of vacant and redundant public properties and risk control: a model for the definition of the optimal mix of eligible functions. *J Prop Invest Financ* 35(1):75–100. <https://doi.org/10.1108/JPIF-06-2016-0038>

An Integrated Evaluation Model as a Decision-Support Tool for Marzano di Nola's Strategic Environmental-Assessment Plan



Francesca Torrieri, Antonella Batà, Angela Aschettino and Barbara Caliendo

Abstract The Pope's encyclical *Laudato si'* draws our attention to the great challenges posed by sustainability objectives, questioning the institutions, the scientific community and civil society regarding the policies to be adopted and the tools to be used. This contribution focuses on Strategic Environmental Assessment (SEA) as an important tool to ensure sustainable development and reach a high level of environmental protection. In particular, considerations are explored by presenting a thought-provoking case study on the SEA of the urban plan for the municipality of Marzano di Nola, located in the province of Avellino in the Campania region. More specifically, this paper provides an integrated evaluation method to support the preparation of the preliminary environmental assessment report and the construction of scenarios for the adoption of urban plans, as an innovative tool that integrates objectives and multidimensional (economic, environmental and social) components, but also various approaches and models for the construction of a long-term shared vision.

Keywords Strategic environmental assessment · Integrated evaluation
Participatory decision-making process

Background: Environmental and Social Issues: Suggestions Contained in the Encyclical *Laudato si'*

The Pope's encyclical *Laudato si'* points out the great challenges posed by sustainability objectives, questioning the institutions, the scientific community and civil society about the policies to be adopted and the tools to be used. The Pope tells us that “*we have to realize that a true ecological approach always becomes a social approach; it must integrate questions of justice in debates on the environment, so as*

F. Torrieri (✉) · A. Batà · A. Aschettino · B. Caliendo
Department of Industrial Engineering, University of Naples Federico II, Naples, Italy
e-mail: ftrorie@unina.it

to hear both the cry of the earth and the cry of the poor” (§ 49). The protection of environmental resources (Borrelli and Citterio 2016) and the eradication of poverty are, indeed, issues that have long been debated in the international scientific community (Daly 1991; Pearce and Turner 1989; Turner et al. 1993; Costanza et al. 1997; Davoudi 1999). Since the first United Nations Conference on the Human Environment (1972), the preservation of environmental quality, the protection of human health and the rational use of natural resources have been priorities. The well-known Brundtland Report (1987) contains an effective definition of sustainable development as “*development that is able to meet the needs of the present without compromising the ability of future generations to meet their own needs*”. The European Landscape Convention (2000) stressed the need for new integrated spatial planning, based on sustainable local development. Today, environmental protection and local governance are implemented through a set of regulatory and policy instruments and cognitive tools at various levels (EU, national, regional and local), which are expressed in environmental and territorial laws. This contribution aims at delving into the message of the Pope’s encyclical by presenting a noteworthy case study on the strategic environmental assessment (SEA) of the urban plan (*piano urbanistico comunale* or PUC) of the municipality of Marzano di Nola in the province of Avellino in the Campania region. More specifically, this paper presents an integrated evaluation method to support the preparation of the preliminary environmental-assessment report (PEAR) and the construction of potential scenarios for the adoption of urban plans. Great emphasis has been placed in the Pope’s encyclical on public participation in the decision-making process. The encyclical highlights the importance of participation in political and public economic choices, stating, “*the local population should have a special place at the table*” (§ 183) as principal stakeholders in the overall economic values. The first part of this paper introduces the topic of policy response to environmental issues (Giordano et al. 2016) and the existing legal framework at European and national levels. The second part describes the proposed methodology and the main results of the case study. The third part concludes by addressing critical considerations in going forward.

1 Legal and Methodological Framework

The SEA was introduced to the European Community by Directive 2001/42/EC (SEA Directive) with the aim of ensuring a high level of environmental protection and promoting the integration of environmental considerations in the strategic decision-making processes (article 1 of the directive). In Italy, the SEA is regulated by Legislative Decree No. 152/2006 and subsequent amendments (Environmental Code)

and by regional legislation.¹ The Campania region introduced Regulation No. 5/2011—in compliance with the Regional Law No. 16/2004, then detailed in a “technical handbook” (2012)—as a support for the public authorities in their work. The territorial government’s regulations specify both conceptual and instrumental elements in the SEA procedure and in planning activities. Any plan or program that may have a significant impact on the environment and on cultural heritage is subject to a SEA (art. 6). Therefore, the SEA is a tool to evaluate, manage and monitor plans, policies and programs (Batà 2001). It is divided into an operating process that includes: (a) development of an environmental report; (b) public consultations; (c) assessment of the environmental report and the outcome of the consultations; (d) the decision; (f) information on the decision; and (g) monitoring (art. 11 of the Environmental Code). The constant interaction between the planning process and the evaluation process allows environmental issues to be considered at the analysis stage of the plan, supporting the process of creating future scenarios, evaluating environmental impacts and implementing and monitoring them over time (Zoppi and Lai 2008; Fusco Girard et al. 2011).

Particularly innovative compared to the traditional planning process is the participatory decision-making process to protect legitimate interests and the creation of the conditions for consensus among stakeholders on actions to be implemented in a territory. Here, it is understandable that there is a need for integrated approaches that take into consideration technical and multidimensional tools that promote dialogue and interaction between various fields of knowledge, i.e., between technical evaluations and evaluations of a political nature (Therivel 2008; Cannavacciuolo et al. 2015).

The role of evaluation methods appears very interesting from this perspective, not only to support the ranking of alternatives, but also to guide decision makers in managing the decision process and results through a descriptive or interpretative approach (Nijkamp et al. 2002; Cannavacciuolo et al. 2013; Del Giudice et al. 2014). The case study under analysis proposes a decision-support system (DSS) developed in a geographic information system (GIS) (Malczewski 1999). The DSS integrates various methods of analysis and assessment as a useful tool in the PEAR phase, as specified in the Campania region’s 2012 Technical Handbook. Part 2 below elucidates on the proposed methodology and describes the main results achieved in the case of the SEA of Marzano di Nola.

¹Since 2000, many regional and local authorities in Italy have introduced SEA procedures—originally on a voluntary basis and then in implementing the Environment Code—as part of the approval process of plans or territorial programs (ANCE—National Association of Building Constructors—Report, 2013).

2 Materials and Methods

2.1 Case Study

The municipality of Marzano di Nola is a city of Etruscan origin. Located in the province of Avellino in the eastern part of the Campania region—in the “*area nolana*” plains area, crossed by the Regi Lagni network of artificial canals—the municipality, with a population of 1734 inhabitants² and covering an area of 4.62 km², has a population density of 377 inhabitants per km². Agricultural areas accounts for 42% of the land area, and the majority of local economic activity is concentrated in the agricultural sector, especially in very small family farms. The main crops in the area are hazelnuts, chestnut, walnuts and olives. The Partenio Regional Park in the north, the Monti Picentini mountain range to the south, and Vesuvius National Park border Marzano di Nola to the southwest. The “Pietra Maula”, a site of community importance (SIC) is located in the north part of the urban area, whereas the focal point of the southeast is the Lauro Mountain. Because of their high natural value, these areas are a key element in conserving the scenic natural heritage of the area. Starting from the strategic preliminary document of urban planning, the SEA process in the preliminary analysis has highlighted the territory’s potentiality and critical issues in order to build a framework upon which to construct possible future actions. The following section discusses some of the main results obtained.

2.2 The Knowledge Framework

The analysis of the SEA process was structured in two parallel moments, the results of which have enabled the construction of the framework of “expert knowledge” (Annex VI letter f) of Legislative Decree No. 152/06, as subsequently amended) and “common knowledge” from which the territory’s potentiality and critical issues were derived. The “expert knowledge” framework was defined on the basis of the environmental technical analysis reported in various georeferenced thematic maps. Using the overlay mapping technique, a map of the municipal area with potential and critical issues was designed with the help of a GIS system. The environmental analysis was then combined with a social analysis aimed at investigating the territory’s potential and opportunities (Dente 2014). In this phase, citizen participation took a leading role, making possible the analysis of local perceptions about the area’s potentialities and critical issues. A survey was distributed to 10% of the population,³ or 145 residents. Of these residents, 28 were students, 31 were unemployed, 23 were

²Italian National Institute of Statistics (ISTAT), 2013.

³The survey sample was random and the survey was submitted by mail.

Table 1 Marzano di Nola—potentiality and critical issues

Potentiality	Critical issues
Quality of environment	Urban sprawl
Uniqueness of agricultural landscape	Lack of green spaces for leisure
Presence of areas and pedestrian paths	Decrease of suitable areas for local wildlife (trees, fences, corridors, vegetation)
Presence of a historically and culturally rich city center	Pollution of the Regi Lagni and surrounding areas
Presence of SIC	Fragmentary nature of commercial activities
Efficient school system	Pollution by dust raised during the hazelnut harvest
Efficient management of waste	Pollution caused by spraying walnut groves with pesticides
Productive activity based on local resources	Presence of illegal dumps
	Absence of strategies to boost the economy
	Areas at risk of hydrogeological instability
	Poor level of preservation of historical and architectural heritage
	Lack of public services and cultural activities

businessmen/professionals, 34 were office workers, 14 worked in the public administration and 15 were retirees. Table 1 shows the survey results.

Based on the survey, a map was defined of the critical issues and potentiality of the area. Subsequently, strategies, objectives and actions of the PUC for Marzano di Nola were defined, with a focus on strengthening and enhancing local production, social structure and the protection of the landscape and environment. This framework enabled defining objectives, strategies and a plan of action, and the identification of areas of intervention.

2.3 Scoping Phase: Definition of Objectives, Strategy and Actions

During the preparation of the scoping phase, four objectives, 12 strategies and 21 actions were identified, organized according to the hierarchical structure shown in Table 2.

Starting from the hierarchical structure shown in Table 2, three scenarios of the plan were identified and evaluated qualitatively and quantitatively compared to the system of indicators.

The first scenario provides a series of interventions aimed at stimulating the economy by favoring local products (e.g., hazelnuts and walnuts), also through the use of incentives for and promotion of alternative forms of agriculture (such as organic farming). An important role is played by the sustainable management of urban areas.

Table 2 Objectives, strategies and actions

Objective	Strategy	Action
1. Sustainable economic development based on cultivating local resources	S.1.1 Promotion of local agricultural production	A.1.1.1 Incentives to create walnut and chestnut groves
	S.1.2 Fostering of development of local microenterprises	A.1.2.1 Promotion of organic farming
		A.1.2.2 Creation of a DOP brand for local production
2. Improvement of town's attractiveness to bring it into line with that of the region/in regard to the regional territorial reality	S.2.1 Improvement of labor supply	A.2.1.1 Development of an industrial area
	S.2.2 Improvement of hotel facilities for tourists	A.2.2.1 Inclusion of new types of accommodations (e.g., farm houses)
	S.2.3 Revival of local traditions	A.2.3.1 Enhancement of local crafts
A.2.3.2 Conservation of historical and architectural values		
3. Development of construction and infrastructure compatible with landscape protection and enhancement of the territory's characteristics	S.3.1 Redevelopment of existing residential area	A.3.1.1 Renovation and development of residential historical and contemporary buildings
		A.3.1.2 Enhancement of public spaces
		A.3.1.3 Redesign of the existing road system
	S.3.2 Relocation of residences in areas at hydrogeological risk	A.3.2.1 Fiscal and financial incentives for relocation
	S.3.3 Housing development concentrated around the existing core	A.3.3.1 Creation of new residential areas around the existing core
		A.3.3.2 Inclusion of new public spaces
		A.3.3.3 Expansion of the existing road system
S.3.4 Promotion of functional mix	A.3.4.1 Inclusion of new public spaces	
	A.3.4.2 Inclusion of neighborhood services	

(continued)

Table 2 (continued)

Objective	Strategy	Action
4. Territorial and agricultural landscape protection	S.4.1 Protection of natural resources	A.4.1.1 Restriction of construction in areas of naturalistic value
	S.4.2 Ecological enhancement of valleys	A.4.2.1 Creation of green areas for recreational activities
		A.4.2.2 Creation of an ecological reserve and regional park
S.4.3 Recovery of the Regi Lagni area	A.4.3.1 Upgrading and securing of river courses	

The second scenario includes a series of interventions aimed at the residential development of the town to meet growing demand in light of the positive demographic trend observed over the recent years. The building expansion foreseen in this alternative plan is also the answer to the expectation of further population growth. The redevelopment of urban and suburban street systems is also included in the plan, as well the renovation of existing architecture and the creation of recreational green areas and facilities.

The third scenario is of a predominantly naturalistic-touristic nature, seeking above all the conservation of the natural qualities of the landscape through the protection of natural resources.

2.4 Evaluation of the Scenarios

The impact of each potential scenario is estimated and reported in Table 3. Through the use of GIS, it was possible to spatialize and measure the indicators in order to define a map of susceptibility to the location of the identified actions.

This framework of knowledge was a key point in consulting various stakeholders and defining a table for consultation prior to the adoption of the PUC.

The above table of effects was assessed and analyzed through a multicriteria decision support system, using DEFINITE software (Janssen et al. 2001a, b), which contains a set of multicriteria methods to transform the effect table, in combination with policy weights, into a ranking of alternatives. The system is able to support all decision processes, from problem definition to report generation. The hierarchical regime method (Hinloopen and Nijkamp 1990)—especially designed to handle both quantitative and qualitative effects—was used to evaluate the three scenarios. The method is based on partitioning the effects of values in accordance with ordinal effect scores.

In this case, the table assessed is a quantitative matrix with cost and benefit values. In the first stage of analysis, it is assumed that all criteria in the effect table

Table 3 Table of effects

Thematic area	Indicators	MU	Status quo	Scenario 1	Scenario 2	Scenario 3
Agriculture	Agricultural area	ha	263.77	10%	-0.50%	12.60%
	Use of fertilizer	q/ha	1582.60	10%	-0.50%	12.60%
	Use of plant protection products	Q	27.69	10%	-0.50%	12.60%
Forestry	Wood production	ha	259.6	10%	-0.50%	15%
Tourism	Tourist infrastructure	m ²	287.1	287.1	287.1	301.5
Industry	Distance of industrial companies from sensible sites	ml	480	1200	480	480
Noise	Population exposed to noise	Ab	1387	1287	1387	1387
Waste	Production of urban waste	kg	568,772	568,772	38%	568,772
	Quantity of waste recycled	kg	455,017	455,017	38%	455,017
Atmosphere	Distance sources of emission from sensible sites	ml	480	1200	480	480
Water	Distance sources of emission from river and flood	ml	480	1200	480	480
Hydrological risk	Interference with areas at hydrological risk	m ²	0.98	0.98	0.98	0.98
Geological risk	Interference with areas at landslide risk	m ²	1.72	1.72	1.72	1.72

Fig. 1 Ranked order of alternatives

DEFINTE 2.0: DEFINTE session VAS (2) 26/11/201

Results MCA 1: Regime method (no stand.; Ordinal (Agricoltura))

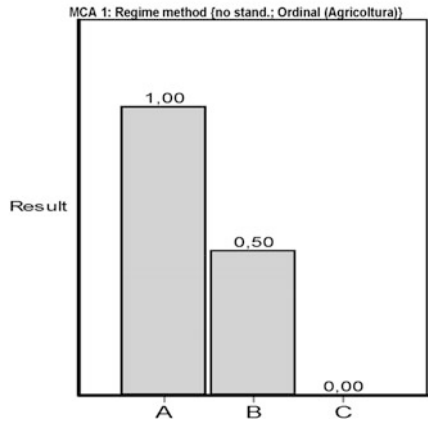
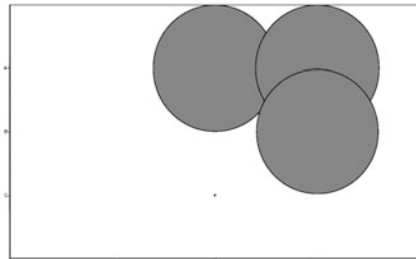


Fig. 2 Dominance table

DEFINTE 2.0: DEFINTE session VAS (2) 26/11/2015 11:15

Dominance Table [ScorUnc.: 30,00 %]

Alternatives	A	B	C
A	1969	2000	
B		2	1969
C			31



have the same importance, i.e., that the weights are equal. In Fig. 1, the results of the hierarchical regime analysis are shown, while Fig. 2 presents the sensitivity analysis based on a Monte Carlo simulation, considering an ordinal distribution of the criterion score and a variation of the input score (-30% and +30%). As shown in Fig. 2, alternative A is always dominant in the ranking of the proposed scenarios, so the solution is robust for the uncertainty associated with the criterion scores. As shown in Fig. 1, scenario A is the one that reduces negative impacts the territory and maximizes benefits. These results are useful to the discussion implemented in the participation phase.

3 Conclusions

The case study enables certain observations as to whether SEA methodology is adequate to meet the sustainability objectives and certain challenges posed by the Pope's encyclical. Practical experience indicates that a SEA is an effective procedure to structure action plans for sustainable development of municipal policies to monitor environmental and social impact. Based on the findings in the investigation, it can be said that a public decision model based on the conceptual and methodological approach of the SEA can fit into a wider territorial governance model-oriented paradigm of sustainability. Using evaluation paths structured, as it is possible to build proactive dialogue between decision makers, planners and evaluators, helping to shape participatory and shared solutions. Moreover, the integration of various approaches and techniques is profitable especially in decision-making processes in which knowledge sharing and knowledge represents a structuring component in constructing the cognitive framework. The latter cognitive framework must become concrete in order to be transformed into shares, conditional upon the achievement of a balanced dynamic between the performance of governments, communities and groups (Hardy and Zdan 1997). The combined use of GIS and typical evaluation tools enabled referring the analysis carried out to spaces and the creating of a localization likelihood map to be used to evaluate each action's impact on the area. Therefore, through an integrated spatial approach, it is possible to outline the decision-making structure that would include both technical assessments which those policies, but also to take into account the views of local communities, dealing with a complex local context. Instead, several issues emerged due to the lack of reliable data on environmental status and on the identification and measurement of the responses to the assumptions made.

References

- Batà A (2001) La valutazione di impatto ambientale quale strumento di tutela dell'ambiente nella fase progettuale. In: AA.VV: Politiche per la tutela del territorio, Atti del Convegno Internazionale, Naples, p 100
- Borrelli G, Citterio M (2016) Environmental sustainability: from theory to practice. The contribution of the Laudato si encyclical. *Valori e Valutazioni* 17:9–12
- Cannavacciuolo L, De Liddo A, Iandoli L, Quinto I (2013) Using social network analysis to support collective decision making process. In : Engineering effective decision support technologies: new models and applications, pp.87–103
- Cannavacciuolo L, Iandoli L, Ponsiglione C, Zollo G (2015) Knowledge elicitation and mapping in the design of a decision support system for the evaluation of suppliers' competencies. *VINE* 45(4):530–550
- Costanza R, Cumberland J, Daly H, Goodland R, Norgaard R (1997) An introduction to ecological economics. St Lucie Press and ISEE
- Daly H (1991) Steady state economy. Washington: Island Press
- Davoudi S (1999) Sostenibilità: una nuova visione per il sistema britannico di pianificazione. *Urbanistica* 112:78–83

- Del Giudice V, De Paola PF, Torrieri F (2014) An integrated choice model for the evaluation of urban sustainable renewal scenarios. *Adv Mater Res* 1030–1032:2399–2406
- Dente B *Understanding Policy Decision*, Springer, Berlin 2014
- Fusco Girard L, Cerreta M, De Toro P (2011) Integrated spatial assessment in planning: strategic choices for Cava de' Tirreni master plan. In: *Proceedings of the international symposium on the analytic hierarchy process*, pp 1–6
- Giordano R, Montacchini EP, Tedesco S (2016) Living wall system: towards the environmental and economic sustainability, research and experimental development. *Valori e Valutazioni* 16:29–38
- Hardy P, Zdan T (1997) *Assessing sustainable development. Principles in practice*. International Institute for Sustainable Development, Winnipeg
- Hinloopen E, Nijkamp P (1990) Qualitative multiple criteria choice analysis: the dominant regime method. *Qual Quant* 24:37–56
- Janssen R, van Herwinjen M, Beinat E (2001a) *DEFINITE for windows. A system to support decisions on a finite set of alternatives (software package and user manual)*. Vrije Universiteit, Amsterdam
- Janssen R, van Herwinjen M, Beinat E (2001b) *DEFINITE for windows. A system to support decisions on a finite set of alternatives (software package and user manual)*. Vrije Universiteit, Amsterdam
- Malczewski J (1999) *GIS and multicriteria decision analysis*. Wiley, New York
- Nijkamp P, Torrieri F, Concilio G (2002) Decision support tools for urban contingency policy. A scenario approach to risk management of the Vesuvius area in Naples, Italy. *J Contin Crisis Manag* 10(2):95–112
- Pearce DW, Turner RK (1989) *Economics of natural resources and the environment*. Wheatsheaf, Brighton
- Therivel R (2008) *Strategic Environmental Assessment in Action*. Earthscan, London
- Turner K.R., Pearce D., Bateman I., (1993) *Environmental Economics: an elementary introduction*. Johns Hopkins Univ. Pr
- Zoppi C, Lai S (2008) *Problematiche partecipative e conflitti nella definizione e nell'attuazione del Piano Paesaggistico Regionale della Sardegna*. Paper in the CD ROM containing works presented at the 29th A.I.S.Re (Italian Association of Regional Science) Annual Scientific Conference, Bari, pp 24–26

The Local Center for the Arts and Culture *La Vetreria*: Example of Cultural Urban Regeneration in Pirri, Independent Municipality of Cagliari in Sardinia



Francesca Leccis

Abstract The publication of the encyclical *Laudato si'*, the second written by Pope Francis, is an exhortation addressed not only to Catholic Christians, but to the whole of humankind, so that everyone cooperates for the “care of the creation”. This paper refers to the fourth chapter of the letter, which suggests an “integral ecology” that respects the interconnection among the environmental, human, cultural, social and economic aspects. Indeed, the Local Center for the Arts and Culture *La Vetreria* realized in the independent Municipality of Pirri in Cagliari, examined in this study, constitutes an example of urban regeneration that springs from the restoration of abandoned industrial buildings and passes through the qualification of the urban space to finally reach the multiscale regeneration of the area including physical, economic, social and cultural aspects. The works, following the examples of urban regeneration identified in the academic literature as cultural regeneration, integrate spaces specifically designed for cultural activities with areas for recreational and leisure activities. This mix of urban functions is supposed to exert great attraction over the population, so that the area connects itself to the urban routine becoming a daily destination, independent of occasional events. The research question is about the success of this project. It has been questioned whether it has been able to generate genuine urban regeneration. Visual analysis, supported by longitudinal and cross-sectional quantitative analysis of economic and demographic data, highlights the results and critical aspects of the project. It shows that economic and social conditions of the area did not actually improve. Despite the successful beautification of the area, the project has not been able either to attract other investments or to trigger socioeconomic upward mobility among the local residents. Thus, it has to be concluded that it failed to achieve its original aim.

F. Leccis (✉)

Dipartimento di Ingegneria Civile, Ambientale e Architettura,
Università degli Studi di Cagliari, via Marengo 2, 09123 Cagliari, Italy
e-mail: francescaleccis@unica.it

Keywords Urban regeneration · Renaissance · Cultural regeneration
Multiscalar regeneration · La Vetreteria · Pirri · Cagliari

1 Introduction

The fourth chapter of Pope Francis' (2015) second encyclical entitled *Laudato si'* invokes integral ecology as an approach able to take into account all the aspects of the current global crisis. It combines various elements of reality, such as the environment, the economy, the social sphere, the culture, the daily life, the common good and the justice between generations, to promote well-balanced development. In particular, the second paragraph of this chapter explains that

There is a need to incorporate the history, culture and architecture of each place, thus preserving its original identity. (§ 143)

This constitutes an additional authoritative support for urban-regeneration approaches based on cultural policies that have been playing a key role in both the US and Europe since the 1980s (Wansborough and Mageean 2000). It is a strategy adopted by many cities to reconquer their leading position in the metropolitan scenario, once phenomena such as deindustrialization, population decentralization and globalization had changed the traditional economic context (Spirou 2006). Indeed, in the new global competition among creative cities, culture is considered the crucial ingredient to foster the success of the city (Florida 2002) because it is seen as the perfect means to ensure the representation and participation of various community groups (Gibson and Stevenson 2004). In particular, the activities connected with theater groups, orchestras and art collections are considered bearers of long-term, direct and indirect, positive socioeconomic impacts (Werquin 1999). Along with these elements, Montgomery (2003) defined a set of indicators to identify successful cultural quarters including, among others, the presence of cultural and meeting places like theaters, bars, restaurants or cafés and the usability of public spaces such as gardens, squares or corners. In fact, cultural policies connected to local communities are more effective than aseptic architectural projects intended for cultural purposes (Stern 2001). In addition, the restoration of neglected buildings is considered by the experts an effective urban policy able to trigger virtuous processes of local development and to tailor housing and employment policies to residents' needs (De Matteis 2015). Coherent with this common wisdom, the project in Pirri is characterized by the restoration of abandoned industrial buildings and the mix of urban functions in an attempt to simultaneously stimulate the cultural, social, economic and urban aspects (Stevenson 2004), as well as the creative ones (O'Regan 2002), by including elements like local history, heritage, townscape, architecture, design, entertainment and food services (Deffner 2000).

However, valuating the impact of both infrastructure and events with precision is a thorny problem (Moulaert et al. 2004a, b). It is perhaps useful first of all to situate the project in its wider context. For this reason, the following paragraph provides

the location of the project and general information about it, such as its origin, description and history. Subsequently, visual analysis explores physical changes and quantitative analysis investigates economic and social changes. Thereby, various results are assembled and a comprehensive conclusion is finally drawn.

2 The Project

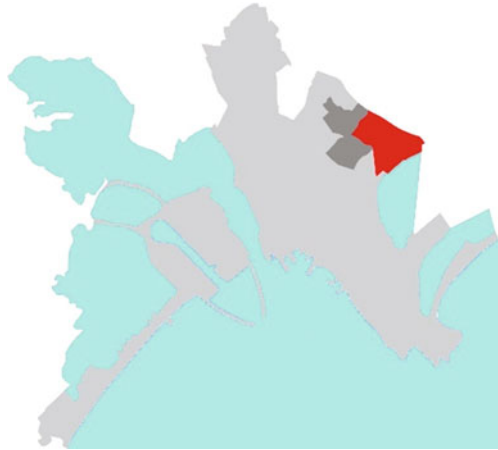
The Local Center for the Arts and Culture *La Vetreria* is located in the Is Bingias neighborhood, on the edge of the historical city center of Pirri, the only independent Municipality of the City of Cagliari, in Southern Sardinia. Figure 1 shows Cagliari on the map of Italy; Fig. 2 illustrates in red the neighborhoods of Is Bingias and Terramaini, which are merged in the following statistical surveys; in dark grey is the surrounding neighborhood of Pirri, used as a basis of comparison; and in light grey are the other neighborhoods of Cagliari.

The project is located in the spaces of a glassmaker, a distillery and a wine factory where manufacturing activities were regularly conducted until the 1960s (Nonnis 2011). Once they stopped, the area went through relentless urban decay. Thus, the city of Cagliari initiated the transformation of these structures into the Local Center for the Arts and Culture *La Vetreria* in the year 2000 with the aim to regenerate the whole area (ibid.). For this reason, they did not limit the work to the restoration of the buildings, but, following the traditional practices of cultural regeneration, they mixed spaces for cultural activities with areas for recreational and leisure activities by providing exposition rooms, conference halls, a cine-theater, a park, a restaurant, a bar, a playground, an off-leash dog area, an internet point and artistic laboratories (Cagliari 2016). The area is served by public

Fig. 1 Location of Cagliari in Italy (author's elaboration 2016)



Fig. 2 Location of Is Bingias in Cagliari (author's elaboration 2016)



transport; bike racks are available; and two large car parks are provided next to the two entrances (Comune di Cagliari 2016a). The opening ceremony of the complex took place in 2003 (Nonnis 2011). Figure 3 shows the masterplan of the area. It can be observed that, in addition to the public spaces listed above, a private residential development has been realized as part of the plan. It is the *Residenza nel Parco*, which is described in the section on the visual analysis.

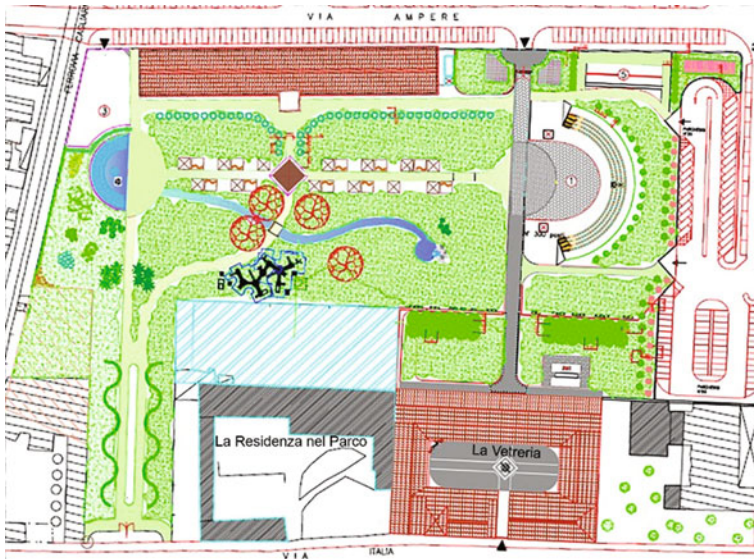


Fig. 3 Masterplan of the regeneration project (Comune di Cagliari 2016b)

3 Methodology

The case study is analyzed through visual and quantitative methods to identify the effects that the project development triggered in the adjacent area. In particular, visual analysis identifies landscape changes that can be observed after the refurbishment of *La Vetreria*, thus pointing to economic capital reinvestment, as illustrated by Davidson and Lees (2005). Simultaneously, quantitative analysis explores socio-demographic and economic changes to investigate whether social upgrading has occurred. Drawing from the examples of Davidson and Lees (2005) and Arbaci and Tapada-Berteli (2012), cross-sectional and longitudinal analyses have been conducted on census data from 2001 and 2011 in the ward of Is Bingias and compared to those of the surrounding wards of Monte Leone, Santa Rosalia, San Giuseppe, Santa Teresa and Parteolla in Cagliari. Data drawn from two census years are adequate to capture the context of evolution of the area before and after the opening of the cultural centre (year 2003) and the effects in the following decade.

4 Visual Analysis

Visual analysis identifies only one mixed-use development and only one building restoration. The former is the *Residenza nel Parco* (Fig. 4) where more than half of the flats (28 out of 53) were still unsold by the end of June 2016, although they had been placed on the market in 2008. The latter is a two-storey residential building located on the corner of Via Italia and Via Dolianova (Fig. 5). It has to be kept in mind, though, that *La Residenza nel Parco* was part of the masterplan, so it cannot be included among the proofs of economic capital reinvestment stimulated by the regeneration of the area. Consequently, the two-storey residential building restoration is the only sign of capital reinvestment that can be spotted in the area.

Fig. 4 La Residenza nel Parco (Vacca srl 2016)



Fig. 5 Residential building on the corner of Via Italia and Via Dolianova (author’s picture 2016)



5 Quantitative Analysis

Quantitative analysis examines demographic data and real-estate trends through both longitudinal and cross-sectional studies to learn whether socioeconomic upgrading has occurred. During the ten-year period 2001–2011, the population of Is Bingias–Terramaini remained stable, both before and after the opening of La Vetreria in 2003, as was also the case in the other areas of Pirri (Fig. 6).

In addition, the ageing of the population of Is Bingias–Terramaini outweighed all other neighborhoods in Pirri, as there was the highest proportion of elderly citizens in any given year between 2001 and 2011. Moreover, the percentage of population aged 65 and above has more than doubled in the study area in the ten-year period analyzed, whereas it increased only slightly in the surrounding neighborhoods (Fig. 7).

Data on employment by sector are provided, aggregated in macro-areas that include the various neighborhoods. Consequently, the analysis cannot be very accurate in this aspect. Nonetheless, it is still worth taking a look at them. One might hypothesize a moderate social upgrading, noticing that the number of people employed in elementary occupations decreased by more than 22% in the area where

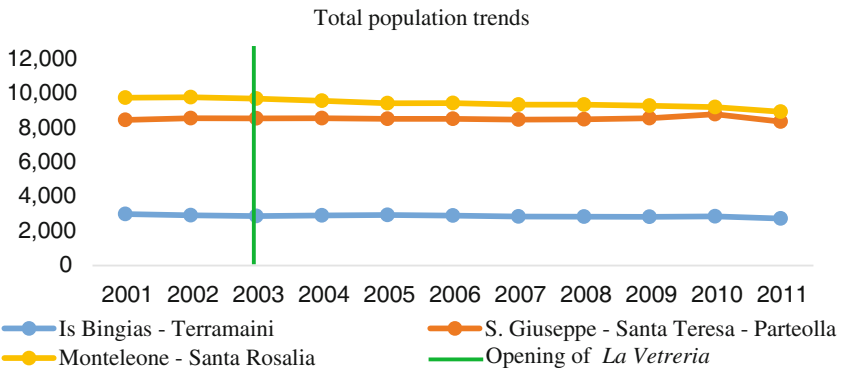


Fig. 6 Total population trends (compiled and calculated by the author. Data from Comune di Cagliari 2014)

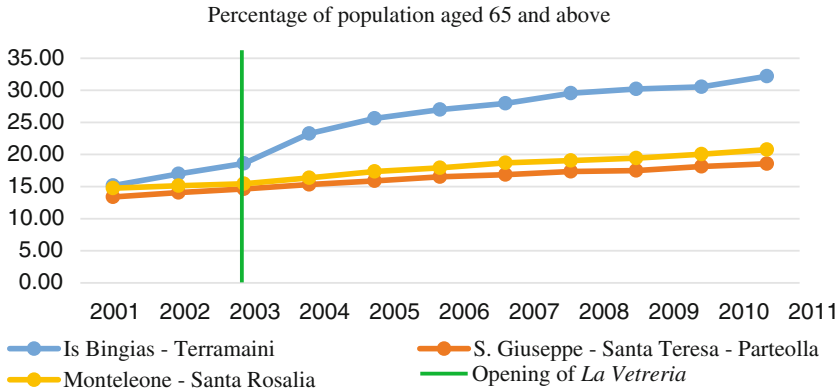


Fig. 7 Percentage of population aged 65 and above (compiled and calculated by the author. Data from Comune di Cagliari 2014)

Table 1 Variation in people working in elementary occupation (compiled and calculated by the author. Data from Comune di Cagliari 2014)

Elementary occupations	2001	2011	Variation (%)
Is Bingias–Terramaini, Monteleone–Santa Rosalia	749	581	-22.43
Barracca Manna, Is Campus-Is Corrias, Monreale, Villa Doloretta, S. Giuseppe–S. Teresa–Parteolla	906	907	0.11

Is Bingias is included, whereas the same increased slightly in the other area (Table 1).

However, this hypothesis is not proven by the number of entrepreneurs and professionals, whose increase is insignificant in the Is Bingias area when compared to the other group of neighborhoods (Table 2), and it is definitely invalidated by the decrease of the number of people holding a level-four qualification or above, a diminution that occurred only in Terramaini–Is Bingias whereas it grew consistently in all the other areas (Table 3).

Neither the analysis of economic aspects supports an upgrade having occurred in the area. For example, housing tenure did not change from rent to ownership. On the contrary, the number of owner-occupied houses remained stable over the ten-year period between 2001 and 2011, while the number of rented houses increased by 10% over the same time (see Tables 4 and 5).

Table 2 Variation of entrepreneurs and professionals (compiled and calculated by the author. Data from Comune di Cagliari 2014)

Entrepreneurs and professionals	2001	2011	Variation (%)
Is Bingias–Terramaini, Monteleone–Santa Rosalia	338	447	32.25
Barracca Manna, Is Campus-Is Corrias, Monreale, Villa Doloretta, S. Giuseppe-S. Teresa-Parteolla	333	728	118.62

Table 3 People with level-four and above qualifications (compiled and calculated by the author. Data from Comune di Cagliari 2014)

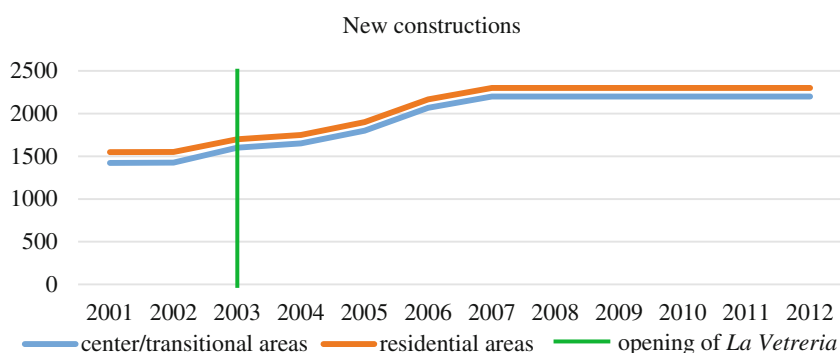
Level 4 qualification and above	2001	2011	Variation (%)
Is Bingias–Terramaini	1414	1356	-4.10
S. Giuseppe–Santa Teresa–Parteolla	2218	3004	35.44
Monteleone–Santa Rosalia	3996	4379	9.58

Table 4 Owner-occupied houses (compiled and calculated by the author. Data from Comune di Cagliari 2014)

Owner-occupied houses	2001	2011	Variation (%)
Is Bingias–Terramaini	931	930	-0.11
S. Giuseppe–Santa Teresa–Parteolla	2227	2466	10.73
Monteleone–Santa Rosalia	3216	3169	-1.46

Table 5 Rented houses (compiled and calculated by the author. Data from Comune di Cagliari 2014)

Rented houses	2001	2011	Variation (%)
Is Bingias–Terramaini	99	109	10.10
S. Giuseppe–Santa Teresa–Parteolla	642	703	9.50
Monteleone–Santa Rosalia	416	439	5.53

**Fig. 8** Historic residential prices in Pirri related to new constructions (compiled and calculated by the author. Data from Camera di Commercio di Cagliari s.d.)

Nor have residential real-estate prices been influenced by the opening of *La Vetreria*, since they varied according to the general property cycle characterized by a steady increase of the prices until the global crisis and a subsequent plateau or fall, regardless if the buildings were new (Fig. 8), in good conditions (Fig. 9) or in need of renovation (Fig. 10). It can also be observed that prices in the center of Pirri,

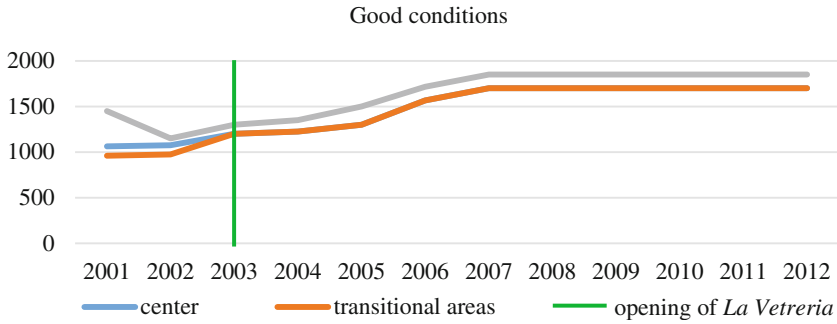


Fig. 9 Historic trends of housing prices in Pirri related to buildings in good conditions (compiled and calculated by the author. Data from Camera di Commercio di Cagliari s.d.)

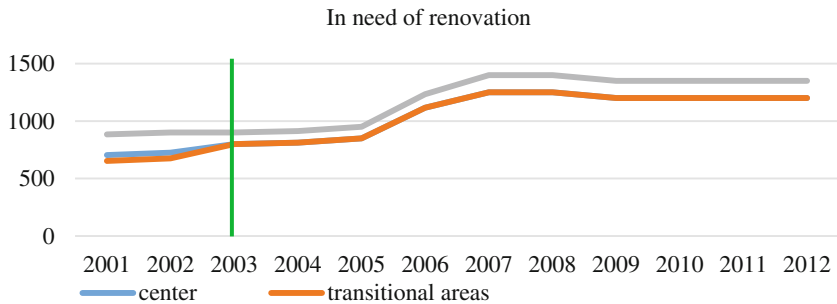


Fig. 10 Historic trends of housing prices in Pirri related to buildings in need of renovation (compiled and calculated by the author. Data from Camera di Commercio Cagliari s.d.)

where *La Vetreria* is located, matched those in the transitional areas since 2003 in the case of buildings in new conditions or in need of renovation (Figs. 9 and 10), and since 2001 in the case of new buildings (Fig. 8).

6 Conclusion

The project examined in this paper is located in Is Bingias neighborhood, on the edge of the historic city center of Pirri, the only independent Municipality of the City of Cagliari, in southern Sardinia. The transformation of the abandoned spaces of a glassmaker, a distillery and a wine factory into the Local Center for the Arts and Culture *La Vetreria* follows the practices known in the literature as cultural regeneration. Indeed, a multitude of urban functions are allocated to the area with the aim to stimulate its liveliness. In particular, spaces for proper cultural activities, such as exposition rooms, conference halls and the cine-theatre, are mixed with

areas for recreational and leisure activities, such as a park, a restaurant, a bar, a playground, an off-leash dog area, an internet point and artistic laboratories. In this way, various elements of reality, such as the environment, the economy, the social sphere, the culture, the daily life, the common good and justice between generations are integrated in order to promote well-balanced development, coherently with the “integral ecology” approach, illustrated in the fourth chapter of Pope Francis’ second encyclical entitled *Laudato si’*.

However, the project failed to achieve its aim, since it has not been able to trigger social and economic improvement of the area, as both the visual and quantitative analysis demonstrate. Indeed, the visual analysis identified only a few new residential developments, and many of the residential units are still unsold, a sign that the area is not attractive, either for capital investment or as a place to live. The quantitative analysis showed that the population remained stable in number and aged dramatically in the neighborhood of Is Bingias, a symptom that the area is not trendy enough for younger residents. Although the decrease of the number of people employed in elementary occupation might suggest a socioeconomic upward of local residents, the figures on entrepreneurs and professionals and on qualification holding prove this hypothesis wrong. Indeed, Is Bingias is the only neighborhood in Pirri where the number of people holding a level-four qualification or above decreased in the ten-year period examined, and the number of entrepreneurs and professionals grew by a much smaller rate than in the surrounding areas. On top of that, the analysis of both the housing tenure and of the residential real-estate prices disprove an upgrade of the area. In fact, there has not been a change from rented houses to owner-occupied properties. Actually, the number of rented houses has even grown. In addition, housing prices varied according to the property cycle, independently from possible influences of the Local Center for the Arts and Culture *La Vetreria*.

In conclusion, it can be argued that, although the project accomplished the successful beautification of the area, it has been incapable of achieving the desired multiscalar regeneration of the neighborhood that encompasses more than mere aesthetics, economic, social and cultural aspects. Indeed, the project has not been able either to attract other investments or to trigger socioeconomic upward mobility of the local residents. The reasons behind this failure might be of various natures and need further investigation. As a suggestion, it can be proposed to inquire into the involvement and participation of local residents and into the tailoring of the interventions realized and the policies adopted to the specific context. In particular, it is advisable to conduct qualitative research that includes interviews of local residents, business owners and cultural association that operate in the area to verify if they approved of the policies adopted, if they collaborated in their definition and to learn what are their unsatisfied needs and what proposals they may have to further improve the neighborhood.

References

- Arbaci S, Tapada-Berteli T (2012) Social inequality and urban regeneration in Barcelona city centre: reconsidering success. *Eur Urban Reg Stud* 19:287–311
- Cagliari (2016) Parco ex Vetreria – Pirri. http://www.comune.cagliari.it/portale/ambiente/at01_parco_ex_vetreria_pirri;jsessionid=E68733AED266B60471218EAC35609498 Accessed 31 Oct 2016 [Online]
- Camera di Commercio Cagliari (s.d.) http://www.ca.camcom.it/IT/Page/t01/view_html?idp=616. Accessed 02 Nov 2016 [Online]
- Comune di Cagliari (2016a) Parco Giardino Ex-Vetreria di Pirri. http://old.comune.cagliari.it/portale/it/scheda_sito.page;jsessionid=464B8383745A4078DAAE0FB63EA902A7?contentId=SIT774. Accessed 31 Oct 2016 [Online]
- Comune di Cagliari (2016b) Masterplan. http://www.comunecaglierinews.it/public/biz_editor/File/reportage/0000067/Parco%20ex%20Vetreria%20di%20Pirri.jpg. Accessed 26 June 2017 [Online]
- Comune di Cagliari - Sistemi Informativi, Informatici e Telematici (2014) Atlante Demografico di Cagliari 2014. http://old.comune.cagliari.it/resources/cms/documents/AtlanteDemografico2014_1.pdf. Accessed 02 Nov 2016 [Online]
- Davidson M, Lees L (2005) New-build gentrification and London’s riverside renaissance. *Environ Plann A* 37:1165–1190
- Deffner A (2000) Cultural industries in Athens: spatial transformations during the nineties. Papers of the 6th World Leisure Congress Leisure and Human. Universidad de Deusto, Bilbao
- De Matteis V (2015) Arriva ‘Tutur’, il piano europeo per il rinascimento urbano. http://www.rainews.it/dl/rainews/articoli/Arriva-Tutur-il-piano-europeo-per-il-rinascimento-urbano-c6e07c2b-2be2-4578-ac40-1f44b034a940.html?refresh_ce. Accessed 31 Oct 2016 [Online]
- Florida R (2002) The rise of the creative class and how it’s transforming work, leisure, community and everyday life. Basic Books, New York
- Gibson L, Stevenson D (2004) Urban space and the uses of culture. *Int J Cult Policy* 10(1):1–4
- Montgomery J (2003) Cultural quarters as mechanisms for urban regeneration. part 1: conceptualising cultural quarters. *Plann Pract Res* 18(4):293–306
- Moulaert F, Demuyneck H, Nussbaumer J (2004a) Urban renaissance: from physical beautification to social empowerment. *City* 8(2):229–235
- Moulaert F, Rodriguez A, Swyngedouw E (eds) (2004b) The globalized city: economic restructuring and social polarization in European cities. Oxford University Press, Oxford
- Nonnis M (2011) Parco Ex-Vetreria. <http://www.comunecaglierinews.it/reportage.php?pagina=67&sottopagina=268>. Accessed 31 Oct 2016 [Online]
- O’Regan T (2002) Too much culture, too little culture: trends and issues for cultural policy making. *Media Int Aust Incorporating Cult Policy* 102:9–24
- Pope Francis (2015) *Laudato si’*. Libreria Editrice Vaticana, Città del Vaticano
- Spirou C (2006) Urban beautification: the construction of a new identity in Chicago. In: Koval JP, Bennett L, Bennet MIJ, Demissie F, Garner R, Kim K (eds) *The new Chicago: a social and cultural analysis*. Temple University Press, Philadelphia
- Stern M (2001) Social impact of the arts projects. Summary of findings. University of Pennsylvania, School of Social Work, Philadelphia
- Stevenson D (2004) “Civic gold” rush: cultural planning and the politics of the third way. *Int J Cult Policy* 10:119–131
- Vacca srl (2016) Residenza nel Parco. <http://arvacca.it/index.php#!prettyPhoto>. Accessed 31 Oct 2016 [Online]
- Wansborough M, Mageean A (2000) The role of urban design in cultural regeneration. *J Urban Design* 5(2):181–197
- Werquin T (1999) Impact des Equipements Culturels sur le Développement Urbain, Rapport de Stage. Agence de Développement et d’Urbanisme de Lille Métropole, Lille

Risk-Analysis Techniques for the Economic Evaluation of Investment Projects



Antonio Nesticò

Abstract The argument of Pope Francis' "*Laudato si*" Encyclical was developed around the concept of "integral ecology": «Since everything is closely interrelated and today's problems require a vision capable of taking account every aspect of the global crisis, I suggest we now consider some elements of an *integral ecology*, one which clearly respects its human and social dimension» (Pope Francis 2015). With regard to investment initiatives, the pursuit of not only financial but also social, cultural and environmental objectives requires a careful and accurate analysis of the various risk components associated with this concept. The objective of this paper is to strongly focus on the concept of risk and the techniques that are commonly used for risk analysis in the economic evaluation of projects. Also included are the identification of critical issues and outlining of potential successful research prospects that are linked to the entire process.

Keywords Risk · Uncertainty · Risk analysis · Sensitivity analysis
Economic evaluation

1 The Concept of Risk and the Risk-Management Process

In the broadest sense of the term, risk is the occurrence of certain events that may have unfavorable effects. This means that, when we talk about risks, we understand that, whenever there is a specific or new occurrence, we have to be prepared that there may be a reasonably associated prospect or chance of damage. This is a widely shared concept in the business-corporate field, as addressed by the works of

A. Nesticò (✉)

Department of Civil Engineering, University of Salerno, Fisciano, SA, Italy
e-mail: anesticò@unisa.it

Fisher (1922), Chessa (1929), Hardy (1931), Sassi (1940), Knight (1960) and Culp (2001).¹

However, the idea of risk as an unfavorable event is accompanied by another, more detailed than the general one, since it refers to situations for which it is possible to define “in an objective way”, which is on the basis of a random experiment’s results, the probability of occurrence.

As Knight (1921) wrote, there is a risk when the events’ manifestation can be measured on a probabilistic basis, contrary to what happens under uncertainty conditions, characterized by the absence of significant data on the statistical frequency of the phenomenon and therefore only appreciably in a “subjective” way.²

Knight (1971, p. 20) focuses on the measurability of uncertainties, distinguishing between measurable uncertainties, properly called risks, and non-measurable uncertainties, the latter called real uncertainties: «It will appear that a measurable

¹Gobbi (1919, p. 49) wrote: «An event may be economically *advantageous* or *disadvantageous* for a person depending on whether he or she is more or less equipped with means for his/her life; it is *indifferent* if the event has neither one nor the other effect. The word *risk* is sometimes used in the sense of chance that has, good or bad, economic consequences; most often in the sense of an economically unfavorable eventuality».

Nor does this meaning contradict the distinction for business activities proposed by Mowbray and Blanchard (1961) in:

- “*speculative risks*”, characterized by an occurrence that can be both profit and loss and
- “*pure risks*” for which they projected only cases of loss.

²Uncertainty indicates a “generic state” that does not support complete knowledge of the development of the facts. Resuming Spencer and Siegelman (1964, p. 9): «Uncertainty has been defined as a state of knowledge in which one or more alternatives result in a set of possible specific outcomes, but where the probabilities of the outcomes are neither known nor meaningful».

The same explanation is given by Saraceno (1970, p. 122): «It can be seen that:

- (1) in the decisions taken in *uncertainty situations*, the values assigned to P do not find a good foundation in the observations of the past; such decisions are, therefore, inevitably different, from other operators to other operators;
- (2) in the decisions taken in *a situation of risk*, the observation of the past provides evidences on the value that has to be assigned to P; if such a presumption is founded and if the observation is made correctly, several operators can therefore assign equal values to P. In other words, the subjectivity that is relevant to the situation referred to in point 1 can effectively fall into the decisions referred to in point (2), while maintaining the risk situation;
- (3) in the decisions taken in *a situation of certainty*, the observation of the past induces a zero value at all probabilities except for one; the determination then results in a choice between the only alternatives contemplated in the corresponding column of the only condition that may occur».

Panati and Golinelli (1991) use the terms *deterministic certainty*, *probability certainty* and *absolute uncertainty*.

The same exegesis is also given by Zerbo and Bellas (2006, p. 256) for the purposes of the cost-benefit analysis of investment projects: «*Uncertainty* refers to the idea that planners do not know for certain what the state of the world will be. While they realize that different states of the world may occur, the relative probabilities of these states of the world may be unknown. *Risk* is a condition where probabilities are assigned to these different states of the world and active consideration is given to how good or bad the outcomes are in each state of the world».

uncertainty, or “risk” proper, as we shall use the term, is so far different from an unmeasurable one that it does not affect uncertainty at all. We shall accordingly restrict the term “uncertainty” to cases of the non-quantitative type. It is this “true” uncertainty, and not risk, as has been argued, which forms the basis of a valid theory of profit and accounts for the divergence between actual and theoretical competition». According to the given interpretation, the effect of risk factors may have indifferently negative or positive characteristics, thus creating possible losses but also opportunities to create a greater value³.

Well, thanks to past studies which have also highlighted the limitations in Knight F. H.’s theorization (De Finetti 1970; Orsi 1985), the distinction between risk and uncertainty proposed by the author himself has been largely resumed in literature⁴, and it has given rise to numerous researches regarding:

- the identification and the classification of the risks and the uncertainties regarding business management and investment initiatives;
- the methodologies and the application techniques for the “economic evaluation” and for the “economic analysis” of the risk⁵; and then also
- the measures carried out to deal with its effects.

These are three specific study fields that however, in the light of the functional relations existing between them, make up together the only logical-operational *risk-management* process, which requires the risks’ *identification* first, and then the corresponding *evaluation* and *analysis*, so the development of appropriate actions to *control* the risks can be identified.⁶

³In this sense, Pennisi and Scandizzo (2003) on p. 227 give an interesting definition of *uncertainty* and *risk*: «There is usually *uncertainty* when it comes to an objective condition, characterized by the possibility that future events may differ according to the different *states of nature* that may occur. We speak instead of *risk* to denote a subjective condition in which, as a consequence of uncertainty, the well-being of one or more subjects depends on the particular state of nature that will occur. It is said in this case that the subject runs a risk to indicate that his well-being can be jeopardized (but may also be exalted) by the realization of one or more particular events».

⁴Among them, we find: Keynes (1921, 2nd ed. 1929), Keynes (1936), Borel (1924–34), Von Neumann and Morgenstern (1944), Samuelson (1952), Hicks (1959) and Saraceno (1970, op. cit.).

It should be noted, however, that studies related to the criteria useful for the so-called uncertainty economy date back to Fermat and Pascal (1654), Huygens (1657), Bernoulli (1730, 1731, 1738) and Laplace (1814). For further information on the historical evolution of risk analysis and treatment, see Massè (1965).

⁵It is worth emphasizing the different conceptual meaning often attributed to the terms “economic appraisal” and “economic analysis” of the risk. As Dezzani F. explains (1971, p. 20): «While the studies that specifically investigate the economic reflection of future events are studies on the risk’s “economic analysis”, those aiming at researches on the occurrence of future events’ “state of knowledge” are instead studies on the risk’s “economic evaluation”».

⁶The economic-corporate literature deals with risk management in business activities since the early decades of the last century. At first, the issue was addressed in terms of *insurance management*, since it was almost exclusively tended to forms of axiomatic cover; Only since the 1950s was there the introduction of the term *risk management*, currently understood as a process to

Figure 1 illustrates the necessary steps to follow to manage the risk inherent in the project activities.⁷

The following paragraph takes into account the most commonly used risk-analysis techniques in the economic evaluation of investment projects.

2 Risk-Analysis Techniques

Once the risks inherent to the project initiative are identified, the *risk-management* process requires developing the “economic evaluation” and the “economic analysis” of the risk. With them, making the differentiation already outlined, we tend to mean: how a certain event will manifest itself, i.e., the event’s effects on the investment. In the follow up of the work, in the manner of several authors (among others, Pennisi and Scandizzo 2003, op cit.), the two terms are considered as synonyms, meaning regardless of “*risk evaluation*” or “*risk analysis*”, the only phase of study addressed, at the same time, to the statistical characterization of the grants in question and to the prediction of the consequences that the assigned probability distributions induce on the outcome of the intervention.

Before summarizing the methodologies and application techniques for *risk analysis*, it should be noted that a few (and those are of questionable theoretical validity) are the useful approaches for the evaluator who is able to express judgments on the feasibility of projects under conditions of uncertainty.⁸ The literature suggests essentially the appeal to:

permeate the entire decision-making process. On historical-evolutionary aspects, just mentioned here, see Bernstein (2002) and Beretta (2004, in particular pages 20–33).

⁷Equivalent is the definition that Amelotti and Valcalda (1998, pp. 253–280) given to risk management for investment projects. In particular, the authors recognize moments, temporally successive and interrelated, so understood:

« *–risk planning*: it represents the development process to organize an interactive strategy to identify the risk-parameters directors, to realize the operational plans, to assess risk evolution and to plan the necessary resources;

– *risk assessment*: it represents the process concerning the identification and classification of risks and their analysis (lessons learned) to define its details, to isolate the cause and to quantify the effects using the tools of Project Management such as WBS, networks, cost model, performance evaluation, etc.;

– *risk handling*: it represents the process related to the identification, the selection and the implementation of the actions to take to limit the risk to acceptable levels according to the objectives and the constraints of the project;

– *risk monitoring*: it represents the process that systematically highlights and reviews the risk-handling performance» (p. 256).

⁸As Mishan (1974, p. 295) claims, «the problem concerning how to make decisions in those situations where past experience has little or no orientation value cannot be satisfactorily solved either in logical or empirical terms, and all of the rules that have been formulated are applicable in a limited way or without a practical value».

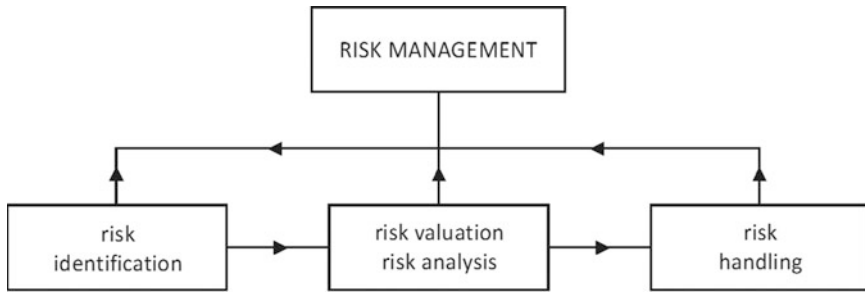


Fig. 1 The risk management process

- the sensitivity analysis and/or
- the evaluation in various scenarios.

Sometimes, mathematical programming tool⁹ and game theory's logic are proposed.¹⁰

The purpose of the *sensitivity analysis* is to detect the effects of the uncertainty related to the performance of the parameters that can significantly affect the results of the evaluation. To this end, the initiative's *performance-variation index* is recorded as a change in the measurement of a parameter, assuming that the others are inhaled. By repeating the operation for all the factors chosen, it is acknowledged to which of them the project is most reactive.

There are obvious limits to such a procedure, which first assumes as a basis for the numerical processing a level of the fundamental values subjectively defined by the analyst, without being able to have data on the probability of event manifestation; this procedure also imposes an analysis developed separately for each variable and thus neglects the joint effect of uncertainty on multiple factors.

This last limit has been exceeded in the evaluations conducted with regard to various scenarios, generally optimistic, of extreme likelihood and pessimism.¹¹

For each, in fact, we hypothesize plausible combinations of the parameters, in order to circumscribe the spectrum of the various cases that may occur. What is obvious is the wide margin of discretion that the technique under consideration

⁹With this tool, a mathematical law, called *objective function*, which corresponds to the project's result with its representative variables, is defined. Constraints, associated with the function and expressed in the form of equations or inequalities, define the *eligibility set* for the values of the variables. The problem to solve is therefore to optimize a function with multiple variables subjected to the predetermined constraint system.

With regard to the purely mathematical aspects, see, among many, Hillier and Lieberman (2006). For an application to the *investment programs* definition, see Morano and Nesticò (2007).

¹⁰A critical analysis on the topic is in Mishan (1974, op. cit.). About the game theory use to support the decisions, see Bennion (1956), Luce and Raiffa (1967).

¹¹In Anglo-Saxon countries, we often talk about *bop analysis*, where *bop* is the acronym of *best, optimistic, pessimistic*.

entrusts to the operator, as well as the modest—if not the least—effectiveness due to decision-making purposes that the results assume where, as it almost always happens, there are a great deal of solutions from the optimistic to the pessimistic scenarios.¹²

Unlike what happens in situations of uncertainty, there are numerous criteria applicable when estimates are carried out in conditions of risk. The logic to follow can be:

- to incorporate the risk into one of the terms that constitute the present value of the project;
- to use statistical tools such as mean-variance or stochastic dominance;
- to adopt probabilistic analysis;
- to examine the intervention according to its “real options”, or rather as a source of a series of opportunities that it can create.

Figure 2 illustrates the best known techniques for *risk analysis*.¹³ Among all, from time to time, the analyst chooses the one that best adapts to the specific case, essentially in relation to:

- (a) the *characteristics of the project initiative*,¹⁴ which may, for example, depend the opportunity to fragment the temporal evolution of the investment into several successive, though interrelated phases; or else, placing it within a single path, rigidly structured through a predetermined system of constraints¹⁵;
- (b) the *availability of data and necessary information to implement the analysis tool*. It is obvious that the existence and reliability of data is itself a function of

¹²On this topic, see Chandler and Cockle (1982) and Loasby (1990). Examples of both sensitivity analysis and evaluation in various scenarios are in Brealey et al. (2006, pp. 234–240). It is worth noting that the authors found in *break-even point analysis* a different way of applying the sensitivity analysis: «When we submit a project to sensitivity analysis or when we consider alternative scenarios, we wonder what would happen if sales or costs were different from forecasts. Managers sometimes prefer to ask this question in different terms and ask how much sales may decrease before the project may be in loss. This exercise is known as a *break even point analysis*» (p. 238).

¹³Other less-known approaches are also proposed for risk analysis. One is that of mathematical programming, already cited as a useful tool for the uncertainty treating. See Mao (1969).

Further models are derived from financial risks' evaluation techniques; See, for example, Basile and Erzegovesi (1989), Penati (1991) and Cherubini and Della Lunga (2001). Equally, references arise from studies on the portfolio-decisions theory, due to Markowitz H. M. (March 1952), originally intended for the selection of securities lending, and subsequently employed to generalize real-estate investments. In this matter: Markowitz (1959), Champernowne (1969), Bicksler and Samuelson (1974), Peterson (1974); and Copeland and Weston (1992).

Interesting reading is the Arrow K. J.'s work (1951), which reviews the economic, philosophical, mathematical and statistical literature on the choice of theme of risky solutions.

Of great value is S. Reutlinger's text (1970).

¹⁴It is pleonastic to say that the project's features arise, at least in part, from those of the reference production sector.

¹⁵Think of a project that employs “mature” technologies or, otherwise, innovative and untried technical solutions. In the latter circumstance, it may be overly simplistic to exclude future variants in some of the dimensions that draw the original structure of the intervention.

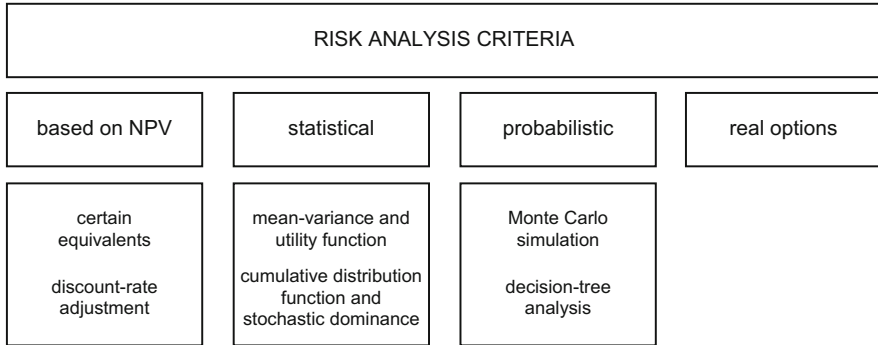


Fig. 2 Risk-analysis techniques

a jumble of factors. Certainly, it is possible to find feedback in similar projects to the subject of study and falling within the same territorial reference system; but also the peculiarities of the context in which the intervention dropped, which define a more or less transparent market and a static or dynamic economic picture (Morano and Nesticò 2006, p. 23).

Coming to a brief review of the essential contents of each technique, the logic underlying the *certain equivalents* and the *discount-rate adjustment* is immediately revealed. Simply recapitulating the formal expression of the Net Present Value (NPV), given by the discounted *Cash Flows* (CF) sum expected from the project in the *n* years of the analysis period:

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+r)^t},$$

it's possible to see the possibility to filter the risk components related to the initiative by replacing the so-called "random" cash flows with "certain equivalent" cash flows of lesser amount¹⁶; or, alternatively, by increasing the non-risky activities' rate with a term that expresses the investment-related risk premium.

The value of certain equivalent flows, whose nature requires the actualization to the foreseeable rate for zero-risk cash use, can be derived in a variety of ways. The best known are two: the first is based on the construction of the decision maker's utility function, starting with the probabilistic structure of the project¹⁷; and the second uses the *Capital Asset Pricing Model* (CAPM) theory. While the former is rarely used because of the difficult mathematical derivation of the utility functions, especially if it comes to more than one intervention, the second is easier to use,

¹⁶The rational basis of certain equivalent lies in the concept of risk aversion. See Dallochio (1995, p. 339).

¹⁷On the topic, see Schlaifer (1969), Allen (1983) and Ingersoll (1987).

since it is possible to find in the market the information needed to implement the calculation model.¹⁸

Broadly widespread is the criterion of adding a risk premium p of the specific investment at the r_f rate that can remunerate money-free risk allocations. In this way, the denominator of the NPV formula is changed, leaving the random cash flows unchanged in the numerator.¹⁹ In practice, the quote p is often *subjectively* determined by the evaluator, based on his experience or with the intention to establish a minimum profitability threshold below which the project is not realized. Obviously, in doing so no concrete *risk analysis process* is in place. More frequent, however, there should be an *objective* approach aimed at adjusting the discount rate

¹⁸As it is written in Pivato (1993, p. 934), CAPM's thesis is that «in a “perfect” financial market and in equilibrium conditions, the yield of each title is equal to the sum of the *interest rate* and to a “*premium*” for systematic risk. This increase is much higher as the bond yield itself' aptitude to fluctuate in harmony with the market is lower. The random risk component, which can be eliminated with a suitable portfolio diversification, does not have any influence on the examined rate».

And then it is specified: «Risk is divided into two parts: the *diversifiable (or non-systematic) component* is eliminated by the same operators, with the formation of the optimal market portfolio; the *non-diversifiable (or systematic) component* is related, instead, to the greater or lesser discrepancies that may occur between the yield fluctuations of the particular bond under consideration, on the one hand, and the optimal portfolio on the other. The equation expressing the model is the following one:

$$\mu(r_j) = i + \beta_j |\mu(r_m) - i|,$$

where $\mu(r_j)$ is the expected yield, relative to the price, for the j -th bond; i is the interest rate for risk-free financial assets; $\mu(r_m)$ is the expected return of the optimum market portfolio; β_j is a coefficient that expresses the magnitude of the expected systematic risk of the title. Precisely, it is:

$$\beta_j = \text{Cov}(r_j, r_m) / \sigma^2(r_m)$$

For a clear discussion on CAPM, see Copeland and Weston (1992, op. cit.), Brealey et al. (2006, op. cit.). See also Lumbly (1991), Damodaran (1996a, b), Massari (1998) and Pastorello (2001).

¹⁹According to Ventriglia (2005, pp. 140 and 141), who also takes Sobrero M. under exam (1999), «higher risk premiums are assigned to riskier investment projects, which are characterized by a high degree of uncertainty relative to the magnitude and temporal distribution of the expected cash flows. This approach, however, often leads to excessive distortions, stemming from the fact that the financial flows of an investment are as much penalized by the discount rates, as they are distant from the time of the decision. The use of arbitrarily high and consistent over time risk premium, gives birth to geometric increasing discount rates, while it is almost never true that an investment is characterized by uncertainty having the same dynamics. It is true, however, that for some investments most of the uncertainty extinguishes itself, normally, in the early years of life of the project. As a result, the risk decreases over time. Ultimately, the risk adjustment according to the subjective approach often results in arbitrary increments of discount rates, which grow geometrically, reducing with the same progression the values of the most distant financial flows over time». Among the texts dealing with the theme of the risk premium, see Cornell (1999), Ibbotson et al. (2004).

to the risk of the initiative according to the rules dictated by the aforementioned CAPM theory.²⁰

Among the statistical techniques for risk analysis there are those of *mean-variance* and the one of *stochastic dominance*, both of which can be implemented when it is possible to associate a probability distribution with the performance index that summarizes the effects of the investment. As is well-known, the meaning of a probabilistic curve is clear in the light of the corresponding mean value and variance, which respectively define the project's average yield value and its "quality" in terms of values dispersion around the one of central trend.²¹

Evidently, an initiative is to be preferred over another if it expresses a higher average value of the evaluation index and a lower dispersion. If such a situation does not occur, then the decision maker's utility functions must be specified for the selection of the interventions. The corresponding mathematical complications can be overcome by recalling the stochastic dominance notion,²² once the existence of the statistical information needed to build the cumulative probability function of the NPV for each of the investments to compare is established. This function returns on the ordinate axis the probability that the NPV is equal to or less than the corresponding value read on the abscissa axis.²³ By overlaying two projects' cumulative functions, it is easy to recognize the one characterized by stochastic dominance.

²⁰On adjusting the risk discount rate according to the CAPM, see Ventriglia (2005, pp. 140–148).

²¹The expected average yield and the yield variance's concepts are of primary importance for the economic evaluation since, considered jointly, they enable the correct interpretation of the invested capital's risk.

In statistical terms, the *expected average yield* R formula—estimated through the NPV or IRR or other indicator more suited to interpret the analysis results—is expressed as the weighted average of the various yields R_s ($s = 1, \dots, n$) that the intervention can generate when various scenarios occur, where the weighting factor P_s is given by the probabilities associated with each of the n scenarios:

$$R = \sum_{s=1}^n P_s \cdot R_s.$$

The *variance* σ^2 is the average of the squared of yield deviations R_s associated with the initiative related to the average value R :

$$\sigma^2 = \sum_{s=1}^n P_s \cdot (R_s - R)^2.$$

The square root of the variance is the *standard deviation*, also known as the *root mean square deviation*. Although variance and standard deviation give the same information about the returns dispersion around the average, the second has the advantage to return the measure of the risk in the same unit of measure in which the expected or observed values and their average are provided.

²²For a simple reading of the *stochastic dominance* concept, refer to Dallochio (1995, op. cit., pp. 320–324). For further information: Goodwin and Wright (2004).

²³It is important to emphasize that the applicability of statistical criteria depends on the availability of objective data and the ability to handle them. On the subject, Dallochio (1995, pp. 311–312) adds: «Assigning a probability distribution to a project's outcomes therefore implies a certain degree of subjectivity from the decision maker. In order to reduce the uncertainty characterizing

Widely employed is the probabilistic tool of the Monte Carlo simulation, capable of comprehensively comprehending the risk arising from a certain number of parameters relevant to the outcomes of an investment. By associating with each of these parameters a probability distribution and statistically simulating, with the help of a calculation software, a high number of combinations of its values, it's possible to find out the NPV's probability law. The extensive bibliography on this subject demonstrates the use of the technique in many fields and, in particular, in the projects' economic evaluation. Useful in-depth readings are Carsberg (1974), Hertz and Thomas (1983), Mason (1992), Savvides Savvakis (1994), Vose (1996) and Jackel (2002).

Finally, it is necessary to outline the *real options* approach, which emphasizes the problem of mutual influence existing between current decisions and future opportunities and, consequently, on the possibilities to modify the terms of the project initiative after its actual launch, in the light of changes in the economic, political, social and environmental context. Replacing the concept of probability with that of volatility, according to the real options theory, «the investment projects in real assets have to be seen as a source of a series of opportunities that management, from a passive to an active approach, is able to capture when certain scenarios occur» (Micalizzi 1997, p. 102). Also here there are many references of interest, among them: Brenner (1983), Stool and Whaley (1993), Trigeorgis (1995) and Schlosser (1999).

3 Conclusions

The riskiness of an investment project is undoubtedly one of the elements that affects its actual realization the most. The economic operator decides to earmark funds for a new activity considering if the target market is well-known or not, the features of demand and supply and the economic and political climate in general, all parameters on which the investment risk depends (Bentivegna 2016). This explains indeed the numerous classifications of the projects as a function of the hazard linked to the parameters just addressed (Buttignon 1990; Dixit and Pindyck 1994) and, at the same time, the abundance of theoretical detailed studies of Italian and other authors about this matter.

Nevertheless, despite the primary importance of this issue in the field of resources allocation, for public and private subjects, in the economic evaluation, the risk analysis is not always studied with due attention. Indeed, the project initiatives presented for public funding are often inadequate. And this especially happens with the environment risk's components, which have been clearly reported in the

the formulating estimates process, there is often an analysis of the projects' historical performance that present a risk level similar to the one of the project to evaluate».

Further reflections can be found in Azzini (1982) and Piccolo and Vitale (1984).

Encyclical *Laudato si'* written by Pope Francis (Penza 2016). Therefore, a risk evaluation techniques' implementation is desirable.

Moreover, it is necessary to disclose the limits associable to the Enterprise Risk Management procedures and to the traditional risk-evaluation techniques, whether they're based on the Net Present Value criteria (certainty equivalent and discount rate adjustment), on a statistical basis (mean-variance and stochastic dominance) or on a probability one (Monte Carlo Method, Decision Tree Analysis). The traditional logics, indeed, generally don't consider social and environmental risks. Hence, for civil and the infrastructure field projects, the researchers can define risk-assessment models based on ALARP logics (As Low As Reasonably Practicable), which have been already introduced by the UK government agency Health and Safety Executive (HSE), for issues connected with health and safety in highly hazardous scopes such as nuclear, energetic and oi-and-gas ones.

There are survey protocols and operative tools through which it is possible to make the investment risks tolerable if they are as low as reasonably practicable (ALARP). The aim is to obtain a "triangular" balance among risks, mitigation costs and related benefits.

Such a model, rooted on the individuation of various components of risk, not only the financial ones but also the environmental ones, is able to select useful options to contain the risk within the project itself, making the decisional processes also transparent.

References

- Allen DE (1983) Finance: a theoretical introduction. Martin Robertson, Oxford
- Amelotti L, Valcalda B (1998) Il ciclo di vita della gestione dei progetti. Dall'approccio tradizionale all'analisi dei rischi. Guerini e Associati, Milano
- Arrow KJ (1951) Alternative approaches to the theory of choice in risk-taking situations. In: *Econometrica*. J Econ Soc 19(4). The University of Chicago
- Azzini L (1982) Istituzioni di Economia d'Azienda. Giuffrè, Milano
- Basile I, Erzegovesi L (1989) L'analisi del rischio degli investimenti mobiliari. EGEA, Milan
- Bennion EG (1956) Capital budgeting and game theory. *Harvard Bus Rev* 34 (reprinted in: *Financial decision-making*, a cura di Mock E. J., 1967, International Textbook Company, Scranton, Pennsylvania)
- Bentivegna V (2016) Dialogue and transparency in decision-making. *Valori e Valutazioni* 17: 25–28
- Beretta S (2004) Valutazione dei rischi e controllo interno. EGEA, Milano
- Bernoulli D (1730, 1731, 1738) Specimen theoriae novae de mensura sortis. *Commentarii academiae scientiarum imperialis Petropolitanae* (trans: L. Sommer, Exposition of a new theory on the management of risk, 1954, *Econometrica*)
- Bernstein P (2002) Più forti degli dei. La straordinaria storia del rischio. *IlSole24Ore*, Milano
- Bicksler JL, Samuelson PA (1974) Investment portfolio decision-making. Lexington Books, Lexington
- Borel E (1924–34) *Traité du calcul de probabilité et ses applications*
- Brealey RA, Myers SC, Allen F, Sandri S (2006) *Principi di Finanza aziendale*. McGraw-Hill, Milano

- Brenner M (1983) *Option pricing and applications*. Lexington Books, Massachusetts
- Buttignon F (1990) *La strategia aziendale e il valore economico del capitale*. CEDAM, Padova
- Carsberg B (1974) *Analysis for investment decisions*. Accountancy Age, London
- Champernowne DG (1969) *Uncertainty and estimation in economics*, vol I, II, III, Oliver & Boyd (Edinburgh) and Holden Day (San Francisco, California)
- Chandler J, Cockle P (1982) *Techniques of scenario planning*. McGraw-Hill, New York
- Cherubini U, Della Lunga G (2001) *Il rischio finanziario*. McGraw-Hill, Milano
- Chessa F (1929) *La teoria economica del rischio e dell'assicurazione*, vol I. CEDAM, Padova
- Copeland TE, Weston JF (1992) *Financial theory and corporate policy*. Addison-Wesley, New York
- Cornell B (1999) *The equity risk premium: the long-run future of the stock market*. Wiley, New York
- Culp CL (2001) *The risk management process. Business strategy and tactics*. Wiley, New York
- Dalocchio M (1995) *Finanza d'azienda. Analisi e valutazioni per le decisioni d'impresa*. EGEA, Milano
- Damodaran A (1996a) *Investment valuation. Tools and techniques for determining the value of any asset*. Wiley, New York
- Damodaran A (1996b) *Manuale di valutazione finanziaria*. McGraw-Hill, Milano
- De Finetti B (1970) *Theory of probability*. Wiley, New York
- Dezzani F (1971) *Rischi e politiche d'impresa*. Giuffrè, Milano
- Dixit AK, Pindyck RS (1994) *Investment under uncertainty*. Princeton University Press, Princeton
- Fermat P, Pascal B (1654) *Six letters on the dice game*. In: Tannery, Henry (eds) *The oeuvres de fermat*, vol II, Paris, pp 288–314 (1894)
- Fisher I (1922) *La natura del capitale e del reddito*. In: *Biblioteca degli Economisti—Serie 5^a*, vol IV. UTET, Torino
- Gobbi U (1919) *Trattato di Economia*. Società Editrice Libreria, Milano
- Goodwin P, Wright G (2004) *Decision analysis for management judgment*. Wiley, New York
- Hardy CO (1931) *Risk and risk-bearing*. The University of Chicago Press, Chicago
- Hertz DB, Thomas H (1983) *Risk analysis and its applications*. Wiley, New York
- Hicks JR (1959) *Valore e capitale*. UTET, Torino
- Hillier FS, Lieberman GJ (2006) *Ricerca operativa*. McGraw-Hill, Milano
- Huygens C (1657) *De ratiociniis in ludo aleae*, Amsterdam
- Ibbotson R, Goetzmann W, Kogut B (2004) *The equity risk premium: research and practice*. Oxford University Press, Oxford
- Ingersoll JE Jr (1987) *Theory of financial decision making*. Rowman & Littlefield, Totowa
- Jackel P (2002) *Monte Carlo methods in finance*. Wiley, New York
- Keynes JM (1921, 2^a ed. 1929) *A treatise on probability*. MacMillan and Co., New York
- Keynes JM (1936) *The general theory of employment, interest and money*. New York
- Knight FH (1921) *Risk, uncertainty and profit*. The London School of Economics and Political Science, London
- Knight FH (1960) *Rischio, incertezza e profitto*, La Nuova Italia, Firenze (Italian translation from: *Risk, uncertainty and profit*, 1921)
- Knight FH (1971) *Risk, uncertainty and profit*. University Press, Chicago
- Laplace PS (1814) *Essai Philosophique sur les Probabilités*. Courcier, Parigi
- Loasby BJ (1990) *The use of scenarios in business planning*. In: Frowen SF (ed) *Unknowledge and choice in economics*. MacMillan, Houndmills
- Luce RD, Raiffa H (1967) *Games and decisions: introduction to critical survey*. Wiley, New York
- Lumby S (1991) *Investment appraisal and financing decisions*. Chapman & Hall, London
- Mao JCT (1969) *Quantitative analysis of financial decisions*. MacMillan, New York
- Markowitz HM (1952) *Portfolio selection*. *J Finance* 7:77
- Markowitz HM (1959) *Portfolio selection: efficient diversification of investments*. Wiley, New York
- Mason F (1992) *Metodi quantitativi per le decisioni*. Giappichelli, Torino
- Massari M (1998) *Finanza aziendale: valutazione*. McGraw-Hill, Milano

- Massè P (1965) La scelta degli investimenti. Criteri e metodi. ETAS KOMPASS, Milano (Italian translation of Luigi Bianchi and Paola Morbilli)
- Micalizzi A (1997) Opzioni reali. Logiche e casi di valutazione degli investimenti in contesti di incertezza. EGEA, Milano
- Mishan EJ (1974) Analisi costi-benefici. ETAS, Milano (Italian translation of Nanni Negro)
- Morano P, Nesticò A (2006) L'analisi delle serie storiche per la gestione degli aspetti incerti nella stima indiretta del reddito aziendale. Rivista dell'Agenzia del Territorio n.1/2006, Stabilimenti tipografici Carlo Colombo S.p.A., Roma
- Morano P, Nesticò A (2007) Un'applicazione della programmazione lineare discreta alla definizione dei programmi di investimento. Aestimium n. 50, University Press, Firenze
- Mowbray AH, Blanchard RH (1961) Insurance. McGraw-Hill, New York
- Orsi R (1985) Probabilità e inferenza statistica. il Mulino, Bologna
- Panati G, Golinelli GM (1991) Tecnica economica industriale e commerciale. Imprese, strategie e management, vol I, NIS, Roma
- Pastorello S (2001) Rischio e rendimento. Teoria finanziaria e applicazioni econometriche. il Mulino, Bologna
- Penati A (ed) (1991) Il rischio azionario e la Borsa. EGEA, Milano
- Pennisi G, Scandizzo PL (2003) Valutare l'incertezza. L'analisi costi benefici nel XXI secolo. Giappichelli, Torino
- Penza G (2016) Pope Francis: The Laudato si' encyclical and the urban issue. Valore e Valutazioni 17:5-8
- Peterson DM (1974) Financial ratios and investment results. Lexington Books, USA
- Piccolo D, Vitale C (1984) Metodi statistici per l'analisi economica. il Mulino, Bologna
- Pivato G (ed) (1993) Trattato di Finanza aziendale. FrancoAngeli, Milano
- Pope Francis (2015) On care for our common home. Encyclical Letter Laudato Si' of the Holy Father Francis. Vatican Press, Rome
- Reutlinger S (1970) Techniques for project appraisal under uncertainty, World Bank (Staff Paper no. 10). John Hopkins Press, Baltimore
- Samuelson PA (1952) Probability, utility and the independence axiom. Econometrica
- Saraceno P (1970) La produzione industriale. Libreria Universitaria, Venezia
- Sassi S (1940) Il sistema dei rischi d'impresa. Vallardi, Milano
- Savvides Savvakis C (1994) Risk analysis in investment appraisal. Proj Appraisal J 9(1). Guildford, Surrey
- Schlaifer R (1969) Analysis of decision under uncertainty. McGraw-Hill, New York
- Schlosser M (1999) Modelli operativi di Finanza aziendale. Prentice Hall International, Hemel Hempstead—ISED, UTET Libreria, Torino
- Sobrero M (1999) La gestione dell'innovazione. Strategia, organizzazione, tecnica operativa. Carocci, Roma
- Spencer MH, Siegelman L (1964) Managerial economics. Homewood, Irwin, Illinois
- Stool HR, Whaley RE (1993) Future and options: theory and applications. South-Western Publishing Co., Cincinnati
- Trigeorgis L (1995) Real options in capital investment: models, strategies and applications. Praeger, London
- Ventriglia F (2005) La strategia di innovazione. Opzioni e problematiche valutative. Giappichelli, Torino
- Von Neumann J, Morgenstern O (1944) Theory of games and economic behavior. Princeton University Press, Princeton
- Vose D (1996) Quantitative risk analysis: a guide to Monte Carlo simulation modelling. Wiley, New York
- Zerbe RO Jr, Bellas AS (2006) A primer for benefit-cost analysis. Edward Elgar, Cheltenham