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Francesco Alberti · Mourad Amer · Yasser Mahgoub ·
Paola Gallo · Adriana Galderisi · Eric Strauss *Editors*

Urban and Transit Planning

Towards Liveable Communities: Urban places and Design Spaces

Second Edition

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Editors

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A culmination of selected research papers from the fifth version of the international conference on Urban Planning & Architectural Design for Sustainable Development (UPADSD) of Florence, Italy (2020).

Springer

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Preface

Metropolitan areas currently face several new challenges and pressures. The many functions of a city are involved in affecting the social, economic, and environmental concerns of its residents. Urbanization is a constantly changing phenomenon. Cities with rapidly expanding populations can be helped by urban planning that combines physical redevelopment with improving the social, economic, and environmental characteristics of its current and future residents. Cities consist of both formal and informal settlements that can be improved through effective urban planning and transportation improvements. Involuntary removal of individuals must be sustainable as well as sensitive to issues of access and gender. Traditional transportation systems must be designed to take account of climate change and the fragmentation of habitat in the process of city decentralization.

The worldwide pandemic has called into question the traditional models of urban concentration and suburbanization as well the tools used to solve problems of environmental degradation, cultural preservation, inadequate housing, and economic opportunity. High unemployment and social instability do not lead to cities that can prosper in the future. Physical improvements and programs designed to improve personal skills may help to increase the ability of residents to escape poverty. Communities that have been disadvantaged by the process of urbanization can be rejuvenated through a careful application of techniques that preserve its heritage and maintain accessibility with the advice of the current residents.

Barriers to metropolitan development can be identified by a partnership between urban planners and residents of those communities that need governmental assistance. The goal of resiliency of the current public infrastructure is a common theme throughout these new techniques which must be discovered, researched, and implemented in order to solve these traditional problems. Unplanned growth places pressures on both individuals and governments to provide a framework that advances the well-being of all members of society. This book represents a collection of well-researched ideas focused on both the cities with developed as well as developing infrastructure. Urban waterfront spaces are an excellent laboratory to demonstrate solutions to problems caused by waste disposal and visual blight in a way that improves the choices available to future generations that will live in the area.

The effect of the global economy, local climate, and historical perspectives is necessary to redesign public facilities that provide for accessibility as well as adequate public facilities. Renewable energy is another way that improved structural design that considers the cultural background of the residents can begin the process of urban regeneration that benefits the citizens currently residing in those areas most in need of improvement. Urban regeneration can benefit from innovative techniques that reduce urban heat islands.

Public participation to improve design as well as improved human interaction with the built environment is a common theme throughout most of the chapters. Cultural values as well as facility needs can be accomplished through site design that works in tandem with those most affected by the improvements. Public and private spaces can be redesigned to provide for an improvement of the quality of urban life in self-sufficient neighborhoods based on the diminishment of environmental risk. The symbolic significance of the current constructed form must not be underestimated. Parks can be designed to provide safe spaces for human interaction, security, and pedestrian hospitality within a dense environment.

The image of the city is important to all its current residents. Another topic covered extensively is sustainability of current urban form in order to provide diversity and opportunity to all individuals regardless of their physical, social, or economic status. Urban planning techniques and implementation tools can be used to advance the abilities of individuals to prosper considering the new challenges facing them.

East Lansing, USA Eric Strauss

Acknowledgments We would like to thank the authors of the research papers that were selected for addition in this book. We would also like to thank the reviewers who contributed with their knowledge and constructive feedback in hopes of ensuring the manuscript is of the best quality possible. A special thanks goes to the Editors of this book for their foresight in organizing this volume and diligence in doing a professional job in editing it. Finally, we would like to express our appreciation to the IEREK team for supporting the publication of the best research papers submitted to the conference.

Introduction

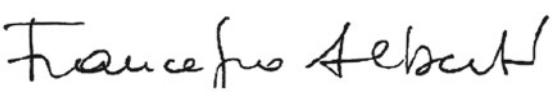
In light of ongoing circumstances, the world has changed profoundly. The health crisis, in the face of which even the richest countries found themselves unprepared, has somehow increased the perception of the other global crises—environmental, climatic, and social—which have been at the center of international debate for a long time, but have continued to deteriorate to date in the absence of major changes in development models in both advanced and emerging economies.

If, on the one hand, this more acute perception of the impending threats to mankind has accelerated mitigation and adaptation policies to global change, mobilizing significant resources towards the so-called ecological transition and the increase of urban resilience in the industrialized world; on the other hand, it is news these days the alarm raised by UN Secretary General, Antonio Guterres, on how the pandemic, increasing the gap between the Global North and South, is putting the planet off track to achieve the Sustainable Development Goals set by the UN Agenda 2030.

Focusing on SDG no. 11 "Sustainable Cities and Communities"—which deals with people's living space, where social issues and impacts from human activities are concentrated, and is therefore the one more evidently linked with each of the other 16 SDGs—the papers that make up the three sections of this book give evidence of how disciplinary research is already able to provide advanced analysis tools and innovative design approaches to appropriately address, at all different scales and latitudes, the challenges we face.

Compiled and Edited during the pandemic, the Second Edition of Urban and Transportation Planning, we remain oblivious as to what the situation caused globally by the new Coronavirus variants will be, when, in a few weeks, the volume will be finally released. Its preparation and whole production process, from the selection to the revision and editing of the papers, undertaken during the pandemic, is only incidentally mentioned in a few of its chapters, since for the most part, they derive from research previously initiated. In fact, only one, in part three, explores its cause-and-effect relationships with the built environment in the context of metropolitan cities in India.

With that being said, the hope is that the health tragedy we are going through can be soon left behind and remembered as a painful, late, but decisive turning point in the collective awareness and in worldwide governments' assumption of responsibility, so that research lines and concepts such as those presented in the following pages find everywhere a fertile ground to germinate and hybridize, helping world regions, cities, and communities to become better places to live in.



Francesco Alberti

Contents

Past and Future: City's Image and Preservation

The Comparison Between Waterfront Space Renewal: Taking Shantang Business Street and San Antonio River as Examples 3
Jierui Wang

Past and Future: The Urban Landscape and the Virtuous Management of Resource Flows for a Sustainable Environment 17
Elvira Nicolini and Antonella Mamì

Territorial Identity and Sustainable Tourism; Resurrection of a Ghost Town: The Vernacular Town of Zriba Oliya as a Case Study 27
Nadya Bachouch

Toward an Inclusive City-System and User's-Oriented Interventions: Udine (IT), A Case Study 41
Mickeal Milocco Borlini and Giovanni Tubaro

Transformative Actions in the Boston Harbor: Lessons Learned from Past Projects Toward a Resilient and Sustainable Urban Future 55
Dalia Munenzon and Yair Titelboim

Evaluation of Mitigation Strategies of the Urban Heat Island Effect in Mediterranean Area. The Case Study of Largo Annigoni in Florence (Italy) 75
Rosa Romano, Paola Gallo, and Alessandra Donato

Linear Cities as an Alternative for the Sustainable Transition of Urban Areas in Harmony with Natural Environment Principles 87
Anna Zaręba, Alicja Krzemińska, Edward Truch, Magdalena Modelska, Francisco Javier Grijalva, and Noriegae Rogelio Monrealf

City Planning: Urbanization and Development

Analysis of Quality Public Space—Case Study: Campus 2 State Islamic University of Alauddin Makassar 103
Sriany Ersina

Understanding the Role of Slums as 'Poverty Traps' or 'Springboards': A Case Comparison of India and Latin America 109
Debakshi Mitra

Changes in Urban Planning and Recommendation for Future Planning in Ho Chi Minh City 125
Pham Ngoc Quynh Giao, Pham Phi Phuong, and Petr Stanicky

The Impact of Public Participation on Implementing Landscape Urbanism Projects 139
Ebtesam Mohamed Ahmed Elgizawy and Ali Khaled Ahmed Elewa

Defining Sustainable Involuntary Resettlement Policies for Project-Affected Women Through Qualitative Review—A Case of Mumbai, India 149
Kanchan Sen Sharma and V. Jothiprakash

A Critical Review of the *Villes Sans Bidonvilles* Programme in Morocco: Lessons to Be Learned Towards Inclusive Urban Growth 159
Maria Rita Gisotti and Elena Tarsi

In-Between Spaces in the Expanding City: Their Role in Designing New Urban Centralities 171
Iacopo Zetti and Maddalena Rossi

Sustainable Regenerative Strategies for the Inner Areas: An Example of "Civic Design" in Marradi (Tuscany) 189
Francesco Alberti, Sabine Di Silvio, Ilaria Massini, Sara Naldoni, and Simone Scortecci

The Use of Semi-public Spaces as Urban Space and Evaluation in Terms of Urban Space Quality 203
Melike Orhan

Rethinking Residential Neighborhood in Dhaka, Bangladesh: Jane Jacobs's Urban Design Principles for Improving Livability 213
Nazmun Akter Pia

Socio-Economic and Political Dimensions and Their Impact on the Urban Form of the Kuala Lumpur Metropolitan Region 225
Marek Kozlowski, Aznida Azlan, Nor Azlina Abu Bakar, and Faziawati Abdul Aziz

Urban Form and Sustainable Development

The Advance of the Concept of Sun-Breakers and Smart Solar Screens 239
Ahmed Mahmoud Saber Mohamed

From Teaching to Entrepreneurial Pedagogy: Preservation of Territorial Heritage Through Design Thinking 257
Hejer Barbouch Ben Fradj

Housing Development in the Town of Mansoura Northern Badia of Jordan 267
Majd Al-Homoud and Salem Al-Oun

Home-Based Enterprises: The Case of Powerlooms in Bhiwandi, India 283
Farozan Ansari

Pandemic Spread in Metropolitan Cities of India—Spatial Planning Factors 297
Sridharan Namperumal, Natraj Kranthi, and Madhukar Kuchavaram

Compact Cities and Land Reform; The Case of South African Cities 309
Sushma Patel

Civic Design to Make Cities More Sustainable and Resilient 321
Francesco Alberti

The Comparison Between Waterfront Space Renewal: Taking Shantang Business Street and San Antonio River as Examples

Jierui Wang

Abstract

Urban waterfront spaces are often characteristic and famous views in cities, with such views even being the symbols for such cities. However, they have gradually become polluted, filled with rubbish, and harmed by the development of urban spaces. In order to provide urban residents with good living environments and magnificent waterfront spaces, their renewal has become an important topic in current and prospective urban development. There have already been many waterfront space renewal examples which can serve as examples, both in China and abroad, and the regeneration approaches therein vary widely in design and execution. Due to different ideologies, customs, cultures, and resources in different places. In order to understand the differences between waterfront space renewal cases in China and abroad, it is necessary to draw a comparison between them. Since the number of cases is large, two typical examples are selected for comparison in this paper, the Shantang Business Water-Street Renewal (SBWSR) in Suzhou, China, and the San Antonio River Improvement Project (SARIP) in San Antonio, United States. Based on previous research and fieldwork, this research compares them according to the relationships between the projects and cities, the projects' economic effects, cultural effects, and ecological effects respectively, to summarise the characteristics of these two cases, and to further inspire and develop better measures to implement urban waterfront space renewal around the world.

Keywords

Urban waterfront space • Renewal method • Shantang Business Water-Street Renewal • San Antonio River Improvement Project

1 Introduction

The concept of urban waterfront space has long been the subject of research, and relevant cases exist worldwide (Hradilová, 2012). However, not all the cities containing waterfront spaces adopt the same strategy to deal with the relationship between urban and waterfront space. Only when they satisfy the requirements of urban development, the balance between human beings and nature, and local cultural and natural environments, can the strategies be regarded as successful. It is important to understand the concept of urban waterfront environment first, in order to understand urban waterfront spaces renewal. With the development of conflicts between urban and waterfront spaces, people are noting the importance of working to improve the urban water environment in order to thus improve their living and environmental qualities, leading to the renewal of urban waterfront space (Hradilová, 2012). Since urbanisation began, number of urban waterfront spaces have been formed. To adapt to the waterfront environment, human beings need to establish a suitable way to live with waterfront spaces, and there are many options and elements which must be considered, and which will be discussed in this paper. Urban waterfront spaces can be divided into several categories, such as river waterfront, lake waterfront and ocean waterfront, etc. (Fu, 2014; Sairinen & Kumpulainen, 2006). Waterfront space renewal has been a timeless activity for several countries, to respond to the development of policy, economy, and geology, and to some extent it makes the urban environment better (Harry & Soledad, 2012). Thus, to solve the existing and historical problems, the cities with waterfront spaces

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have been taking specific strategies to regenerate the spatial environments since 1960s. For example, waterfront space renewal can provide cities with new images, to create economic investment and to attract suburban and rural residents to live and settle in the cities, and there have been many western cities achieved this goal (Richard, 2001). Chinese cities also have similar problems, so some cities have made forced to renew their waterfront spaces, such as Suzhou, Hangzhou, Shanghai, and Hong Kong (Fu, 2014). However, it is still a gap that if the strategies of waterfront space renewal are general between western and Chinese cities, so this study is going to find it out. This study takes two urban river waterfront space renewal projects as examples, to explore the relationships between urban areas and their river waterfront spaces, and to compare different strategies for dealing with the problems relating to the conflicts between urban and waterfront spaces.

2 The Problems with Urban Waterfront Spaces and Examples

2.1 The Problems with Urban Waterfront

Ancient civilisations typically converged alongside water sources, enabling these civilisations and cultures. The four typical examples of these are ancient Egypt, ancient Babylon, ancient India, and ancient China (Erriu & Pirlone, 2016). After converging, the people establish villages, towns, and eventually urbans areas. However, the development of urban areas is a long process, and with the accumulation of population, resources, and living space over thousands of years, the distances between urban and water environments have been narrowing, and urban waterfront spaces have developed (Hradilová, 2012). For thousands of years, the balance between humanity and nature was relatively well-maintained, but it has been deteriorating since the First Industrial Revolution in the nineteenth century. The difference between urban water environments and natural water environments is that the former are more affected by humanity. The rate of urban expansion is high, meaning that urban areas now often reach water environments, and it is inevitable that urban pollutants are discharged into water, including domestic sewage, industrial sewage, agricultural sewage, and construction waste. In addition, urbanisation can take up the land and damage the integrity of the water environment (Yu et al., 2018). When dealing with the conflict between urban spaces and urban waterfront spaces, it is essential to select the proper methods, whether confirming or altering the water environment. The damage is the least when the method chosen involves confirming the water environment, while the approach of changing the water environment can damage both natural and cultural environments. Two typical examples of water environment damage caused by urban development are outlined below.

2.2 Suzhou Urban Water System as an Example

Suzhou is a city which has been using pedestrian and water streets simultaneously since the ancient era in China, so it is regarded as an 'Oriental Water City', with the 2500-year-old 'amphibious chessboard' framework still operating today (Lu, 2016). The *Pingjiang Map* is an urban map of Suzhou city from the Song Dynasty, 800 years ago, clearly reflecting this framework (as shown in Fig. 1). The biggest difference in the river system in Suzhou from the ancient to the present is the water quality, which could previously be consumed by residents in the Song and Yuan dynasties. It was one of the most important paths for business on the Beijing-Hangzhou Grand Canal in the Ming and Qing dynasties, especially in Shantang Business Water-Street. The famous painting *Suzhou's Golden Age*, which was painted during the Qing Dynasty, shows a scene of Shantang water-street flourishing (Liu, 2008) (as shown in Fig. 2). During this era, numerous businessmen were living and doing business on and by the river, and the quality of water was damaged due to the abundant commercial activities.

The second period of damage began during China's reform and opening-up from the 1980s. Suzhou is located in the central area of the Yangtse River delta economic area, and it is next to Shanghai, so it has become the second biggest city in this area. With the expansion of the urban area and substantial immigration from elsewhere, this ancient city is no longer suitable for its original size and environment. Although the 'amphibious chessboard' framework remained, the high water quality does not.

With the precious water environment becoming severely harmed, the damage to the urban area is far-reaching. As stated above, due to rapid urbanisation and economic development, the water quality within the urban water system has been damaged seriously in present-day Suzhou. Although it is positive that the original urban framework is maintained, the reduced water quality takes the meaning and spirit of the framework away, meaning that the water system can only be enjoyed from a distance rather than engaged in. At the same time, the harm to the water quality reflects the ecological damage (Yu et al., 2018). The Suzhou urban water system is a giant system, and the rivers within it cross each other as they flow to larger water systems such as the Lake Taihu and the Yangtze River, etc. Hence, the damage to the inner water system is not only contained within the system, but also harms the environment in the region of the Lake Taihu rim and the lower reaches of the Yangtze River. One typical example is the outbreak of blue-green algae in Lake Taihu in 2006 (as shown in Fig. 3). Currently, the

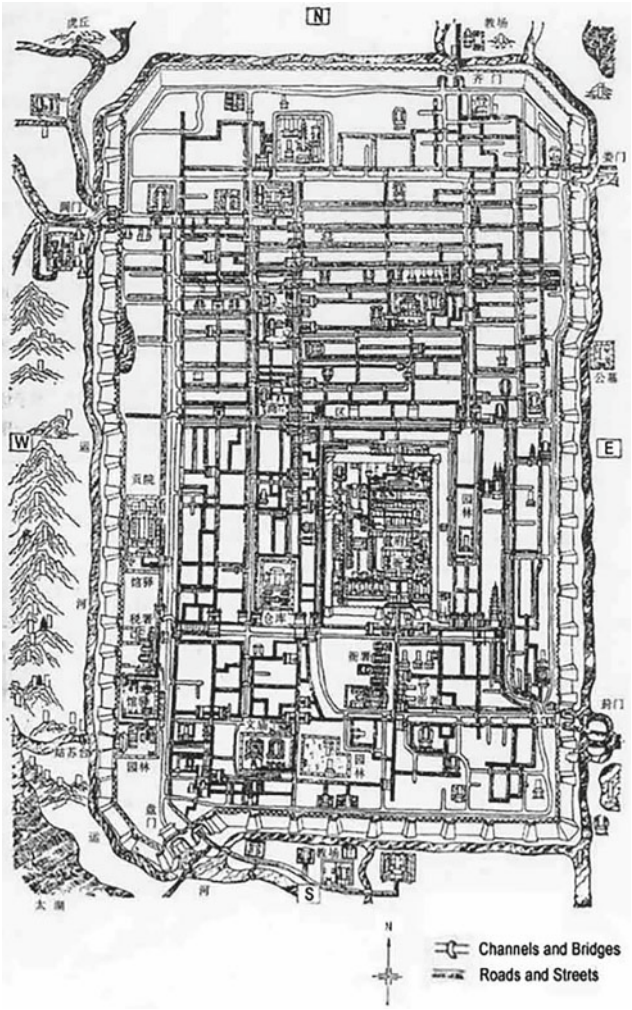

Fig. 1 *Pingjiang Map* shows the framework of 'amphibious chessboard' of Ancient Suzhou city (http://image.baidu.com)

water quality of Suzhou is relatively bad, though it has recently been improving (Yang et al., 2017).

2.3 San Antonio River as an Example

San Antonio, which is located in the south of Texas in the United States, is one of the most important cities in the state, with Dallas to the north and the Mexican border to the south. It is a southern gateway city of the United States, and its significance is obvious. The main river running through the city is the San Antonio River, which is part of the reason for the city's foundation (Lombardi, 2014). It sources from a spring inside the city, crossing the whole urban area, extending south to the Espada Dam, and eventually joining the Guadalupe River. Because of the rapid development of San Antonio, the gathering of underground water has been beyond the capacity of nature, drying the source spring and eventually the whole river, leading to the phenomenon of river closure and drought (SWA Group, 2001) (as shown in Fig. 4).

The portion of the San Antonio River outside the city was always ignored. Due to underground water extraction at the source spring and a lack of suitable planning strategies, the river lacked a pure water supply for a long time. At one point, the river could only be provided with recycled water to prevent it from drying out, and would otherwise have become dead water. Due to the lack of water, contaminants from the city gathered in the river, leading to even larger scale pollution. In addition, the urban flood control also seriously damaged the lands alongside the river, and natural levees were replaced by artificial embankments made of concrete within the suburban areas around the San Antonio

Fig. 2 A part of the painting *Suzhou's Golden Age* (http://image.baidu.com)

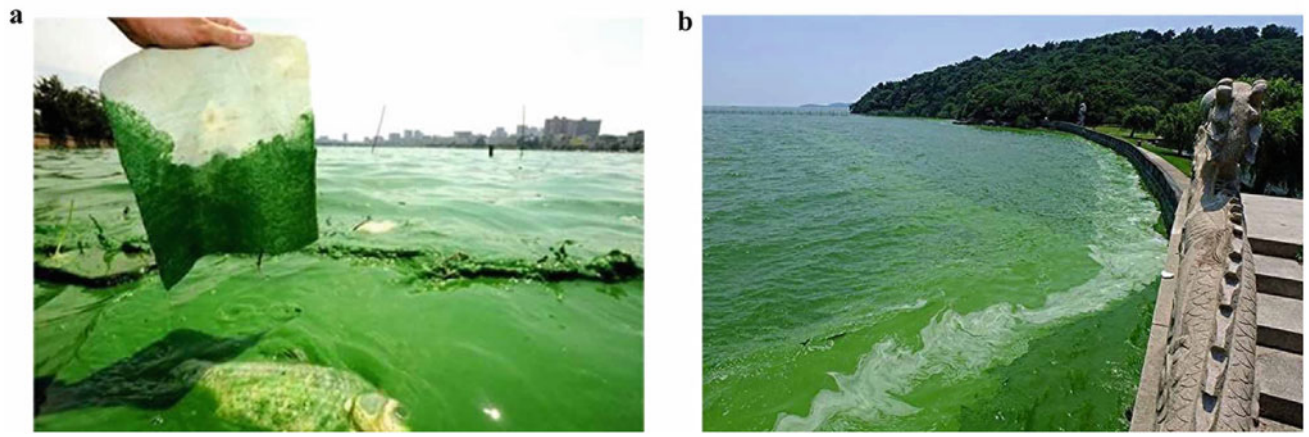

Fig. 3 Outbreak of blue-green algae in Lake Taihu (http://image.baidu.com)

Fig. 4 **a** Water source of San Antonio River (SWA Group, 2001) **b** Dry riverbed of San Antonio River (SWA Group, 2001)

River for 13 miles, meaning that the natural views were seriously damaged (SWA Group, 2001) (as shown in Fig. 5). In addition, exotic species invasion also seriously damaged the original natural environment, and the native species were replaced by alien ones, causing local resources to be over-consumed (Lombardi, 2014). Because of these

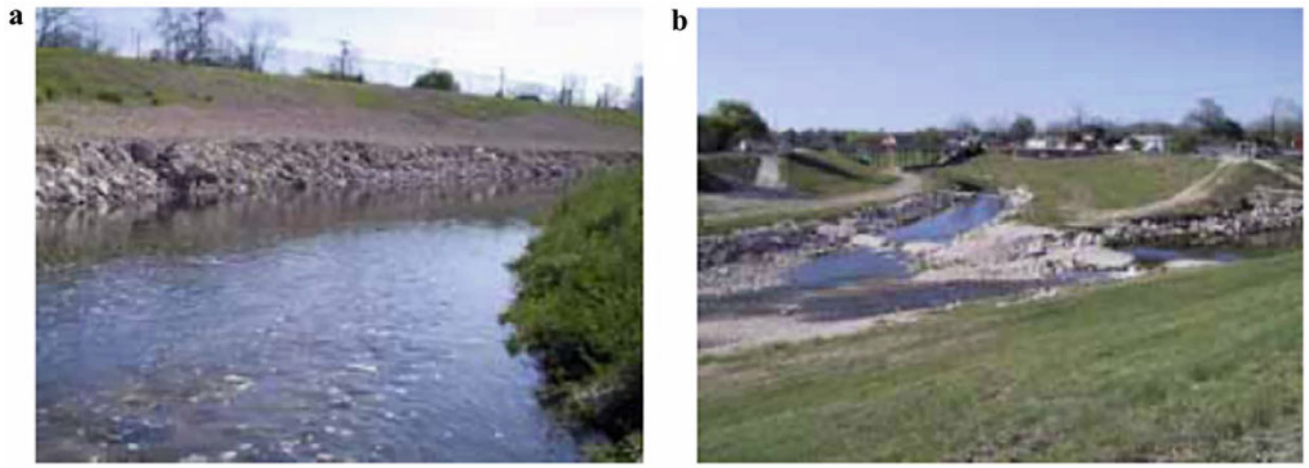

Fig. 5 Ecological damage of San Antonio River (SWA Group, 2001)

problems, biodiversity and carbon storage declined due to the high river surface run-off (Elhassan et al., 2016; Yi et al., 2018).

3 Strategies for Solving Problems with urban Waterfront Spaces

3.1 Universal Strategies

Due to rapid urbanisation, the environment around urban waterfront spaces has become a significant problem (Dn & Xu, 2014). It is necessary to achieve the aim of urban development, while at the same time ensuring that the natural environments of urban waterfront spaces are not damaged, in order to achieve harmony between humanity and nature. This aim is conflicting, because the balance between human beings and nature is difficult to control. To achieve the aim, urban development involves difficult decisions.

Urban waterfront space renewal strategies vary worldwide, and while some are universal, they also need to be combined with local realities to establish whether they are suitable for the specific local environments (Sairinen & Kumpulainen, 2006). These strategies include: improving water quality; recovering original water ecosystem; engaging in planting to enhance the surrounding environment; combing with local urban characteristics to construct a cultural water environment; engaging in business functions, to set up urban waterfront business districts and activate the local area; and combing natural and artificial environments, to improve idle and dilapidated water environments, and to improve the experience of local residents and tourists; etc. (Jones, 1998).

3.2 Strategies of SBWSR

Shantang River Renewal is a typical example of urban waterfront space regeneration in Suzhou. The government of Suzhou proposed a planning strategy, which is divided into five reaches, for the reconstruction of Shantang street in 2004. These reaches are (from south to north): Civic Reach, Historical Reach, Cultural Reach, Relic Reach, and Attractions Reach, respectively (Liu, 2008) (as shown in Fig. 6). At present, the first one has already been reconstructed comparatively relatively well, showing the historical business and civil views, creating an atmosphere of a traditional business water-street. Additionally, the surrounding traditional alleys and residences are all retained, reflecting traditional civil lives in ancient Suzhou.

The project uses the strategies of engaging business in reconstructing surrounding traditional residences alongside the river, dredging waterways, repairing embankments, recovering the original business atmosphere from the Ming and Qing dynasties, and improving local activity (Liu, 2008). Shantang Business Water-Street has already become a key attraction within Suzhou, encouraging more and more tourists to visit, and to experience the local atmosphere. Because of the business function, this street is always energetic; not only is business booming in each shop, but also tourists have a multilevel exploration experience, and the waterways serve as important views and transport. At the same time, the locally traditional residences are well-kept and repaired, enriching the layers of the street. It is obvious from this that the implementation of this project is based on local history and culture. It is thus hoped that ancient Shantang Business Water-Street can be fully rebuilt by means of engaging new elements in local culture.

3.3 Strategies of SARIP

SARIP is a complete improvement system which was developed by the city of San Antonio at the end of the twentieth century. It plans and guides the objectives and strategies of river renewal during the first ten years of the twenty-first century, followed by developing and establishing expectations for the river improvement throughout the first half of the century. The contents of the project are various, but the main aim is to improve the bad condition of the river, to recover the original natural environment, and to provide native residents and tourists with suitable waterfront spaces for travelling and wandering. The main problems include a lack of source water, pollution, and artificial reconstruction of natural environments. To solve these issues, local government, the River Oversight Committee, native residents, and other organisations together organised the River Improvement Committee to propose renewing 13 miles of urban waterfront spaces outside the urban area (Darcy, 2009). They all hope that the improved San Antonio River can not only act as the core tourist attraction of San Antonio, but can also serve residents, to provide them with alternative leisure places, to bring more economic benefits, and to inherit local history and culture (SWA Group, 2001) (as shown in Fig. 7).

Because of the problems of pollution and the water source drying up, the strategy for improving the quality of source water is established, and the specific actions include a remedial sewage treatment plant for discharge water, increasing the collection of rainwater, saving more downstream river water, and restoring the local natural environment. The aim is to increase the river discharge. Additionally, based on the problem that the natural river levees have been artificially reconstructed, the project involves recovering natural environments alongside the river. The specific strategies include turning concrete

Fig. 6 Different sections of Santang street renewal planning (SZPD)

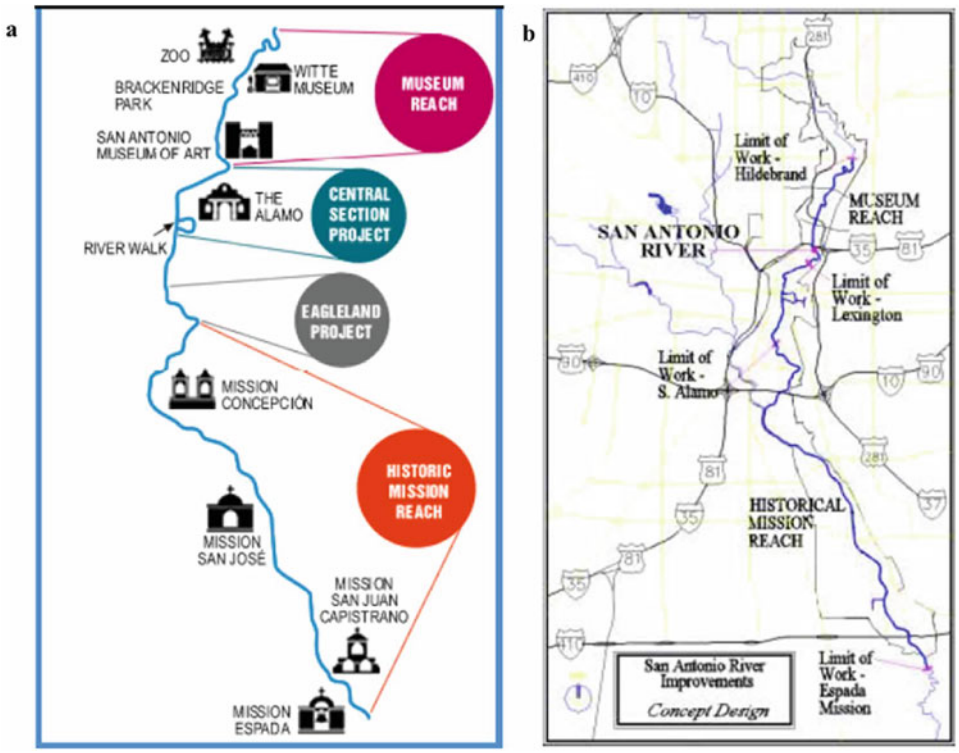

Fig. 7 Different parts of SARIP (Darcy, 2009; SWA Group, 2001)

embankments into dirt or gravel levees, and purchasing the land of local dwellers around the river to improve the water environment on a larger scale. In the north reach, the number of local cultural resources is great, including higher education institutions and museums. Thus, based on this important characteristic, the project plans to construct a line of the urban cultural waterfront park, and to establish neighbourhoods with high density and a multihouse style, to activate the local cultural atmosphere (SWA Group, 2001).

4 Comparison of the Strategies

Some of the strategies within SBWSR and SARIP are typical for regenerating urban river waterfront spaces, not only for maintaining river water environments, but also for advancing urban development. However, they also have their own district characteristics, and a comparison between the strategies will be presented below.

4.1 A Comparison of the Relationship Between Project and Urban Areas

Shantang Business Water-Street was located at the northwest corner of ancient Suzhou, and this area was the edge of the city during the Ming and Qing dynasty. However, it is now inside the city, between the business centre and the famous tourist attraction of Tiger Hill. Hence, the location of the street is significant. Figure 8 is a map of ancient Suzhou and the location of Shantang Street. The number 1 represents the whole of ancient Suzhou, and number 2 represents Shantang and Shangtang business streets in the figure. With this complex and changeable environment, Shantang street

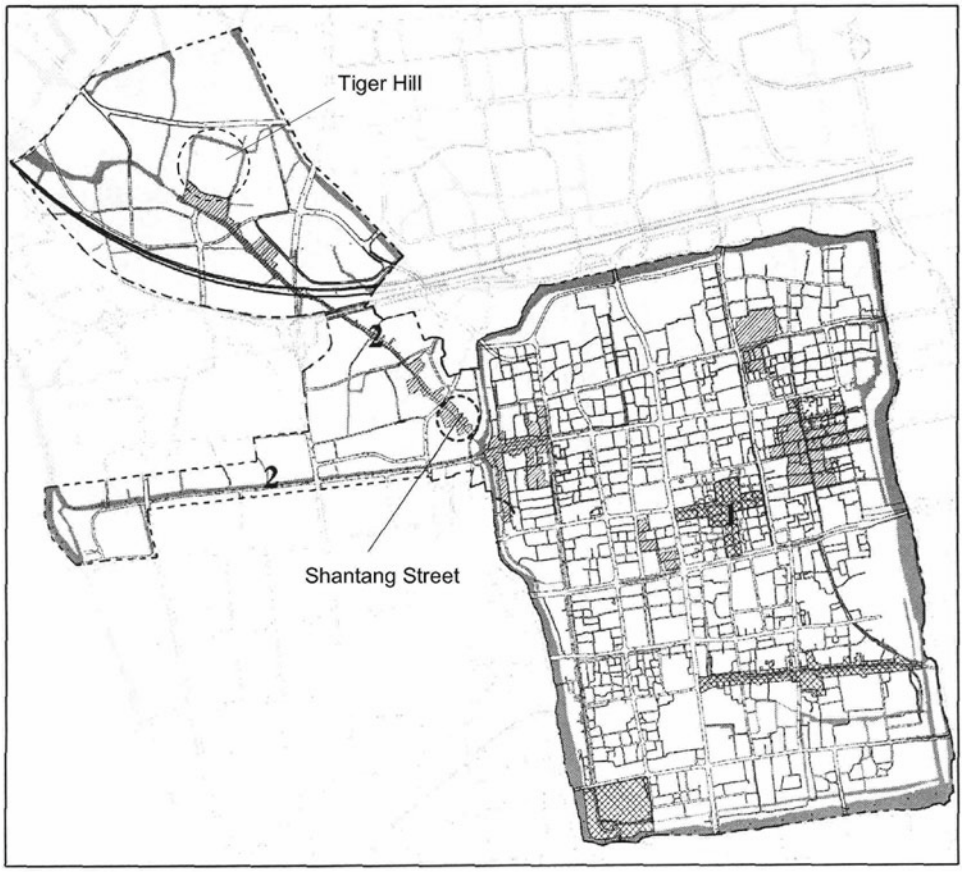

Fig. 8 The location of Shantang street at ancient Suzhou city (Liu, 2008)

becomes a core element of urban improvement for Suzhou. In the process of completing the theory of the reconstruction of the old city in Suzhou, SBWSR has been regarded as a typical template (Liu, 2008). It innovatively established the methods for river training by stages and zones combined with surrounding resources, and embedded river training in urban development, not only for improving the river itself, but also for providing economic support for urbanisation (Liu, 2008).

The San Antonio River is located in San Antonio in Texas, in the south of the USA (as shown in Fig. 9). The river flows across the city and then extends south, and its length outside the city is 13 miles (Darcy, 2009; SWA Group, 2001). Although Paseo Del Rio waterfront pedestrian street (the River Walk) was constructed in the 1920s inside the city, making the river a famous tourist attraction, the part outside the city had been idle till the end of the twentieth century. With the urgent need to solve the river's problems, such as extra construction of flood banks, rapid economic development, serious environmental damage, etc., strategies for river improvement outside the city become essential (Kang & Schauer, 2008).

4.2 Comparison of the Implementation of River Renewal

The project of Shantang water-street renewal is divided into three stages, and consists of five sections to effectively reconstruct the river followed by the surrounding resources. At present, only the civil reach has been completed, aiming to construct a business water-street which is characteristic of Suzhou, surrounded by traditional residences, to provide people with an exhibition of ancient Suzhou's original appearance. The project was proposed by the Suzhou development and reform committee, and the first party is Suzhou municipal government. Furthermore, it was implemented by Shantang Historical and Cultural District Development Co. Ltd (Liu, 2008). Hence, it is a government project, without local dwellers taking part. Some dilapidated houses were demolished, due to their obstruction of the waterway and their lack of safety (Liu, 2008).

SARIP involves the participation of several public organisations, including the River Improvement Committee organised by the municipal and county government, and local residents. The project was drafted by the committee,

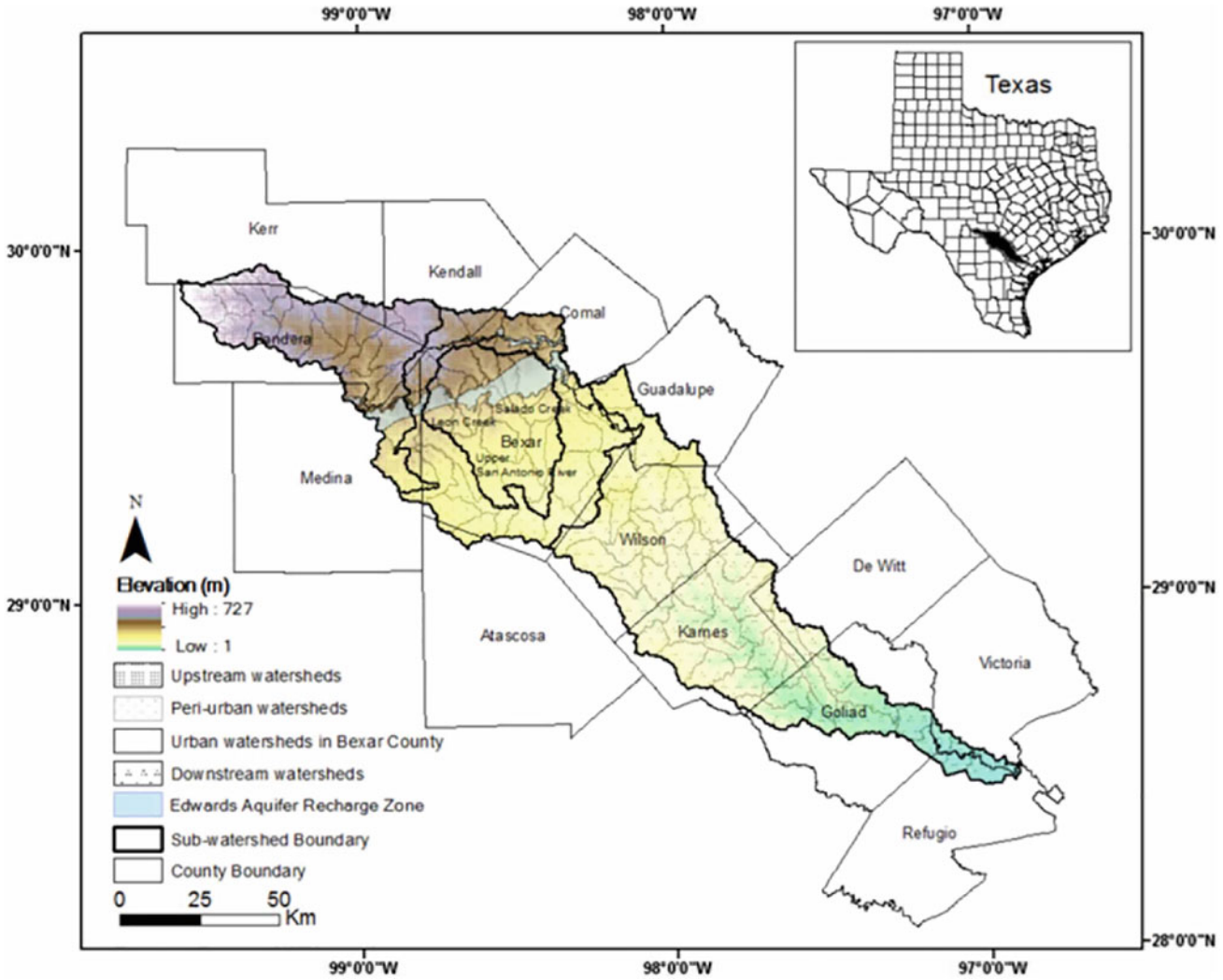

Fig. 9 The location of San Antonio River basin (Yi et al., 2018)

and then a programmatic document was passed after several checks. The implementation of the improvement is based on the document. The document establishes the aims and contents of the improvement during the first ten years of the twenty-first century, based on which it also proposes aims for the first fifty years of the century, to ensure sustainable development. The document sets requirements for the project, and includes several specific appendices. The goals to be achieved by the improvement should all follow the lead of the document, and they also need to be reported to the committee to be agreed (SWA Group, 2001). It is obvious from the above that this project is rational and democratic, as it is proposed and provided based on advice by, as well as the government, several relevant organisations, and local people (as shown in Fig. 10).

4.3 Comparison of Cultural Strategies

There are many cultural places that are valuable for research around Shantang Street, including Tiger Hill and Lingering Garden, etc. (as shown in Fig. 11), and the street itself is also a historical site, regarded as one of the transportation junctions of the Beijing-Hangzhou Grand Canal, since the Song dynasty around one thousand years ago. There are also some local customs, such as Story-Telling and Ballad Singing in Suzhou Dialect, Kun Opera, Suzhou Embroidery, which are engaged within some shops to make tourists feel more immersed in the local culture. The government of Suzhou establishes 'reimaging the ancient Shantang' as the theme of the project, using local cultural resources to rebuild and improve the cultural industries, and also to propagandise the appearance of the local traditional water-street (Liu, 2008).

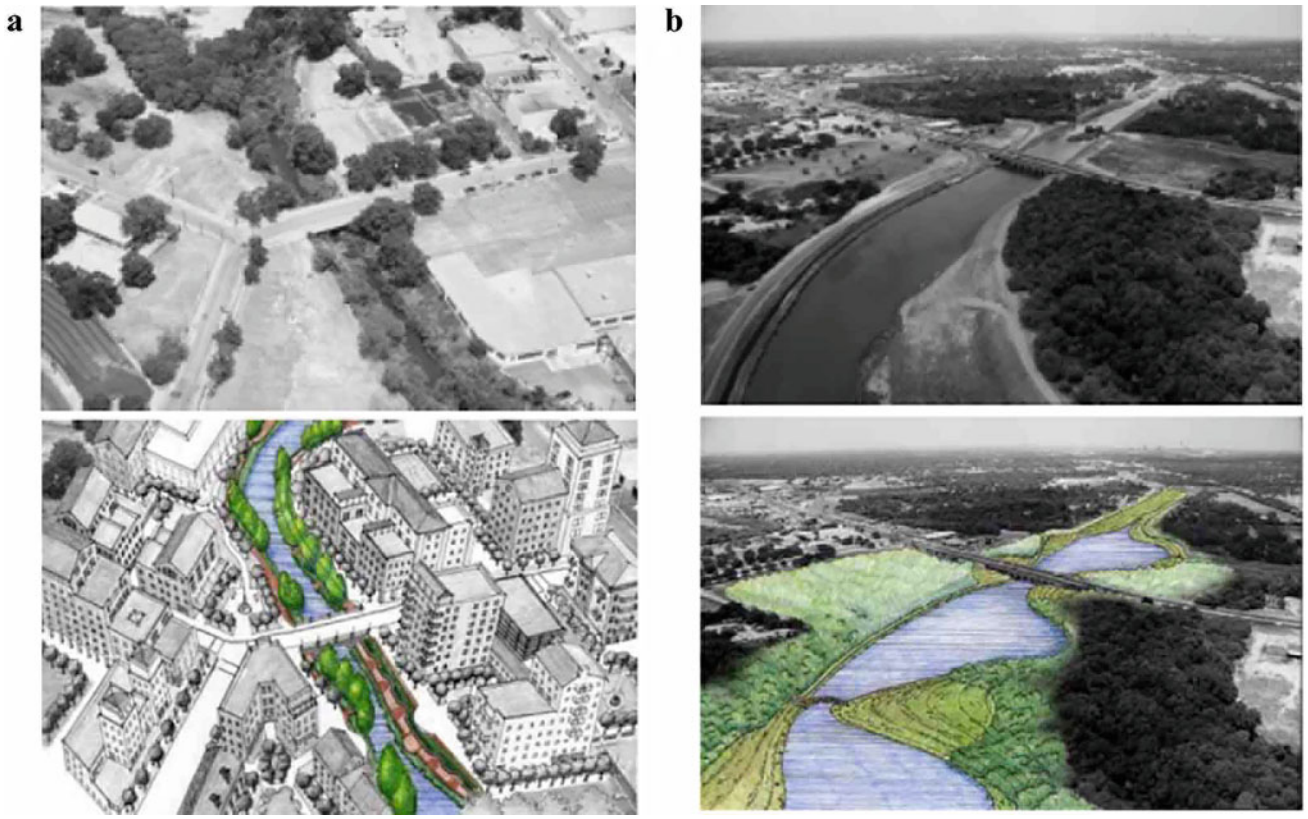

Fig. 10 **a** Northern reach before and after (SWA Group, 2001) **b** Southern reach before and after (SWA Group, 2001)

Fig. 11 **a** Tiger Hill (http://image.baidu.com) **b** Lingering Garden (http://image.baidu.com)

The northern reach of SARIP is located in the northern suburb of the city, and was rebuilt and improved based on the theme of the local museum. This six-mile part is divided into 'urban' and 'park' reach respectively, aiming to intensify the local culture based on the current variety of resources. For example, the 'park' reach is rebuilt and improved based on Brackenridge park in the original site, to provide citizens with high-quality environments and park culture. San Antonio Historical Relic Park is planned for the southern reach, and an old canal in the park is rebuilt as a cultural educational site. There are four church relics, which are Mission Concepción, Mission San José, Mission San Juan, and Mission Espada, respectively (from north to south), spread across the seven-mile southern reach, which is rebuilt as a cultural park according to the relics (SWA Group, 2001).

4.4 Comparison of Economic Strategies

The most obvious characteristic of Shantang Business Water-Street is that the river renewal is combined with

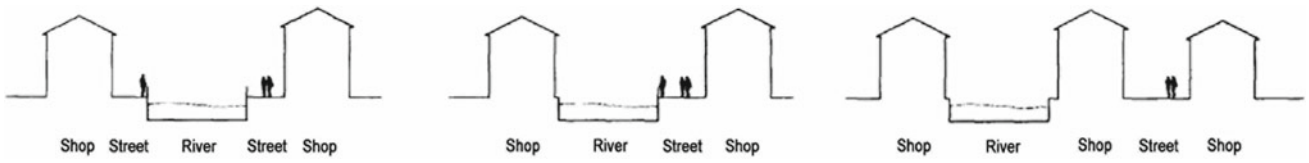

Fig. 12 Three relashipship between river, streets and shops

business, to rebuild the ancient impression of Shantang River-Street. The main strategy is establishing stores alongside the street, divided into pedestrian-street and water-street, presenting options for tourists with different characteristics and preferences (Fu, 2014; Zhang, 2014) (as shown in Fig. 12). The completed first stage of the project actually achieves the aim of constructing a cultural business street. The number of tourists visiting each day is extremely high, and people are increasingly drawn to the area for travel and consumption because of the local culture and the continual development of innovative shops (as shown in Fig. 13).

In comparison, in the northern 'park' reach of SARIP, the main mission is providing local citizens and tourists with a line-shape park. There are many cultural elements and environments alongside the river levees in the reach, and it is suitable for the development of economic projects, so this reach is planned to be reconstructed into residential areas with high density and multiple housing types, to provide more accommodation for residents. This not only energises waterfront spaces, but also provides local businesses with activities to participate in (SWA Group, 2001). In the southern reach, as well as the improvement of environments and existing historical relics, the reconstructed relic parks provide residents and tourists with alternative leisure places, providing numerous tourists attractions for San Antonio, to further stimulate the local economy (Darcy, 2009; SWA Group, 2001).

4.5 Comparison of Ecological Strategies

Although the business and cultural effects of the SBWSR project are clear, the ecological effect is less obvious. The main material of the embankments alongside the Shantang River is hard dimension stone, so there is no soft-land filtering out impurities in the river (as shown in Fig. 14). The waterway is connected with the Suzhou water system, so its water quality can easily be affected by the whole system. There is no evident flotage on the river, but the water quality is not as good as it was during ancient times (Yang et al., 2017). This paper suggests that a suitable strategy is cooperating with the surrounding Suzhou traditional gardens, such as Tiger Hill and Lingering Garden which are near the river, to purify the water quality, since the existing ecological strategies are not good enough.

In contrast, SARIP is good at protecting local ecology, and the main content of the project in the south reach is recovering the original natural environment alongside the river (as shown in Fig. 15). The main measures include eliminating alien plant species, recovering natural levees, purifying water sources, controlling floods, etc. Supported

Fig. 13 **a** Water-street (http://image.baidu.com) **b** Pedestrian-street (http://image.baidu.com)

Fig. 14 Shantang river embankment still uses hard materials (http://image.baidu.com)

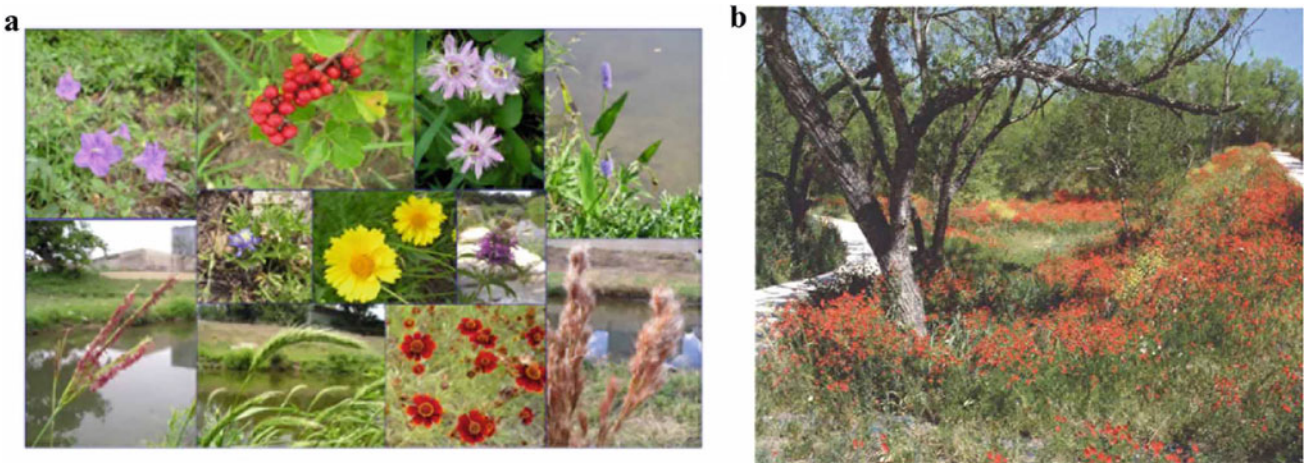

Fig. 15 **a** Typical plants in south reach Figure (Darcy, 2009) **b** Typical view of southern reach (Darcy, 2009)

by a hydraulic model, the feasibility of these methods is comparatively high (Darcy, 2009). After some pilot treatments, it has proven to be helpful for recovering local ecology. Thus, this project has some ecological effects.

5 Summary

This paper establishes the concept of urban waterfront spaces, followed by several problems and different solution strategies for such spaces. It then introduced two renewal projects, which are SBWSR in Suzhou, China, and SARIP in Texas, the USA, respectively. Although these two samples bring a range of good outcomes to their respective cities, their strategies are different. Through comparisons, it can be seen that there are differences among the characteristics of the waterfront space renewal strategies in different urban areas, cultures, and environments. The reasons for renewal are almost the same for these two examples, but the aims and results are different. Shantang Business Water-Street is built as a business waterfront space with Suzhou-specific characteristics; the San Antonio River is renewed as a leisure waterfront space with local natural and cultural environments. These two examples can reflect the universal strategies of urban waterfront spaces renewal: such as dredging waterways, improving waterfront environments, and engaging with cultural and business factors. Clearly, however, they both have their own characteristics, as summarised below:

Table 1 Comparison of waterfront renewal strategies between SBWSR and SARIP

	SBWSR	SARIP
Implementation	Led by local government, implemented by construction companies	Proposed and planned by local government, organisations, and residents
Cultural strategies	Keep and repair surrounding traditional buildings and relics	Construct cultural sites based on local museums, church relics, and old riverways
Economical strategies	Construct a business water-street, and stimulate the nearby economy	Construct residences to attract dwellers to consume in the area; Construct urban parks to attract local people and tourists
Ecological strategies	Little to no ecological strategy	Recover natural levees and habitats for local plants and animals

1. Implementation: SBWSR takes the project by stages, according to the existing cultural resources alongside the river to rebuild the ancient Shantang Street as a cultural, business, and tourist attraction. It is led by local government, without citizens participating, so it cannot take advice and suggestions from the locals. In contrast, SARIP approaches the project based on reaches. This is a highly effective approach, and two reaches can learn from each other. Another important point is that the project is planned and processed by local government, social organisations, and around residents together, taking advice and suggestions in a democratic way. Additionally, the project is strictly determined by the document, to avoid changes during the implementation.
2. Cultural strategies: In terms of culture, SBWSR is challenging, because the local history is so long, and the local culture so distinctive. There are such many valuable and researchable historical relics around the street, such as Tiger Hill, Lingering Garden, and Chang Men. There are also numerous traditional residences surrounding the site. Based on these cultural resources, the project effectively engages businesses in the local culture, to construct one business water-street with traditional Suzhou characteristics. The layout is a combination of outer streets and inner lanes, deconflicting between business streets and traditional residences, and providing tourists with a window showing Suzhou culture. In comparison, the history of the San Antonio River as an urban river is much shorter, while the committee effectively utilises the local cultural resources, such as local museums, church relics, old riverways, parks, etc. Using these limited resources to construct cultural views, the project makes an effort to provide residents and tourists with leisure and entertainment places in a good environment, while also, educating people about local culture.
3. Economic strategies: These two projects both rebuilt urban waterfront spaces to advance and stimulate local economies, but their strategies are different. Specifically, the main elements of the completed part of SBWSR are business and residence, aiming to construct a waterfront business street. The business environment is strong alongside the street, and it also stimulates the surrounding economy. SARIP, in contrast, regards business as a secondary element for the purposes of the project. For instance, the project includes the construction of good-quality waterfront residences with high density and several house styles in the northern reach, to attract residents to drive the surrounding businesses. In the southern reach, historical relic parks are developed for citizens and tourists, so as to stimulate local tourism.
4. Ecological strategies: The biggest difference between these two projects is the attitude to ecological renewal. It is obvious that SBWSR includes nearly no ecological improvement. First of all, the water quality of the Shantang River is highly affected by the Suzhou water system, so the water quality improvement is not evident. Secondly, the selected embankment material is a hard stone, so the river cannot be filtered by soft land and sand. Thirdly, local garden resources are not utilised well. SARIP, however, is strong on ecological recovery, especially in the southern reach. By rooting out alien species, recovering natural levees, purifying water sources, controlling floods, etc., the local natural environment has been improved: not only have native species' habitats improved, but also the water quality of the river has drastically increased.

All these comparisons can be summarised in Table 1.

6 Conclusion

The comparison between these two projects stated above indirectly reflects different and specific strategies for dealing with the same problems relating to urban river waterfront spaces. In the context of the growing number and importance of urban waterfront spaces, many renewal projects involve similar strategies, while politics, culture, economy, etc., are

different in different places, meaning that each project includes its own special and unique strategies based on its context. As a developing country, China makes efforts to develop its economy by means of urban waterfront space renewal, with other aims being secondary to this. By contrast, developed countries concentrate more on cultural and natural environment factors, as the economic development is already mature, so the more long-term impacts are prioritised.

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Past and Future: The Urban Landscape and the Virtuous Management of Resource Flows for a Sustainable Environment

Elvira Nicolini and Antonella Mamì

Abstract

A circular process in the case of resource flows can best be expressed according to a plan that takes into account the geographical proximity and synergy between citizens and industries. The study hypothesizes the possibility of anticipating part of the recycling processes in residential urban areas. This streamlines the work phases and consumers become an active part of the process. Circular management of resource flows is an operational problem that emerges with greater severity in an urban landscape, due to the constraints generated by road networks and the need to protect basic values. It often happens that the degradation generated by the irresolute nature of the technical-environmental issues related to service management, affects both the vulnerability of the character of the city and the involvement of various stakeholders. Here, we present the results of a research work that identifies criteria for a waste collection system planned in an urban landscape that has highly defined forms and values. In its first phase, the research takes into account the characteristics of the main waste fractions, leading to the selection and implementation of preferred means for sustainable and virtuous management. The second phase features the definition of operative strategies for the management of resource flows, with the objective of regenerating and developing the local context. The investigation's goal consists in the elaboration of summary sheets that select the operative systems integrable with qualitative and quantitative systemic factors, typical of the environment in which the research is being carried out.

Keywords

Circular management • Wastes • Urban landscape • Multicriteria evaluation

1 Introduction

The circular planning of resource flows is the result of specific initiatives for a self-sufficient urban site and initially evolves in accordance with the concept of "industrial symbiosis" and, subsequently, via urban–industrial interaction —"urban symbiosis" (Van Berkel et al., 2009). Industrial symbiosis is an activity that involves industries that are normally separated in a collective approach geared towards achieving a competitive edge, with physical exchanges of materials, energy, water and/or by-products (Chertow, 2000). The key to industrial symbiosis lies in collaboration and the synergic possibilities offered by geographical proximity. The networking of industries develops a self-sufficient system at the service of the city, which becomes a producer of zero kilometre goods and waste disposal and recycling point for these same products. The carrying out of these activities on site helps mitigate polluting emissions emanating from transportation of goods and product recycling prevents further erosion of resources. The management of resource flows arranged in this way opens up new markets and creates jobs, whilst eliminating a dependency on importation of raw materials and favouring the fulfillment of production cycles. An extension of industrial symbiosis is represented by urban symbiosis regarding the use of by-products (waste) from the city as alternative raw materials or sources of energy. In the same way as industrial symbiosis, urban symbiosis is based on synergic opportunities deriving from the geographical proximity between the producers of waste and potential industrial players, via a transfer of economically and environmentally advantageous resources. The principle of proximity, typical of local daily life on a "human scale", favours a commitment to collaboration and the opportunity to develop innovative policies contiguous to the needs of the citizen, creating through collectivity a sense of self-acknowledgement and responsibility. Moreover, should management be reduced to the scale of a smaller consumer-base, the result might be an improved

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capacity for regional control, since treatment and waste disposal would take place in the very areas where it had been produced; a reduction in time and transport and disposal costs would ensue (Nicolini, 2019). The circularisation of processes could be transferred from the industrial sector to the actual organization of the city, its economy, its social system and its governance (Girard, 2013). In the organization of the city, this process will evolve all-inclusively, offering various possibilities (from the prevention of material wastage to pretreatment for in situ recycling), involving several administrative bodies, evolving simultaneously on various levels on the urban scale, and with the participation of all players.

Involving the city actively means influencing the citizen's quality of life and demands innovative rethinking for many services, such as waste recycling, which would be the first consideration in our vision of an ecosystem. Especially with regard to waste, the ecosystem of the future will demand a circularity of resources; a series of demands on the part of the citizen are envisaged, in connection with daily life, and these will need to be met utilizing appropriate systems and technology. Apart from providing for recycling activity, sensitizing the players and organization of the local area as regards future management, actual planning envisages specific technology geared towards implementing the cycle in question. In this dynamic, the question arises as to how should this technology relate to the urban landscape. In defined areas with their own identity, such as an urban landscape, the operational tools for waste management might clash with the features of the area, interrupting the harmonious continuity of the panorama. Therefore, it becomes necessary to integrate conservation with development, via a principle of relationality between technological systems and identifying features of the landscape.

There have often been failings in both the local handling of urban waste and in mobility; this may be linked, above all, to a tardy modernization of networks, which places Italian cities at a clear disadvantage when compared to other analogous European contexts. Secondly, the lack of homogeneity in the local region, especially in historical settings with particular structural and morphological characteristics, has often engendered conservative policies; the response to environmental problems at the regional level has often been prompt and improvised, action (that cannot be deferred) being taken only when needs arise.

In organizing the city this process advances all-inclusively in several fields, involving various administrative bodies and evolving simultaneously on various levels on the urban scale, with the participation of all stakeholders and on different social levels. Apart from providing for recycling activity, sensitizing the players and organization of administrative bodies responsible for subsequent management, the planning proposes specific technology to implement the cycle. A second, and by no means less important, the issue concerns the relationship this technology should enjoy with the urban landscape. The complexity of relations between cases of conservation and social dynamics, might on occasion have provoked initiatives of a sectorial type, which today, with regard to waste management, may manifest a situation of poor coordination between the various neighbourhoods; this results in some areas boasting differentiated waste collection and others not, with obsolete waste collection devices and equipment that defile the landscape.

Of course, the waste collection devices and systems need to respond to the requirements of the consumers using the site, in terms, for example, of accessibility, the convenience of the waste collection timetable clarity in differentiation of refuse, but they must also blend in with the background so that the qualities already present in the physical–environmental context are maintained. For example, domestic refuse collection constitutes a sound compromise between the household and environmental impact, since it constitutes a system where the devices are of an acceptable size and positive performance in terms of quantity of material intercepted and quality of fraction recycled. We must bear in mind that collection of certain fractions (e.g., from the streets) is capable of generating large quantities of refuse (biological, paper, plastic and, less often, glass), which might engender negative consequences with regard to urban décor and encumbrance.

Furthermore, the programming of a domestic refuse collection circuit might resolve the question of accessibility to waste disposal points, guaranteeing the principle of proximity for the householder and, at the same, time rendering the general public more responsible in their daily commitment to differentiation (Mamì, 2014). If waste management were reduced to an inferior local scale a greater capacity for territorial control would result, since the treatment and disposal of waste would take place in the very places it was produced and the outcome would save time and lower the costs of transport and disposal. However, in this instance too, in a close-knit urban context, there is no lack of local operational difficulties as regards limited space; these could be partially resolved by employing complementary circuits for collection (ecological islands, communal centres, eco-points, etc.) (Regione Siciliana, 2012).

The specific nature of the context assumes importance in the planning of disposal sites, in the choice of areas in which to position and then house the disposal equipment, in the design of the equipment, in the mobility, size and noise levels of the devices, and in the planning of services (timetables and daily quantities). The aim of this study consists in the analysis of strategies and operational

management tools compatible with an urban landscape; at the same time, these should respond to various requirements in a functional manner and in tune with the daily life of the local community.

2 Methods

The work outline presented here represents the outcome of a wider ranging analysis regarding the resource flow cycle in the urban context, organized into several phases from disposal to recycling. In this paper, partial results are presented, with a focus on the collection phase, and, in particular, the daily involvement of the consumer and the effects on the urban landscape. The results are reported in summary sheets arranged according to planning strategies and operational tools for handling the collection of the main resource flows in an urban centre. The summary sheets analyse the features of each fraction and the negative consequences that these might generate not only for the landscape, but also the well-being of the consumer, at the moment of their disposal.

For each fraction, the following were singled out: strategies for managing the collection phases and pretreatment of the resource flow with which to pursue the set aims; urban planning action geared towards predisposing the physical elements in response to the problems that have emerged; typology of circuit to be implemented and the relative disposal apparatus to be adapted; the preferred annotation for integrating the scenarios into a specific context.

With regard to the hypotheses for circuits, basic parameters need to be laid down, separate for each fraction and which may affect the operational choices for the collection systems. These might consist of: speed of fermentation, which would determine needs in terms of frequency of collection; the specific weight and predisposition for compressing, which might require the utilization of different vehicles for picking up and transporting the material. More specifically, several variables were defined to characterize each fraction (indicated as criteria) and the relative aims to restrict or favour the choice, according to the individual case. Starting from these objectives, several planning strategies were hypothesized in locally located neighbourhoods, elaborating disposal and pretreatment strategies that would lighten the load of overall management, restricting the quantity of material. Certain needs emerge from these strategies, corresponding to concrete actions that the management plan might provide for.

Respect for the quality of the landscape, for environmental standards and the possibility of carrying on one's daily life normally, represent a precondition for considering a particular space to be inhabitable and utilizable; at the same time, this space might well be equipped with the required technical appliances for carrying out the envisaged functions. The intervention should respond to the demands as dictated by the actual site, whilst improving its overall discernible image and, at the same time, blending in with the existing parts. In fact, running services efficiently in an urban area means not only taking into account the factors that regard the cycle of the individual fraction, but also the compatibility of the service infrastructure with the landscape. Starting from this consideration, in the summary sheets, there is a section headed "notes for integrationability", which stresses the constant need to examine the context in which planning is taking place.

Therefore, we propose possible systems along with collection and pretreatment devices, which, according to their circuit type (vehicular or Pneumatic Waste Collection System) could be integrated into the urban environment. To this end, the physical features were considered, as well as the acoustic and olfactive emissions characterizing these operational tools, which might impact a close-knit, stratified and well-defined architectural environment such as the urban context. In this case, whilst also taking into consideration less bulky devices, integrationability should always be verified in situ, subject to a specific survey of not only the operational area in question, but also the adjacent road network.

In particular, the Pneumatic Waste Collection System circuit, by means of aspiration of air flows via underground conduits, carries the flow of material from its place of origin to the collection terminus, situated in strategic areas in the neighbourhood suitable for sorting out the flows. This would entail installing new plant engineering and infrastructural components, which might impact the landscape both during the implementation and operative phases, albeit with the possibility of employing conduits of a limited size, running in parallel with other urban networks. Therefore, in this case, there would be a need for a phase of investigation into possible interference not only with existing networks, but also with the historical stratification of the various sites, and an estimate of the multiscale impact on the construction work.

We prepared the summary sheets according to the various kinds of refuse produced, as a useful tool for planning a home-based collection circuit. In creating these cards we hypothesized the institution of differentiated collection at fixed centralized points, for the management of materials of occasional production and also the optimization of collection and transport of the main fractions, i.e., biological, cellulose and plastic. The analysis also considers the possibility of integrating the circuit with ecopoints or collection areas positioned at ground level around the back or sides of buildings (waste disposal areas for differentiated collection, with financial incentives for the material delivered). These solutions might encourage the enhancement of virtuous

behaviour on the part of the householder and the maximization of processes of edification and involvement on the part of the general public. Furthermore, wherever there are small densely populated neighbourhoods, or wherever there is difficulty of access to individual houses, in urban areas and historical centres, we considered the incorporation of mobile dumpsters (to replace immovable domestic appliances).

3 Results and Discussion. Planning Strategies and Operational Tools for Managing Resource Flows in Urban Centres

3.1 Organic Fraction

Differentiated collection of the organic fraction necessitates distribution to all individual households of bags and bins in accordance with the collection circuit to be implemented. Containers of limited size help limit typical phenomena of the fraction, such as a tendency to ferment, with a consequent release of liquids and nasty odours; they also help the householder with disposal, by reducing the possibility of inserting bulkier, extraneous materials and in the transportation of material of elevated specific weight.

The organic fraction is composed of nitrogenous elements making up more or less 50% of the wet fraction, carbonaceous refuse deriving from pruning accounting for 30%, sludge (10%) and 10% the remaining part, consisting of tiny quantities of paper, cardboard and cloth (ISPRA, 2019). Compost can be obtained from this fraction by means of an aerobic, industrial or domestic biological process, during which the microorganisms, in the presence of oxygen and a balance between the chemical elements in the composted material, decompose the material, first of all, via hydrolysis and then via humification. The deriving compost can be used as a fertilizer for agricultural purposes, thus representing a natural resource at the conclusion of the cycle. There are several compost bins on the market, which, because of their shape and size, are suitable for a variety of contexts.

Through industrial processes of anaerobic digestion, biogas and by-products can be obtained, including compost and soil fertilizer. Biogas is the result of a process of decomposition of substrata of various types deriving not only from organic material, but from sludge and agroindustrial waste. The biogas obtained is then purified and can be conveyed, as fuel, using a diesel cycle endothermal engine coupled with an electrical energy generator (Vismara et al., 2009). Traditionally, most biogas production plants were of considerable size and situated in industrial zones on the outskirts of cities; today, there exist small/medium-sized systems, with several functional variants, which can be installed in small local neighbourhoods. The newest technology consists of metal containers with the function of anaerobic digesters, with modules that can be assembled and transported, to the exclusion of any construction work (Mami et al., 2012).

The fraction needs to be pretreated, in order to eliminate any extraneous elements, in a water mixer and a press extruder that compresses the material in a calibrated sieve. Planning of the collection circuit could integrate several possibilities: ranging from a simple collection of differentiated material to on-site, pretreated material, and to total completion of the cycle in situ, rendering the user autonomous in the production of raw/secondary materials.

The waste disposal devices and any plant components linked to pretreatment and treatment of the material, must, on the one hand, respond to the requirements of well-being for the consumer in question, so as to stimulate participation and increase the resource flow; on the other hand, they must take into consideration the landscape in which they are inserted and which has well-defined characteristics. Therefore, with regard to all programmed activities and any equipment to be installed, there needs to be a consideration for the slightest visual encumbrance, for the view from panoramic view-points and itineraries or from main roads. In the specific case of the organic fraction, any actions will also have to respect the principal indicators of social well-being, including olfactive perception and emissions of greenhouse gases. The summary sheets (Tables 1 and 2) with the planning strategies and operational tools for organic flow management are reported.

3.2 Cellulose Fraction

The overall quantity of cellulose-packaging waste delivered for recycling, on the basis of CONAI's "Programma generale di prevenzione e di gestione degli imballaggi e dei flussi di imballaggio", constitutes the most-extensively reprocessed fraction (COMIECO, 2019). Recycling of the cellulose fraction is a repeatable process that guarantees conservation of the environment in terms of woodland, water and energy resources. Therefore, this highlights the importance of educating towards differentiation on the part of the consumer, the principal player in a sustainable process.

Differentiated material flows into mono-material platforms, scattered around the local region, where it is tallied and separated according to type and weight, and purified. The process produces compressed waste paper, which is sent to the paper mill and is progressively dehydrated and mixed in variable quantities with virgin fibre, resulting in a homogeneous paste. The cycle ends by restoring a material that is analogous to the traditional raw materials used in producing paper items.

Table 1 Planning strategies for organic flow which could be integrated into the city

Criteria/Aims	Waste management strategies	Actions of planning	Notes for integrationability
Tendency to ferment/Odour containment	Limitation of the accumulation phase	Planning of green areas	Check the compatibility between the root system of the shrubs and the elements under the roadway
	Waste disposal anytime	Planning of ventilated underground areas	Prior diagnostic investigations in situ
	Planning on the basis of climate context (humidity; temperature)	Planning of eco-islands on ground floors or outside	If outdoors, hide the eco-islands and do not place them in significant visual perspectives
	Possibility of pretreatment and/or immediate recycling	Planning, in a neighbourhood area, of a composting area and of a small cogeneration plant	Avoid exposing the devices and the plant systems in the areas of public access and which interfere with significant paths and views
Elevated specific weight/Size containment	Increase of collection by type of user with a higher production	Supply to residences of food waste disposer unit for use under sinks	Limit the visual impact
	Waste disposal anytime	Sizing for intended use and for eating habits	Avoid conferring in places of high-quality architectural and of significant visual perspectives
Presence of liquids/Limit the liquid drift	Limitation of accumulation phase	Planning of inspection devices for the disposal of waste	Avoid waste disposal on roadways
	Avoid any interference between the fractions during the accumulation phases	Disconnect ecological islands from busy road axes	Avoid waste disposal conferring in places of high-quality architectural and significant visual perspectives
Daily production/Daily collection	Increase of collection by type of user with a higher production	Planning various waste disposal points in a neighbourhood (radius max. 80 m)	Avoid waste disposal conferring in places of high-quality architectural and significant visual perspectives
	Correct sizing of waste disposal volume for users	Prevent the joint disposal of different waste	Avoid interference between the waste fractions in the disposal and collection phases
Weight Loss by evaporation/Favour perspiration	Planning on the basis of climate context (humidity; temperature)	Planning a ventilation system for ecological islands if these are indoors	Limit the dispersion of odours and the visual impact
Compost and biogas generation	Planning and distribution of pretreatment and/or recycling points in a neighbourhood	Planning of bio-stabilization plants and of anaerobic digestion plants	Activate the plant systems in industrial areas, avoiding interference with significant visual perspectives

In the collection of cellulose materials, there is an elevated risk of mixed waste paper and cardboard packaging, which follow two different recycling cycles. It is therefore deemed necessary to pay particular attention to both the management and programming of these flows, as regards the consumer's waste disposal, using auxiliary appliances that are easily recognizable and complementary to each other.

If, on the one hand, the low specific weight of the product composition favours rapid collection, a sudden accumulation of waste material might however emerge during periods of intense labour and in urban areas with a high concentration of tertiary activities. To this end we might hypothesize integrating into the collection system compaction elements to reduce the visual encumbrance; however, if these are not adequately designed in sound-proof areas, they may well cause hearing problems for the user, as is often the case in compactor vehicles.

Hygroscopicity and hydrophilia are both phenomena that bring about material decomposition, provoking dissemination of odours or harmful substances, whenever there might be contamination with diffused chemical elements, a situation that is more than likely in waste disposal. In situ pretreatment actions, with the function of crushing and compressing, could certainly limit any potential problems, as well as the visual impact due to the bulky dimension of the fraction. The summary sheets (Tables 3 and 4) with the planning strategies and operational tools for cellulose flow management are reported.

Table 2 Operational tools for organic flow management which could be integrated into the city

Criteria/Aims	Type of collection circuit	Waste disposal devices	Notes for integrationability
Tendency to ferment/Odour containment	Pneumatic Waste Collection System	Bags with reduced capacity (10 l)	Prior diagnostic investigations in situ
	Domestic collection through light tank vehicle or microcompactor	Buckets with reduced capacity (6–10 l)	Avoid their exposure in squares or in front of facades
	Road collection through compactor vehicle	Integrated eco-islands	If they are to be underground, prior diagnostic investigations in situ
Elevated specific weight/Size containment	Pneumatic Waste Collection System	Bags with reduced capacity (10 l)	Prior diagnostic investigations in situ
	Domestic collection through light tank vehicle or microcompactor	Wheeled bins (120–240 l); Buckets (6–10 l)	Avoid interfering with significant paths and views
Presence of liquids/Limit the liquid drift	Pneumatic Waste Collection System	Waterproof bags	Prior diagnostic investigations in situ
	Domestic collection through light tank vehicle or microcompactor	Wheeled bins (120–240 l); Buckets (6–10 l)	Avoid waste disposal on roadways
Daily production/Daily collection	Pneumatic Waste Collection System	Bags with reduced capacity (10 l)	Prior diagnostic investigations in situ
	Domestic collection through light tank vehicle or microcompactor	Integrated ecoislands, tanks, wheeled bins	If they are to be underground, prior diagnostic investigations in situ
	Road collection through compactor vehicle	Integrated eco-islands	Limit the visual impact
Weight loss by evaporation/Favour the perspiration	Domestic collection through light tank vehicle or microcompactor	Breathable bags	Limit the olfactory impact
Compost and biogas generation	Pneumatic Waste Collection System	Biodegradable bags	Prior diagnostic investigations in situ
	Domestic collection through light tank vehicle or microcompactor	Composters	Limit the dispersion of odours and the visual impact

Table 3 Planning strategies for cellulose flow which could be integrated into the city

Criteria/Aims	Waste management strategies	Actions of planning	Notes for integrationability
Variety of material produced/Differentiate the material by size	Separation of collection by type of material (paper and cardboard)	Planning of ecoislands with optical reading elements	Limit the visual impact and the exposure in squares or in front of facades
	Avoid any interference between the fractions during the accumulation and collection phases	Planning of inspection devices for the disposal of waste	Avoid waste disposal on roadways
Low specific weight/Collect high quantities of material for a collection path	Increase of collection by type of user with a higher production	Possibility of accumulation with systems that limit the large volume	Limit road collection
	Distinction by specific weight	Sizing of ecoisland for intended use and for eating habits	Limit the visual impact
Seasonality of the quantities produced/Increase of collection in the most intense seasons	Flows and consumption analysis by season	Sizing of ecoisland for maximum seasonal flows	Avoid the accumulation of waste disposal
	Avoid any interference between the fractions during the accumulation phases	Check the availability of areas on internal ground floors	Avoid the joint disposal of different waste
Large volume of material/Promote the compaction	Limitation of accumulation phase	Integrate the compaction elements into the eco-island	Limit the acoustic impact
	Sizing of devices by volume and by number of users	Provide solutions to prevent the joint disposal of foreign materials	Avoid the joint disposal of different waste

(continued)

Table 3 (continued)

Criteria/Aims	Waste management strategies	Actions of planning	Notes for integrationability
Hygroscopicity and hydrophilicity of the material/Avoid decomposition phenomena	Weather–climate context analysis (humidity; temperature)	Planning of ecoislands protected from contact with liquids	Limit the visual impact and waste disposal in places of high-quality architectural and significant visual perspectives
High combustibility of matter/Avoid combustion phenomena	Weather–climate context analysis (humidity; temperature)	Planning of ecoislands protected from contact with flammable substances	Avoid waste disposal on roadways
Predisposition for recycling	Planning and distribution of pretreatment and/or recycling points in a neighbourhood	Planning of pretreatment and recycling plants	Activate the plant systems in industrial areas, avoiding interference with significant visual perspectives

Table 4 Operational tools for cellulose flow management which could be integrated into the city

Criteria/Aims	Type of collection circuit	Waste disposal devices	Notes for integrationability
Variety of material produced/Differentiate the material by size	Pneumatic Waste Collection System	Paper or cardboard bags with reduced capacity (10 l)	Prior diagnostic investigations in situ
	Domestic collection through microcompactor	Intelligent waste bins, wheeled bins (120–240 l)	Avoid their exposure in squares or in front of facades
	Road collection through compactor vehicle	Integrated ecoislands	If they are to be underground, prior diagnostic investigations in situ
Low specific weight/Collect high quantities of material for a collection path	Pneumatic Waste Collection System	Paper or cardboard bags	Prior diagnostic investigations in situ
	Domestic collection through micro-compactor	Wheeled bins (120–240 l); Tanks (6–10 l)	Avoid interfering with significant paths and views
	Road collection through compactor vehicle	Integrated eco-islands	Limit the collection times
Seasonality of the quantities produced/Increase of collection in the most intense seasons	Pneumatic Waste Collection System	Paper or cardboard bags	Prior diagnostic investigations in situ
	Domestic collection through light tank vehicle or micro-compactor	Wheeled bins (120–240 l); Tanks (6–10 l)	Avoid waste disposal on roadways
	Road collection through compactor vehicle	Integrated eco-islands	Limit the visual impact
Low specific weight/Collect high quantities of material for a collection path	Pneumatic Waste Collection System	Bags with reduced capacity (10 l)	Prior diagnostic investigations in situ
	Domestic collection through micro-compactor	Integrated eco-islands, tanks, wheeled bins	If they are to be underground, prior diagnostic investigations in situ
Hygroscopicity and hydrophilicity of the material/Avoid decomposition phenomena	Pneumatic Waste Collection System	Waterproof plastic bags	Prior diagnostic investigations in situ
	Domestic collection through micro-compactor	Integrated eco-islands, tanks, wheeled bins	Limit the olfactory impact
High combustibility of matter/Avoid combustion phenomena	Pneumatic Waste Collection System	Waterproof plastic bags	Prior diagnostic investigations in situ
	Domestic collection through micro-compactor	Integrated eco-islands, tanks, wheeled bins	Preventing risk phenomena
Predisposition for recycling	Pneumatic Waste Collection System	Paper or cardboard bags	Prior diagnostic investigations in situ
	Domestic collection through light tank vehicle or micro-compactor	Integrated pretreatment systems	Avoid pretreatment in squares or in front of facades Limit the acoustic impact

3.3 Plastic Fraction

Amongst the flows of packaging, the plastic fraction is the one principally involved in energy saving, accounting for a figure of about 70% (COREPLA, 2018). Recycling the plastic fraction will lead to great savings in terms of non-renewable raw materials with a consequent reduction in polluting emissions and greenhouse gases. The recycling process takes the form of mechanical or manual selection of packaging deriving from a differentiated collection, with the aim of eliminating any extraneous fractions and quantifying them according to the typology of polymer. It is possible to obtain, from refuse, alternative fuels of a non-fossil origin, via thermochemical processes of conversion that break down the polymer into the original monomer. The final product takes the shape of a granule, which, when inserted in an extruder with a perforated plate, becomes a polymer with a filamentous structure.

The user could contribute actively, not only in the selection process, but also by bringing forward the grinding phase, which normally takes place using mills that crush the material coarsely, resulting in pieces of a homogenous size and irregular shape. Small, on-site devices could help limit the size and accelerate the recycling process. These devices could be made available for a neighbourhood community or wherever the size might also consent positioning in a condominium.

In the same way as other packaging, plastic has a high percentage of extraneous fraction because of the difficulty the user might encounter in distinguishing thermoplastic from thermoset flows. In order to carry out successful differentiated collection, along with a sensitization campaign, we consider it indispensable to have integratable systems in disposal units; these could be x-ray scanning systems that can distinguish between the various types of plastic (PET, PVC, HDPE).

Planning the flow management service requires a contextual analysis regarding several aspects, including the meteoclimatic one, which influences fermentation and decomposition times, and, in the case of plastic, its natural tendency towards thermal expansion, which can be perceived in the total resulting volume. In the same way as cellulose, the plastic fraction is exposed to the risk of flammability, possessing the unfavourable characteristic, when compared to other material delivered, of releasing toxic substances that might reduce air quality to levels below the minimum consented by law. Exposure of fractions to potential risks must be the first factor to be considered in the plan of action. In fact, from the analysis carried out, it emerges that, for every fraction and type of environment examined, there should be specific corresponding measures for use and action and with tools created appositely to contain potential critical episodes. It is evident that this does not happen except in isolated cases, such as compost bins for the wet fraction, since it would entail high costs and extensive availability of urban space, which, in densely built-up districts such as historical centres, is usually lacking.

We consider that these measures should be highlighted singularly, instead of by type of Pneumatic Waste Collection System collection, especially for those of a vehicular circuit; for these, there are greater conditions for risk verification because of exposure to the external environment of the flows of material being deposited. The summary sheets (Tables 5 and 6) with the planning strategies and operational tools for plastic flow management are reported.

Table 5 Planning strategies for plastic flow which could be integrated into the city

Criteria/Aims	Waste management strategies	Actions of planning	Notes for integrationability
Variety of material produced/Differentiate the material by size	Separation of collection by type of material (thermoplastic and thermosetting)	Planning of ecoislands with optical reading elements	Limit the visual impact and exposure in squares or in front of facades
	Avoid any interference between the fractions during the accumulation and collection phases	Planning of inspection devices for the disposal of waste	Avoid the joint disposal of different waste
Thermal expansion/Size limitation	Limitation of accumulation phase	Sizing of areas for intended use	Avoid the accumulation of waste disposal
	Weather–climate context analysis (humidity; temperature)	Planning areas not exposed to thermal excursion	Avoid unprotected waste disposal on road surfaces
Pollutant emissions/Emission containment	Limitation of accumulation phase	Planning areas protected from wind and from temperature changes	Avoid the accumulation of waste disposal
	Avoid any interference during the accumulation and collection phases	Check the availability of areas on internal ground floors	Check the compatibility with the areas inside the buildings

(continued)

Table 5 (continued)

Criteria/Aims	Waste management strategies	Actions of planning	Notes for integrationability
Large volume of material/Promote compaction	Limitation of accumulation phase	Integrate the compaction elements into the eco-island	Limit the acoustic impact
	Sizing of devices by volume and by number of users	Provide solutions to prevent the joint disposal of foreign materials	Limit the visual impact and the waste disposal in places of high-quality architectural and significant visual perspectives
High combustibility of matter/Avoid combustion phenomena	Weather–climate context analysis (humidity; temperature)	Planning of ecoisland protected from contact with flammable substances	Avoid waste disposal on roadways
Predisposition for recycling	Planning and distribution of pretreatment and/or recycling points in a neighbourhood	Planning of pretreatment and recycling plants	Activate the plant systems in industrial areas, avoiding interference with significant visual perspectives

Table 6 Operational tools for plastic flow management which could be integrated into the city

Criteria/Aims	Type of collection circuit	Waste disposal devices	Notes for integrationability
Variety of material produced/Differentiate the material by size	Pneumatic Waste Collection System	Transparent bags with reduced capacity (10 l)	Prior diagnostic investigations in situ
	Domestic collection through microcompactor	Intelligent waste bins, wheeled bins (120–240 l)	Avoid their exposure in squares or in front of facades
	Road collection through compactor vehicle	Integrated ecoislands	If they are to be underground, prior diagnostic investigations in situ
Thermal expansion/Size limitation	Pneumatic Waste Collection System	Plastic bags	Prior diagnostic investigations in situ
	Domestic collection through microcompactor	Wheeled bins (120–240 l); Tanks (6–10 l)	Avoid interfering with significant paths and views
	Road collection through compactor vehicle	Integrated ecoislands	Limit the collection times
Pollutant emissions/Emission containment	Pneumatic Waste Collection System	Plastic bags	Prior diagnostic investigations in situ
	Domestic collection through light tank vehicle or microcompactor	Wheeled bins (120–240 l); Tanks (6–10 l)	Avoid waste disposal in places of high-quality architectural and significant visual perspectives
	Road collection through compactor vehicle	Integrated ecoislands	Limit the visual impact
Large volume of material/Promote compaction	Pneumatic Waste Collection System	Bags with reduced capacity (10 l)	Prior diagnostic investigations in situ
	Domestic collection through microcompactor	Integrated ecoislands, tanks, wheeled bins	If they are to be underground, prior diagnostic investigations in situ
High combustibility of matter/Avoid combustion phenomena	Pneumatic Waste Collection System	Waterproof plastic bags	Prior diagnostic investigations in situ
	Domestic collection through microcompactor	Integrated ecoislands, tanks, wheeled bins	Preventing risk phenomena
Predisposition for recycling	Pneumatic Waste Collection System	Plastic bags	Prior diagnostic investigations in situ
	Domestic collection through light tank vehicle or microcompactor	Integrated pretreatment systems	Avoid waste disposal in places of high-quality architectural and significant visual perspectives Limit the acoustic impact

4 Conclusions

An efficient plan cannot disregard an analysis of the coexistence of various aspects affecting the landscape, assuming a form compatible with the variables referring to a particular context. Analysis carried out and results obtained show the importance of a multicriterial assessment as an aid to the decision-making process, especially in existing contexts, where the variables are multidimensional and multiscaled. The work carried out hopefully represents a contribution to the programming of services and a point of departure in singling out technological systems and devices with regard to a circular management of the service. At the same time, the study invites reflection on the importance of the actual operational site and suggests bearing constantly in mind the possible impact that any action might cause. In this sense, our assessment weighs up the requirements of the services against the particular features of the urban landscape.

The overall vitality of the city (tourism, migratory flows, commuting) demands a review of the overburdened and inefficient services. These need to be examined with a view to an enhanced, sustainable and circular remodulation. With regard to the management of solid urban waste there is a need to start from several prerequisites:

- Compatibility of the physical structures, devices and vehicles with the city's delicate landscape;
- Involvement of the householder as an active player;
- Predisposition towards pretreatment and recycling in the proximity of the household, in order to reduce the amount of material, speed up the cycle of transformation of refuse into raw/secondary materials and limit both the costs and the environmental impact of transportation.

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Territorial Identity and Sustainable Tourism; Resurrection of a Ghost Town: The Vernacular Town of Zriba Oliya as a Case Study

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Abstract

Once retreated to the mountain, the indigenous inhabitants of Zriba Oliya were organized in one ethnic and anthropological group closed upon itself. This old village was deeply marked by the total abandonment of its old establishments in favor of some more comfortable and practical industrialized constructions. Consequently, the village was left in ruins; a phantom village despite the feeble restoration attempts made by interveners. It is a cultural patrimony marking such a specific territorial identity being lost and disappearing. The association responsible for the safeguard of the medina of Zriba Oliya in collaboration with the local community has launched a recovery program in order to integrate it into the dynamics of sustainable tourism. With the development of mass leisure activities, how would this preserving orientation advocate "softer" tourism, more respectful of nature, endogenous heritage, and the cultural traits of the populations?

Keywords

Territorial identity • Vernacular architecture • Sustainable tourism • Préservation • Revitalisation

Introduction

The vernacular habitat is the expression of the popular culture values that each country has invested in housing and its extensions. It has gradually developed over the centuries and it has been executed with local techniques and means, which not only express specific functions but also satisfy social, cultural as well as economic needs. Through character, originality, and invention, it shapes the environment and integrates naturally into it (Guindani & Doepper, 1990). Note that the term vernacular is consecrated by its use in the sense of "proper to the place," a synonym of the so-known as architecture without architects, spontaneous, indigenous, rural, primitive, anonymous. This type of architecture synthesizes most of the specific elements that characterize the territory; its shape or rather its responses to climatic, topographical, socioeconomic, cultural, and technical factors on the one hand and its materialization linked to the endogenous resources which give it a considerable symbolic importance on the other. This type of architecture allows a community to define itself in relation to its space, traditions, and past.

Vernacular architecture makes therefore an important element of the territory's identity. It is a heritage. In order to relate the heritage represented by the vernacular habitat to culture and identity, it is necessary to adopt a broad definition of culture, an anthropological definition that refers to the lifestyles, systems of values, and the worldviews of a given society. This type of culture brings together all the signs, symbols, representations, patterns, attitudes, and values inherent in social life (Guindani & Bassand, 1982). Territorial identity, on the other hand, results from the cultural profile of the community. Yet, it also reflects a number of other parameters that are constantly interacting and reciprocally conditioning each other. Examples include nature, landscape as and built patrimony, which significantly contribute to defining a sense of belonging to a population. The same applies to the economic activities and "know-how" of a given community, such as farming, pastoral activities, fishing, crafting, hunting, and harvesting. All these activities are in fact intimately "linked to the soil," "specific to the place," and completely inseparable from the natural, environmental, and human potential of the territory. They therefore constitute strong elements of the identity of the community in question. We find these elements and many others in the context of the vernacular building. This type of architecture reflects several dimensions of local and regional

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territorial identity; it is in fact a mirror of the territory, i.e., of the space inhabited and shaped by man. Any analysis of the vernacular architecture can therefore be based on a conceptual approach characterized by three reference poles from which each object can be methodically located:

- The human dimension: the man inscribed in the environment builds its socioeconomic, cultural, and historical features.
- The natural environment and landscape determine the architectural form through environmental data such as climate, topography, morphology, etc.
- Local endogenous materials (stone, wood, earth) shape the vernacular construction and determine the specific techniques for implementing the built form.

Today, vernacular architecture is at the heart of various projects related to the conservation and enhancement of the local, regional, cultural, and historical heritage. These projects go hand in hand with the development of an alternative tourism referred to as agritourism, ecotourism, or even farm tourism. Faced with the development of mass leisure activities, these offers advocate "softer" tourism, which is more respectful of the nature, the endogenous heritage, and the cultural characteristics of populations. Indeed, Zriba Oliya, a former vernacular town located in the governorate of Zaghouan in Tunisia, was marked by a total abandonment of its ancient settlements in favor of new industrialized constructions, which are more comfortable and functional meeting the current needs of man, which are constantly evolving and changing. As a result, the place has found itself in a state of ruin, a ghost town, despite the few attempts of restoration it had undergone on several occasions by some stakeholders. It is a cultural heritage marker of a specific territorial identity that was being lost and disappearing.

It was necessary to combine efforts in order to preserve, conserve, enhance, and revitalize this cultural and historical heritage being lost despite its great contribution to local development. Consequently, it was included in the alternative tourism circuit. Within this framework, the Association for the Safeguarding of the Medina of Zriba Oliya, in collaboration with the local community, has launched a recovery program to integrate it in the dynamics of sustainable tourism.

In this article, we suggest identifying how this preserving orientation advocates a "softer" tourism that is more respectful of the nature, endogenous heritage, and cultural traits of this population.

1 The Vernacular Village of Zriba Oliya

1.1 Itinerary

Zriba Oliya is the first nucleus of Zriba.[1] It dates back to the fifteenth century and it is located about 3 km from Hammam Zriba in the governorate of Zaghouan, 72 km from the capital Tunis. This old abandoned village stands on a rocky massif of Djebel Zriba at an altitude of 312 m and it extends over an area of 2 ha. One can reach the village of Zriba Oliya via Hammam Zriba by crossing the metal bridge of Oued El Hammam built in front of the mounds of the old fluorite mine, which was exploited during the period between 1970 and 1992. A 3.9 km path crosses the mine or rather the remains of an industrial exploitation with its whitish soil and corroded metal installations. When climbing the relief, one would enjoy the magnificent view of the natural landscape. Stone constructions with a ruin aspect would mark one's arrival to the old village (Fig. 1).

1.2 The Prosperous Zriba

The village of Zriba expressed a constantly evolving social and spatial dynamic where the relationships between the population and its environment are structured according to the constraints of nature. As for community life, the Zribians act in solidarity as one big, united family. They share the same lifestyle, interests, culture, characteristics, and sense of belonging. Major works such as building a new house or harvesting wheat are accomplished by a collective effort.

The Zribian way of life has in turn led to a very rich traditional production drawing on the raw materials and natural components found on the site and its surroundings. The abandonment of Zriba Oliya and the choice of other

[1] Zriba or Hammam Zriba is a city located about 60 km south of Tunis at the foot of Jebel Zaghouan. Administratively attached to the governorate of Zaghouan.

Fig. 1 The vernacular town Zriba Oliya

lifestyles led to the disappearance of the Zribian practices. Crafts,[2] livestock,[3] and agriculture,[4] which used to be their main economic activities, have disappeared along with a skill passed down from fathers to sons for centuries.

Zriba Oliya has remained the only settlement in the region for a long time. The inhabitants have exploited the plains for agriculture and the surrounding water sources to support themselves. The Zribians form a single ethnic and anthropological entity that has founded a closed economic system (Fig. 2).

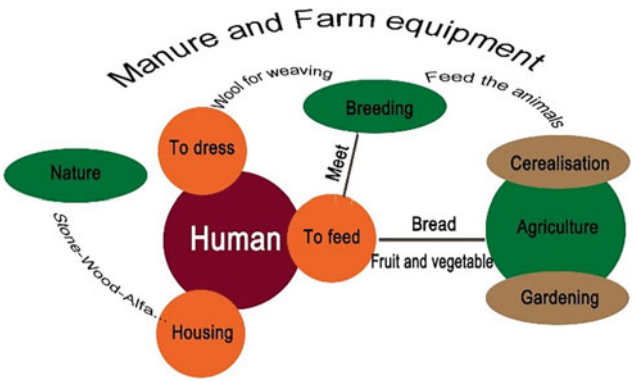

Fig. 2 The self-sufficient economic sectors of Zriba[5]

1.3 Morpho-Degenartion in Zriba Oliya

"Everything that exists is in time and transforms into it. This transformation is part of a process that is, sooner or later, moving towards a certain degeneration and a sort of end" (Bertrand, 2000). The abandoned estate of Zriba Oliya, a village that was once coveted and autonomous, made it a marginalized space. Indeed, this village underwent irreversible changes with the emergence of colonial capitalism, which increased even after independence. The Zribians were forced to leave Zriba Oliya, a village which they have taken care to shape and sculpt for centuries, and which series of painful events have led to decay. One would note:

- The cohabitation of the villagers with the foreigners who have gradually infiltrated by affecting internal changes in the Zribian lifestyle.
- Land dispossession by settlers claiming the absence of land registration, a notion the village was not familiar with. Zribians were then forced to work on colonial farms in order to live. This was particularly the case in other villages such as Takrouna.

[2] All members of a Zribian family participated in craft activities. Zribian women played an important role in craft work by transforming raw materials into consumer products. In her space within her bedroom and behind her loom, she transforms wool into carpets and clothing (kachbiya, kadroun, hram, etc.) and cereals into the many products that made up their daily diet. However, the Zriban man transforms raw materials into productive goods. From Alfa, stone, wood, reed, smar and straw, he manufactures the equipment necessary for his agricultural activity such as: hinge, ladder, seals, baskets, beehives.

[3] This activity is considered as an important practice due to its considerable contribution in food production (meat and milk) and wool for weaving. The oxen are used to produce manure for agriculture. Also, the profusion of aromatic plants in the site encourages beekeeping activity.

[4] The plain around the village of Zriba Oliya was used as a farming land. Olive growing and cereal harvesting occupied an important place in the life of the villagers. Socially, the harvest period was a time of celebration and gathering where Villagers shared the harvest and kept it in granaries dug into their houses.

[5] Diagram showing the closed circuit economy of Zriba.

- The construction of the school, serving both to integrate children into contemporary life and to prepare them for the tertiary sector, has accelerated the disequilibrium of the sociocultural balance: In fact, the main focus of acculturation, information, and dissemination was previously the family and children followed in the footsteps of their parents.
- With the discovery of the fluorine mine whose exploitation required manpower to, and the construction of the fluorite processing plant, "the number of workers increased from 21 in January 1952 to 82 in January 1953 including 63 inhabitants of the Zriba village."[6]
- The destruction of the environment. This is mainly due to the low income of the Zribians who had started deforestation for the manufacture of charcoal for sale.
- The movement of the inhabitants of Zriba Oliya between 1964 and 1975 led to the creation of a new city, Zriba Hammam. At independence, a political decision that aimed to upgrade the mining sector was taken. The school was also moved to this new nucleus near the mine, "with the independence of the country in 1956, the mining sector was an important element in the Tunisian economy."[7]
- The doubt and illusion of having the choice between staying and leaving for the new city was a guided decision by the displacement of the school and the encouragement of the first families who gave in.
- The acceptance of fate and the departure toward a new life.

This abandoned and deserted town, where the spirit of the place remains present but silent and mute has gone through a drastic break. In the quest for the moving history of Zriba and from meetings with villagers, we discovered a not only hidden, but also poorly told story; a story of painful separation and forced uprooting; a story of the progressive desertion of Zriba by its inhabitants. They were pressured by settlers to leave their homes. Besides, Zriba Oliya's architecture is an on-site architecture, which is shaped by the morphological and climatic constraints of its environment. The vernacular of Zriba Oliya responds to the demands of its inhabitants with respect for nature, people's lifestyle and social, cultural as well as economic character. Its alleys hierarchically serve public facilities and houses represented by squares were places for villagers'gatherings (Fig. 3). Its houses change and evolve in time and space to meet the needs of its users. Its devices preserve privacy and keeps away the eyes of strangers.

Fig. 3 Zriba Oliya in 1975 taken by Gabriel Camps[8]

Its architectural forms and local materials ensure a pleasant microclimate. To achieve an aesthetic that conveys a cultural identity. This architecture allowed this community to define itself in relation to its space, its traditions, and its past. For a long time after its abandonment, the Berber town of Zriba Oliya has represented a remnant of a formerly complete state. The phenomenon of degradation has invaded the place. It is generated from a complete presence of the village; a new form of presence is being marked by its missing parts: If it continues, it will lead to an irreversible loss and the village will certainly become nothing.

The survey of the built patrimony state allows classifying the constructions according to their degree of deterioration. As for constructions, which have undergone a severe deterioration, the whole is buried under stones and vegetation. Few walls resist and remain standing. Other constructions are moderately degraded. Yet, they have a clear template with the distinction between the rooms and the patio is still possible (Fig. 4).

2 Tourism and Sustainable Development; New Alternative to Zriba Oliya

"The vernacular built heritage is important because it is the fundamental expression of a community's culture, its relationship with its territory is, at the same time, the expression of the world's cultural diversity."[9] A mystical world with varied landscapes, where suddenly time stopped life, has left Zriba Oliya. It nevertheless kept all its purity. Wandering

[6] Economic and social bulletin of Tunisia, no. 74, Study of village economy, the village of Zriba-Tunisien, Grossin J. Civil controller of Zaghouan, March, 1953.

[7] Extract from the article, National Office of Mines: Extractive mineral industry in Tunisia.

[8] Gabriel Camps is a French prehistorian, specialist in the Berbers'history.

[9] Vernacular Built Heritage Charter. Ratified by the 12th General Assembly of ICOMOS, Mexico, October 1999.

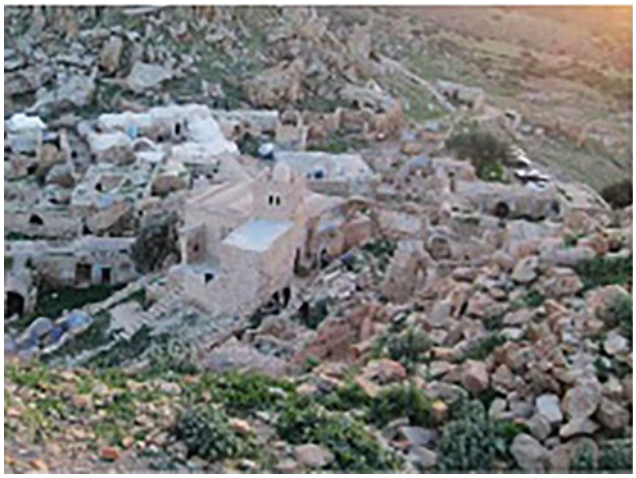

Fig. 4 Current photo showing the degradation

through its deserted alleys, contemplating its splendid ruins, and being fascinated by its walls, which embrace the silhouette of the mountain, one would wonder why this village has lost its value. Reviving this village, which is a place where the genius of the place still resides, would enliven the debris. Watching over pieces of fallen stones reveals the urgent need to opt for a new alternative.

2.1 Sustainable Tourism

Sustainable tourism development means any form of development of this activity that respects, preserves, and enhances, in the long term, the natural, cultural, and social resources of a territory. Among other things, the emergence of the concept of "sustainable tourism" comes from the perspective of applying the precepts of sustainable development stated since 1987 with reference to the Brundtland Report that gave birth, in 1995, to the concept of sustainable touristic development. Indeed, if we refer to the Brundtland Commission's definition, sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

It was then defined as "a tourism activity that respects and preserves natural, cultural and social resources in the long term and contributes positively and equitably to economic development and to the fulfilment of the people who live, work or stay in these areas."[10] The adoption of the "Charter for Sustainable Tourism" by the participants of the World Conference on Sustainable Tourism, held in Lanzarote (Canary Islands, Spain) in April 1995, was an important milestone. Sustainable tourism was defined by 18 principles that take on board the objectives of sustainable development. It therefore aspires to a reasoned development, associating the actors of tourism, public and private, NGOs and local populations, in a system of greater solidarity, allowing real local development through a more equitable sharing of the benefits, and burdens generated by tourism. Furthermore, this tourism must also be environmentally friendly.

The application of the precepts of sustainable development to tourism is therefore characterized by international cooperation and by the involvement of local actors for a more egalitarian model of tourism development, favoring a better distribution of wealth thanks to significant economic spin-offs. A model that also fully integrates environmental and cultural issues, managing resources, striving to limit the impacts of tourist activity, and enhancing the natural and cultural heritage. This charter was followed, at the General Assembly of the World Tourism Organization (WTO) in 1999 in Santiago (Chile), by the adoption of the Global Code of Ethics for Tourism. In order to be a frame of reference for the rational and sustainable development of world tourism, this code contains nine articles defining general rules and the aspirations of the charter and is addressed to the governments of the emitting and receiving households of the tourist activity, to the public and private tourism actors and to the tourists themselves (Knafou & Pickel, 2011).

Consequently, this type of tourism must be considered "as one of the major stakes of tourism planning. The notion of sustainable tourism is linked to that of sustainable development, which expresses the 'sustainable' character of development, i.e., development that does not call into question the natural and social environment" (Kinvi, 2005). This way of considering and practicing tourism "associates with faith the notion of duration and the sustainability of natural resources (water, air, biological diversity…) and social and human structures. The objective of sustainable development is, thus, to make compatible the improvement of conditions and standards of living that result from development and the maintenance of the development capacities of future generations. The concept of sustainable tourism is today a major challenge within the framework of the major orientations of economic development, especially from a regional point of view" (Kinvi, 2005). It is also interesting to note that sustainable tourism is one of the essential foundations for the successful integration of the tourism sector into the objectives of economic development. This orientation requires the implementation of a structured and thoughtful tourism approach, because inadequate and inappropriate planning can cause very serious harm and damage to the environment and the balance of the social environment. "Unplanned or poorly planned tourism results in the degradation of natural and cultural heritage and can be especially disruptive to the traditions and lifestyles of local populations, which can even make tourism unacceptable…" (Kinvi, 2005). Therefore, sustainable tourism must make

[10] Council of Europe, Naturopa, no. 84, p. 7, 1997.

optimal use of environmental resources, respect the socio-cultural authenticity of host communities, and ensure long-term sustainable economic activity.

2.2 Sustainable Tourism for Sustainable Territorial Development

The World Tourism Organization definition contains both perspectives, namely, respect and preservation of heritage and the capacity of tourism to produce resources to foster development in destination territories.

The question is how to apply the guiding principles of sustainable development to tourism, including tourism practice, destination governance. and the various components that make up this activity. These issues bring us back to the question of the governance system needed to transform tourism into a source of territorial sustainability.

Territory and tourism are linked. They represent an "essential duo" since the attractions of the territory constitute a motive behind the tourist's chosen destination. The tourist offer, made up of these numerous resources, is then intrinsically part of the territory. Moreover, the attachment to the place is essential since the tourist activity cannot be located as the tourist keeps moving on the territory. These multiple resources then constitute the attractiveness of a territory and make it a popular tourist destination. Indeed, both nature and landscape, as well as built heritage, strongly contribute to defining the sense of belonging of a population. The same applies to the economic activities and the "know-how" of a given community such as agricultural and pastoral activity, handicrafts, hunting, and harvesting. All these activities are in fact intimately "linked to the soil," "specific to the place," that is to say completely inseparable from the natural, environmental, and human potential of the territory. They therefore constitute strong elements of the identity of the community in question. Territorial development refers to "any process of actors'mobilization that leads to the elaboration of a strategy of adaptation to external constraints based on a collective identification with a culture and a territory."[11] Thus, territorial development will depend on the willingness of the actors to mobilize in favor of a territorial organization. This mobilization is a long-run process and this dynamic of actors aims to reorganize the local economy facing the challenges and problems of the territory. It is an adaptation strategy. This territorialization mechanism in Zriba Oliya was based on the search for specific resources to this territory that allow it to differentiate itself from its neighboring vernacular villages, relying on the significant social construction of the territory. Moreover, territorial development in this area aims to make it more attractive and competitive, bringing it to life again. A proactive process seeks to increase the competitiveness of this territory around a strong mobilization of actors. This new approach seeks to refocus the territory on itself, by enhancing its resources and highlighting its actors.[12] Indeed, territorial development follows several stages based on the construction of a project by actors, the elaboration of an adaptation strategy to the different constraints of the territory, the mobilization, and the revelation of the territory's resources. These steps highlight the agreement of actors on a project with common aims, the consideration of the territory's constraints, the expectations, and needs of the local populations.

3 Zriba Oliya Ghost Town Recovery Plan

A local, regional, and national symbol, the vernacular habitat is closely associated with the history of rural civilization, its traditions, lifestyles, and value systems. A history, which is eminently local and regional, yet omitted. The definition of a recovery plan aims mainly at the safeguarding of this territory, its protection and its enhancement through its revitalization with the objective of reviving the artisanal, cultural, and commercial activities within this former perimeter, which requires access facilitation, creation of a reception unit and establishment of a tourist circuit. This program has taken into account certain measures that influence the quality of the services on the visited places such as the provision of a car park offering parking possibilities and a pleasant immediate environment is also necessary. Museum techniques and animations are also a quality criterion. Finally, refreshment and recreational opportunities are necessary during the visit. Developing cultural and tourist activities in the heritage is based on the development of guesthouses, cultural and leisure spaces, crafts, workshops, etc. The suggestions of different tourist circuits that differ in the stages of the visit are based on the same places. The idea is to "recycle" the village to meet the needs of tourism: a field that is more oriented toward culture, ecology, and human beings subsequently ensures the sustainability and transmission of this legacy carrying a historical burden and reflecting on the collective identity of future generations. The recovery project brings together on the same site a complete change of scenery in a preserved and rich nature. Based on an original concept strongly linked to development tourism, the visitor will be able to discover the region through a

[11] Bernard Pecqueur, Rayssac S. course, Development and Sustainable Tourism, Tourism and Development.

[12] Marc Galochet, Guy Baudelle, Catherine Guy, Bernadette Mérenne-Schoumaker: Territorial development in Europe. Concepts, issues and debates. Territoire en mouvement Geography and planning review [Online].

project of grouping together hosting infrastructures such as accommodation, catering, a craft center, etc.

3.1 Restoration of the Mosque

The National Heritage Institute with the help of the Medina Safeguarding Association of Zriba Oliya restored the mosque in 2014. This mosque, marked by its cubic minaret, is the only place of worship in the village. This building has undergone restoration work (Figs. 5 and 6). Apart from its daily prayer activity, this building was a gathering place for villagers during religious holidays, weddings, funerals…

Fig. 5 The mosque before restoration

3.2 Restoration of the Mausoleum

The Sidi Abdelkader Mausoleum is in reference to Sidi Abdelkader who is the founder of the Qadiriyya[13] in Baghdad. This building has been restored by the Association for the Safeguarding of the Medina of Zriba Oliya and the National Heritage Institute (Figs. 7 and 8). This mausoleum was built in the seventeenth century. It played the role of a Koranic school (Kouttab) dedicated to the children of the village. It was a place of celebration of festivals related to the cults dedicated to the marabout. These festivals were marked by the act of bathing in Zriba Hammam. It symbolized a gathering place for the Zribians.

Fig. 6 The mosque after restoration

3.3 Clearance of Roads and Plots

It was necessary to carry out work on roads (Figs. 9 and 10) and plots (Fig. 11) of the village, which are the destination of tours and the places intended for cultural activities and events.

The provision of a car park (Fig. 12), which offers parking possibilities and a pleasant immediate environment (Fig. 13).

3.4 The Signage

Just after the bridge spanning the Oued El Hammam,[14] you have to take the path between the debris left by the old fluorine mine. Along the way, there are directional signs that facilitate the access to the site (Fig. 14). This is a very

Fig. 7 Before restoration

[13] The Qadiriyya (in Arabic: القادريه) or Qadir brotherhood is a Sufi brotherhood founded in the eleventh century by Sheikh Moulay Abd al Qadir al-Jilani (we also pronounce Al-Jilali), whose sanctuary and mausoleum is located in Baghdad, city where he taught for many years.
[14] A 45° sulfur hot spring, known for its benefits.

Fig. 8 After restoration

Fig. 9 An other principal road

Fig. 10 An other principal road

Fig. 11 Plot

important element. It is clear and continuous. At the village level, signs have been installed to provide visitors with information about the town and its history.

3.5 Creation of a Reception Structure

The project of redeploying "Dar Bel Hadj" into a tourist reception and animation center is a personal project, a visionary initiative of the owner of this house (Figs. 15 and 16). The accommodation is located at the entrance to the village in the upper part, which used to be the old nucleus of this building. It is located on the way that used to be the main road with its commercial vocation, not far from the mosque and the "Sidi Abdelkader" mausoleum.

Fig. 12 Provision of a car park

Fig. 13 The village today

It is a construction composed of rooms along the lane that opens onto the patio. The rooms which open onto the lane are small rooms were for commercial use. The other rooms overlooking the courtyard are for residential use. At the level of the courtyard, there is a sort of an attic buried in the form of a well "Matmoura" with a depth of 3 m.

As the development program aimed to create a tourist entertainment center meeting the standards (Fig. 17), it was necessary to meticulously transform the construction (Figs. 18 and 19) in order to have the necessary facilities of: a depot, a preparation area, a cooking area, a swimming pool, a restaurant, an exhibition room, a multipurpose room, an office and a sanitary block (man and woman) (Figs. 20 and 21).

Fig. 14 Directional signs

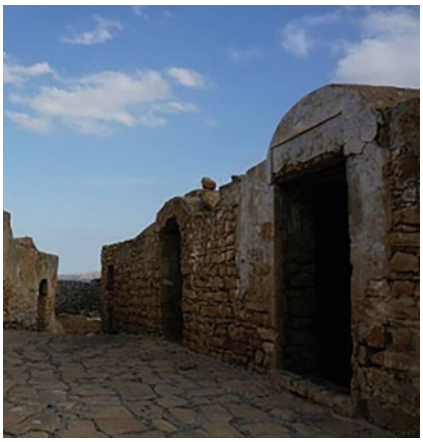

Fig. 15 The house before rehabilitation

Fig. 16 Abandoned construction that requires general maintenance to preserve the original architectural aspect

Fig. 17 Advertising poster for the guest house

Fig. 18 The house after rehabilitation

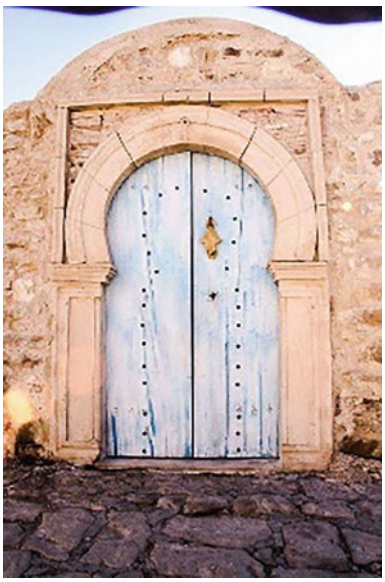

Fig. 19 Main entrance

Fig. 20 The courtyard

Fig. 21 Outdoor space planning

3.6 The Organization of Cultural Events

Cultural events that are very common profoundly modify the cultural landscape within this area. Festivals and other cultural events are considered as important events, a unique and exceptional moment that brings together an audience around an unusual universe. The organization of cultural events is rarely the responsibility of a single actor. It rather relies on the collaboration of a group of people; local actors, regional partners, and government community. Events include street entertainment, parades, exhibitions, artistic evenings, etc. The deserted locality had aimed to sensitize people to the value of Zriba Oliya, its role in history, the originality and richness of its skills, its traditional way of life and the beauty of its traditional architectural character.

3.6.1 Cultural Activities

Furthermore, as a means of sustainable development, tourism must make sure to take into account local populations. Indeed, they do not only make an integral part of sustainable development through the social pillar, but they also make the most important part of their environment since Man and nature cannot be dissociated. Local populations are important for tourism in a territory and they play several roles. The program for the revitalization of the old vernacular nucleus of Zriba Oliya called on these former residents to participate in various events (Fig. 22). These populations can be both parts of the governance process or they may constitute a local clientele very useful for the site (Figs. 23, 24, 25, and 26). In any case, integrating them in the tourist activity must be necessary for tourism that is a factor of sustainable development.

3.6.2 Sports

Today, natural resources constitute many tourist destinations and products. Indeed, since the end of the twentieth century, outdoor sports have been developed to become a real tourist offer and improve the attractiveness of the territories. The mountains appear as a real playground for these practices, which by being structured, contribute to the development of mountain areas. Thus, territorial resources, tourist products, and the structuring of the offer must be closely combined to make tourism an attractive and economically important activity.

Indeed, the site offers sports activities related to nature such as: zip lining, mountain biking, horse riding, walks with bivouac, fitness, and discovery trail (Fig. 27). By promoting self-awareness and contact with nature, the participants are necessarily respectful of the environment (Fig. 28).

3.6.3 Creativity Fostering Framework

Access to the vernacular heritage of Zriba Oliya encourages the discovery of the emblematic places of our territory, which are essential to forge cultural landmarks and stimulate creativity as well as imagination. Attracted to the landscape and the magnificent not only natural but also architectural

Fig. 22 Participation of former residents

Fig. 23 Exhibition of old utensils

Fig. 24 Parade

Fig. 26 Traditional marriage ceremony

Fig. 25 Open workshop

panoramas, the vernacular inspiration is qualitative. The village is seeking to consolidate a cultural practice and a new space for activities. The charm of the village has won the hearts of artists, designers, and filmmakers whether Tunisian or foreign for ages (Figs. 29, 30, and 31). The discovery of this magical place has made the village of Zriba Oliya a land of unique inspiration.

Conclusion

We approached this study with the intention of determining the ways of upgrading obsolete architecture that is not taken into account by the actors working in the field of traditional heritage. Moreover, vernacular and modernity could be contradictory concepts. The vernacular building represents a catalyst for sustainable urban development between tradition and continuous innovation. Indeed, everywhere in the world, economic, cultural, and architectural standardization and the phenomena of socioeconomic globalization threaten the survival of the vernacular structures. They are extremely vulnerable when facing the serious problems of obsolescence, internal balance, and integration. Therefore, the fundamental matter is how to resist these forces not only by people, but also by governments, urban planners, architects,

Fig. 27 Sports practiced in the town

Fig. 28 Zriba Night Trail sport event

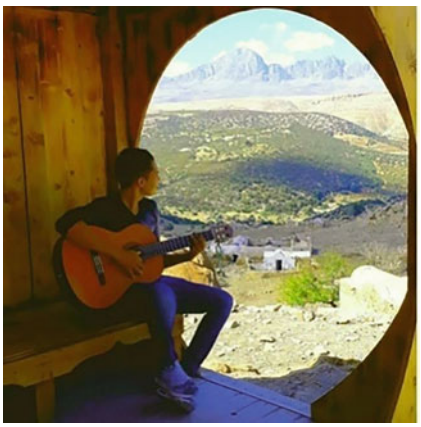

Fig. 29 Artist inspiration

Fig. 30 Shoot for a clothing brand

curators, and multidisciplinary groups of experts. Much of this cultural heritage, though priceless, is exposed to various threats due to man and the evolution of his environment. Fast and improvised modernization has resulted in a housing evolution that breaks with building traditions, building materials, implementation, size, and shape. Vernacular architecture has therefore lost its role and function because of socioeconomic and cultural changes. Indeed, today, it

Fig. 31 Series filmed in 2020

becomes more and more neglected and abandoned in favor of industrialized constructions, which are more comfortable and functional. The latter better meet the current needs of man, which are constantly evolving and changing. The vernacular architecture of Zriba Oliya, like any architecture of this typology, is an integral part of the heritage of humankind and we are only its custodians who must pass it on to future generations. Therefore, the village revitalization and safeguarding project is not an end in itself. It is a catalyst, an incubator for small village projects. It has therefore been thought out in such a way that it would be a trigger which enables the villages concerned to manage their own development by carrying out direct or indirect activity or work linked to the site. The project is being carried out in several phases of construction and development allowing a partial activity from the outset. From the beginning of the realization to its final design, the project is fundamentally evolutionary. The recovery program is therefore a long-run project. During the realization of this project, it was necessary to analyze and implement an approach in a deep reflection that takes into account the many socioeconomic parameters, which must be respected for rural development to be fully sustainable.

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Toward an Inclusive City-System and User's-Oriented Interventions: Udine (IT), A Case Study

Mickeal Milocco Borlini and Giovanni Tubaro

Abstract

The contribution proposes methodologies and strategies for conscious and inclusive urban planning. It anticipates some experimental results related to the accessibility strategies of the city of Udine (Italy). The purpose of the research is to recognize the multiple needs of different categories of users and to offer design strategies for social, inclusive, and sustainable development, allowing access and use to services "for all." The word equity differs from equality: the fair project distributes services to a specific type of user in an uneven, but rightly measured way. The proposed approach is based on the human-centered design, where the attention is shifted from the concept of "user" to the concept of "person" who participates directly in the analysis and in the design processes. The pilot research—carried out in a sector of the city—is divided into two phases: a first quantitative mapping and a second qualitative analysis connected to the participation of users with different abilities and ages. The first phase recognizes the intended use of buildings on the road section and localizes on the cartography ramps and pedestrian crossings while reporting—objectively—the critical issues of urban accessibility. In the second phase, users with kinetic, and vision difficulties have been involved. The participating subjects walk the streets of the designated blocks and—subjectively—signal and evaluate the critical issues and barriers that they encounter. The interpolations of the objective and subjective data acquired led to the definition of incremental design strategies retraining accessible routes and urban connection through inclusive urban planning.

Keywords

Inclusive urban planning • Human-centered design • Social development • Equity • Disability

1 Introduction

The city as a *system for living* provides satisfactory solutions to the needs of its citizens with inclusive solutions,[1] and specifically—in this essay—they correspond with the measurable quality of usability and connection between different urban areas. Therefore, the city is considered as "*a set of objects*" (Milocco Borlini & Tubaro, 2020, p. 97) concerning its inhabitants and the interaction with its "interface" generates different behavioral and sense-preceptive responses (Norman, 2004). The *person* is at the center of this study where his/her direct participation in the analysis and mapping phases implement the possible redevelopment of the *city as an artifact*: "The city is considered as […] the construction site of a possible inclusive system for people with a design based on experience" (Tubaro & Milocco Borlini, 2019, p. 97). Improving urban liveability, investigating the present criticalities, and possible transformations of the city interface are useful tools for supporting the legislation for the removal of architectural barriers.

The study shows the results of a preliminary analysis of urban porosity, and the connection of a defined area of the

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[1] Confront UN CRPD 2008, https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/convention-on-the-rights-of-persons-with-disabilities-2.html last retrieved, November, 2020.

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city of Udine (Friuli-Venezia Giulia, Italy).[2] The defined urban area is rich of elements to be evaluated with attention to the potential for use and transformation of the spaces of collective interest. The study considers and highlights the urban fabric, and the road section from a connective perspective and aims to identify the different users' needs to be solved and systematized. The users considered in this first phase are among those with reduced kinetic and visual abilities; the investigation wants to expand its horizon to a broader range of stakeholders. Therefore, the urban project for an autonomous and independent urban life identifies the weaknesses of *inclusive living*, offering urban transformation as an indispensable requirement.

The methodology used in the *human-centered design* (HCD), has been reinterpreted to investigate the interactions between the urban areas and the human figure and the relationships that are already existing within the city fabric.

The study not only identifies objective and subjective problems connected to fruition, indicating corrective and integrative remedial interventions for physical impediments, but it recognizes useful elements for the redevelopment of urban identity; for instance, the blocks of the oldest city fabric were traversable; these areas today are no longer porous forcing the inhabitants to travel long distances towards basic services.

It is necessary to underline that the policy to be adopted —both in the specific case study and as a general example— is a policy of connectivity and not only of mobility (Milocco Borlini & Tubaro 2019, 2020). One of the aims of the research is to propose a *general policy* of accessibility that gives attention to connective spaces of universal interest because they are *for all* (Conti & Tatano, 2018) while promoting new sensitivities capable of responding to the overall needs of the community, for better living conditions (Angelucci, 2018; Pizzocaro & Figiani, 2009).

1.1 State of the Art

The inclusive processes of urban transformation are united by a "*conscious planning*" (Conti & Tatano, 2018) and set the city goals as which "*collective good*" through an "*ethical social development process*" (Conti & Tatano, 2018).

Reworking critically and synthetically some scientific, regulatory, and institutional texts (ADB, 2017), it is deduced that an inclusive urban landscape is manifested through principles of equity, safety, livability, and connectivity that concern the services of the urban agglomeration and the social subjects aiming to the *universalization* of city development suitable for all *users*, reducing as much as possible the social and environmental gaps.[3]

Concepts such as *adaptability* are explained through the slow, perpetual changes in the urban system and the continuous evolution of citizens' needs related to population growth and age; it should be considered also the evolution in urban planning and the presence of primary services that emerge from the literature and national and intentional case studies; it must be emphasized that this process is in perfect harmony between the user and the city object and manifests itself through the human–urban interactions (Cellucci & Di Sivio, 2018). Along with the adaptability of a city system, it should be considered permeability, connection, regeneration, and requalification of urban areas and—as a focal point—the participation of users and the renegotiation of spaces. To meet the needs of all human beings, it is necessary to work with heterogeneous strategies for integrated planning *for all* (Conti & Tatano, 2018; Milocco Borlini & Tubaro, 2019, 2020) to "[re] enable" space (ADB, 2017, pp. 2–6), to return it and make it as usable as possible for the whole community.

When planning in an inclusive way for an autonomous and independent life of the human being (confront Convention on the Rights of Persons with Disabilities, UN, 2008), it is necessary "to take into account the improvement of urban comfort for any user and with any capacity" (Milocco Borlini & Tubaro, 2020, p. 100); consequently the user-centered strategies, applied to urban dynamics, summarize the responses of the human being in continuous interaction with the environment in which he finds himself (Cellucci & Di Sivio, 2018). The research explores the usability projects through the study of the specific literature and some case studies, deepened from a technical, legislative, and design point of view and from a social, participated point of view, open to all the *special needs* of the population.

For instance, V. Tatano (2018), draws up "the Atlas of accessibility of Venice," which collects and catalogs all the limiting urban elements and the consequent possible solutions for the urban area. The scientific approach used is of considerable interest for the goals of the research; an abacus of urban elements is defined and the city of Venice is mapped from an inclusive point of view while recalling the importance of the regulations and highlighting the planning needs and possible solutions of interventions on historical urban agglomerations.

[2] Udine, Italy, see: https://goo.gl/maps/DnfVwfYY2bnFpKRM9, Google Maps 2020, last retrieved November 2020.

[3] Law 41/86, Art. 32 (PEBA); Law 104/92, Art. 24 (PEBA extension to urban spaces); Presidential Decree 503/96 Articles 3–4 (Definition of accessible routes); Presidential Decree of 4 October 2013 (Promotion and implementation of the principles of accessibility and mobility); Presidential Decree of 12 October 2017 (Forecast of the need to review the legislation, adapting it to the principles of Universal Design in implementation of the UN Convention); Regional law 19 March 2018, n. 10 (General principles and implementing provisions on accessibility). Translation by the authors.

Fig. 1 Amsterdamse_thermometer_van_de_openbare_ruimte_2019, p. 5, open access. Courtesy of the City of Amsterdam, 2021

On the same topic, but with a different outcome, the City of Amsterdam[4] created a document summarizing graphically and scientifically the urban spaces and accessibility of its city center; this system is called "Open space Thermometer" and is downloadable for free (open access) on the administration website; in the document, the "hot" and "cold" routes are represented in different colors, respectively the less and more accessible routes (Figs. 1 and 2); the same method is applied to parking lots, and bikes routes.

Vienna, on the other hand, is an interesting case study regarding some areas of historical urbanization (Jaritz & Szende, 2016); the medieval area is characterized by a fabric composed of architectural volumes of two or three floors, of limited depth, but of considerable length, arranged parallel to the road axes (Banik-Schweitzer, 1998); this would imply an alleged difficulty in permeability between relatively close road axes, but the connection is guaranteed by the "possibility of crossing" given by some semi-public courtyards and galleries (sometimes owned by commercial, gastronomic, or hospitality businesses) which remain open throughout the year, even when the activities contained therein are closed (i.e., during winter). Even if the Vienna system is on a small scale, it could be linked to some sections of the underground city systems of Montreal in Canada.

Other international experiences to take into consideration concern the city of Singapore, awarded for its policies (which are to be renewed by 2030) on usability and for the attention paid to people with disabilities or the aging population; besides, the city of Chester (UK) is representative for the system of connections at a height that extend over all the historical preexisting buildings of the city confirming policies for a "future—all users—urban regeneration" that will be applied in some areas selected by the municipal administration—"Access City Prize" (Salman, 2018).

From international experiences, we can learn that urban mapping tools related to the themes already presented, along with the use of *apps,* contribute to the evolution of the metadata structured knowledge process with *open access*

[4] Amsterdam Map, https://www.amsterdam.nl/bestuur-organisatie/volg-beleid/ontwikkeling/openbare-ruimte/cijfers/, last retrieved November 2020.

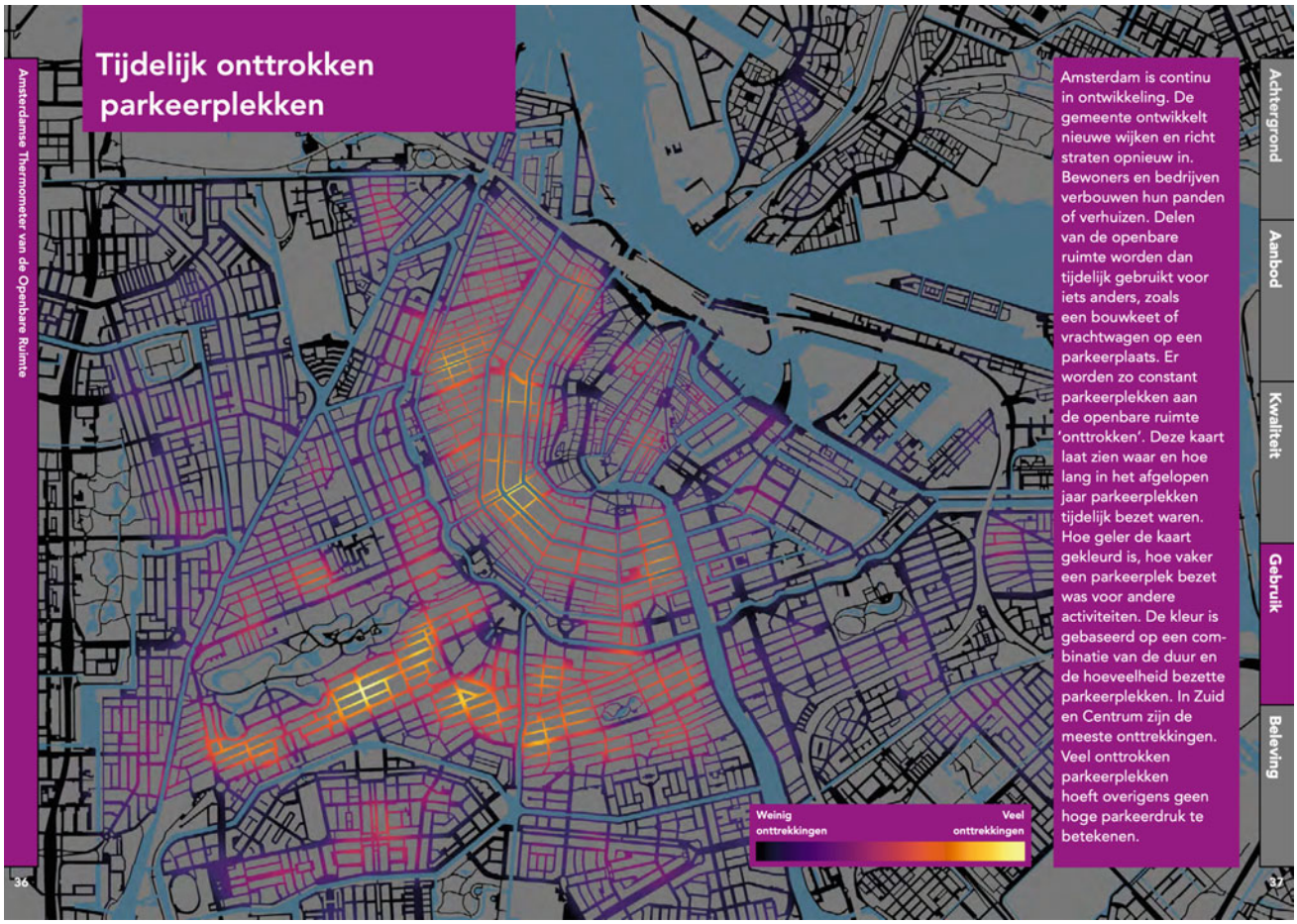

Fig. 2 Amsterdamse_thermometer_van_de_openbare_ruimte_2019, p. 19, open access. Courtesy of the City of Amsterdam, 2021

and participatory approaches such as *AccessMap*[5] and *OpenSideWalks*.[6]

2 Methods

The inclusive city should not create diversity and it should guarantee the easy use of primary and essential services to any user, in an equitable way (Afacan, 2011). The objective study of a defined area (Fig. 3) was the first step of the research analysis, carried out by survey technicians, subsequently, on a smaller area and in a participatory manner, users with disabilities were involved (subjective mapping).

As the authors previously stated (Milocco Borlini & Tubaro, 2020, p. 104):

> Through the documentation, geo-referencing, the photo-reportage, and a geometric and photographic survey, with critical notes and considerations of subjective experiences, it was established a database useful to improve the calibration of the specific needs experimentally identified. In the product-system-path, users were directly involved.

Redesigning the city environment with "criteria of fairness and consistency" (Milocco Borlini & Tubaro, 2020, p. 104) are indissoluble objectives for building a city within everyone's reach. The inclusive city cannot be achieved without interpolating the needs of all its citizens, and the services present toward the higher degree possible of usability. The strategy to be implemented must enhance the project interventions in progress and update the urban planning legislation, always taking into consideration the implementation times and administrative requirements (Milocco Borlini & Tubaro, 2019, 2020).

In this context, the research analyzes the criticalities found during the urban objective and subjective mapping, making synthesis and interpolating the results, to propose sufficient accessibility of the *lieux urbains* under study; inclusive itineraries are also proposed, that are accessible

[5] AccessMap, https://www.accessmap.io/?region=wa.seattle&lon=-122.338&lat=47.607&z=14.5, last retrieved November 2019.
[6] OpenSideWalks, https://www.opensidewalks.com, last retrieved November 2019.

Fig. 3 Greater selected area of study

and differentiated according to the different groups of stakeholders, respecting the current state of the city, guaranteeing—where applicable—a path that is as continuous as possible and free of barriers.

2.1 Users and Elements for Urban Analysis

The study examines the diverse needs of different *users* to verify the limitations on the urban fabric (street level), therefore, we have considered the elderly, those with reduced mobility, and people with impaired vision.

Studying the different modalities of relationship between the user and the city environment and studying the phenomena of discontinuity in usability and accessibility of the streets, allowed to recognize the critical areas of the context took into account and their severity/weight; their resolution would allow the citizen's mobility which is an integral part of urban liveability regardless of one's abilities. The more the use of services and urban areas is facilitated, the greater is the possibility of stakeholders to be present in community life; this will lead to the continuous improvement of economic, social, and urban inequalities. The research sought to minimize the social division considering also urban identity and culture (Afacan, 2011; Inger, et al., 2016); the active participation of stakeholders proved to be essential, accompanied by acts of training, dissemination, and sharing with the associations of disabled people present in the municipal area. The strategies studied to support the practices for the elimination of architectural barriers (P.E.B.A. in Italy) improve usability, porosity, and also aims to the reconversion of forgotten city areas.

2.2 Urban H.C.D. Method

The interactions that take place in it and between the inhabitants have been analyzed as dynamics of acceptance or lack of freedom of use of the urban body, where the attraction poles are the essential services of the citizen, the entrances, the pedestrian paths, and so on. The importance of individual subjectivity is typical of the HCD method and, its reinterpretation on an urban scale is essential for the definition of the research path, which has developed with the recognition of the accessibility/inaccessibility indices of different categories of users leading to proposals of feasible interventions.

The study reaches the definition of a *database* necessary for the active participation of users with a preparatory analysis and mapping work that allows us to weigh and identify the critical city conditions.

In summary, the verified critical phenomena in the chosen area are transport services, commercial and food services, personal services and their accesses, road safety, the presence/absence of cycle paths, sidewalks, ramps, and pedestrian crossings, tactile footpaths, and so on (Bandini Buti, 2008; Tosi, 2005). Naturally, the research wants to lead at least to an urban adaptation sufficient to guarantee usability and safety. The intentions of the research fall into the desire to reduce distances and increase the city porosity according to the needs of each user.

The participation of users (stakeholders) along with the investigation of inclusiveness criteria—in the selected urban area—led to understanding the priorities translated in technical and infographic drawings useful for current and future discussions with civic bodies.

3 Analysis, Synthesis, and Objective Mapping

The general (*objective*) study area taken into consideration is located in the Center-North quadrant of the city of Udine, defined by the intersections between via Gemona and via Tarcisio Petracco, in the city center, and via Pordenone and via Martignacco in the North West, including via Diaz and via S. Valentino in the West (Fig. 4).

The objective criticalities found by the research group are manifested mostly in the lack of porosity between public

Fig. 4 Objective mapping

spaces and roads, creating *caesuras* within the same urban block. The potential of these disconnected spaces lies in their possible reconnection with a possible reactivation of commercial services (local micro-economy) and the reduction of the average travel distances between essential and primary services (yellow lines in Fig. 4).

Through a cartographic analysis of old maps, up to the contemporary ones through GIS tools, it was possible to highlight the changes in the urban state over time; the objective mapping on-site made it possible to recognize the activities and services on the ground floor of the buildings (defined by different line colors, Fig. 4), the public or private areas, and so on. The survey was carried out using instruments to measure the distances and the depth of the paths (sidewalks) and pedestrian crossings, as well as the slopes of the ramps and the level of usability of the pavement; every criticality found has been positioned on the cartography, both analogically and virtually. Through a transposition of the collected data, it was possible to create a graphic map of the routes where the lines represent accessibility, depending on the color; we pass from magenta, which corresponds to total inaccessibility, to green which represents total accessibility. It should be highlighted that the objective mapping was carried out by technicians, surveyors who knew the current legislation on urban accessibility and architectural barriers.

3.1 Subjective Mapping

From the objective macro area, a smaller Pilot Area was defined (Fig. 5), in which a participatory mapping was carried out; users with different needs and ages were involved and the data collected were summarized in graphical drawings and then validated by superimposing subjective data to objective ones (see Sect. 3). The survey with the stakeholders assessed the surrounding conditions of the chosen area, the available transport, commercial or restaurant services, the architectural limits (depending on the stakeholder perception), and the usability of the public areas, sidewalks included (Milocco Borlini & Tubaro, 2020).

In this participatory mapping context, users have identified any critical issues along the paths given, evaluating them according to a personal severity scale (1 to 5—1 accessible to 5 inaccessible); the evaluations were recorded and were georeferenced on the cartography and accompanied by an image of the criticality detected. The pathways

Fig. 5 Pilot area

and the traces were subsequently graphically reported using, as for the objective mapping, the same colors to indicate their severity (i.e., magenta = inaccessible); the punctual/vertical criticalities were indicated by points with a brief description of the problem (Figs. 6 and 7). Briefly, the horizontal and vertical limitations (poles in non-regulated positions), movable or permanent architectural devices that interrupt the itinerary are considered critical (objective and subjective) and therefore mapped and reported graphically and on GIS services (qGis).

Following the reporting of the subjective limitations indicated above, the characteristics of the urban spaces examined were different for each group of users with different disabilities and were verified through the cartographic overlay (GIS i.e., qGis, Umaps, etc.) and the experimental use of innovative information technologies, such as support of urban accessibility and relevant in the field that is also "part of the evolution of the building process" (Milocco & Tubaro, 2020, p. 102).

As anticipated, a total of 10 people, were involved to complete the monitoring and weigh specific qualitative and quantitative values, in order to interpolate the data collected and the specific interpretations of the pilot area; this led to a strategic solution of the most critical areas and routes. The subjective results of the users made it possible to recognize the itineraries at least sufficiently accessible through a verification given by overlapping all the criticalities (Fig. 8) recognized by each user group; the sum of the criticalities found and consequently the recommended itineraries were expressed graphically on the cartography of the pilot area (for each group) by relating it (comparison/verification/validation) with the objective mapping carried out at the beginning of the research (Fig. 9).

The data interpolations allow the designers to rethink new routes considering a "new fabric porosity of the block" (Fig. 10) that allows shorter travel distances (Milocco Borlini & Tubaro, 2020).

The final objective is therefore to propose possible interventions in order to enhance the urban redevelopment toward the maximum possible inclusiveness of the city.

4 Results and Discussion

The proposed strategy, exemplified in the elaborate Fig. 10, aims to reconnect separate areas with the focus of increasing urban porosity—while decreasing the distances between the communication routes—and restoring "new" public spaces for the community. Through the renegotiation of the spaces with private individuals (daily opening of semi-private areas of passage, by direct concession) it would be possible to retrain and reactivate areas in the process of urban desertification and/or with a greater degree of inaccessibility, improving the quality of life, increasing interactions between people and promoting neighborhood microeconomics.

In this specific case, the garden of the University of Udine (Palazzo Antonini),[7] becomes the central fulcrum for the distribution of the possible connecting routes.

Several accesses and interventions are foreseen on the vast green area ad in its whereabouts: i.e., the Via Gemona access; the complete redevelopment of Via Cicogna (especially the paving); some possible connections through the parish spaces of the Church of S. Quirino. In light of these considerations, "safe area" and "safe cores" could be expected, as possible solutions to the issues discussed in this paper. Those safe cores can "contain" social gathering points

[7] Palazzo Antonini, center of the Pilot Area, Udine, Italy, see: https://goo.gl/maps/81zPoFZ9TacnH9na6, Google Maps 2020, last retrieved November 2020.

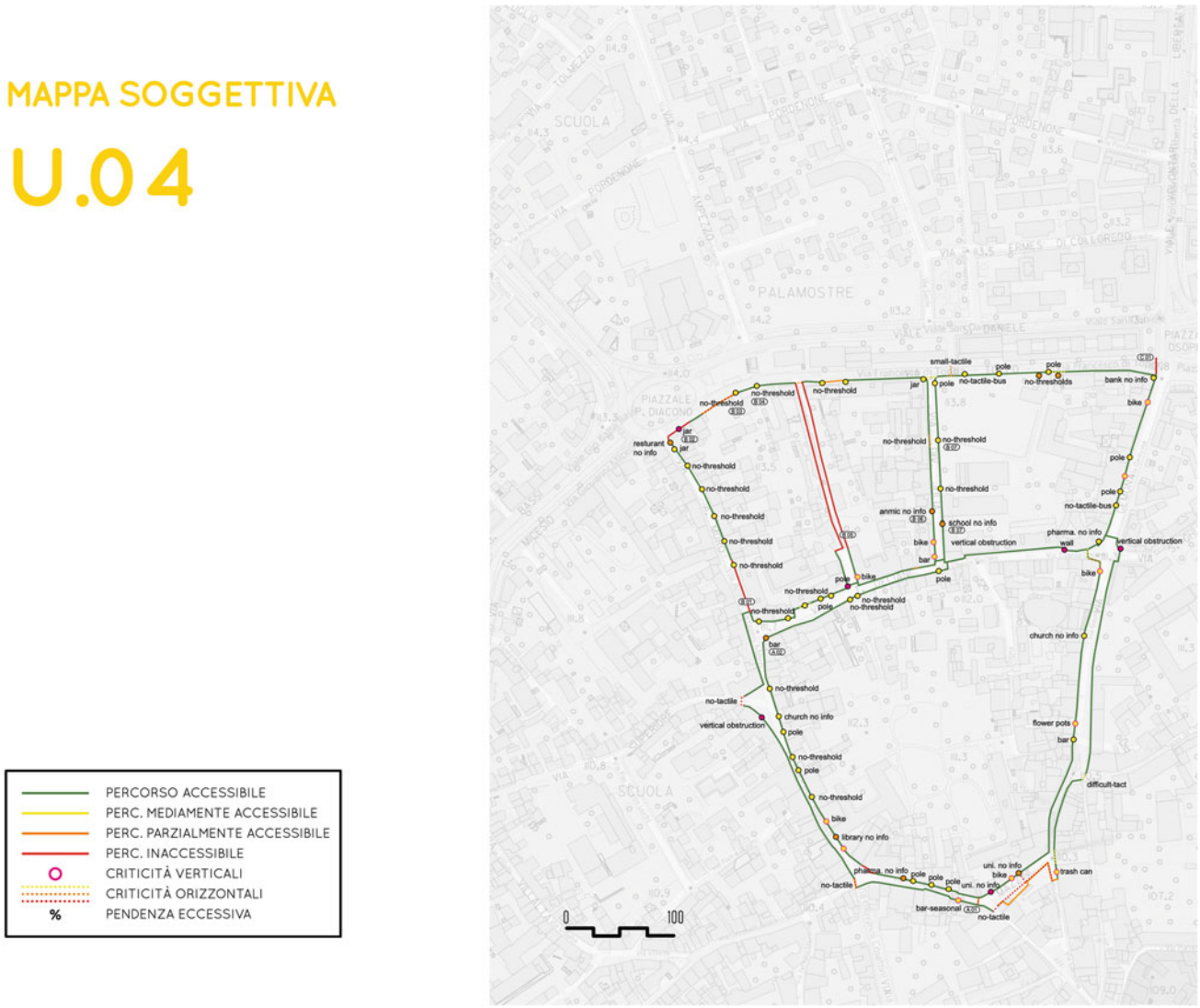

Fig. 6 Subjective mapping. User—impaired vision

for all groups of citizens favoring an intergenerational sociocultural exchange and also may lower the social stigma that affects some stakeholders. From a design point of view, the areas indicated above should be retrained with strategies that decrease inaccessibility for all and increase the usability and social and urban inclusion, toward ever more secure, inclusive and connected spaces for all.

5 Conclusions

The study has considered the urban space from a connective point of view and integrates the limitations related to accessibility, the length of the paths, and the urban permeability of the historic center into a system.

Fig. 7 Georeferenced, photoreportage

Among the possible future expected outcomes, there is the possibility of transferring the analysis carried out as support elements to the regional and national plans for the reduction of architectural barriers.

It can be stated that the analysis of the pilot area considered, are significant for the research carried out because it presents phenomena that can be objectively and subjectively detected, defining the evolutionary framework—on different scales—for possible design interventions, redefining increasingly accessible paths, and integrating policies for the removal of architectural barriers. The experimentation conducted makes it possible to extend the active participation of users to the entire city of Udine, transferring the "urban HCD" methodology and other research projects in progress and plans for the removal of architectural barriers on the entire Italian territory (PEBA).

This study has led to in-depth studies useful to recalibrate the existing urban usability with a focus on the reactivation

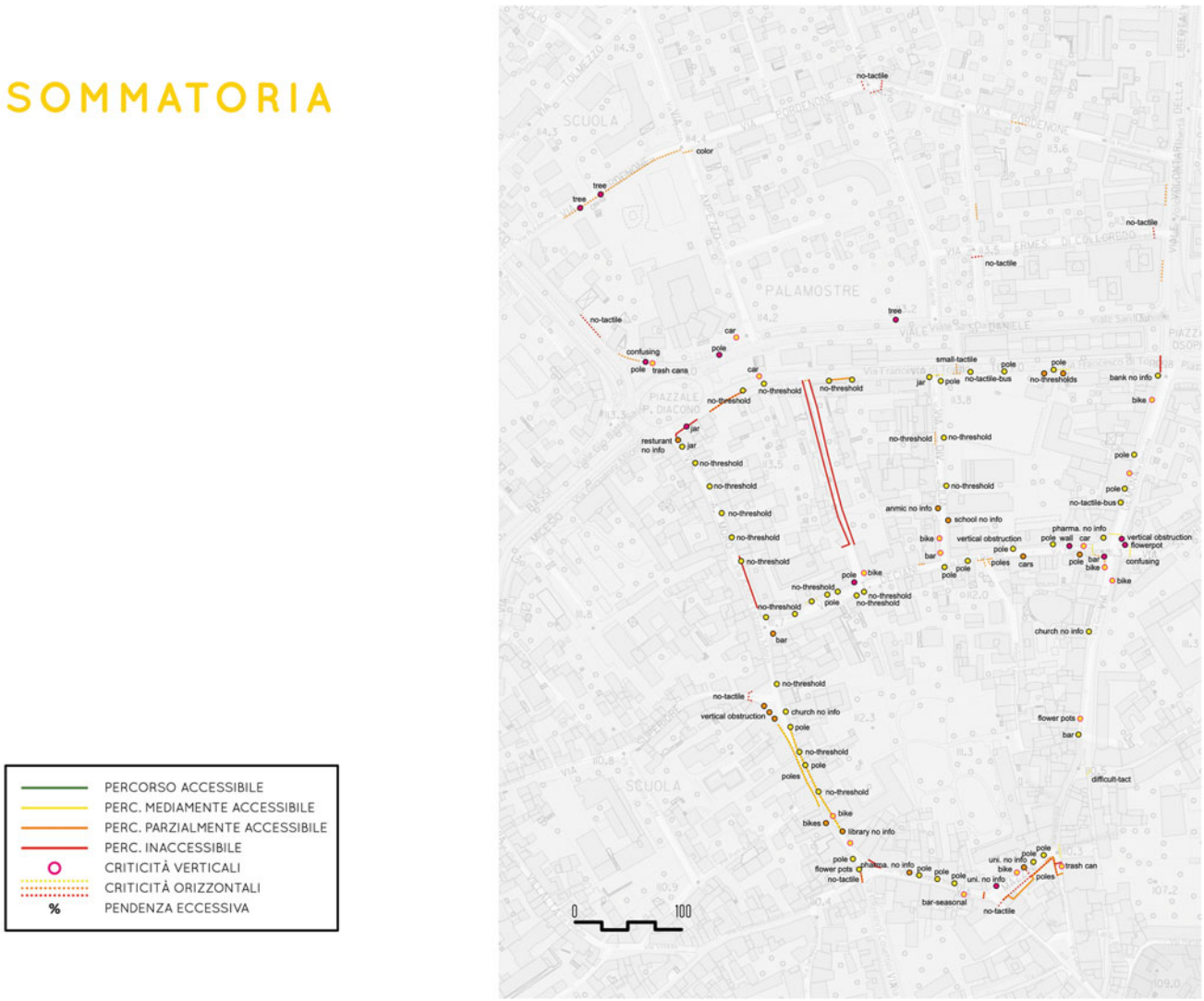

Fig. 8 Sum of critical issues—all users group—impaired vision

of public and private services, thanks to the increased porosity of the pilot with affinities to urban and social regeneration practices.

However, it is not excluded that once the experimentation with a *mapathon* event will be carried out (post-COVID-19), *it* would be possible to proceed with transferable models focused on the phenomena that generate discomfort and separation for users by implementing a mass of georeferenced data not referred to a specific urban fabric.

The city is for everyone.

Fig. 9 Suggested accessible paths for users—group—impaired vision

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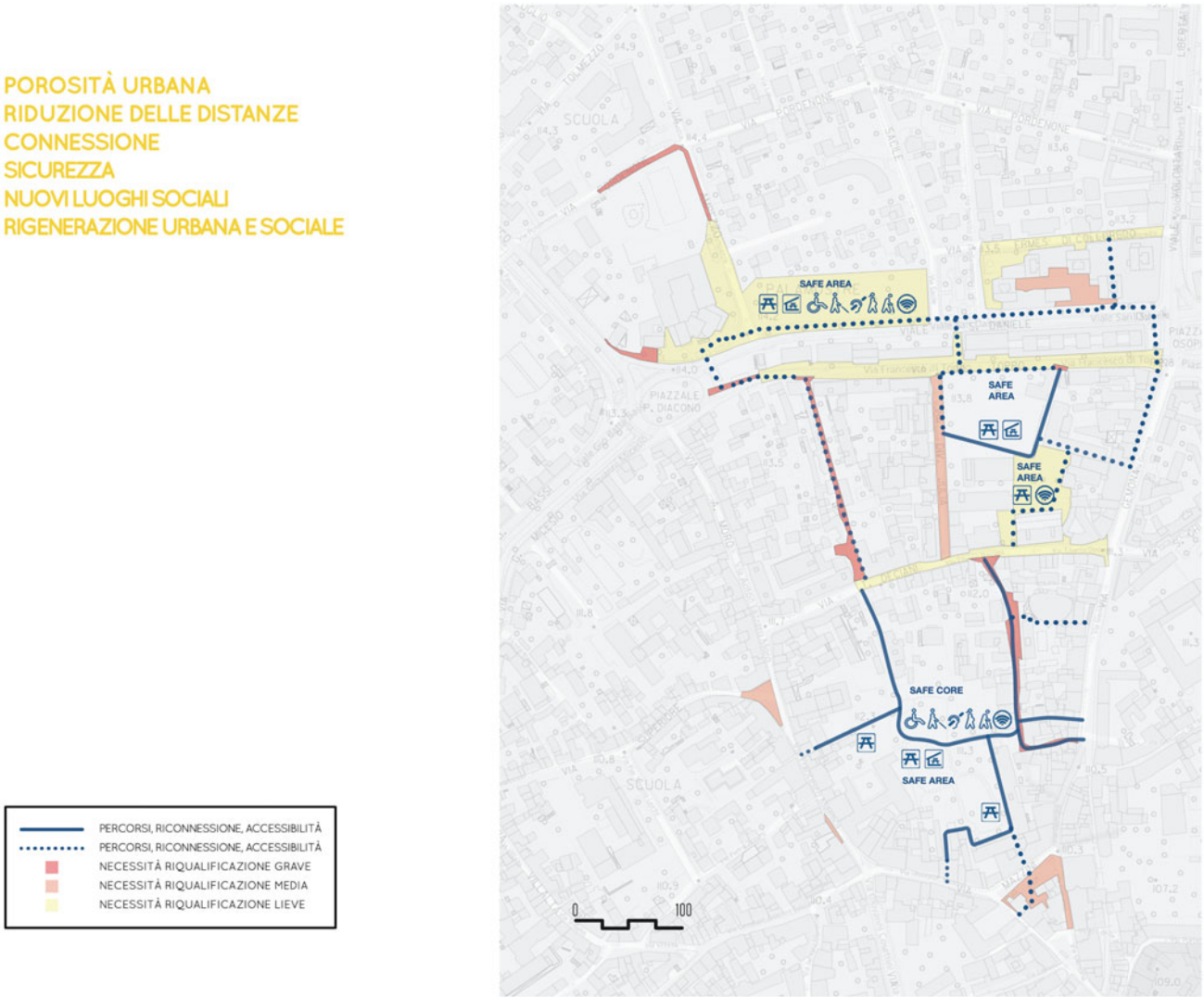

Fig. 10 Strategy. Requalification (yellow, low need; orange medium need; red, high need), porosity, new safe cores

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Transformative Actions in the Boston Harbor: Lessons Learned from Past Projects Toward a Resilient and Sustainable Urban Future

Dalia Munenzon and Yair Titelboim

Abstract

Following a long history of transformative environmental policy and massive investment in infrastructure, Boston's harbor has transformed in the last 30 years from an industrial wasteland to an essential resource for urban development, economic growth, and public benefit. Today, amidst rapid urban expansion, an increase in population, and impending climate threats, Boston's waterfront is poised for a critical subsequent transformation. This paper examines comparable urban projects and gathers lessons to address resilience as the next major urban challenge for the Boston metropolitan area. The 2016 Climate Ready Boston initiative framed the City's particular vulnerabilities and has resulted in the Mayor's Harbor Vision for unifying objectives aimed at leveraging open spaces for resilience and equity. The implementation of such a vision will require a herculean effort and will undoubtedly transform the public realm for the better. This study conducted a retrospective review of the Boston Harbor Cleanup and the construction of the Central Artery Tunnel to extract methods and challenges for implementation and evaluate the long-term impact on the City. This paper focuses on two key aspects: (1) tools for implementation (2) project benefits. Tools for implementation include strategies for financing, regulatory challenges, opportunities for new governance and organizational structures, community engagement, and the role played by civic groups and philanthropy. The impacts explored include the value of environmental cleanup, public health, and social equity. This paper concludes by proposing a framework for the best practices to implement Climate Ready Boston and emphasizes the significance of public participation in the process. It summarizes how this endeavor can be seen as an opportunity to reenvision the waterfront and learn from past projects as the City's waterfront continues to transcend from industrial uses toward recreational, ecological, and sustainable purposes.

Keywords

Resilience • Boston harbor • Waterfront design • Climate change • Governance • Urban planning

1 Introduction

Urban adaptation to climate change involves complex systems, planning across time scales, and diverse urban environments. Urban adaptation to potential climate impacts will provide the ability to recover, sustain, grow, and to be resilient, after an extreme weather event. Designing with risk in mind includes the overhaul of the built environments and standard processes. The destructive hurricanes of the last decades and the subsequent adaptation programs showed that coastal infrastructure alone could not achieve long-term physical and social resilience. Such initiatives include opportunities for rethinking drainage and wastewater infrastructure, transport networks, open space and ecological systems, and their integration with and goals for neighboring communities. Engagement and citizen interest in public decision-making are the critical apparatus for designers and developers to achieve collective priorities and goals, encouraging equitable public engagement and successful projects.

Boston Harbor is vulnerable to coastal flooding and has experienced several occurrences of coastal flooding in the recent decade (Fig. 1 shows flooding from the King Tide

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Fig. 1 King tides in Downtown Boston, October 2020 (MyCoast, 2020)

Event in October 2019). This risk will increase in scale and frequency with climate change, rising sea level, and extreme storm events. Implementing an urban adaptation project to address these issues is an immense endeavor that will transform the public realm and connection to the waterfront, particularly for the 47 miles long Boston coastline. It will require a multilayered approach to provide redundancies at the risk reduction level and address local community needs such as equity and accessibility to public space. The urban resilience project as a whole is greater than the sum of its parts, and the level and quality of co-benefits are the primary evaluation criteria for many strategies. The urban adaptation project is not only a highly complex multilayered infrastructural effort, but it is also a long-term vision for the City and its residents; it is primarily an investment in the social and economic strength of the community. To take upon this challenge, the City of Boston has developed a series of conceptual plans and a comprehensive citywide vision—the Resilient Boston Harbor Vision (Fig. 2 from the City of Boston website) (City of Boston, 2018b). The Resilient Boston Harbor Vision is framed under the Climate Ready Boston 2016 (CRB) initiative to develop flood protection solutions that integrate resilience infrastructure with open space, by way of design and community outreach.

CRB is a framework for multiple interdisciplinary efforts to be developed and addressed over the next decades in terms of design, construction, policy, governance, and regulation. The CRB initiative emphasizes equity, access, and aims to provide a roadmap to address social resilience and environmental justice. Environmental justice is crucial to climate projects as cascading threats are compounded for traditionally underserved populations. Integrating the goals of these communities will contribute to an equitable resilience solution. The CRB initiative comprises: the initial scientific analysis of site-specific climate risks and vulnerabilities, districts plans with near and long-term solutions, the Boston Harbor Vision, policy, and design guidelines for city

Fig. 2 Resilient Boston harbor vision (City of Boston, 2018b)

Fig. 3 Climate ready Boston districts (City of Boston, 2016a, b)

infrastructure and private property, alongside other studies that will be necessary for the formation of the comprehensive, resilient and sustainable future of the City (Figs. 3 and 4 from the 2016 Climate Ready Boston report) (City of Boston, 2016a, b).

At the core of this paper are the district plans created as part of the CRB initiative in 2017–2020. They outline design and planning concepts with the potential timeline and steps to realize these strategies (i.e., implementation roadmap). Per each district, an implementation roadmap outlines the next steps for three decades into the future and identifies challenges from financing, engineering complexities, coordination, governance, and necessary regulatory changes. Additional studies from local research institutions suggest innovative solutions resolve these challenges. However, despite the extensive preparation and the urgency of the impending risk, the City has not taken clear actions toward implementation. Significant policy and regulatory issues still need to be addressed; the main challenges related to governance and funding are hindering due to local political will.

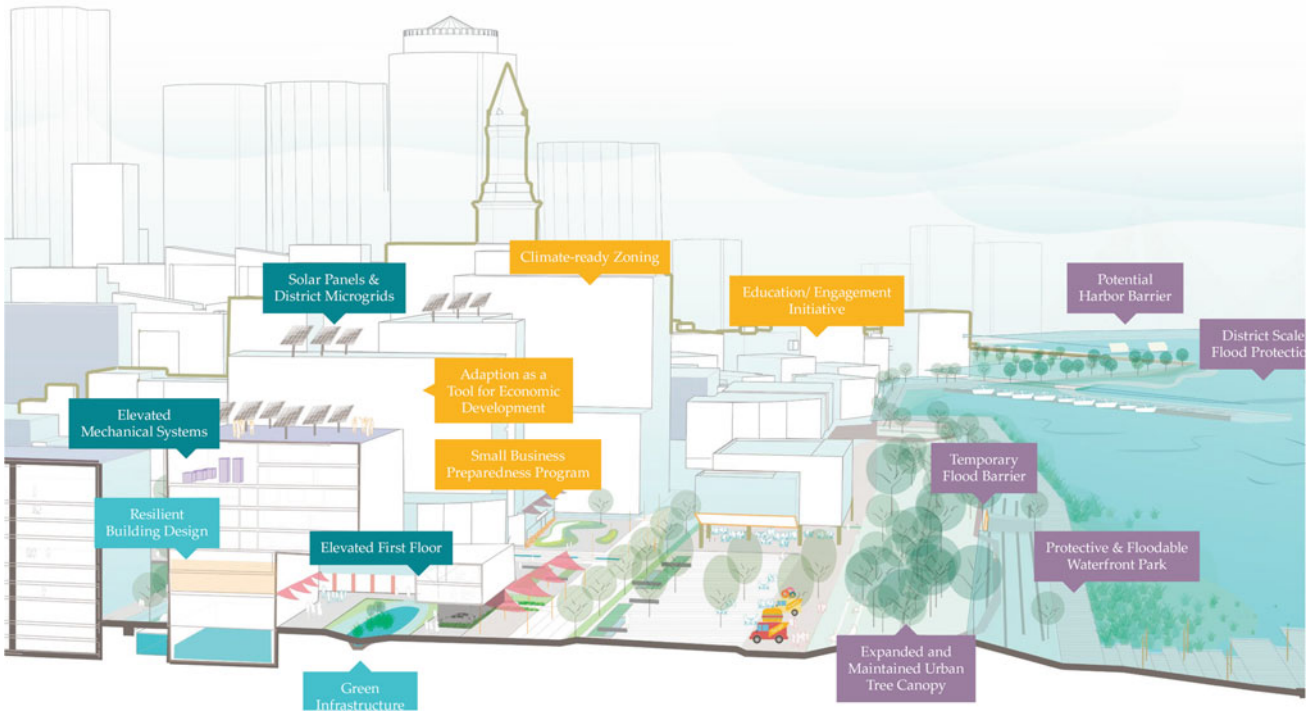

Fig. 4 Climate ready Boston strategies (City of Boston, 2016a, b)

In order to drive the process forward, this paper seeks to ask crucial questions about what needs to happen. How will urban adaptation projects on a 47-mile-long coastline come to life in these modern times? An effort of this scale is not new to the City of Boston; in the last three decades, the City has completed two massive public work projects: the Boston Harbor Project and The Central Artery/Tunnel (CA/T). This prompts the question of, what can we learn from how these projects unraveled? Are there any lessons from the tools they used to implement the projects? Or, what drove the state and the City to take action?

This paper will review the plans and documents developed for the CRB and the vision presented by the Mayor of Boston (Walsh, 2018). It will start with the scientific study undertaken by the Boston Research Advisory Group (BRAG) (The Boston Research Advisory Group, 2016) pertaining to climate projections in relation to the geographical context and the flood maps developed for the City as part of work done by The Boston Harbor Associations (Douglas et al., 2013). A deep analysis of the proposed district strategies available will identify implementation challenges per each neighborhood: East Boston (City of Boston, 2017), South Boston (City of Boston, 2018a), Downtown, and North End (City of Boston, 2020). These changes will be explored with focus on social resilience and the important connection between equity and public investment (Martin, 2014). To better understand the potential strategies to drive implementation, the paper will review two reports on Governance and financing strategies from the University of Massachusetts Boston (UMass Boston) (Kruel, 2018; Levy, 2018). To explore comparable aspects to the CRB from the Boston Harbor Project and the CA/T, the methodology will be to review three aspects of each case study (1) What role did civic activism play? (2) Which new institutions were established for this purpose? How was the project funded and executed? (3) What are the benefits of the project? This will be accomplished through an examination of research by Save the Harbor/ Save the Bay and the economic valuation of the cleanup project (Jin et al., 2018). Finally, the paper will conclude with a discussion of the operational lessons that can be taken from the two case studies, by the CRB. Additionally, how civic action pushed the City and state to implement the case studies and how public opinion and action help to improve the outcome. The critical role of communities and stakeholders in climate adaptation and large-scale development projects is twofold. Essentially, they are the client, as the design process will deliver a project that will serve their needs and safety, and they are the driving force behind it, building political commitment and long-term capacity. Therefore, the public must play a significant role in the design, and community priorities must be incorporated in the CRB concepts.

2 Background and Historical Context

2.1 The Resilient Boston Harbor Vision

At the Greater Boston Chamber of Commerce speech in October 2018, Boston's Mayor Martin J. Walsh presented his vision for an ambitious resilience plan. This vision was based on preliminary work for the Climate Ready Boston framework in 2016, and other initiatives along the 47-mile-long coastline (City of Boston, 2016a, b). The objective approaches resilience from both physical and social angles. The plan aims to protect the City of Boston from the rising sea level and future storm surges, while creating a more equitable and accessible waterfront. As the Mayor defines it, "this is the opportunity a resilient Harbor presents—to protect Boston, connect Boston, and enhance Boston, now and for future generations." (Walsh, 2018). This ambitious plan builds on the City's history of large and transformative urban projects. It provides a political legacy to address the impending risks of climate change and coastal flooding. The need to involve the local Chamber of Commerce emphasized the need for broad public support and potential financial commitments from the participants. Political buy-in (or civic support), financing, and an innovative governance structure are all at the foundation of what this effort will require.

The presented vision will address the 40 sea-level rise and coastal flooding projected to occur by the end of the century. The estimated cost of such a project is in the range of several billions of dollars spanning over 10–15 years of design and construction. Public projects at this scale are rare in Cities in contemporary times—and need a great political will to support implementation. $1 billion is the estimated cost for just one of the neighborhoods, South Boston, which is only a fraction of the whole system (Chesto & Logan, 2018). According to a financial study performed by the Sustainable Solutions Lab in the University of Massachusetts (UMass) Boston, the total cost of mid-century adaptation strategies for the vulnerable districts can reach $2.4 billion (Levy, 2018). This estimated cost is a tremendous effort even for a relatively wealthy city like Boston. Therefore, the adaptation narrative has to be of a collective vision, an aspirational idea with multiple benefits extending beyond the protective barrier services.

2.2 Boston Harbor and Waterfront Transformation

Like many coastal cities, Boston is facing significant risk from future high-intensity storms and the rising sea level. As is typical of most cities, Boston's activities, density, and life

Fig. 5 Boston shoreline composite (Map Works Inc., 1999)

evolved along the coastline. Boston's urban form and history, beginning as a merchant port city, are deeply rooted in its connection to the harbor; life in the seventeenth and eighteenth centuries always followed the rhythm of the port (Glaeser, 2003) (Fig. 5). Marine industries occupied the waterfront along the harbor; with the technological changes in the nineteenth century, they experienced decline while inland manufacturing increased. Rapid growth and urban expansion in the nineteenth century led to one of the largest public works efforts faced by the city, in the construction and land reclamation of Back Bay. Urbanization outpaced the city's ability to update and invest in its sewer and water systems and was exacerbated by the urban decline of the mid-twentieth century, thus leading to Boston Harbor earning the questionable title from local media "Harbor of Shame" in the early 1980s. "The Harbor was the most degraded in the United States, with twelve billion gallons of raw or partially treated sewage…" Charles Monroe Haar writes in his book outlining the public and private partnership that led the harbor clean-up (Haar, 2005). The City's Cleanup process was initiated by the requirements of the Clean Water Act of 1972, necessitating an update to infrastructure, institutions, and governance mechanisms. In actuality, this process took several decades to materialize.

Thirty years after the initiation of the process, Boston's waterfront is once again the urban and economic anchor for the city. As analyzed by Save The Harbor/Save The Bay in the Boston Harbor Indicators Report (i.e., an advocacy group founded in 1986 to maintain the public pressure and involvement in the public investment towards a clean harbor): "Today, Boston Harbor—the natural foundation on which Boston's economy was first built—is once again at the center of the City's future" (Save The Harbor/Save The Bay, 2004). The report identifies development and growth along the waterfront as driven by the public investment of $21 billion over three decades—including The Boston Harbor Project, The Central Artery/Tunnel Project (CA/T also known as the "Big Dig"), and The Rose Kennedy Greenway. The investment was focused on regional infrastructure with local impact on the improvement of the urban realm and public spaces. New development along the coast over the last 15 years introduced more than a dozen million square feet and thousands of residential units (Save The Harbor/Save The Bay, 2004). The changes simultaneously brought about new industries, such as tourism, which leveraged the improved access to public parks and the historic waterfront, restored landmarks, and mix-use development with commercial attractions.

A large section of the development incepted by these transformative improvements included the Seaport district in South Boston (Fig. 6) (Allen, 2015). The neighborhood transformed a 1000-acre concrete wasteland over the last two decades into a burgeoning skyscraper realm. The Seaport neighborhood was constructed on low-lying reclaimed land historically known as the South Boston flats (and the Commonwealth flats); the development and plan for the area was initiated in concert with the construction of the Central Artery Tunnel (Seasholes, 2018). The South Boston Waterfront Municipal Harbor Plan outlined access to the waterfront, parcellation of blocks, and open spaces (Boston Redevelopment Authority, 1999). Construction of the commercial and residential building and the development of the public realm started incrementally after Mayor Menino presented in 2010, "the Boston Waterfront Innovation District" plan (Hoban, 2018). Hurricane Sandy devastated East Coast cities in 2012, including New York City, yet Boston was fortunate as it reached the city six hours after the high tide. At the time, the Seaport properties were in the early

Fig. 6 Boston Seaport district (Allen, 2015)

stages of design, thus requiring property owners to make efforts to increase resilience measurements for their buildings. Moreover, the existing projection and resilience standards outlined in the City's zoning and design guidelines were connected to the historic FEMA Flood insurance rate maps (Flood Hazard District, Article 25). Simultaneously, the City started mapping and developing science-based long-term climate projections for sea-level rise (SLR) and storm surge, which showed a greater risk to the area and an increase in the frequency of tidal flooding.

2.3 The Climate Ready Boston Analysis and Initiative

The Boston Harbor Association (TBHA) developed a series of maps that examine the extent of the area at risk of coastal flooding (Douglas et al., 2013) taking into account SLR and future climate change projections. The study was launched as a response to the severe IPCC reports from 2007 and an increase in nuisance flooding across the city, as the FEMA maps proved to be insufficient, limited only to historic data of past floods. This initial study identified that 6% of the City could be underwater in the event of a 100-year coastal storm surge at high tide at the time of the report, and 30% of the City would be affected in a mid-century storm event. While the City already initiated climate studies and expressed interest in exploring some adaptation planning in 2009, the findings of this study recommended comprehensive preparedness planning with clear co-benefits to reduce vulnerabilities in the near and long term. This planning initiative would be grounded with an in-depth vulnerability assessment and updated science and models (Douglas et al., 2013). Climate Ready Boston was the initiative established to accomplish these recommendations from the science, adaptation, and preparedness strategies, while providing implementable solutions. Similar to the other city-wide efforts carried out in the twentieth century, this was a collaboration between philanthropy, the state, local business, and the City.

The Climate Ready Boston climate change and SLR projections were prepared by the Boston Research Advisory Group (The Boston Research Advisory Group, 2016). The group's objective was to build a consensus around science-based climate projections for sea-level rise, intense storms, and heat. They cited over 100 sources and developed localized standards for projections. Acknowledging that in order to prepare for the future, the city needed to look forward and depart from solely historic data, the report established a framework for updating the standards and science as we learn more about the pace of the changing climate. The report

summarized three SLR scenarios based on the IPCC Representative Concentration Pathway and ocean dynamics. According to the BRAG model, by 2100, the extent and scale of the current 1% probability storm surge (100-year storm) will become an annual occurrence with rising sea levels. Furthermore, the 100-year storm in 2100 "under both scenarios the heights for a 1% probability flood are ~1.5–2.5 m higher than today, the latter value representing a near doubling of their current value" (The Boston Research Advisory Group, 2016). With some level of uncertainty towards the end of the century, the report nonetheless anticipates more intense and frequent storms towards the middle of the century.

The vulnerable landmass area identified in the TBHA report is mostly reclaimed land and tidal mudflats filled by residents over generations since the arrival of the British. Reclaimed land accounts for almost a third of the area of the city and therefore, the projected losses are extreme. A study of flood losses in coastal cities estimated that without proper planning and design for adaptation to sea-level rise, subsidence, and intense storms, the projected annual loss for Boston in 2050 will be $741 million (Hallegatte et al., 2013). The Climate Ready Boston presented the climate projections as developed by the BRAG; the report summarized risks from extreme heat, precipitation, and sea-level rise, analyzing the specific risk per the city's neighborhoods, and presented an implementation roadmap with necessary planning, policy, and solutions that will be needed to prepare and address the risks. For coastal flooding, the report focused on three scenarios: "9 SLR with 100-year storm surge (1% annual chance flood) for the year 2030—with the neighborhoods East Boston, Charlestown, South Boston, Dorchester, and Downtown at the highest risk, 21″ SLR with 100-year storm surge (1% annual chance flood) for the year 2050, and 36″ SLR with 100-year storm surge (1% annual chance flood) for the year 2070 "exposing over 15% of the population to flooding" (City of Boston, 2016a, b). Beyond potential damage to property, the reports attribute asset loss to critical infrastructure and regional transportation systems, adding business disruption to the accumulated cost of inaction (Fig. 7 created by author for this paper).

The CRB initiative outlined strategies built around community needs, local knowledge, and climate risks. The result was a district-specific approach driven by an overarching vision with both resilient infrastructure and equitable

Fig. 7 CRB districts with 1% probability storm floodplain in 2070 (image created by authors)

public open space. District-focused plans will guide implementation as a tool to mitigate the scale of the project. The timeline prepared to oversee the implementation process will address immediate risks and their solutions; future solutions will need to accommodate multiple benefits.

2.4 Physical and Social Resilience

The CRB initiative included several parallel processes. The first was a district-scale vulnerability assessment and vision planning effort for each of the five coastal neighborhoods including: East Boston, South Boston, Charlestown, Dorchester, and Downtown. The second was a development of guidelines and zoning overlay for buildings in the floodplain to ensure new development and retrofits are constructed above the design flood elevation (i.e., the projected flood with a freeboard for subsidence). The third was establishing standards for public works projects, to leverage ongoing and planned capital projects to improve their resilience. Finally, the Mayor Harbor Vision in 2018 combined all projects and proposals into one unified narrative. A resilient waterfront will require a physical transformation of the coastline; in many of the studied areas, the edges will need to be raised between 8′ and 6′ to withstand the rising seas, tidal changes, and storm surges. Potentially, this is an opportunity to rethink the extensive waterfront as a public asset, to provide open space and improve accessibility and diversity of uses suitable to the current and future population of the city. The relationship between the city and the harbor was defined in every generation by the economy and the people of Boston; in this evolution, the waterfront is the driver of growth and protection.

The particular facet of maximizing public benefit and providing value beyond the utility of flood protection is an essential component of resilience planning. CRB mapped socially vulnerable populations in areas prone to risk and identified a disproportionate susceptibility to direct and cascading impacts of climate risks. Dr. Atyia Martin, The Chief Resilience Officer for the City of Boston, defines social vulnerability as "compounding factors of long-term discrimination and exclusion from planning and emergency management practices" (Martin, 2014). The populations identified as more vulnerable are usually at higher risk of isolation, making it more difficult to engage and participate in the planning process. Therefore, approaches for mitigation should connect residents to resources, social capital, and increasing physical spaces and official frameworks to engage and connect with City officials and community members. Through this approach, rebuilding the coastline will need to address inequalities, deteriorating urban infrastructure, and the preservation of affordable housing, while fostering local wealth-building opportunities. The public project as a whole is greater than the sum of its parts and the level and quality of co-benefits are the main evaluation criterion for many strategies.

3 Main Challenges in Implementing Resilience

3.1 District Scale Climate Solutions

This section focuses on the review of the proposed district plans and the challenges identified by this study for implementation. The implementation roadmaps of these plans look 15–25 years into the future, to accomplish the full vision.

East Boston, one of the most diverse communities in the city with approximately 55% of the population identifying as Hispanic/Latino, established the first CRB district plan in 2017. East Boston consisted of five islands connected by reclaimed land and was therefore significantly susceptible to coastal flooding. Historically, it was a working neighborhood with a water-dependent industrial waterfront, but the neighborhood started changing with the success of the harbor cleanup project. New developments started rising along the coastline; in fact, one of the most recent developments, the Clippership Wharf (opened in 2019), was mentioned as an opportunity in 2004 Save the Harbor/Save the Bay report. These new properties comply with the limited guidelines provided by the City at the time and therefore have ground floors constructed above the projected flood elevation, offering building protection for coastal flooding. The intention to resolve the imbalance of protected new developments vs. vulnerable low-income housing and the need to provide public access and equitable resilience was at the base of the Coastal Resilience Solutions for East Boston and Charlestown report (CRSEB) (City of Boston, 2017) (Fig. 8).

The East Boston vulnerability analysis identified near-term flood pathways that are projected to extend inland during an event of a 100-year storm with the SLR of 9″. Several flood pathways breach the coastline at Jeffries Point and converge at the low point in the Greenway, with an additional pathway located by Central Square. Both areas have experienced coastal flooding during winter storms in the last decade. These breach points between the raised new waterfront developments were visible during the two Nor'easter storms in January and March of 2018; the January storm reached the City's highest recorded tide of 15′ above sea level (Caperton Morton, 2019).

It is estimated that, beyond 2030 (when sea level rises more than 9″), the ocean will overtop the extent of the coastline. The plan proposed a layered strategy with near-term solutions aimed to address the urgent threats at the Greenway flood pathway. A deployable barrier system was proposed and installed at the entry point to the Greenway.

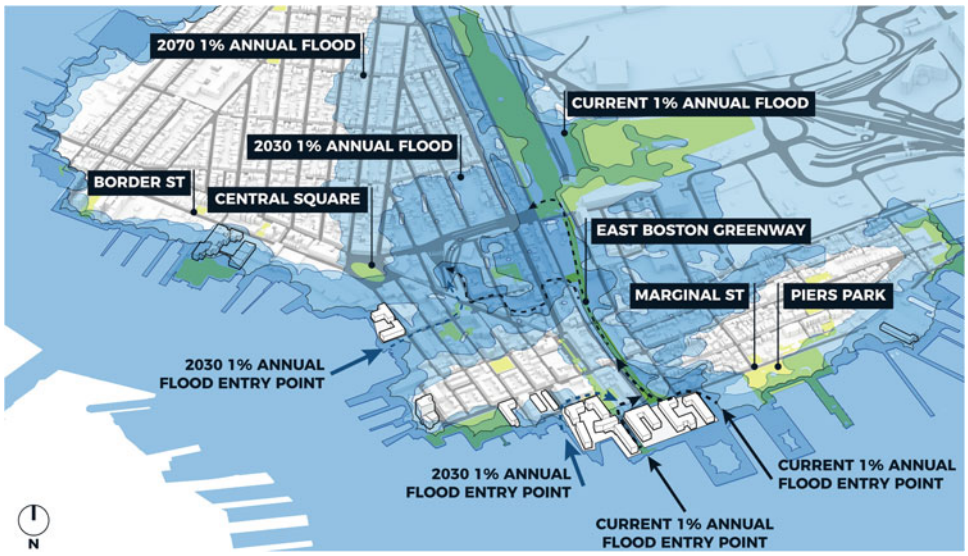

Fig. 8 East Boston flood pathways (City of Boston, 2017)

The long-term strategy focused on a system of continuously elevated parks with 11 acres of open space along the coastline, which currently consists of new developments, deteriorated piers, and underutilized industrial lots. The report estimates the cost of this project as between $121 and $200 million. An additional cost that is not represented in the construction is future maintenance and the operation of the integrated flood barrier and park. To maintain the infrastructure as operational throughout its lifecycle, the City will need to designate and train personnel. The implementation roadmap (City of Boston, 2017) outlines the necessary steps for the realization of this project. In the next 30 years, the project will face a series of challenges based on the site conditions, namely, related to ownership structure, policy, and regulations; these challenges are consistent across the five neighborhoods and district plans. At the same time, it is important to consider the current population of the East Boston neighborhood and the challenges that they are experiencing through gentrification and displacement. The strategies and solutions proposed can exacerbate these issues if not addressed with the involvement of the community.

The CRSEB plan provides a preliminary framework for an integrated system of recreational spaces, nature-based solutions (wetlands), and coastal barriers. However, it lacks concrete guidelines to address the fundamental complexities and challenges. One issue that was overlooked by the plan is infrastructure and utilities. For example, stormwater infrastructure is not addressed in this study and is critical for the success of a flood barrier. The existing combined sewer overflow outfalls are at the same elevation as MHHW (i.e., Mean High High Water level—highest predicted elevation of an astronomical tide) (Fig. 9) (City of Boston, 2017).

In the East Boston context, implementation challenges can be broken down into several areas:

- Majority of the coastal lots are privately owned. To ensure continued implementation of an integrated barrier, there is a need for coordination on timing, design, and operations after construction. A regulatory mechanism will need to ensure owners to preserve space for a barrier (Fig. 10) (City of Boston, 2017).
- Policy and regulations will need to be studied to find the balance between the water-dependent industrial uses and the integrated park/flood barrier. Designated Port Area (DPA) is a state policy, with which public access and raised shorelines might be in conflict. DPAs are areas regulated by the Coastal Zone Management office at the state. They were created to protect water-dependent industries such as marine industries, shipping, fishing, etc.
- This waterfront section has the potential for new development, making it important to work with the local community to find the best mix between the land uses they prioritize, and the land uses the property owners would like to develop. Community buy-in will be necessary to drive a large-scale public project forward.
- Cost and financing—to secure federal funding for the construction of the barrier, the City will need to show public interest in the land. The City will need to acquire easements to receive federal funding for infrastructure on privately owned lots. Innovative financing mechanisms based on value capturing from new development and public–private partnerships collection could provide additional financing sources.

The Seaport in South Boston is susceptible to tidal flooding that can occur monthly. Due to the topography of the neighborhood, the current 100-year storm floodplain covers most of the area by over-topping the coastline. The

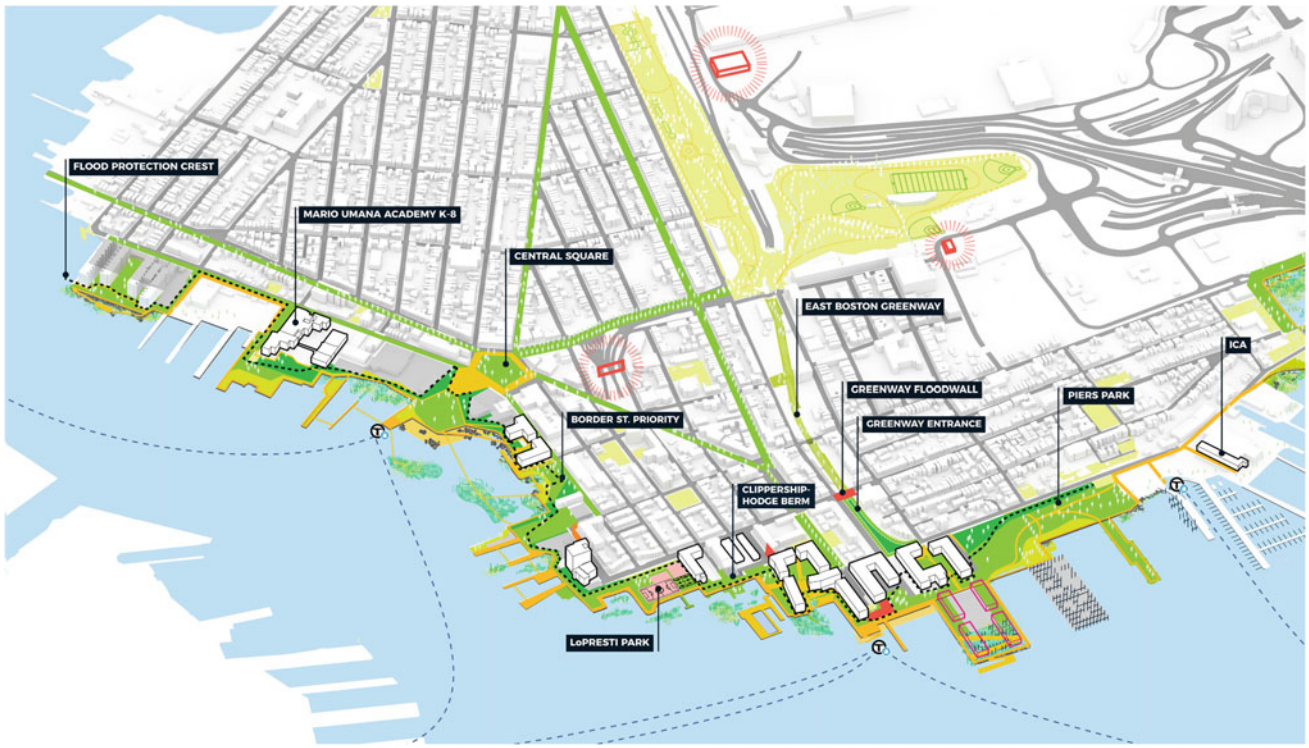

Fig. 9 East Boston long term vision (City of Boston, 2017)

Fig. 10 East Boston coastal zoning (City of Boston, 2017)

Fig. 11 South Boston resilient solutions (City of Boston, 2018a)

Coastal Resilience Solutions for South Boston (CRSSB) project estimates that over 5000 buildings will be exposed to coastal flooding during a 100-year storm toward the end of the century with 36″ SLR and an expected loss of $8 billion (City of Boston, 2018a). The plan explores multiple solutions for sections of the coastline; the primary strategy is to aspire for a waterfront alignment to protect the whole area. The cost of the plan is estimated at $521 M to $1.0B with annual operational costs of $7.8 to $15.2 M. CRSSB points out three main challenges to implementation: governance (private–public ownership), state and federal regulations for in-water land expansion, and funding mechanisms (City of Boston, 2018a) (Fig. 11).

The CRB district plan envisioning the coastal protection approach for the Downtown and North End encounters a different environment from East Boston and the Seaport (City of Boston, 2020). The Downtown is the historic core of the City; the coastline was reclaimed over the years, and the piers and wharves stand on centuries-old foundations. The subgrade in Downtown contains multiple utility and transit systems. The estimated cost of the waterfront option, according to the study, can be up to $300 M. Similarly, the challenges of the previous district plan funding and regulations are a significant issue that the City will need to resolve upon implementation. Governance, ownership, and jurisdiction play a critical role in the success of the waterfront solution; the potential strategy can provide a framework for property owners to come together and develop a design with the guidance of the City. The challenge in this case will be to balance interests and facilitate agreements and incentives. The second question regards implementation in a dense and active area such as Downtown and the need to minimize disruption during construction.

Overall, the challenges can be summarized into four main categories: civic activism and social equity, governance, regulatory practices, and funding. Each of these district plans has a detailed implementation roadmap and recommendations for the next steps; however, to start implementation, the City needs to resolve the complex challenges described above. The broad-scale overhaul of the City's built environment requires a reflection on past projects and an inquiry into the lessons learned from these processes.

3.2 Implementation Challenges

The implementation of large-scale public infrastructure requires robust public interest to support the effort, cost, and potential disturbance to the daily order during implementation. The vision plan provides an opportunity to evaluate the cascading impacts, explore systematic relationships, and outline the objective of benefits and transformations to the urban realm. Gradually aggregating and detailing projects from the larger scale brings attention to the missing links in

the urban planning system to create the long-term collective and knowledge required for adaptation.

The CRB work presented several implementation challenges that will require further study and the development of strategies to resolve. The main issues this study unravels are questions regarding the organizational authority and the governance framework to span the challenges of public, private, state, and city. This organized effort can support the other difficulties of alignment policy, regulations, and developing financing mechanisms. The Sustainable Solutions Lab at the University of Massachusetts, Boston conducted the following two studies to address these issues: Governance for a Changing Climate: Adapting Boston's Built Environment for Increased Flooding (Kruel, 2018) and Financing Climate Resilience: Mobilizing Resources and Incentives to Protect Boston from Climate Risks (Levy, 2018).

In general terms, the Governance for a Changing Climate: Adapting Boston's Built Environment for Increased Flooding report recommends forming new institutions to foster collaboration between the state, city, and municipalities in the metro area. The study connects resilience with "the region's equitable economic growth" by phasing the creation of partnerships and institutions to collect data for monitoring and analyzing these incremental changes (Kruel, 2018). Governance consists of both the establishments and the regulations created to support these institutions. To adapt existing institutions to climate change; institutions will be required to create a framework to integrate flexibility while maintaining reliability. Multiple existing zoning laws and policies can be tied to science and data to allow future adaptability without needing new regulations. Additional recommendations focus on equitable planning; for ongoing public support and trust, there is a need to expand climate-related projects and policies to include multiple benefits and social equity for the community. Finally, the report recommends expanding the authority of institutions such as the Massachusetts Water Resources Authority and the Metropolitan Area Planning Council, to include the resilience vision.

The Financing Climate Resilience: Mobilizing Resources and Incentives to Protect Boston from Climate Risks (Levy, 2018) report looks at the cost-benefit of adaptation projects like a basic tool for incentives. It suggests developing better metrics for risk and more accurate ways of pricing potential impacts for both property owners and insurers. The financing will have to come from multiple sources to spread the burden from the state, federal, city, and residents and per each entity, there are multiple traditional tools and mechanisms that can be utilized, including value capture, carbon tax, resilience dividend, sewer bills, and special zones. Any proposed mechanisms will need to be equitable in regard to risk exposure, ability to pay, carbon footprint, a transparent and engaged decision-making process, and injecting money back into the public realm and benefit.

The literature from CRB to the UMass Boston reports, highlights traditional and innovative tools to address the implementation challenges. Whether the strategy is incremental or proposes substantial structural changes, the timeline estimated for coastal adaptation is projected to span more than two decades. Bostonians raised concern that while the concepts and plans are a step in the right direction, there is not enough action forward (Caperton Morton, 2019; Conservation Law Foundation, 2020; Wilkinson, 2018). The concepts are not enforced by zoning and regulations and remain as a recommendation and guideline. While action stagnates, the waterfront continues to develop, leading to future risks and vulnerabilities. Three main questions lie at the center of advancing urban climate adaptation: (1) What is the scale of public and political interest needed to drive action and how can civic leadership support action? (2) What were the challenges for implementation? (3) What are the benefits of transformational change in the urban realm? The case studies (discussed in the proceeding section) aim to address these questions by identifying successful strategies for implementation, to address the common challenges of large-scale transformational infrastructural projects.

4 Case Studies

4.1 Methodology

This paper's methodology is focused on a robust analysis of comparable case studies to offer approaches to resolve the challenges identified in the implementation of a large-scale, urban adaptation project. This study draws from multiple resources and papers to provide a detailed comparison of qualitative and external qualitative data. The two projects presented here as case studies are: The Boston Harbor Cleanup and the CA/T, both implemented between 1985 and 2004. These projects were selected due to the size of operation; both are expansive public infrastructure projects. Similar to the CRB initiative, these projects required coordination between state and city operations, needed unique pressure to start implementation, and had a long-term transformative impact on the City, its economy, and the built environment. The Boston Harbor Cleanup overhauled a deteriorated infrastructure system across the City, required the construction of one of its king wastewater facilities, established a new state agency, and created a new public park on Spectacle Island. The Central Artery project transformed and revived the urban environment of downtown. Challenges and failures in the CA/T process of implementation have created financial challenges for the City and State and harmed the public trust (Figs. 12 and 13) (National Governors Association, 2019).

Fig. 12 Downtown and the Central Artery 1982

The previous portion of the paper highlighted the implementation complexities of the city-wide resilience project. Climate Ready Boston will have to materialize incrementally and be planned and managed in a multidimensional manner. The design and construction of such a project will need to occur at the small scale of several abutting lots, their owners, and the City. Planning and permitting will have to be coordinated with the district plan and other stakeholders (City and State agencies, utilities, etc.). Constant disruption to the urban environment will continue for years, and the public will need to be reminded of the original vision and the positive outcome. Dividing the district plans into smaller projects will reduce the project risk, and the City will need to plan for obstacles and disruptions in the process, preemptively. Civic leadership and community activism with their support or opposition can reduce that risk.

Boston has a unique experience with large-scale urban environmental projects. Possibly the "largest public works project in the world" (Krieger et al., 1999) was The Boston Harbor Cleanup and The CA/T and "$21 billion of public investment between 1987 and 2004" (Save The Harbor/Save The Bay, 2004). In the Leading-Edge report, Save The Harbor/ Save The Bay summarizes that the project aimed to accomplish regional goals and public investment to help catalyze private investments and the successful transformation of the Harbor (Save The Harbor/Save The Bay, 2004). In hindsight, decades after completion, it is possible to evaluate the conditions leading to the project, outline the steps taken for implementation, and assess the full extent of benefits and impacts the project had on the City. This section will describe findings from these two case studies focusing on comparable aspects to the Climate Ready Boston challenges: (1) What are the tools for implementation? What role did civic activism play in moving the project forward? (2) Which new institutions were established for this purpose? (3) How was the project funded and executed? What are the benefits of the project's spatial, economic, and environmental components?

Fig. 13 Downtown and the new Greenway 2017 (National Governors Association, 2019)

4.2 The Boston Harbor Cleanup

The Boston Harbor Project began in 1986, following a court-mandated order to modernize the wastewater infrastructure of the City and clean the Harbor. While the project was completed in 2001, the MWRA continued to improve and revamp the stormwater and wastewater system in Boston throughout the 2000s. Decades of neglect and a deterioration of the wastewater treatment infrastructure led to one of the most polluted harbors in the country, infamously called the "Harbor of Shame" (Toner, 1988). The total cost of the project was $4.7 billion, including the wastewater facilities of the Boston Harbor Project and the Combined Sewer Overflow control plan [Massachusetts Water Resources Authority (MWRA) 2014]. Today, people sail in the Harbor, swim along the beaches safely, and marine wildlife is often seen in the Harbor [Massachusetts Water Resources Authority (MWRA) 2019].

4.2.1 Civic Activism

The project took approximately 15 years to implement and to construct the required facilities, increasing pumping capacity, disposing of all solid waste, replacing pipelines, and establishing the institutional framework. While the project was completed on time, the events leading to its realization unfolded over a decade prior, with the driving force of civic leadership. Without the strong call from the local community for cleaning the harbor and modernizing the City wastewater system, this project might have taken place. Civic groups appealed to the court to require the local government to act and clean the harbor pollution that had been created from 300 years of use and neglect. Following the Federal Clean Water Act in 1972, local political leaders (City and State) submitted a waiver to the EPA and postponed action while shifting responsibilities and stagnating in bureaucratic gridlock. The push for action came from local activists, philanthropy, and public administration (Berg,

2004). Several actors led the litigation and campaign for public interest: Bill Golden, the City Solicitor for the City of Quincy, Massachusetts; the Conservation Law Foundation (CLF), an environmental advocacy group; and Save the Harbor/Save the Bay formed by the Boston Globe writer Ian Menzies, Bill Golden, and Judge Paul Garrity. The Boston Foundation (TBF), a historic community foundation rooted in Boston's civic life, supported the advocacy group work with grants (Brady, 2001). The judicial action started in 1982 when the mayor of Quincy, Massachusetts, sued the commonwealth and the Metropolitan District Commission (MDC) for the discharge of sewage into the Bay, against state law and in violation of the Clean Water Act (Levy & Connor, 1992). The Metropolitan District Commission (MDC) was the state authority responsible for wastewater treatment facilities and sewer systems. It was also in charge of state parks and recreational facilities. When it came to investing funds to modernize wastewater infrastructure, the state legislator was more inclined to redirect resources to the latter uses (Levy & Connor, 1992). In 1983, the CLF launched a court action against both the commonwealth and the EPA, the former for breaching the Clean Water Act, and the latter for failing to enforce the act (Jin et al., 2018). Although a higher court overruled state judge orders, the legislator established the Massachusetts Water Resources Authority (MWRA) in 1984 to take over the MDC wastewater responsibilities. In 1986, the federal court outlined a schedule through to 2025 with steps and instructions to build a new treatment facility (Levy & Connor, 1992). The public pressure created by advocacy groups and the court rulings were strong enough to foster a reorganization of governance and environmental resources management.

4.2.2 Governance and Funding

The challenges in acting upon the Clean Water Act can be associated with the institutional structure and limits of the MDC. Therefore, the act enabling the MWRA was a crucial moment in the Boston Harbor Project. The legislature enabled the creation of the MWRA "empowered to operate, regulate, finance, and improve the delivery of water and sewage collection, disposal and treatment systems and services, and to encourage conservation" (MWRA enabling act 1984). The independence of the MWRA as a semi-public authority allowed it to make decisions and raise funding separate from political considerations. It had the power to fund the project by collecting fees from residents and to "issue its own bonds and raise water rates as needed to cover the costs of the cleanup" (Berg, 2004).

4.2.3 Co-Benefits

Research by the Boston Foundation and Save the Harbor/Save The Bay showed the Boston Harbor Project led to private investment and development at the waterfront, totaling $2.2 billion and 60% of the City's population growth by the year 2000 (Save The Harbor/Save The Bay, 2004). A study from the Marine Policy Center at Woods Hole Oceanographic Institution and the School for the Environment at the UMass Boston looked at the ecological benefits to the Boston Harbor Project to assign a monetary value to the improvement of natural resources (Jin et al., 2018). The study combined water quality, ecosystem criteria, and value of recreation and open spaces in urbanized areas, estimating the value at $30–100 billion (the cost of the project was $4.7 billion).

4.3 The Central Artery

The objective of the Central Artery Project (CA/T) was to replace a series of deteriorating elevated highways constructed in the 1950s with a depressed system, to improve congestion and reduce air pollution. Above the tunnel in place of the viaduct, the project created 27 acres of linear open space called the Rose Kennedy Greenway. The Greenway connected the waterfront back to Downtown and the North End and allowed for new developments. Soil excavated for the creation of the tunnel went to cap landfills in the state and to Spectacle Island to cap the historic landfill and create a new park (Mass.gov, 2020b). The CA/T was substantially more complicated than the CleanUp, as it was more extensive in the spatial effort, the complexity of coordination, and the diversity of systems implemented. The project had over 100 construction contracts, with the most extensive geotechnical study in the nation, utility relocation program, and coordination with the MBTA subway tunnels. Also, one of the challenges was building 7.8 miles of roadway and tunnels across the dense urban fabric and maintaining the City fully operational with minimal disruptions. The project took three decades to complete, starting planning in 1982 with the restoration of Downtown streets in 2007 (Mass.gov, 2020a). The CA/T unfolded with more obstacles; the project took 8 years longer than planned and was error-ridden. The cost estimated in the early planning was $2.6–$5.8 billion, but the final price tag was closer to $15 billion–$24 billion with debt (Flint, 2015).

4.3.1 Civic Activism

In the early stages of the project, various interest groups in the City voiced concerns about issues from rodents to noise impact on marine life, the CLF that sued the state due to the dissatisfaction with a potential increase in traffic, and the Sierra Club litigated against air pollution (Boot, 1992). One influential organization was established in 1988 by local property owners, stakeholders, and businesses in Downtown —the Artery Business Committee (ABC). ABC's mission was to maintain the City operational while the project was

happening and influencing the plans for the benefit of the City (Luberoff, 2004). The group lobbied for funding at the local and national level and ensured the creation of the Greenway. Community outreach was part of the planning process for the use of air rights above the turnpike. The master plan, "Civic Vision for Turnpike Air Rights in Boston" (City of Boston, 2020), explored design options to repair the urban fabric and new uses above the highway. The long-term support and commitment of public groups and organizations was necessary for consensus-building in a long and complicated project.

4.3.2 Governance and Funding

Initial funding based on the estimated cost of $2.8 billion was provided (80% of) by the federal government from the Interstate Highway program. The incredible engineering challenge of building a tunnel on unstable landfill created centuries ago while the City above kept going, created unprecedented challenges, both big and small. The time added to the overall effort and the complexity of mistakes and unknowns added to the project, increased the cost. ABC, the local advocacy group lobbied the State legislature and Congress to prevent cuts in the funding (Luberoff, 2004). Massachusetts had to cover all the extra costs beyond the original estimate. The state had to increase tolls and fees and reduce spending in other places across the state (Flint, 2015).

The responsibility over the project was assigned to the Massachusetts Highway Department (MHD) in 1991.

The management team of the project was a private–public partnership between the State and an Engineering firm, Bechtel/Parsons Brinckerhoff. The agreement for the collaboration created a condition where B/PB had control over the design and was representing the state and advising it (Project et al., 2003). Public sentiment over this collaboration in lieu of the many mistakes and the cost overrun, was due to wrongdoing of the constructors and a lack of oversight (Flint, 2015). However, there was no clear record of corruption and the firm returned approximately $1 billion to cover the design flaws.

4.3.3 Co-Benefits

The original goal of the project was accomplished as it reduced congestion and allowed the flow of traffic. However, it also created more traffic than before. Taking down the elevated highway transformed the city; it connected the waterfront with the historic North End streets. Views and access points for pedestrians to the water and into Downtown revived the essence of the Harbor City. The buildings along the Greenway increased in value with the creation of an additional facade. The Rose Fitzgerald Kennedy Greenway is a lively and active place with art installations, beer gardens, and a weekend market.

4.4 Main Benefits and Takeaways

Both projects significantly improved the access and the quality of the waterfront experience. The Downtown and North End became one with the historic wharves and increased the value of properties. "The Shawmut Peninsula is some of the most sought-after and desirable urban real estate in the country" (Flint, 2015). The opportunities to develop the Seaport neighborhood in South Boston and add recreational programs along the waterfront include museums, the New England Aquarium, sailing, kayaking, and the use of the Boston Harbor Islands. The new open spaces, potentially improved water and air quality have improved the quality of life and the health of the City residents.

Both projects show different implementation processes with very different levels of engineering and management complexity. The Boston Harbor Project was overwhelmingly supported by the public and advocacy groups. Once the state realized it had to act, it established a new independent authority, which successfully drove the process. The project focused on renewing facilities without the complexities of the energetic urban fabric. On the other hand, the "Big Dig" was a gargantuan effort to transform the city while it remained active. Public opinion shifted as the project extended in schedule and budget, and the message over the final benefit for the greater metro-area community was not always coherent. The advocacy groups involved, represented one group of Bostonians and not the voices of all residents (Miller, 2012). The focus on the car and no other public transit infrastructure fostered questions of equity. There is a substantial amount of comparable experience from these projects to apply to the CRB initiative. The following discussion section will explore the overlapping issues and lessons learned from the past projects.

5 Discussion: Lesson Learned

This study aimed to compare and analyze large-scale public projects with transformational impacts on the urban environment. This exercise also attempted to extract approaches to resolve questions and challenges that have arisen in the CRB initiative. Section 3 identified four main challenge categories to be explored in the methodological comparison: civic activism and social equity, governance, regulatory practices, and funding strategies. Section 4 extracted the relevant lessons per each category from the reported history and studies. This paper used these categories as guiding issues: (1) Potential tools for implementation and civic activism's role in moving the project forward. Large-scale projects are known to be cumbersome to execute and while the urgency and need for implementation are well

established in the cases, it is hard to see any drive for implementation without a strong incentive or a political movement. (2) The scale of implementation and future operations require the establishment of new institutions and governance structures. Some of the challenges toward implementation are due to the lack of functioning or adequate institutions. Similarly, regulations and policies can be barriers to the implementation of specific project components. The change of such regulation extends the timeline of implementations; on the other hand, certain policies can incentivize actions. (3) The cost of these projects is seemingly the first and foremost significant challenge. Strategies to evaluate the benefits of a project started with the cost–benefit of the preventable loss or negative impact of the current condition. These projects all show significant benefits beyond the single utility: the spatial, environmental, and economic value that is created and extends beyond the projected.

5.1 Civic Activism, Public Participation, and Moving the Project Towards Implementation

Although in the Boston Harbor Project, what forced action was a court order, civic action, and public consensus was the instigator and the motivation to implement and push the project forward to materialization. Multiple advocacy groups backed up the same vision from their perspective. The public interest showed to drive political will and commitment to institutional change. In both cases, the actions of the TBF, CLF, Save the Harbor/Save the Bay, and ABC fostered stewardship and influenced the inception of the process and its evolution.

On the other hand, in the CA/T, the project was driven by federal political interests and available funds. The original intention to improve the public realm of downtown was admirable, however, the process failed to engage all impacted groups. Additionally, in a transportation project of this scale in a major metropolitan area and a regional business center, many stakeholders had interest in improving the outcomes. That said, missed opportunities were identified by advocacy groups that could have improved the CA/T project, if they were engaged on time. These are potential lessons that can be carried forward for the CRB initiative. For example, the CA/T project's main goal was to improve traffic and resolve engineering issues with the existing viaduct. The ABC advocated for specific spatial impacts and the design of the public realm to connect their neighborhood to the waterfront and provide better urban context to their properties. Potentially, the outreach to other commuter groups and City residents would have revealed interest in additional benefits such as public transit, pedestrian connections, bike lanes, etc. Moreover, the lack of transparency and public participation in the process exacerbated the public sentiment regarding the mishaps and schedule extensions in the construction process.

The lesson for CRB is to leverage the public support and engagement process to create community support and long-term stewardship. Public interest and support can be achieved through substantial communication of the risks, climate impact, the City's future, and the potential long-term benefits for the City's living environment. To drive the project forward and maintain a long-term commitment to the project's success, the community needs to feel invested in the outcomes. The Climate Ready Boston district planning process includes outreach to local community groups and stakeholders; however, it is not yet enough to drive the project forward to action.

5.2 Setting up Institutions with Agency and Governance Framework

Both projects were publicly funded with federal grants and fees collected from taxpayers. The way in which the responsible authority managed these funds has been a source of criticism. The overrun of the construction cost of the CA/T led to the neglect of other systems. Furthermore, the structure of the project management team and the public–private partnership raised questions from the community. For the Boston Harbor Project, the state had to form a new authority, the MWRA, with the ability to collect fees removed from the political gridlock. The establishment of a specialized authority with the capacity to implement the project and collect fees was a critical step to executing the cleanup project.

In the context of CRB—for a project of this scale, coordination and organization capacity needs to be across scales of leadership, with authority to make decisions and drive a flexible process. A governance framework could provide leadership and coordination across all necessary city and state agencies. A regulatory strategy aiming to address the identified hurdles in the current policy can streamline legislative processes. An additional takeaway can be tied to the flexibility of the project's objective. The project framework should allow flexibility under the umbrella of a vision, especially if the core purpose is to solve a problem as the project has an expanding schedule and cost. The Mayor's Harbor Vision presents a comprehensive strategy for multiple benefits beyond the resilience utility. The approach to divide the comprehensive plan to districts allows aggregation of the project and site-specific benefits.

5.3 Innovative Funding and Financing Mechanism

The main takeaway from the quantitative summary of previous studies and reports of both case study projects is that it is clear that the financial benefits and long-term economic value is more significant than projected. For long-term success, self-sufficiency, growth, and financial sustainability, these two transformative urban infrastructural projects have proven successful. Simultaneously, it is important to set the framework to ensure equitable access to this future economic growth and invest it back into public infrastructure. From this study, it is evident that the benefits of the Boston Harbor Project and the CA/T exceeded well beyond the expected and initial utility of these infrastructure projects. In essence, improvement of the urban realm and quality of natural resources catalyzes financial investment and ecosystem revitalization. From a cost–benefit perspective, thirty years down the line, the benefits outweigh the original investment as the "Boston Harbor Cleanup is about 5–16% of the total asset value of ecosystem services" (Jin et al., 2018). The Resilient Boston Harbor Vision is another opportunity to transform and improve the urban realm for the future, minimizing loss due to extreme climate events and creating additional value and benefits.

Potential strategies to support the funding and financing of the CRB projects can come from future values and benefits. These strategies can draw from future benefits and outline incremental funding mechanisms. For example, as was described by some of the CA/T critiques: the ABC as an interest group could leverage the project benefits from quantifiable value. As property owners, they directly benefited from the public investment in the project. While property owners have endured the years of construction and invested in the process—the question should be asked—should they have contributed more to the funding of the project? (Flint, 2015) This financing strategy called value capture, accounts for the future increase in property value or individual savings due to public investment. These funds can be redirected to pay for the project as a strategy for more equitable resource distribution. As Climate Ready Boston looks at waterfront strategies, the proposed alignment protects a larger area of inland properties. Therefore, concepts of resilience dividend (Rodin, 2017) and value capture can be incorporated.

6 Conclusion

The vision to transform the Boston coastline into a resilient waterfront is a complex and multidimensional effort. It is comparable in the scale, cost, and level of systemic changes necessary at the physical and institutional levels. The case studies examined in this paper offer a view into broad, long-term impacts of infrastructure projects. Beyond the stated goals of each project, the result on the ground and cascading transformation of the urban realm and built environment shows great ability for sustainability and strength. The successful transportation systems and Greenway in Downtown Boston, created after an excruciating construction process, presented a steady increase in property values, new businesses, growth of population, and improvement of urban life. The Boston Harbor Clean-Up allowed people to use the waterfront, enjoy the harbor with various recreational and commercial activities, as the city grew along the coastline with a new appreciation for the waterfront, and ecological habitats were restored. In contemporary times, the harbor is no longer used for the industry but as a recreational resource for the community. The optimistic take from the case studies—is that although it was cumbersome to implement and an expansive effort—it was well worth the trouble.

The most significant takeaway from the project studies is that this type of public project will need to be more than the sum of its parts, with a deep connection to the community and support from civic leadership. There is an opportunity to envisage the possible benefits of this project and leverage the endeavor for multiple equitable community priorities. Residents are conscious of their environments, geographic problems, and structural deficiencies, which may not be as apparent to professionals. The knowledge and ideas they provide will, in essence, promote creative solutions and strategies. Executing this project will require institutional arrangements and a change in the standard cultural perception; it will be a gradual transformation—a learning curve towards collective knowledge building.

To foster public interest and drive action, the community needs to participate beyond the standard practice. The future risk of climate change and the uncertainty of extreme weather events can be complicated and daunting to grapple. The process facilitating the CRB needs to develop a deep learning strategy and long-term stewardship across all ages and community groups. The process informs, educates, and empowers the community to develop ideas—it can bring people together and make social connections stronger. The developed networks can be developed to support long-term climate adaptation initiatives and as the basis for effective implementation. Finally, governance and the institutions created, need to fit the scale and complexity of the challenge. Institutional capacity should not be the hurdle preventing a project of this scale of importance from happening. An effective authority could support coordination between agencies and stakeholders, resolve financing issues, and drive regulatory and policy changes.

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Evaluation of Mitigation Strategies of the Urban Heat Island Effect in Mediterranean Area. The Case Study of Largo Annigoni in Florence (Italy)

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Abstract

Global warming is the most-documented phenomenon of climate change. Any increase in global temperature effects on human health has a severe impact on the citizen's well-being and the overall environmental quality of urban contests (IPCC, Global Warming of 1.5 °C. An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, 2018). Numerous studies report the specific impact of current and projected urban overheating on the increase of the energy demand for cooling purposes during the warm period. Urban climate and the phenomenon of 'Urban Heat Island Intensity' (UHI) have been extensively investigated in the last decades and a lot of research has been conducted in South Europe (Santamouris, Energy and climate in the urban built environment, 2013). Moreover, the EU policies promote research and innovation actions on urban regeneration through nature-based solutions, both using and improving existing technologies to face challenges, as well as exploring more novel materials and architectural components, for improving well-being in urban areas. In this work, an evaluation of the impacts of a design proposal developed for the urban regeneration of Largo Annigoni in Florence is done to reduce heat stress at a micro-urban scale of the built environment. Simulation of microclimate conditions of the analyzed area was performed using the three-dimensional software ENVI-met for urban modelling comparing indexes of environmental comfort such as Mean Radiant Temperature, the PMV Index (Predicted Mean Vote), and the PET Index (Physiologically Equivalent Temperature). Besides, climate-adaptive design became an important tool to encourage the regeneration of contemporary cities, with a particular focus on the effects generated from the combination of innovative technologies for mitigation and adaptation to climate change of urban space.

Keywords

Climate adaptive design • Urban heat islands • Urban regeneration • ENVI-met • Environmental comfort

1 Introduction

According to global climate change scenarios, the IPCC (2018) reported that "in many regions land and sea, even if the greenhouse gases emissions are drastically reduced, temperatures are increasing at 0.2 °C per decade (approximately 1 °C above pre-industrial levels), precipitation patterns are changing, sea levels are rising, and climate-related extreme events such as heatwaves and heavy precipitation are growing in frequency and intensity." Furthermore, in the urban area, global warming and associated changes in temperature can have significant implications on public health (Armstrong et al., 2015; Hajat et al., 2010), energy consumptions (Santamouris, 2013), and outdoor thermal comfort (Evola et al., 2017). Consequently, cities need to adapt to avoid or reduce the negative impacts caused by climate change, such as weather-related deaths and economic losses from climate-related extreme events in the future. This situation requires a response not only from the national governments but also from the local authorities. The integration of future climate variability in urban planning processes at

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the local level can assess and select adaptation options and strategies, considering the particular geographical, socio-demographic, or economic characteristics of a given place (The International Bank for Reconstruction and Development, 2011).

Many scientific studies (Akbari et al., 2016; Grimmond et al., 2016; Hajat et al., 2010) have shown how temperature is higher in urban areas, than in nearby rural areas. The annual mean air temperature of a metropolitan area can be 1–3 °C warmer than its surroundings (U.S. Environmental Protection Agency, 2010). This phenomenon, known as Urban Heat Island (UHI), can affect communities due to increasing urban discomfort and summertime peak energy demand resulting in increased costs for cooling, air and water pollution, greenhouse gas emissions, and incrementation in illnesses and heat-related mortality.

The local weather conditions (i.e., wind and cloud cover), the geographic location (i.e., climate and topography), not only the urban geometry but also properties of urban materials used to cover the ground and buildings surfaces, the reduced vegetative covers or absence of green infrastructures are key factors that influence UHI development. Concerning the urban geometry factor, the dimensions and spacing of buildings within a city can considerably affect wind flow, energy absorption, and thermal quality of the urban environment. Over the years, several research studies focused on the analysis of local microclimate conditions of historical "urban canyons," which are characterized by a downtown area that is surrounded by enclosed spaces and tall buildings (Georgakis et al., 2014). Castaldo et al. (2017) defined an urban canyon as "a space with a low sky view factor (SVF) value, closer to zero and with a limited surface heat re-emission capability, where the outdoor comfort is mainly affected by exposure to solar radiation and also street orientation and height/width ratio (H/W) have a considerable effect." Moreover, some recent Italian studies (Bassolino & Ambrosini, 2016; Evola et al., 2017; Lassandro et al., 2018) investigate the possibility to use novel materials and technologies to improve the outdoor comfort conditions in historical urban areas, where typical renovation strategies cannot be applied due to the presence of historical-landscape constraints. The objective is to analyze the impact of different mitigation strategies to reduce the UHI effect, adopting multiple scenarios based on a parametric design approach and comparing various configuration models mainly focused on trees and vegetation and properties of urban materials, in particular radiative (i.e., albedo and thermal emissivity) and thermal properties (i.e., heat capacity). Specifically, for paving materials placed at the ground level, the interest of researchers on innovative cold materials (i.e., cement-based materials and highly infrared-reflective stone) is growing, and as Dessì (2011) mentioned, an "emerging body of research and pilot projects are helping scientists and urban designers understand better the interactions between pavements and the urban climate."

Based on these considerations, this work investigates design approaches and solutions that support a design proposal of an urban transformation in Tuscany, Italy, which considers reducing exposure to climate risks (UHI, heatwaves, water, and flooding deficiencies), economic, and social sustainability. Furthermore, the paper presents analysis and evaluations operated in the frame of Post-graduate Master Course in Bio-ecologic Architecture and Technological Innovation for Environment (MSC ABITA) of the University of Florence, in order to improve the climate resilience of Florence's historical square Largo Annigoni. The design approach, based on microclimate simulation for urban modeling, was developed as a tool to stimulate the urban regeneration of the Italian historic districts, focusing on the effects of combining innovative climate mitigation and adaptation technologies.

2 Research Methodology

The research methodology, as described below, was articulated step by step to define a sustainable and resilient meta-design proposal for the urban regeneration of Largo Annigoni, from state of the art to evaluation of the design proposal. In detail, the scientific work was articulated as follows:

(1) Analysis of urban geometry factors and urban fabrics (buildings density and morphology) and climatic conditions (altitude, latitude, degree days, average temperature, prevailing wind, sun path diagram); (2) Analysis of urban open space uses, based on different patterns of spatial occupancy and considering specific users profile depending on the season and on the different time of the day; (3) Identification of some representative microclimate indicators for pedestrian comfort (mean radiant temperature, air temperature, relative humidity, wind speed) and urban features (solar radiation, sky view factor); (4) Identification of the urban and building features that mainly influence the local microclimate, such as: materials physical properties, urban fabric morphology, mitigating elements (e.g., water bodies, vegetation and integrated green systems as green walls and green roofs); (5) pre-processing of the geometric and physical model of Largo Annigoni, through ENVI-met; (6) UHI simulations of the square's urban climate before and after the renovation of 2019; (7) design of a suitable project scenario; (8) pre-processing of the geometric and physical features of the project scenario through ENVI-met; (9) simulation of the project scenario; (10) analysis of the simulation results and identification of the most effective technological strategies, in terms of mitigation of the urban heat island, overall improvement of thermal comfort and urban microclimate.

In detail, the transformation project shown in this paper was developed in the frame of MSC ABITA, involving students in the project-based learning experience through active exploration of a real case study.

The MSC ABITA, initiated in 2003, following EU directives aims to offer an advanced level of knowledge that gives new inputs and instruments for environmental projects in an eco-compatible perspective. In particular, it trains new professional figures capable of influencing the decision-making process to enhance territorial revitalization processes by defining intervention scenarios and comparing the different design solutions to build more sustainable and resilient buildings and cities. The topics dealt with a concern on environmental, economic, and social sustainability applied to the territory's management and governance at an urban scale. In the MSC Academic Year 2019–2020, as part of the practical experience in developing microclimatic simulations, students analyzed the outdoor comfort of the square Largo Annigoni using dedicated software, such as ENVI-met.

The design proposal was inspired by a holistic approach finalized to improve the Florentine square's resilience, starting from a first analysis carried out on the identification of its social and environmental features. Attention was paid to preserve its historical urban configuration and its relations with the surrounding areas whilst increasing its responsiveness to the effects of climate change, in particular to the UHI. Moreover, with the aim to transform both the psychological perception by users, in particular university students and elderly people, the design strategies were focused to maintain its functional and aesthetic appearance. Simulations were performed using ENVI-met software to calculate and compare the leading indicators of the UHI's impacts on the urban environment. In detail, to determine the value of the Mean Radiant Temperature (PMV Index, °C) and outdoor thermal comfort (PET Index) of a specific user (including sex, age, height, and weight data), the ENVI-met's application "Biomet" was used. Moreover, in this phase of analysis, only climatic conditions of the UHI and the PMV index that exceeds [−3/+3] range value were taken into account to identify the thermal discomfort for the older people that represent the case study's target group.

3 The Case Study

3.1 Largo Annigoni Before and After the 2019 Renovation

Largo Annigoni (Fig. 1 and 2) is a large public square realized in 2005 as the roof of underground parking in the Sant'Ambrogio neighborhood, located in the historical center of Florence. The recovery project, by Florentine studio Natalini Architetti, provided the total demolition of the former municipal warehouses giving way to a parking and a new pedestrian square for the Sant'Ambrogio neighborhood. On the west side of the new court, paved in "pietra serena" (a typical Tuscany stone), two pavilions are located to allow the parking entrance and exit as well as the access to its technical rooms. Recently, 28 modular and prefabricated boxes were built in the northern part of the urban space to realize the new city's antique market. Since the renovations, citizens spend much time in the square during the whole year, particularly during the summertime, despite the inadequate comfort conditions due to the absence of shading or green surfaces and the lack of urban furniture to increase their livability.

Currently (Fig. 2), the square presents a complexity of physical and morphological conditions due to the simultaneous presence of historical and modern buildings surrounding the space, market activities, and restoring spaces.

Fig. 1 Largo Annigoni square before the 2019 renovation (Base case)

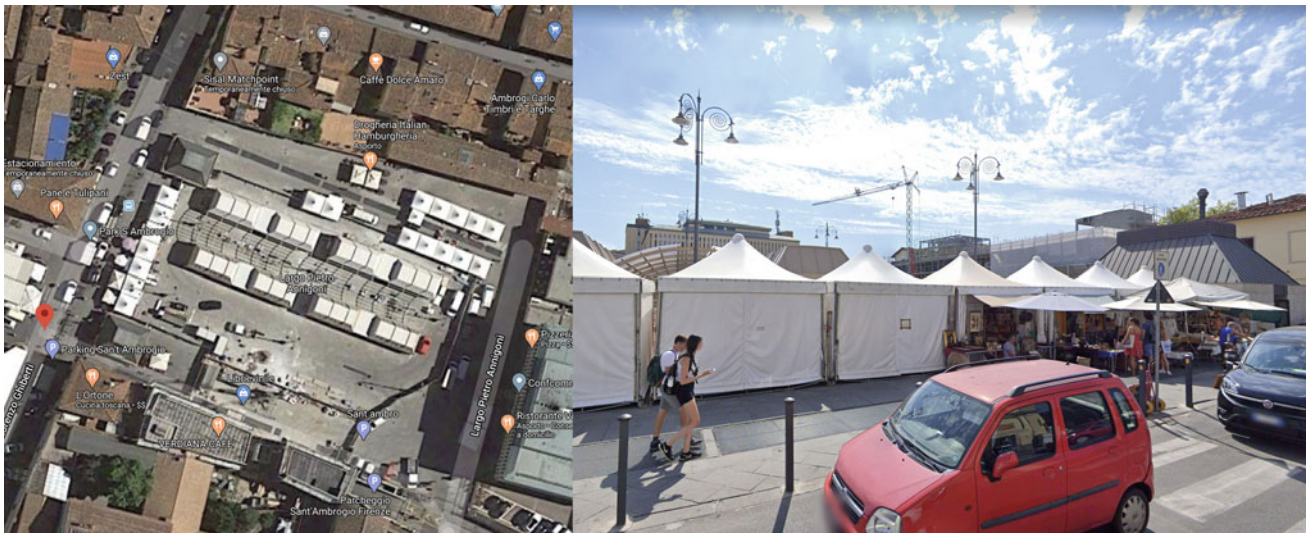


Fig. 2 Largo Annigoni square after the 2019 renovation (Scenario 1)

On the east border, the headquarter of the Nazione magazine is located, while the new access to the School of Architecture of the University of Florence is under construction along the southern border; on the west edge, Via Mattonaia divides the square Annigoni from Sant'Ambrogio market.

3.2 Master Students Design Proposal

The square is surrounded by buildings with irregular shapes in a fragmented composition; its pavement is realized with dark pedestrian materials, while the adjacent roads are paved with asphalt. The absence of trees and vegetation, water elements, semi-permeable and permeable green areas, shading elements, seats, and other street furniture elements are evident.

For this reason, the MSC students' regeneration design proposals (Figs. 3 and 4) were focused on the definition of new urban spaces, where a new antique market and other social infrastructures were located to improve the outdoor comfort and the environmental performances of the urban district and to increase its social potential as aggregative space.

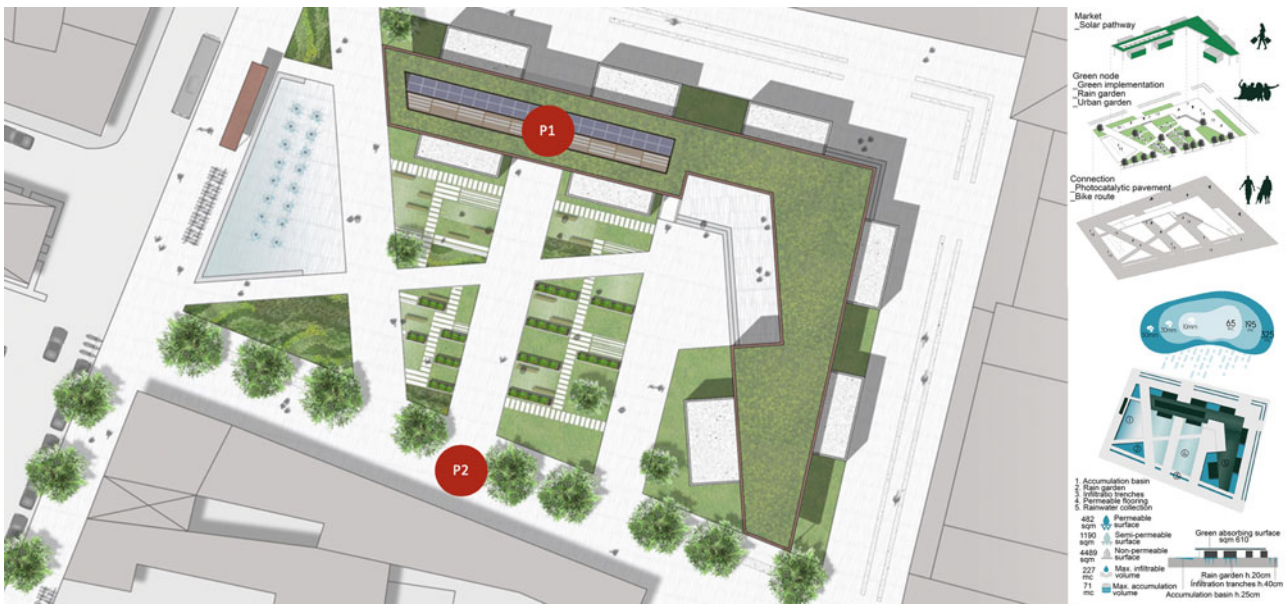


Fig. 3 Design proposal (Scenario 2): **a** Plant layout: P1, solar wood shading, P2, south border near the new entrance of the Architecture School; **b** Green infrastructures design scheme; **c** Water infrastructure design scheme

Fig. 4 Rendering of the design proposal (Scenario 2)

In detail, the project of Master students was focused on: (1) the re-paving of the square; (2) the construction of new market buildings with integrated renewable technologies for the energy production and water storage in a wooden solar shading structure; (3) the retraining of the nearby streets, transformed into green corridors; (4) the design of water elements, like fountains, to increase the outdoor comfort, especially during the summertime; and (5) the realization of a rain garden for water collection to prevent and treat the local stormwater run-offs.

The vegetative species integrated into the green areas of the new square were selected from native species according to the phytoclimatic and bioclimatic characteristics of the study area considering the following: mild and non-allergenic species; a balanced use of evergreen and deciduous trees to improve seasonal water regulation; permeability of foliage for radiation control; seasonal adaptability and maintenance.

The project proposal was also characterized by using the local materials for the urban paving with a high albedo and a low Solar Reflectance Index (SRI).

4 Simulation Model

The proposed method analyzed microclimate conditions and thermal behavior of the square Largo Annigoni (before and after the realization of the flea market in 2019) using environmental simulation modeling performed through the ENVI-met, a holistic three-dimensional software that allows the developing predictive models based on the fundamental laws of hydrodynamic and thermodynamic at an urban micro-scale.

Indeed, ENVI-met can fulfil detailed microclimatic analysis starting from the climatic data, (including wind speed and direction, hourly air temperature, and humidity), the interactions between several environmental factors (such as the surface materials, buildings, and vegetation), and their influence on the urban microclimate. Moreover, it evaluates Fanger's indices based on the modified heat balance equation for outdoor conditions developed by Jendritzky and Nubler (1981).

In detail, to evaluate the main design strategies, to develop appropriate project proposals for a future requalification of the square based on their impact, and to reduce the UHI effects, the atmospheric temperature (°C) and the outdoor thermal comfort (PMV and PET indexes) were calculated, analyzing the energy performances of three different scenarios: Base case, before the renovation (Base case); Base case, after the 2019 renovation (Scenario 1); and Design proposal (Scenario 2).

The study starts from a reference simulation model, the Base case before the renovation, in which the square was generated editing the area with a rotation of −20° from the North. The grid size of the rendered model was 60 × 60 × 30 (x-y-z) with three-dimensional spacing of dx = 3.00 m; dy = 3.00 m; and dz = 2.00 m. The buildings included in the model have a height between 6 and 24 m. For the modeling of the vegetation modeling related to Scenario 2, three different tree types were employed (Table 1).

Table 1 Principal characteristics of trees integrated into the model simulation

Characteristics of the trees	Acer negundo	Tilia platyphyllos (t)
Height (m)	11	25
Width (m)	9	15
Albedo	0.5	0.18

Moreover, the simulation model was developed mainly on radiative properties of surface materials of the three different design scenarios (Table 2). Finally, a part of the urban context surrounding the square was included in the model, as the software struggles in producing precise results near the edges of the simulation area.

The input setting of input climatic data in ENVI-met simulations refers to the hottest day expected in the climate file: the August 1, 2017 (Minimum Temperature 20.0 °C at 4:00 a.m.; Maximum Temperature 41 °C at 04:00 p.m.; Minimum relative Humidity 15% at 01:00 p.m.; Maximum relative Humidity 70% at 6:00 a.m.; and 0.2 m/s wind speed from south direction).

The results associated with the atmospheric temperature and Predicted Mean Vote (PMV) and Physiologically Equivalent Temperature (PET) were derived from the least favorable microclimatic conditions (04:00 p.m.) and in the relation to the most disadvantaged users, represented by older men (Age: 75 years, Height: 1.75 m, Weight: 75 kg, Clo: 0.90, Met: 1.35).

The analysis of solar radiation and sun path diagrams (Table 3) for the Base case was performed in a 3D model generated with Sketchup using Florence's meteorological data in .epw format (Energy Plus Weather Data format).

Three different scenarios (Fig. 5), listed below, were analyzed by the students of the MSC ABITA to compare different design strategies to minimize the impact of the UHI effect on urban area:

- Base case. The model was extrapolated/generated by analyzing the Largo Annigoni urban environment before the 2019 renovation, as described in detail in Sect. 3.1.
- Scenario 1. The model created had the same characteristics as the Base case model with the addition of prefabricated modules located on the north side of the square from Florence's municipality in 2019.
- Scenario 2. The model was realized in order to analyze the impact of the technological solutions adopted for the urban area regeneration, improve its microclimate and thermal comfort, and increase the quality of users' urban life, as described in Sect. 3.2. The same Input files of the Base case were analyzed in ENVI-Met software, modifying only the Configuration File with the new urban materials and elements added in the design scenarios.

5 Results

5.1 Atmospheric Temperature, PMV, and PET Index

Simulations for all three scenarios were measured on August 1, 2017 within the 24 h range. Figure 6 shows Thermal and PMV maps of the three scenarios analyzed during the warmest period of the day (04:00 p.m.).

The plan views (x-y) show the data at pedestrian eye-level height (z = 1.75 m, representing perceived thermal comfort of the users).

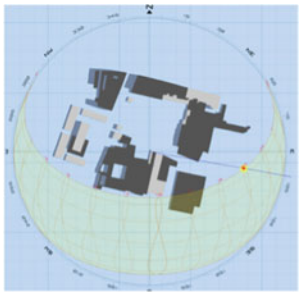
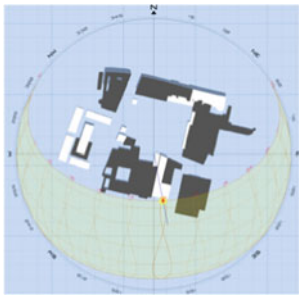
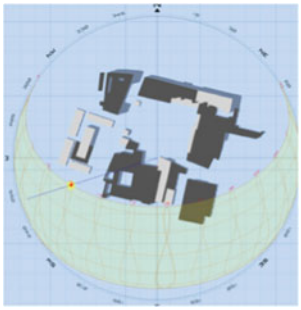
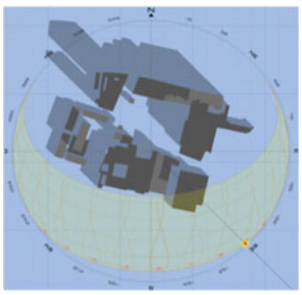
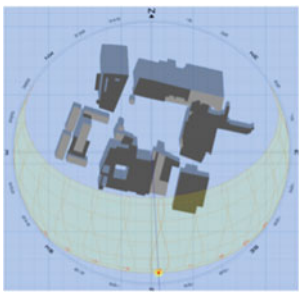
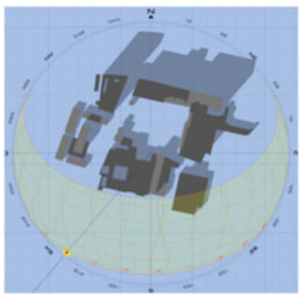
The simulations results achieved can be summarized as follows:

- *Base case.* The square shows a general discomfort throughout the day due to the lack of trees, vegetation, and shaded areas with a temperature range from the maximum of 38.87 °C to the minimum of 36.40 °C in the south part of the square. Climatic comfort indicators delineate a condition of high stress due to the summer overheating (PMVmax = 6.52 equivalent to PETmax = 79.70 °C). The buildings' shadow on the southern border creates an area with a minimum PMV index value of 5.52.
- *Scenario 1.* Compared to the Base case, this scenario shows no significant improvement over the whole square's urban comfort, with the permanence of extreme

Table 2 Radiative properties of surface materials integrated into two design scenarios

Materials	Albedo	Emissivity	Base case	Scenario 1	Scenario 2
1 Asphalt	0.2	0.93	✓	✓	✓
2. Asphalt with red coating	0.5	0.93			✓
3. Dark granite pavement	0.2	0.63	✓	✓	
4. Reflective concrete light	0,7	0.93			✓
5. Loamy soil	0.15	0.90	✓	✓	✓
6. Grass	0.2	0.97			✓

Table 3 Solar radiation analysis and sun path diagrams for the Base case

Summer Solstice 21 June		
 09:00 a.m Azimuth: 100,41°, Altitude: 45,09°	 12:00 p.m Azimuth: 169,01°, Altitude: 69,38°	 03:00 p.m Azimuth: −107,87°, Altitude: 50,97°
Winter Solstice 21 December		
 03:00 p.m Azimuth: −141,21°, Altitude: 12,72°	 12:00 p.m Azimuth: 176,79°, Altitude: 22,77°	 09:00 a.m Azimuth: 136,06°, Altitude: 9,66°

microclimatic conditions. Radiant and air temperature reduction is achieved only in the northern area of the square, in correspondence with the shading formed by the market roof, with a PMV of 4.45; however, it is below the comfort threshold. Also, the gallery area between the two rows of new market buildings shows a slight improvement compared to the reference case (atmospheric temperature of 36.33 °C), due to the shading generated by the volumes, but also in this case, the PMV is 4.40. In other words, the addition of new prefabricated buildings connected by a covered gallery does not guarantee to achieve good comfort performance inside the square, with overheating phenomena detected in summer days also inside the new flea

- *Scenario 2.* The covered area of the flea market designed by Master students in this scenario is realized in wood and covered with a mobile roof structure with adaptive shading devices. This design choice favors the temperature reduction of −3.33 °C with a temperature range from a maximum of 38.39 °C to a minimum of 35.37 °C (Fig. 7). The PMV index shows a minimum value of 4.45 and a maximum of 6.52, with a maximum reduction of −2.06 (Fig. 8) corresponding to the central area of the new flea market located in the northeast side of the square, where the existing dark pavement was replaced with reflective concrete, and a wood shading device was built. Furthermore, the new nine trees located on the south side of Largo Annigoni, close to the main pedestrian path, generated additional shading areas to benefit the square users.

5.2 Detailed Analysis of Hourly Temperature Profile

To better understand the comfort conditions and the temperature oscillation in different areas of the square, two different spot points were selected: near the wooden solar shading (Fig. 1) and on the south border of the Largo Annigoni close to the new entrance of the Architecture School (Fig. 1).

Regarding the UHI phenomenon, the analysis (Figs. 9 and 10) shows that Scenario 2 guarantees good results in both the analyzed spots. Furthermore, it is interesting to note the decreased atmospheric temperature in the southern

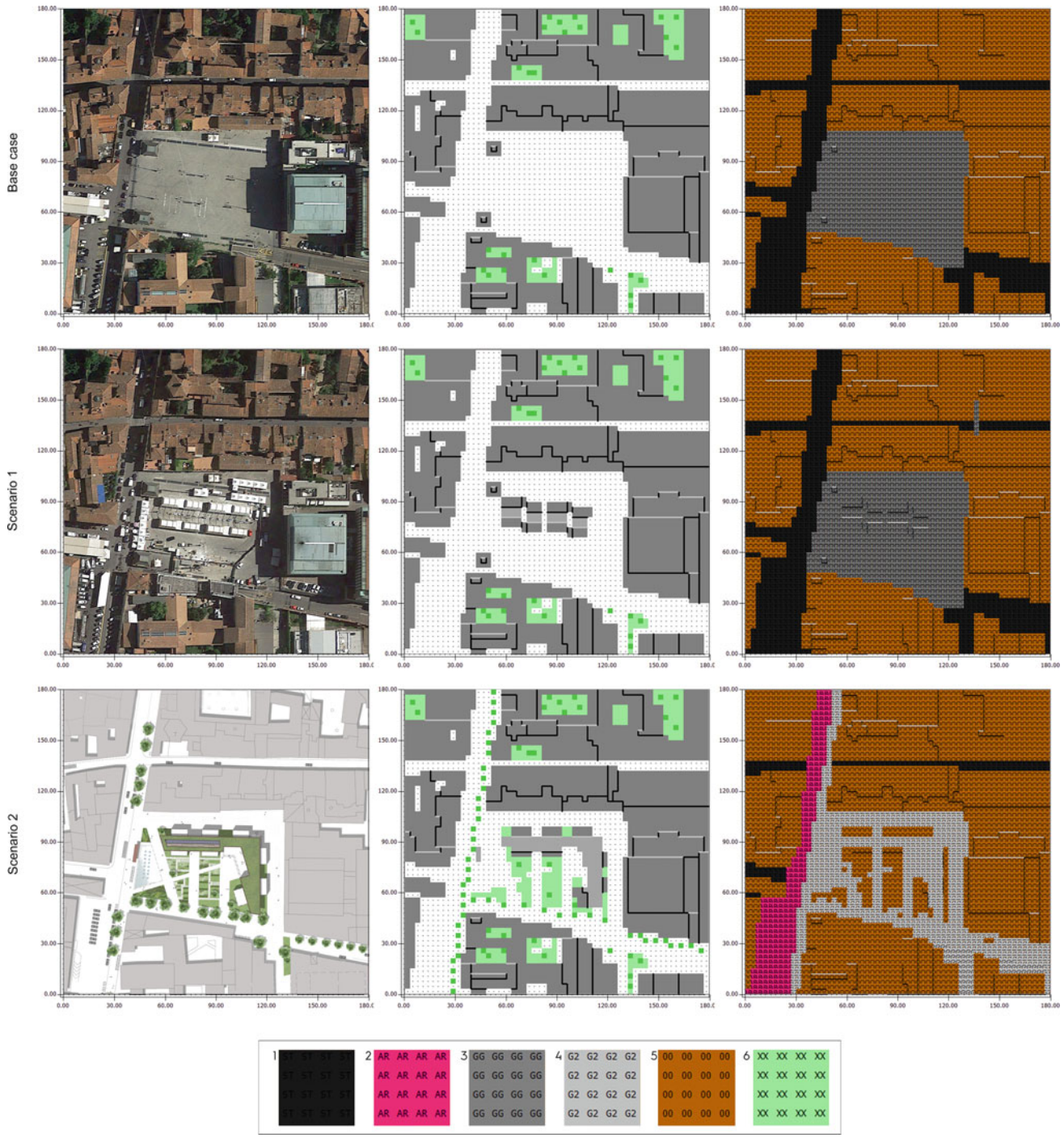


Fig. 5 Surface vegetation and soil analysis in the three simulation models: Base case, Scenario 1, Scenario 2

border area (P2) in comparison to the Base case and Scenario 1, despite limited changes (repaving and to planting new trees) proposed by design for this zone.

In other words, the ENVI-met simulations show that the design choice to integrate shading device, green and reflective surface, allowed reducing the atmospheric temperature in a historical urban contest, which improves the urban microclimate comfort also in the inadequately ventilated and not directly affected by the effect of shading systems.

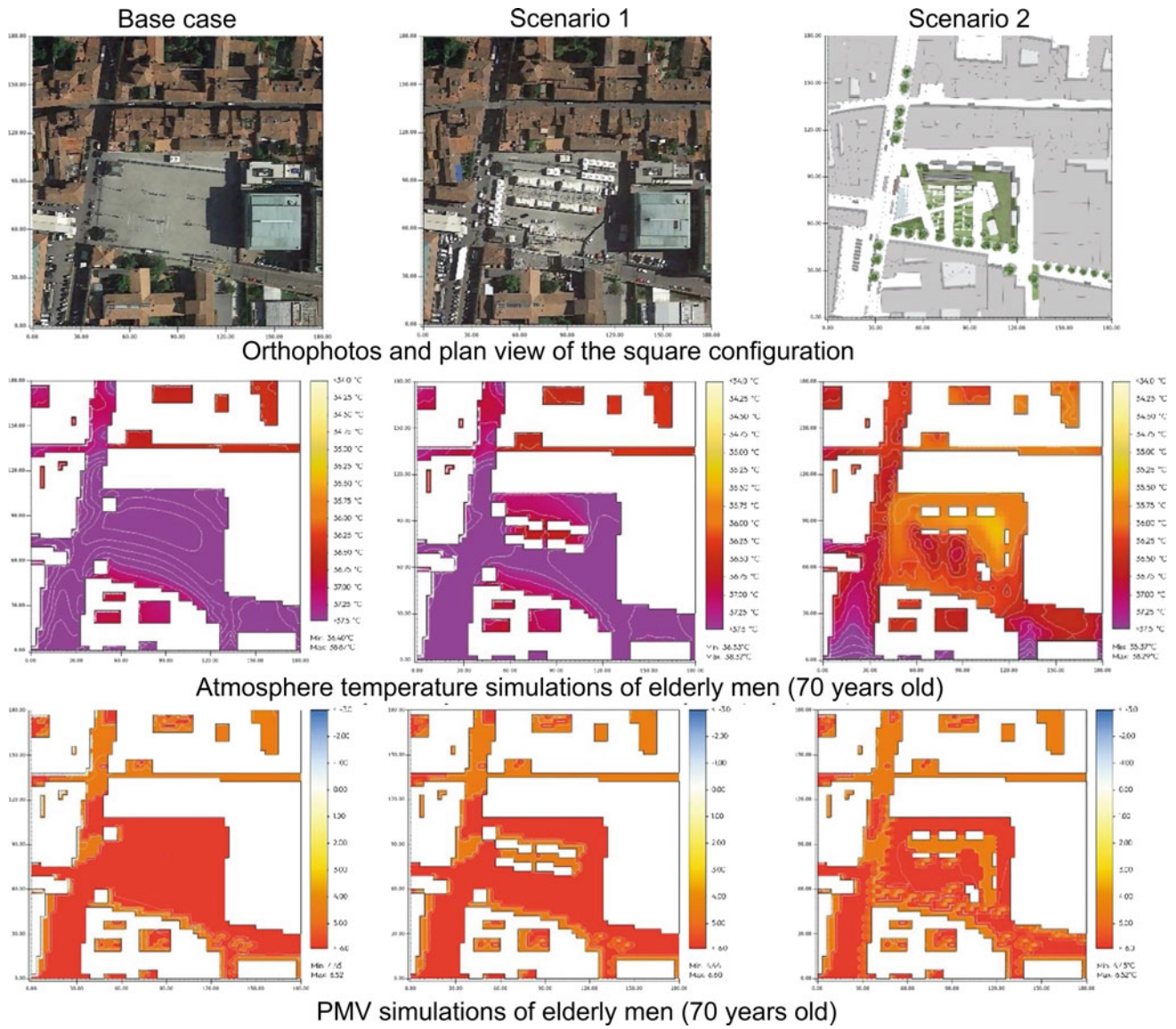


Fig. 6 Thermal and PMV maps of the three scenarios analysed

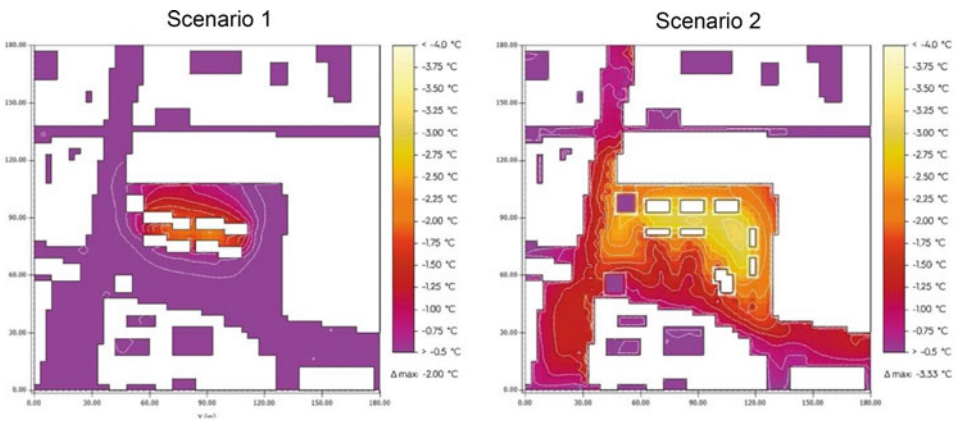


Fig. 7 ENVI-Met® comparisons of the decreasing of atmospheric temperature in the scenario 1 and 2, x–y view at z = 1.75 m, at 04:00 p.m., 1 August 2017

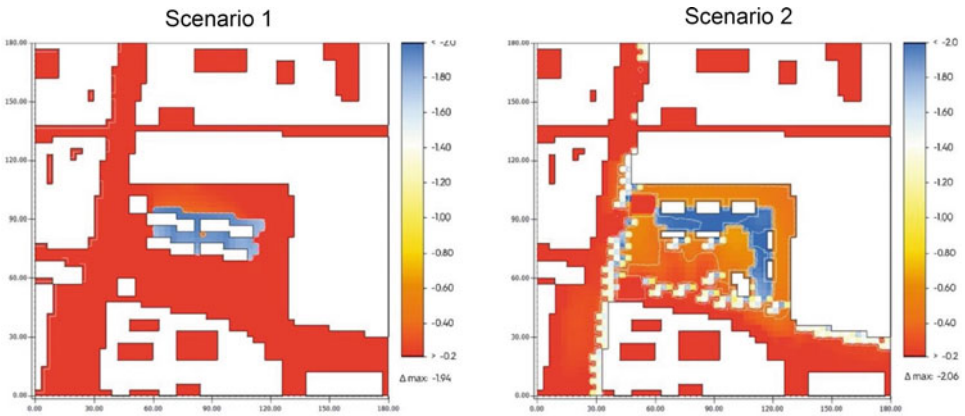


Fig. 8 ENVI-Met® comparisons of the decreasing of PMV in the scenario 1 and 2, x–y view at z = 1.75 m, at 04:00 p.m., 1 August 2017

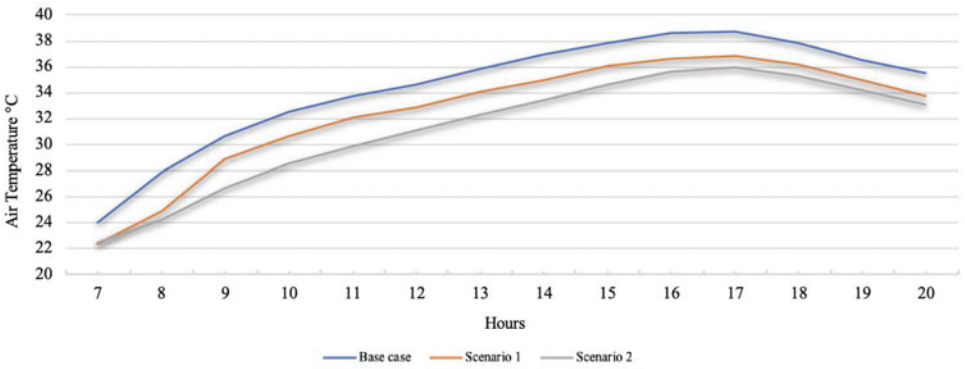


Fig. 9 Hourly temperature profile of the selected spot situated under the wooden solar shading, at z = 1.75 m, at 04:00 p.m., 1 August 2017

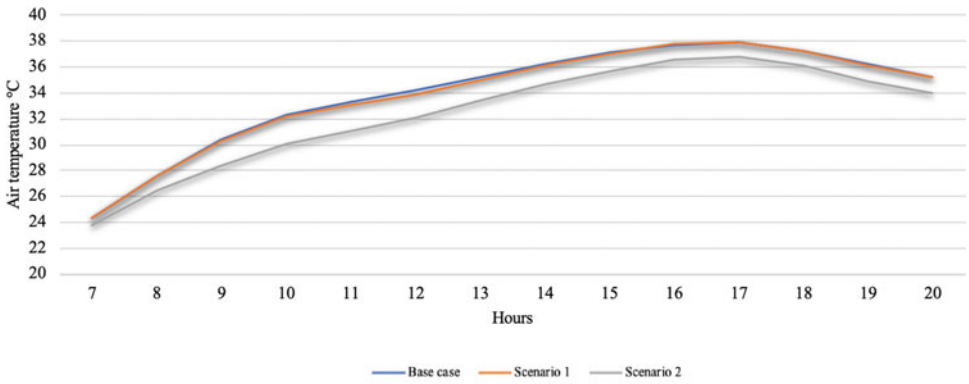


Fig. 10 Hourly temperature profile of the selected spot situated in the south border, at z = 1.75 m, at 04:00 p.m., August 1, 2017

6 Conclusions

Climate change adaptation in an urban area and city resilience requires collaborative problem-solving and useful integrated methods for the evaluation of different strategies at the urban micro-level concerning the climatic characteristics of the site and to the purposes of urban planning. The public space needs to be renovated to promote the city's image and contribute to advancing the social, physical, or economic life-quality of its citizens. Furthermore, urban environmental quality depends on microclimate conditions and the Urban Heat Island effect, which can affect communities by incrementing the urban discomfort, energy needs due to summertime peak, heat-related illness, mortality, etc.

Therefore, as confirmed by an EU report in 2015 (EU Expert Group, 2015), "UHI mitigation strategies have been implemented in various sustainable cities around the world. These strategies include urban greening through the use of simple technological solutions as green and blue

infrastructures, replacement of standard materials with highly-reflective ones, simple shading devices; all strategies that can be implemented consistently and stand a good chance of reducing the ill effects attendant upon the occurrence of UHI in the built environment."

Accordingly, the presented study shows how the architectural value of public spaces can be considered an appropriate strategy for improving urban outdoor comfort also in the historical center of the cities located in southern Europe, where frequently typical retrofit solutions cannot be applied due to the preservation constraints. In addition, the simulation results confirm the thermal benefits in terms of outdoor thermal comfort for pedestrians generated by the application of the proposed materials with particular radiative properties (i.e., albedo and thermal emissivity) and thermal properties (i.e., heat capacity).

Furthermore, the workflow of the design process together with the use of simulation software to predict the effect of the application of such strategies on a case study to improve the microclimate behavior can become a useful method for designers and the Public Administrations to know exactly the achievable results of these strategies in order to choose the best solutions to redevelop an urban space and to improve its environmental comfort (Romano et al., 2019).

Finally, the quality of the results achieved from the students of the Master ABITA in the frame of this practical exercise demonstrates the validity of teaching methods chosen, which has contributed to increasing the cognitive maturity of the young architects linked to the technological and environmental options made at the urban scale. A choice that requires an increasing degree of specialization and cares at the scale of technological detail for the integrated project, but especially of responsibility toward professional assessments that can have irreversible effects on our future and on that of following generations.

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Linear Cities as an Alternative for the Sustainable Transition of Urban Areas in Harmony with Natural Environment Principles

Anna Zaręba, Alicja Krzemińska, Edward Truch, Magdalena Modelska, Francisco Javier Grijalva, and Noriegae Rogelio Monrealf

Abstract

Intensive urbanization influences the quality of urban green areas, pollution, shrinking of forests, intensification of erosion as well as the fragmentation of habitats and loss of biodiversity. Despite the important role of urban ecosystems, they are exposed to the increasing destruction of the ever-expanding city. The decentralization of the compact city and balanced development, in harmony with natural environment principles, is beginning to shape city-regions. The transport system is one of the main development-stimulating factors which is beneficial to the society and contributes to the economic and cultural activation of urbanized regions. The simplicity of the linear system, based on a transport network, is expressed in its functionality—the separation of collision-free, pedestrian traffic from roads, and easy access to industrial, service, residential and recreation centers. The paper examines studies and contemporary practices of linear urban systems, based on the backbone of road network, in response to the need to find a model solution for an increasing demand for new residential, industrial, and recreational green areas, and attempts to define the role of the linear settlement system in the transition of spatial connections networks.

Keywords

Linear city • Decentralization • Urban transition

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1 Introduction

The development of the urban fabric in the history of mankind was intuitive, and related to the economy, topography, and other constantly changing factors. Through this system of operating, many biologically valuable areas were allowed to degrade. This condition persisted for many years and nothing was done to recover biologically active areas. Sometimes, when production was unprofitable, industrial areas stood abandoned and over time in postindustrial areas spontaneous natural succession could be observed. Currently, such areas are undergoing revitalization. Nowadays, patchwork systems are created in cities to support areas with different uses. Architects and planners have been discussing for years over which of the city planning systems is the best and most efficient and functional for residents due to the specific biome of the city (New Urbanism, Green Urbanism, Transit Oriented Development, Bio-urbanism, Smart City, etc.). For this reason, interesting solutions are projects of linear cities, which are introduced as they do a transparent and extremely simple infrastructure system that allows the transformation of the urban fabric by imposing order and creation of a well-functioning environmental biome.

Linear configuration provides an opportunity to unify parts of metropolitan regions fragmented as a result of urban sprawl. The opportunity appears in developing combination of grey and green infrastructure linkages between landscape and urban patches on different planning scales such as city, suburbs, exurbs, and hinterland scales (among others: Bennedict & McMahon, 2006; Zaręba, 2014). Despite the fact that decentralization of compact, densely populated cities is an interesting, still underappreciated urban vision, the linear system does not take into account functional, landscape, and cultural diversity of urbanized areas. This paper examines the transition of linear cities in chosen case studies, describes patterns of urban linear forms, and evaluates current urban practices in relation to economic, society, and environment factors. The analysis was framed around the hypotheses that

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linear cities deliver multiple benefits to society and environment, and studies of their role in transition of contemporary urban planning should be continued.

2 Materials and Methods

The objective of the paper is to explore and develop the concept of the linear city in the context of urban-use transition focused on the city's natural system and transport. The studies were based on selected examples of linear cities chosen from the history of urbanism, and examples, theories, and practices related to contemporary linear de-concentration of urban settlements. The case studies were analyzed in terms of ecological, economic and social functions with an emphasis on environmental sustainability. The paper includes the synthesis of ecological, economic, and social SWOT analysis, presented in a table. The studies were based on identifying historic and contemporary linear cities by analysis of scientific and popular science literature, reports, government and policy documents, projects documentation, conference proceedings, and websites dedicated to linear cities. Literature was identified by structured and semi-structured searches in selected major scientific databases—Scopus and Web of Knowledge. Additional searches were based on the authors' own knowledge related to the topic of the research. The authors formulate the research hypothesis that decentralization of existing and future cities can occur in various spatial systems (in a linear and linear-patchwork system) and present diagrams of development of urbanized areas depending on their location in relation to transport networks.

3 Linear Cities Concept Outline—From La Ciudad Lineal to Dynopolis

3.1 Early Linear Cities

The idea of linear cities first appeared in 1883, in the Soria y Mata project of the linear belt-type city (La Ciudad Lineal), running along the main communication axis from Madrid to Kamchatka (Boileau, 1959; Soria y Mata, 1883). The main assumption for creating the linear de-concentration concept was the controlled development of cities. This was supposed to be achieved by the urbanization of periphery areas in suburban zones, by use of road infrastructure. In the second half of the nineteenth century, only a few architects, among them Soria y Mata, were aware of the fact that new inventions in communication (such as tramways) could be significant for the future of urban redevelopment. Soria y Mata, who maintained that "all urban problems are connected with communication problems," put forward a new urban vision of an estate, located parallel to the tram line (Soria y Mata, 1883). The tramway was an element which organized the city layout, and, according to his design guidelines, urban areas should be joined by "one street of unlimited length, from Cadiz to Petersburg, from Beijing to Brussel" (Soria y Mata, 1883). Arturo Soria y Mata came up with the idea of creating a new thoroughfare with tramlines for Madrid. According to his idea, new residential quarters in the city were to be built in close connection to this road (Boileau, 1959; Collins, 1959a, b, 1969; Velez, 1983). In 1894, Soria y Mata obtained permission to bring to life the project of the tramway route, in the shape of a loop, which would connect Madrid with surrounding cities and villages. The loop was supposed to be 48 kms long. In order to implement the project, the cheapest terrains—designed as future residential areas, situated on the outskirts of Madrid—were purchased. The first, five-kilometre-long segment, came into service in the second decade of the twentieth century (Table 1).

De Castillo improved the concept at the beginning of the twentieth century, claiming that, in a linear city, a communication route should connect two development centers located polarly to each other (Collins, 1959a, b). According to the project, the development area was supposed to be much wider, and divided into zones of different destination such as a network of parks and other green areas, connected with surrounding forests and farms. An additional strip of land would allow the creation of a comprehensive linear city, using its space in a more environmentally sustainable way. Stress was put on citygenic factors, allowing the creation of social relationships. The concept turned out to work very well in practice, and examples of its implementation are to be found in Chicago and Boston (Hall, 2014).

Tony Garnier's concept of the Industrial City (Cite Industrielle), dedicated mainly to production and the flow of goods and markets, was focused on the decentralization of emerging industrialized urban centres (Garnier, 1932). Garnier introduced the Cité Industrielle project for Paris in which new estates, parallel to thoroughfares, were based on rectangular buildings of reinforced concrete and located in the vicinity of industrial and residential areas (1901–1904) (Fig. 1).

Garnier suggested separating areas of different functions and their drawing aside on the basis of the transportation system. Industry was an element which organized the pattern of a city. In the Industrial City, Garnier designed a significant number of buildings used for social purposes (such as commune centers, university quarter, sport playgrounds) located mainly in the city centre (Collins, 1959a, b). Similarly, to the Soria y Mata concept, Garnier's city has a linear character—urban development, buildings and other elements of city infrastructure are concentrated along the thoroughfare in which a tramline is incorporated. The exemplary project of the Industrial City was designed for 35,000 residents with

Table 1 Review of the linear city concept

Name of the linear city	Year	Theory and model	Implementations in practice	Outcomes of the linear city planning implementations
Soria y Mata "La Ciudad Lineal"	1883	A new urban vision of a housing estate, located parallel to the tram line	Five-kilometre-long segment, which connects Madrid with suburbs came into service in the second decade of the twentieth century	The project opened the room for further linear cities development models
De Castillo	Beginning of the twentieth century	A transport route connected two development centers located polarly to each other, the development area was much wider, and divided into zones of different destination	Examples of its implementation are to be found in Chicago and Boston	An additional strip of land would allow the creation of a comprehensive linear city, using its space in a more environmentally sustainable way
Tony Garnier "Cite Industrielle"	1932	Industry was an element which organized the pattern of a linear city, separated on areas of different functions with significant number of buildings used for social purposes	Not implemented	Socialist utopian novel model, project of the Industrial City was designed for 35,000 residents with a settlement zone 6 kms long and up to 600 m wide
N.A. Milyutin "Socgorod"	1930	Industrial buildings were located between the river and the railway line, while a belt of residential buildings occupied the area between the railway line and the main road Milyutin concentrated on gigantic mass production plants in ZSRR	Not implemented, but in 1932 Milutin proposed various floorplans for low-cost communal housing for the industrial city	Rapid industrialization possibilities, natural flow of production from raw supplies to finished goods
Ernst May Magnitogorsk, western Russia	1929	Comprehensive industrial linear city, with belts of housing blocks and green areas located parallel to the factory	Magnitogorsk, western Russia the sprawling factory and additional industrial areas swallowed up investment land, leaving little space for housing settlement	The industrial area is concentrated on the left bank of the river Ural, and the main residential complexes are located on its right bank
Le Corbusier "La Ville Contemporaine" "La Ville Radieuse"	1922 1935	The radial city—"La Ville Contemporaine" (1922) for 3,000,000 inhabitants with skyscrapers, green spaces and transport facilities "La Ville Radieuse" (1935) for 1,500,000 inhabitants based on axial arrangement	The model was copied in Moscow and in Algiers, where the main axial highway was elevated and run across the top of skyscrapers placed below	The principles of the *Ville Radieuse* were incorporated into the Athens Charter, published in 1933, the first linear megacity
Hilberseimer High Rise City (Bauhaus)	1924	In the linear city the public transport was organized on two levels: circular motion was provided at the level of the ground, and pedestrian traffic in special galleries at a higher level	Not implemented	Good lighting of apartment interiors, fast road communication, separation of pedestrian and vehicular traffic were separated
Walter Gropius, Adolf Behne, Hermann Hasler, Bruno and Max Taut, Ludwig Hilberseimer Hans Scharoun "Siedlungen" housing estates	1925–1929	Convenient location in relation to transport system and access to services, design improvements would have to relate to the physical and social character of society, blocks of flats were located paralel to steets, usage of standarized and prefabicated structures, housing in close relations to facilities (schools, local shops, local work places)	Dessau-Törten Housing Estate (1926–28), Walter Gropius *Großsiedlung Siemensstadt* (1929–1931), Hans Scharoun	Considered as the most characteristic arrangements of settlements from the interwar period, emphasize the specific needs of the masses (housing, work, food, and recreation

(continued)

Table 1 (continued)

Name of the linear city	Year	Theory and model	Implementations in practice	Outcomes of the linear city planning implementations
George R. Collins "Linear city" or "Corridor"	1950	Modern dynamic linear city related to the transportation revolution and the search for efficiency and possibilities, different forms of linear city, such as single-axis plans, production line plans, and compound linear plans	Not implemented	Transport corridors for people, services and goods
Doxiadis "Dynopolis"	1965	Linear city structure was determined by dynamic forces expressed by transport system changes (from pedestrian oriented cities—*axiradius* systems to new modes of transportation of multiple speeds —*axiradia*) and increasing complexity of movements in urban systems	The original Master Plan of Islamabad, covering the urban area of Rawalpindi was never put into practice. It developed the cities' south-westerly expansion with zones of housing and services, both arranged in grid structures parallel to thoroughfares	Dioxiadis distinguished determinants of contemporary linear city: a multimodal transport system, *centripetal forces* of existing settlements and *aesthetic forces* of attractive locations
Kenzo Tange Linear Tokyo	1960	Unifying the city structure, communication and architecture; Transport in a form of elevated highway or underground; City divided into two zones: a zone of traffic of metropolitan atmosphere with areas of non-disturbing industry and service centers, and a zone of silence and recreation 18 km of a linear city (with a width of 2.2 km), consists of 10 districts	Prospective development plan for Tokyo 1960	Transition from the radial system —closed to the linear—open
Oscar Hansen "Linear Development System"	1970	A comprehensive and flexible continuous urban system connecting the development areas in three belts: residential and service belt, settlement with agricultural farmland and forest belt, and the extractive industry and harmful industry belt	Housing estate (Juliusz Słowacki quarter) in Lublin (Poland) and in the housing estate located in a suburban zone of Warsaw (Przyczółek Grochowski) (Poland)	In order to deliver fresh water to residential areas and factories, belts are located parallel to the biggest rivers
Michael Graves and Peter Eisenman "Jersey Corridor Project"	1965	20-mile-long urban settlement consisted of two parallel strips, one for industry and the other for housing, shops and services	Not implemented	Megastructure inspired by the concept of "Road-Town," six stories above ground Graves and Eisenman proposed the space for open-air cafes and shops, on top of the buildings: restaurants, pools, and penthouses
Gilles Gauthier "Gauthier's Linear City"	1995	Located in the suburbs of contemporary cities, where the public transport system was efficiently distributed on three interconnected levels—Metro for short distances, Suburban Train for medium distances, and High-Speed Trains for long distances	Not implemented	Combination of multimodal transport in urban megastructures in metropolitan areas (metro, suburban train, high-speed train)
Saemangeum Development and Investment Agency Saemangeum (South Korea),	2013	Situated in the middle of the Yellow Sea rim, the linear city is placed on the giant seawall construction	Saemangeum development project	The world longest sea dike (33,9) connecting Gunsan and Busan west coast of Korea

(continued)

Table 1 (continued)

Name of the linear city	Year	Theory and model	Implementations in practice	Outcomes of the linear city planning implementations
Soleri "Lean Linear City	2012	City divided into two, running parallel, giant, urban structures, which form a continues ribbon module (module measures 200 m in width and 88 m in height, and accommodates 3200 inhabitants)	Not implemented	The city is supplied with energy produced by photovoltaic panels and wind turbines

Fig. 1 Spatial layout of Tony Garnier's Industrial City development, simplified model

a settlement zone of 6 kms long and up to 600 m wide. Modern industrial architecture, divided by green areas and a river from the residential estates, was a significant element of the urbanized landscape.

In the period between the First and Second World War, in communist Soviet Union, the idea of the linear industrial city presented in N.A. Milyutin's book "Sotsgorod. Problemy stroitel'stva socialisticheskih gorodov," published in 1930, also emphasized close relations with a river, in this case the Volga (Milyutin, 1975). In Milyutin's project industrial buildings were located between the river and the railway line, while a belt of residential buildings occupied the area between the railway line and the main road (Fig. 2). Recreational terrains, also organized in a belt, were located in proximity to the Volga (Collins, 1959a, b). A transportation route ensured easy access to residential, farm and work areas.

In the 1920s and the beginning of the 1930s under the supervision of Ernst May and Hannes Meyer the next

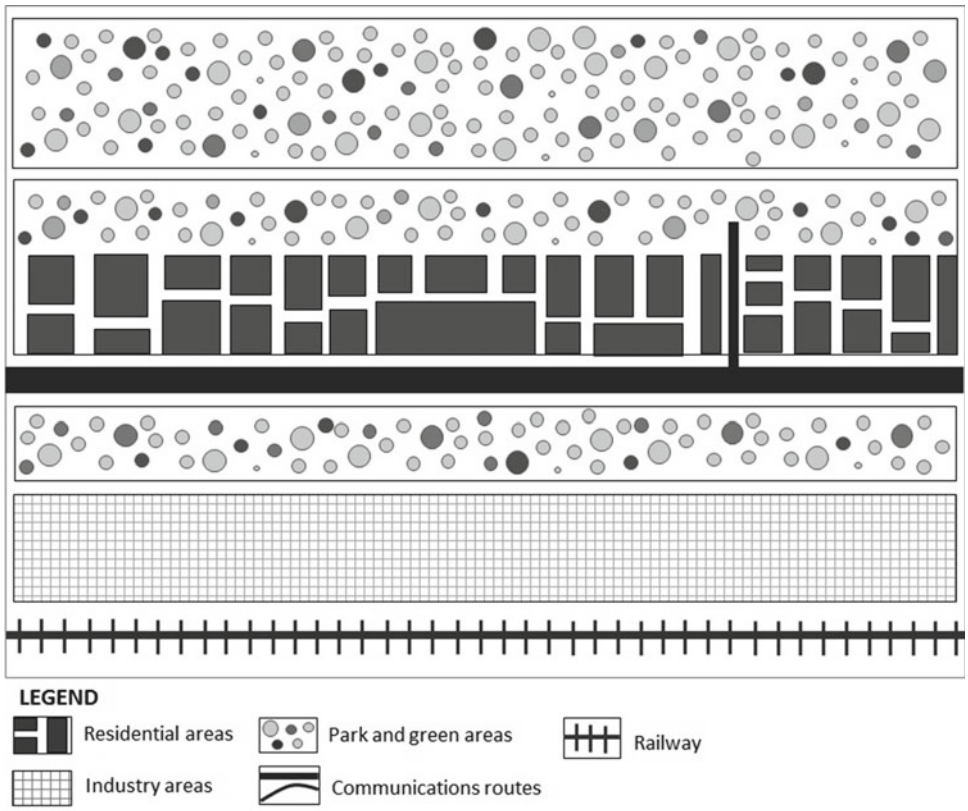

Fig. 2 Spatial layout of N.A. Milyutin's Industrial City development, simplified model

projects of new linear cities were created. Römerstadt and Zickzackhausen—compact, self-sufficient settlements from Germany's Weimar period, consisted of equidistant five-story communal, prefabricated apartment buildings, equipped with amenities and facilities such as schools, theatres, playgrounds, and community spaces. The city of Magnitogorsk (Fig. 3) designed by Ernst May, located in western Russia on both banks of the river Ural, was founded in 1929 to exploit the magnetite iron ore of Mt. Magnitnaya. According to the urban plan, Magnitogorsk was designed as a comprehensive linear city, with belts of housing blocks and green areas located parallel to the factory. In the modified city plan, the sprawling factory and additional industrial areas swallowed up investment land, leaving little space for housing settlement. Currently, the industrial area is concentrated on the left bank of the river Ural, and the main residential complexes are located on its right bank (Mako, 2014).

3.2 The Athens Charter

The Athens Charter (Congress Internationaux d'Architecture moderne, 1933) promoting de-concentrated development, enacted at the fourth CIAM congress in Athens in 1933, is one of the most influential documents in the history of urbanism (Coleman, 2005). It includes rules that normalize issues related to urban planning in modern cities, which should, first of all, be better organized and with better communications, and provide residents easy access to greenery and light. Instead of the nineteenth century's overpopulated quarters, the authors of the Athens Charter were proponents of multi-story block buildings, separated from each other in order to provide access to sunlight, recreation, and green areas (Le Corbusier, 1973). Sunlight, green, and open space are, according to the Athens Charter, three basic components of modern urban planning (Coleman, 2005; Le Corbusier, 1973). The rules of the Athens Charter were implemented in interwar projects, for example, in those of Walter Gropius, and, after the Second World War, became a standard in urban planning all over the world. The first blocks of flats, made of reinforced concrete prefabricated elements, built according to the Athens Charter rules were built before the war, in the 1930s, in France. The Athens Charter opened the doors to significant urban de-concentration concepts, such as the linear cities concept, for example, applied in Tokyo linear city rebuilding plan from 1960s, or to the Continuous Linear System in Poland. One of the most significant examples of the implementation of the Athens Charter is the block of flats—Unité d'Habitation, in Marseille (Le Corbusier, 1945).

Le Corbusier, even though his attitude toward the idea of linear cities was very negative in the 1930s, 15 years later, in

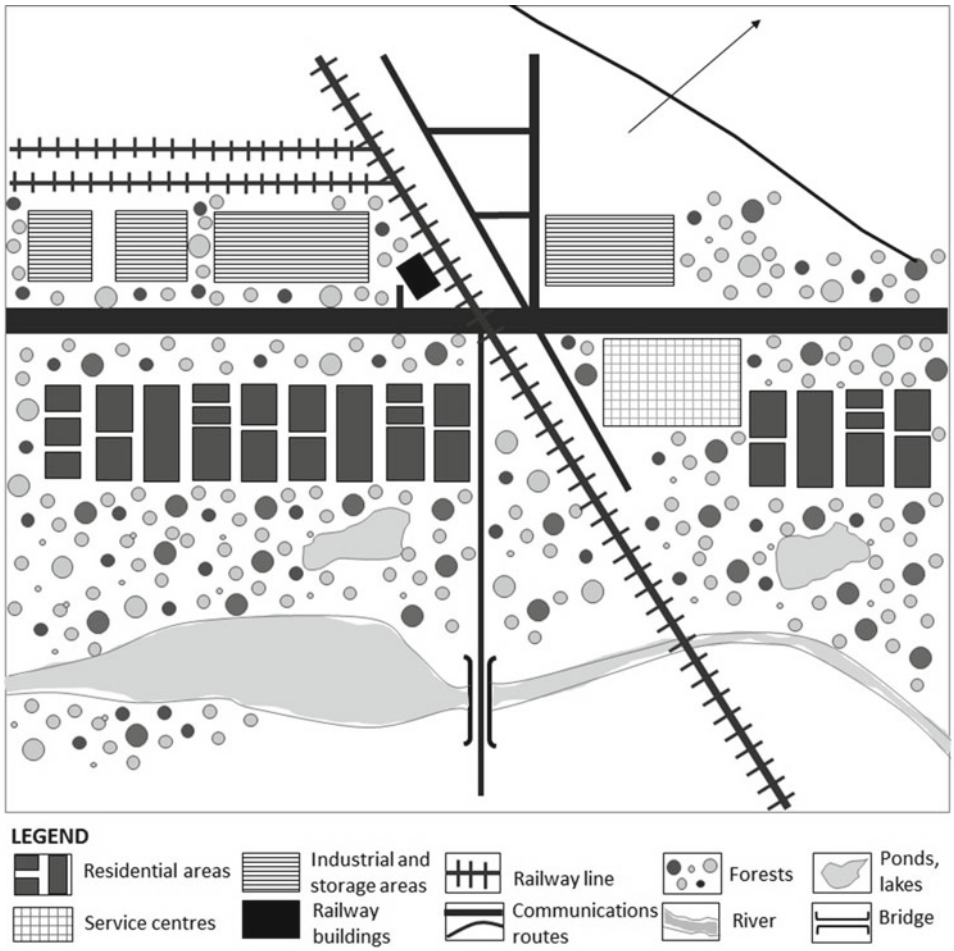

Fig. 3 Spatial layout of Ernst May's Magnitogorsk development, simplified model

his work "Les trois etablissements humains," he focused on issued related to the industrial linear city (Le Corbusier, 1945, Jencks 1981). Le Corbusier put forward the idea of a linear city closely connected by four means of transport: railway, road, waterways, or airplane, seen not only from the perspective of the region or the country, but also from the perspective of the whole continent. Le Corbusier's utopian city is a continuous city along transport routes leading from the Urals to the Atlantic Ocean and from the Mediterranean to the North Sea. In 1922 Le Corbusier designed the radial city—"La Ville Contemporaine" for 3,000,000 inhabitants with skyscrapers, green spaces, and transport facilities. In 1935 he extended the ideas of La Ville Contemporaine and proposed "La Ville Radieuse" for 1,500,000 inhabitants based on axial arrangement (Jencks, 2000) (Fig. 4). The residences—tall apartments, set in greenery, "were to be spread out from a centerpiece of civic buildings like the arms of a cross" (Collins, 1959a, b, p. 92). This type of residential area planning was copied in Moscow and in Algiers, where the main axial highway was elevated and run across the top of skyscrapers placed below (Collins, 1959a, b). The principles of the *Ville Radieuse* were incorporated into the Athens Charter, published in 1933.

3.3 Modernist Tendencies in Linear Cities Arrangements

Hilberseimer in a modification of the linear city concept tried to solve the problem of traffic jams by organizing public transport on two levels: circular motion was provided at the level of the ground, and pedestrian traffic in special galleries at a higher level. The city designed by Hilberseimer, intended for 2 million inhabitants, was founded on a rectangular street grid, with a lack of derogations from a strict compositional arrangement. The location of blocks of flats was subordinated to good lighting of apartment interiors. The emphasis was placed on fast road communication. Pedestrian and vehicular traffic were separated—pedestrian traffic was supposed to take place above the streets (Hilberseimer, 1944).

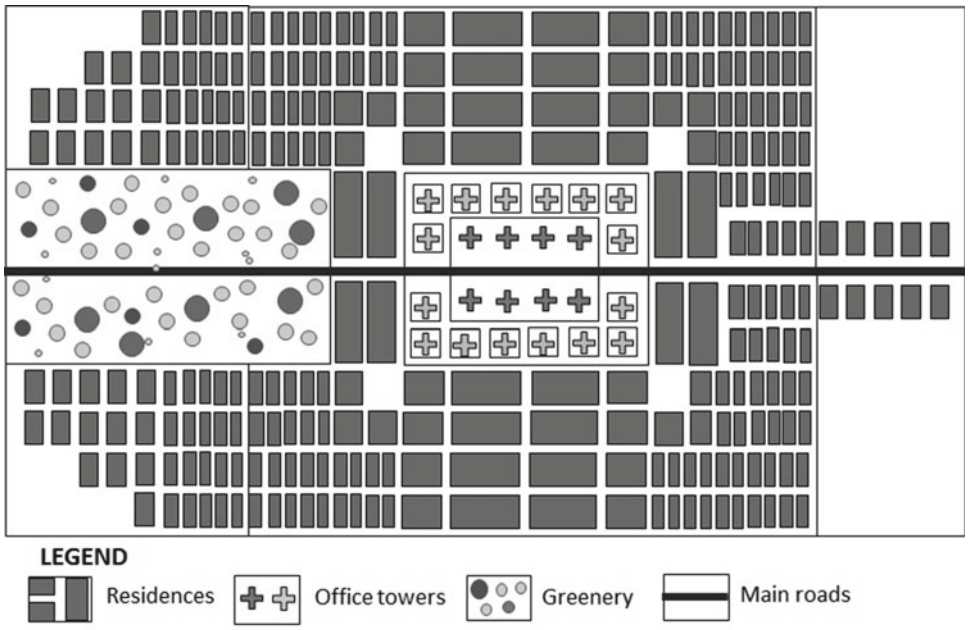

Fig. 4 Spatial layout of Le Corbusier's "La Ville Radieuse," simplified model

The layout of Walter Gropius's linear city, which primarily takes into account the convenient location in relation to transport system and access to services, can be considered as the most characteristic arrangements of settlements from the interwar period. Many urban settlements were built in line with these principles, often designed only to meet technical requirements and satisfy the most important living needs of inhabitants. In the years 1929–1931, Hans Scharoun designed a large *Siemensstadt* residential complex (*Großsiedlung Siemensstadt*), also known as the Ringiedlung estate, in the Charlottenburg-Nord district of Berlin, in close proximity to Siemens plants employing 60,000 workers. Hans Scharoun implemented a development concept of a dispersed built housing estate, with a large number of green belts, which became a model for residential construction after World War II. The majority of its five-story houses were set in parallel rows, located on the north–south city axis.

In the interwar period, modernist housing estates designed for the Warsaw Housing Cooperation were created in the capital of Poland. Barbara and Stanisław Brukalski designed colonies IV, VII, and IX for the Żoliborz residential area (Warsaw, Poland), obtaining different urban interiors due to a varied combination of architecture and greenery layouts. After having analyzed the residents' needs, the designers introduced many innovative improvements and solutions that resulted in the creation of a diversified, flexible system of housing. Three two-story blocks located near Wilson Square in Warsaw in the shape of an arch, sections of a circle, formed Colonies VII and IX. The aim of the designers was twofold: to enter into the natural relief of the area of this part of Żoliborz residential quarter, and to create an urban composition for the growing district. A green belt was placed between the buildings, where the entrance to apartment staircases were situated.

George R. Collins, in the late 1950s and the 1960s in a series of articles highlighted the idea of the "linear city" or "corridor" (both terms were used interchangeably) as transport corridors for people, services, and goods (Collins, 1960). He introduced various concepts of linear cities such as single-axis plans, production line plans, or linear decentralization (Collins, 1960; Sap, 2007). In 1969 C. F. Whebell introduced the corridor theory, in which he emphasized, first of all, economic development issues and the relation between trade and the structure of urban systems (Whebell, 1969). Doxiadis in his research criticized linear cities concepts and stated that the linear concept can only exist as part of a city. Instead, he introduced *Dynopolis*—a new city structure determined by dynamic forces expressed by transport system changes (from pedestrian oriented cities—*axiradius* systems to new modes of transportation of multiple speeds—*axiradia*) and increasing complexity of movements in urban systems (Doxiadis, 1967). Beside the dynamic force of a multimodal transport system, he distinguished also other determinants of contemporary Dynopolis development: *centripetal forces* of existing settlements and *aesthetic forces* of attractive locations (Doxiadis, 1965). In his theory, he combined Christaller's central-place hexagonal theory with his innovative dynamic model of city transitions. Dioxiadis implemented theoretical research principles in practice in the Islamabad and Rawalpindi master plans, where he developed the cities' south-westerly expansion with zones of housing and services, both arranged in grid structures parallel to thoroughfares (Doxiadis, 1965, pp. 1–28).

3.4 Linear Tokyo of 60s by Kenzo Tange

In the prospective development plan for Tokyo from 1960, Tange adopts three assumptions:

- transition from the radial system—closed, to the linear—open.
- unifying the city structure, communication, and architecture.
- introducing an urban plan that would primarily take into account population growth (Tange, 1976).

The linear system used by Tange does not include a city center in the traditional form (Fig. 5).

In the project, three elements of functional structure of the city were distinguished: residence-housing, work, and recreation. Transport is carried out in a form of elevated highway or underground, while the surface is designed for pedestrians and green areas. Kenzo Tange divided the city into two zones: a zone of traffic of metropolitan atmosphere with areas of non-disturbing industry and service centers, and a zone of silence and recreation, with green and open spaces. Tokyo, according to Kenzo Tange's plan, stretches for 18 km (with a width of 2.2 km), consists of 10 districts, with service centers within walking distance (Fig. 5). Each district has 14 blocks of fifty or sixty floors designed for 8500 inhabitants, equipped with basic services located on lower floors. Between the blocks there are playgrounds for children and underground garages. The blocks are of trapezoid shape, tapering upwards, therefore the apartments have access to sunny terraces with greenery. Disturbing industry is located on the outskirts of the city (Pernice, 2007; Tange, 1976, Zhongjie, 2010). Kenzo Tange solves the issues of architecture and the road network as a whole. The main communication axis, 40–50 m above the level of the Tokyo Bay, consisted of three-level carriageways, and a suspended single-track railway. According to Kenzo Tange, agglomerations of 10 million inhabitants have increased administrative needs. He claimed that due to this fact, the development of an open system with the axis of communication constituting its spine in contemporary cities is necessary, so that the master plans could be implemented in stages.

3.5 Linear Development System by Oscar Hansen—LSC (Poland)

In 1934 Polish architects—J. Chmielewski and S. Syrkus—introduced an innovative and interesting model of redevelopment for future Warsaw named "Functional Warsaw." The concept is based on the principle of urban settlement

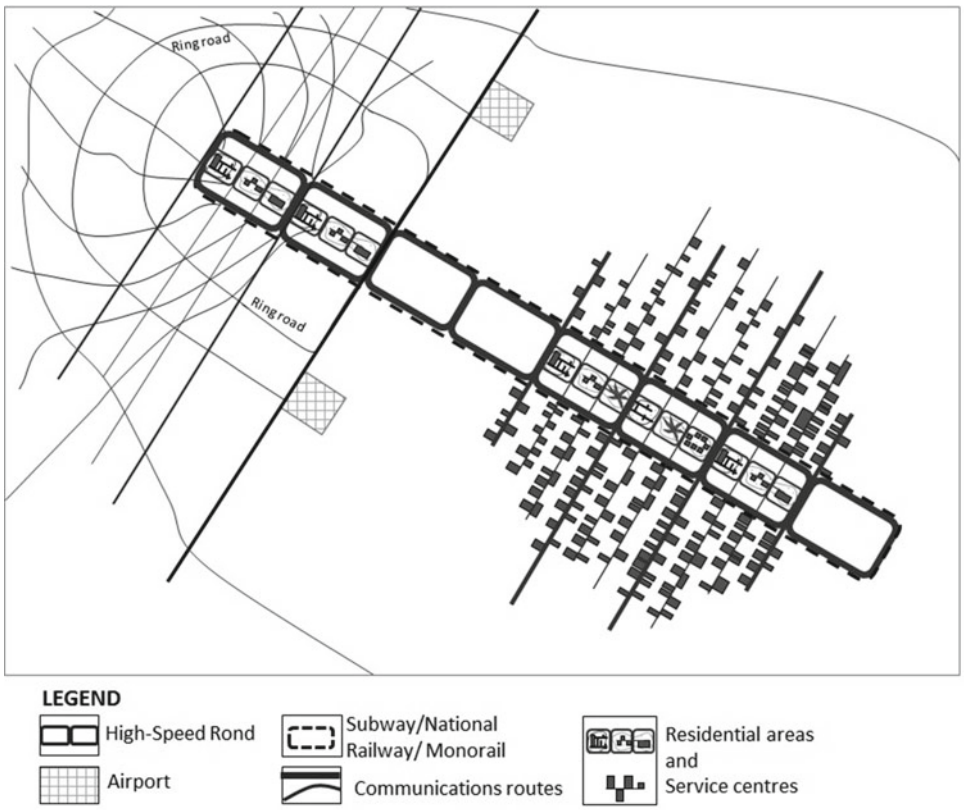

Fig. 5 Spatial layout of Tokyo according to Kenzo Tange urban design vision, simplified model

de-concentration along development belts, including residential, open space, agriculture, industrial and storage areas, service centres, farm settlements, forests, and roads and railway lines, designed on the basis of the transport system and Vistula River located parallelly (Malisz, 1966).

The idea of a settlement network based on river belts (Linear Development System—LSC) was presented for the first time by Hansen in his paper "LSC—continuous linear system" published in 1970 (Hansen, 1970). According to LSC planning principles, development should be concentrated along the main rivers and should intersect their tributaries. The basic principle was to create a comprehensive and flexible continuous urban system connecting the development areas in three belts: residential and service belt, settlement with agricultural farmland and forest belt, and finally the extractive industry and harmful industry belt. LSC was a utopian vision of redevelopment of Poland in which urban centers stretched from the Tatra mountains to the Baltic Sea along narrow development belts. In the cities, residential, employment, science, and recreation functions were organized in zones separated by greenery. The Linear Development System is a proposal for shaping the human environment on the basis of a flexible model of interrelationship between residential and service areas (Stanek, 2013). In the LSC, Hansen differentiated three parallel belts: the residential and service belt with light industry, the belt of farmland and forests with historic villages, and mining industry and a belt of heavy industry. The particular belts are interconnected through crosswise communication, ensuring that the time to get to work cannot be longer that 30–45 min. In order to deliver fresh water to residential areas and factories, belts are located parallel to the biggest rivers. Hansen proposed four development belts, stretching from the north to the south of the country. The residential and service belt includes housing, hotels, indoor recreation, business, and retail zones. In proximity to trading and service areas, public amenities such as local clinics, chemists, nurseries, cultural, and social amenities are located. The outlines of the concept's basic principles can be seen in two investments in Poland: in the project of the housing estate (Juliusz Słowacki quarter) in Lublin and in the housing estate located in a suburban zone of Warsaw (Przyczółek Grochowski).

4 Futuristic Vision of the Linear City Concept. Road Towns—The Modification of the Linear City Concept

The concepts of futuristic cities contain a wide variety of solutions and give myriad possibilities for transforming the urban fabric and building a multifunctional city, depending on the creator's vision. One of the first examples of such city visions is the concept of the road town, which integrates buildings with road infrastructure in one linear, multifunctional construction. In the historic conception of Edgar Chambless of Road Town from 1910, the city's functions stretch along the electric train located in a trench. A linear city, in the form of a "continuous house" is capable of spanning America from New York to San Francisco. This influential idea, "the architectural manifesto of the twentieth century," inspired Le Corbusier, who introduced some of its ideas in his Algiers plan, and Frank Lloyd Wright, who adapted Roadtown's transportation model for the concept of Broadacre City (Peter Myers, Is this Roadtown?, https://architectureau.com/articles/is-this-roadtown/).

Years later, in 1965, Michael Graves and Peter Eisenman, inspired by Chambless's concept, presented the Jersey Corridor Project, a new linear city with buildings connected by rails and roads running underneath. This 20-mile-long urban settlement consisted of two parallel strips, one for industry and the other for housing, shops, and services. Six stories above ground, M Graves and P. Eisenman created the space for open-air cafes and shops, and on top of the buildings the following facilities were located: restaurants, pools, and penthouses (1965).

Chambless's idea of Roadtown was developed in Gauthier's Linear City, located in the suburbs of contemporary cities, where the public transport system was efficiently distributed on three interconnected levels—Metro for short distances, Suburban Train for medium distances, and High-Speed Trains for long distances. Private transportation is based on small electric vehicles. On the rooftop of residential buildings, "we find a community park with games, a pool, a wading pool, a sauna, a picnic and sun-bathing areas, a shaded area, a gazebo, a small restaurant-bar as well as a reception room" (Linear City, n.d.).

In the futuristic project of Saemangeum (South Korea), situated in the middle of the Yellow Sea rim, the linear city is placed on the giant seawall construction (13 km in length). The seawall, which had cut the city off from the Yellow Sea, now was used as the base for a linear megastructure, including boulevards, open green spaces, and transit lines, running in the middle of the construction and buildings located above. The energy for this multifunctional, multilayer construction is delivered by photovoltaic panels and wind turbines (Youtube, 2008).

According to Soleri and his utopian concept of the "Lean Linear City," we should change our "hyper consumptive" way of life via a "lean urban alternative." The benefits of this system Soleri sees in "reducing fossil fuel dependence" due to a new "network of logistically distributed habitat" (Soleri et al., 2012; Youtube, 2010). The city is supplied with energy produced by photovoltaic panels and wind turbines. Lean Linear City is divided into two, running parallel, giant, urban structures, which form a continues ribbon module.

Between both mega structures, a green atrium and pedestrian and bicycle paths are situated. Each housing module measures 200 m in width and 88 m in height, and accommodates 3200 inhabitants (Youtube, 2010).

5 Results and Discussion

In ordering the urban tissue, it is necessary to transpose the spatial arrangement based on the existing patchwork system and combine it into a new, logical urban organization model focused on building a healthy biome for the city. An important stage in building this system is connecting the city with suburbs through a linear system that allows the creation of matter and energy flow corridors. A patchwork-linear mixed system can bring many benefits to urban tissue. The SWOT analysis (Table 2) above shows the benefits—ecological, economic, and social—which the linear system provides to the newly created urban fabric.

(1) First of all, their linear arrangement can be joined to the existing road network, which reduces transport costs and the necessity to provide additional communication linkages joining city centers with suburban areas.
(2) Multimodal, combined transport and sewage system contribute to delivering goods, trade, and waste discharge. Industrial areas, combined with public transportation, have easy access to markets, workers, and services, which contribute to the increase of cities' income. Countryside and open landscape, free from pollution and noise, is sociologically beneficial for inhabitants. Outdoor recreational activities such as bicycle trails, footpaths and parks can be easily integrated with the road network.

Table 2 SWOT analysis of environmental, social, and economic factors in linear cities

	Economic	Ecological	Sociological
Strengths	• A linear system results in the coupling of communication with the industry and services • Clear communication system • Multimodal combined transport system • The communication system facilitates the flow of goods and people • Reducing the need for communication links between the center and suburbs	• Condensation of buildings along the main communication axis provides greater protection of the open landscape from fragmentation and protection of agricultural areas • A linear layout provides easy access to recreational areas • Possibility of creating a buffer zone of greenery from industrial areas	• Easy access to transport hubs and public areas is conducive to social contacts • A clear communication system reduces the stoppage time in traffic jams
Weaknesses	• Long distances between industrial plants and outlets can increase the cost of goods	• Possibility to increase unitary pollution along the city's transport axis • Possible problems with airing the city and access to fresh air hindering creation of natural habitats of plants and animals in the urban tissue	• Monotony of the urban landscape may affect the lack of identification of the individual person in the urban tissue • There are no defined dominants, urban interiors and characteristic nodal points
Opportunities	• Possibility of introducing fast urban transport (for example, using a hyper loop) • The possibility of developing structures erected by man to create new linear cities (for example, Saemangeum)	• Linear system and dense buildings create new opportunities for renewable energy • Possibility of creating a new linear recycling system • Waste management in the city is easier • With the adoption of a larger width for a linear city, it is possible to create new ecological corridors • New communication solutions can affect the reduction of pollution (for example, the Roadtown concept and underground communication)	• With the adoption of a larger width for a linear city, it is possible to create new urban interiors • Greater comfort of living and access to sunlight through the location of terraces (e.g., Lean Linear City)
Threats	• In the case of unpredictable accidents and mishap (catastrophes, failures), the only transport connection in the city can be "cut-off"	• The linear form of the city is a barrier to the migration of animals and plants in ecological corridors • Possibility of UHI effect in a linear configuration	• The location of housing estates may hinder social communication in various parts of the city • Dense urban buildings may affect the feeling of being "overwhelmed" and be a cause of social exclusion

(3) Existing and linear cities designed so far developed mainly in horizontal layouts in relation to the main road, which enabled urban development aimed at optimal use of transport.
(4) The idea of spatial megastructure, which is a combination of the concept of a linear city with the concept of a vertical city, was initiated by a group of Japanese architects in the 1960s, creating projects under the new direction in architecture—metabolism.
(5) Futuristic concepts such as Gauthier's Linear City, Saemangeum, or Lean Linear City assumed the development of cities primarily in vertical systems to maximize the use of space and the release of land from buildings. Areas thus "saved" can be used to create regional and local landscape parks. In this way, nature becomes a binding element of an urbanized unit.
(6) Decentralization of cities can occur in various spatial systems. Figure 6 presents diagrams of development of urbanized areas in linear arragement depending on their location in relation to the main road. The diagram shows the possibilities of using different urban systems of de-concentration and concentration of buildings. Each of the proposed spatial systems has its advantages and disadvantages. The greater distance from the main road ensures the possibility of using the areas "freed" from buildings under greenery, for example, creating green buffer belts or green belts with a recreational function The vicinity of the main transport linkage ensures, in turn, easy movement of the city's inhabitants and simplification of the distribution of services and goods. The model presented in the article combines the advantages of horizontal and vertical linear city. It can be introduced in various forms and concentrations, for example, in the suburbial zone—especially in the close neighborhood of the city. The proposed spatial arrangements are an alternative to the city's current sprawl, which is currently under criticism and difficult to control.

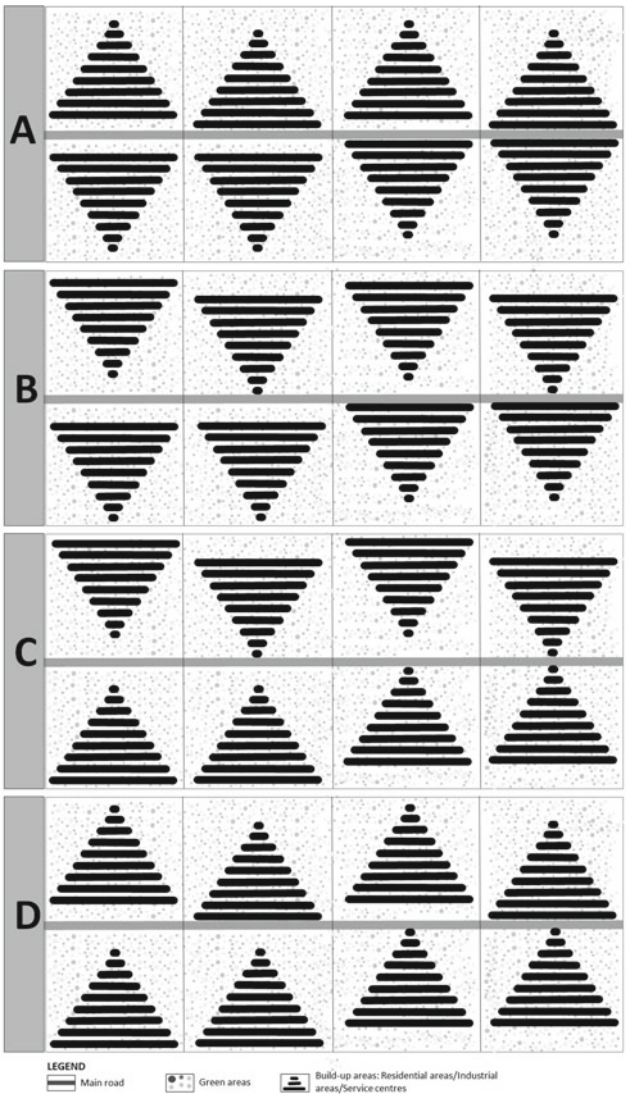

Fig. 6 Diagrams of development of urbanized areas depending on their location relative to the main road

6 Summary

Spatial problems in the urban tissue overlap with environmental and social problems, making life in the city more and more difficult and full of chaos. Due to inadequate space management and the unintuitive arrangement of road infrastructure, city dwellers spend too much time in means of transport. Because of this, the quality of life deteriorates. Transformation without innovative and effective planning interventions is virtually impossible. However, changes should be made systematically, adjusting their pace to the specificity of the city. An example of such changes is the concept of the linear city developed by many planners over the years. The introduction of a linear settlement system, apart from simplifying the spatial structure of the city, brings many benefits to the environment, economy, and society. Owing to the controlled development of linear settlement arrangements, and the limited space linear cities need, nature can be reborn and biodiversity can increase. It should be highlighted that although linear city arrangements are increasingly transforming traditional urban pattern and its implementation in existing cities with dense transport networks could contribute to significant energy losses, some principles (connected, for example, with changing of form and range of suburban zone) can be introduced to contemporary urban planning. This particularly concerns the present transformation of suburbs, endangered by urban sprawl, responsible for rapid decrease of agriculture and natural

areas, and further fragmentation of habitats. Some answers to the question how to manage these problems can be found due to new, innovative solutions, futuristic visions drawn from, among many other concepts the idea of linear cities.

Some of the proposed examples included in the paper refer to linear developments along rivers. River valleys form a basic axis of settlement development and are specific ecological corridors, the disturbance of which might result in serious consequences for biotopes. Any form of uncontrolled investment can cause disturbance to water management and increase the risk of fluvial floods in urban areas. It should be underlined that in linear urban planning concepts the aspects of mutual interactions between changes in riverside landscape and possibilities of disturbances to water management should be highlighted and carefully analyzed.

The futuristic avant-garde dealing with architecture and spatial planning in the 1960s perfectly combined the idea of linear cities with a new look at urban tissue growth, while maintaining the city's biome in excellent condition. Therefore, looking at the projects of the Japanese metabolists, it seems that the idea of linear decentralization and the metamorphosis of cities is possible. The transformation of the urban system at the meeting point of the city and the suburban zone utilizing innovative linear solutions will simplify the urban structure, which will undoubtedly affect the quality of life in the city.

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Analysis of Quality Public Space—Case Study: Campus 2 State Islamic University of Alauddin Makassar

Sriany Ersina

Abstract

Behavioral, social, cultural, and climatological factors currently influence the pattern of public space provision, especially on campus areas. At present the public space of the CAMPUS 2 area of State Islamic University of Alauddin Makassar tends to be "neglected" which is clearly seen from the arrangement of the physical design of the area; starting from the pedestrian ways, green open spaces/parks, gazebos, and the existing parking system do not yet appear as comfortable "containers" by its users, so these spaces are not yet in accordance with their functions. The theory of public space refers to elements of the quality of tropical city spaces by (Darmawan, Ruang Publik dan Kualitas Ruang Kota. Proceeding. Seminar Nasional PESAT, 2005a; Analisis Ruang Publik Arsitektur Kota, 2005b), because they are considered to have the same activities of its users, namely: human scale and density, structure of clarity and identity, neatness-security-comfort, city/region management, visual variety, activity and mixed functions, special spaces, and pedestrian hospitality. This research is based on the rationalistic paradigm with a descriptive research method approach, namely: literature study on the basic theory of public space quality, field observations, analyzing data using the Good Public Space Index (GPSI) method, as well as drawing conclusions so that it can be used as a guideline in the development and planning of public spaces in the CAMPUS 2 STATE ISLAMIC UNIVERSITY OF ALAUDDIN MAKASSAR in the future.

Keywords

Quality • Public spaces • Campus

1 Introduction

State Islamic University of Alauddin Makassar (UINAM: Universitas Islam Negeri Alauddin Makassar) is a newly created campus of the Alauddin Islamic State Institute (IAIN), which has two campuses: currently, the campus 1 in Sultan Alauddin street no. 36 Makassar city is used as Strata Two (S2)/Magister and Strata Three (S3)/Doctorate lecture activities, training centers, lodgings/hotels, and hospitals, etc.; and campus 2 in HM. Yasin Limpo street no. 36, Samata, Gowa regency is used as a Strata One (S1)/bachelor-level lecture activity.

Campus 2 State Islamic University of Alauddin Makassar consists of several buildings including convention building, rectorate building, faculty of science and technology, faculty of business and economy and all public facilities. Where the accessibility between buildings is still difficult to reach on foot due to the design of the area since there is still no connection between the buildings in the form of pedestrian ways. In a regional scale scientific study of urban (Sepideh Movahed et al., 2012), pedestrian ways are part of public space that must be considered because that is where social activities occur.

At present the public space of the CAMPUS 2 State Islamic University of Alauddin Makassar tends to be "neglected" which is clearly seen from the arrangement of the physical design of the area; starting from pedestrian ways, green open spaces/parks, gazebos, and the existing parking system do not yet appear as comfortable "containers" by its users, so these spaces are not yet in accordance with their functions. Campus 2 of State Islamic University of Alauddin Makassar is also a unique campus that has open public space and many activities inside; among others, it is used as a

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national ceremonial activity, learning and discussion for students, and sports activities such as football, basketball/futsal and sometimes the university field is used for animals like goats and cows for preparation Qurban of celebration Eid al-Adha.

Therefore, it is important to manage these public space campus in terms of planning and design through public space maintenance programs, enhancing the design of public spaces, as well as improving the quality of Campus 2 environment, State Islamic University of Alauddin Makassar (UINAM). It is expected that this improvement of the quality of public spaces including connecting these public spaces is made in order to create a campus area that is comfortable to humans.

The theory of public space refers to elements of the quality of tropical city spaces by Darmawan (2005a, b), because they are considered to have the same activities for its users, namely: human scale and density, structure of clarity and identity, neatness-security-comfort, city/region management, visual variety, activity and mixed functions, special space, and pedestrian hospitality.

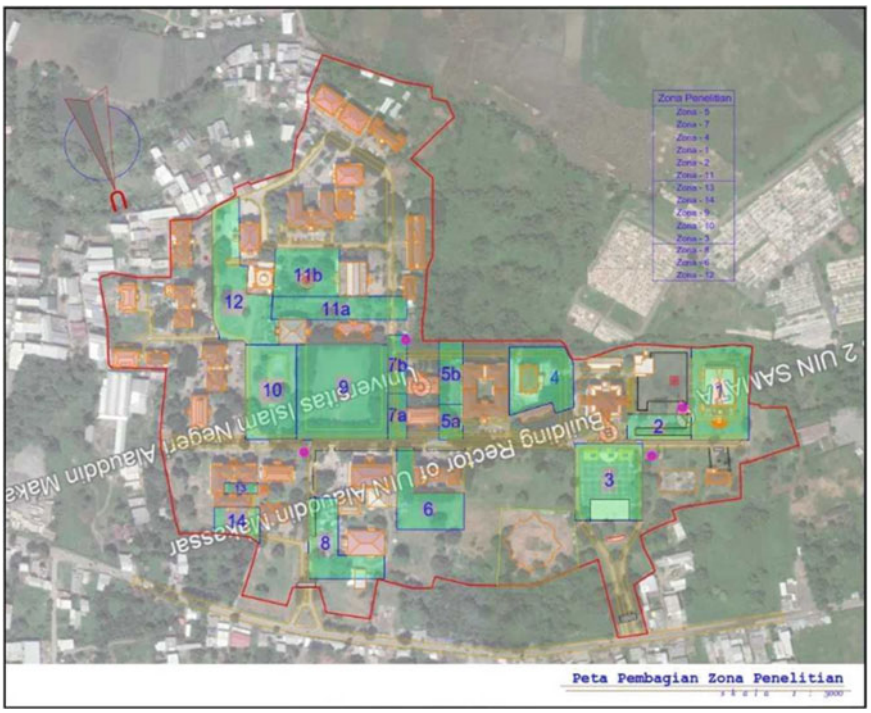
In this research (Fig. 1), it is based on the rationalistic paradigm with a descriptive research method approach, namely: literature study on the basic theory of public space quality, field observations, analyzing data using the GPSI method, as well as drawing conclusions so that it can be used as a guideline in the development and planning of public spaces in the CAMPUS 2 STATE ISLAMIC UNIVERSITY OF ALAUDDIN MAKASSAR in the future.

Quality public space according to Carr (1992) can be seen from the ongoing activities in that space. Activities in open public spaces include telling stories, playing games, and greeting each other, or just passive contact such as sitting down to watch the surroundings and listening to the crowd and also creating an active and festive atmosphere.

Several indicators of the use of public spaces that serve as benchmarks for quality in an area are: (1) number of users; social activities in public spaces that occur because of the presence of other people in that place; public spaces that function well are indicated by more people using the space which in turn can invite more and more people to visit (Gehl, 1987). (2) The level of social activity is indicated by the high proportion of users who come together or in groups; people who come in groups have used a room to meet regularly (Whyte, 1979). (3) The time of the activity is reviewed based on the use of space that varies according to time and day of the week.

2 Literature Review and Theory

Public space, according to the Project for Public Spaces in New York in Darmawan (2005a, b), in a city is generally referred to a form of space that humans use together in the



Information:
Zone 1 : **Convention building**
Zone 2 : **Convention building and its surroundings**
Zone 3 : **Plaza University/UINAM**
Zone 4 : **Lecturer Building and its surroundings**
Zone 5 : **Parking of Science and technology faculty building and its surroundings**
Zone 6 : **Ushuluddin and philosophy faculty building**
Zone 7 : **Pedestrian way connecting**
Zone 8 : **Gate 2 University/Campus**
Zone 9 : **Football field**
Zone 10 : **Basketball / Futsal court**
Zone 11 : **Garden fountains university and its surrounding**
Zone 12 : **Da'wah and Communication faculty building**
Zone 13 : **Health and Medicine faculty building**
Zone 14 : **Health and Medicine faculty building and its surroundings**

Fig. 1 Map of research zone distribution (*Source* Personal Editing, 2018)

form of roads, pedestrians, parks, plazas, public transportation facilities (bus stop), and museum.

In general, public space is an open space that can accommodate the need for meeting places and joint activities in the open air. This space enables human encounters to interact with one another. Because these spaces often arise in a variety of joint activities, these open spaces are categorized as public spaces.

Meanwhile, according to Roger Scruton in Darmawan (2005a, b), each public space has the following meanings: a location that is designed to have maximum access to the surrounding environment, where humans interact and the behavior of the public space users.

Although some experts say that public space is generally open space, Rustam Hakim (2003) says that public space is a container that can accommodate certain activities of the community, both individually and in groups, where the form of public space is very dependent on the pattern and building mass composition. By their nature, public space is divided into two types, namely:

1. Closed public space: is a public space contained in a building.
2. Open public space: public space outside the building which is often also called open space.

In assessing the quality of regional public spaces there are eight important elements, namely:

1. Mixed activities and functions
2. Special space
3. Pedestrian hospitality
4. Human scale and density
5. Structure, clarity, and identity
6. Neatness, safety, and comfort
7. Regional management
8. Visual variety

According to Gehl (2011), outdoor activities in public space are divided into three categories, namely: necessary activities, optional activities, and social activities.

Furthermore he also explained that it includes (1) Necessary activities such as going to school or to work, shopping, waiting for a bus or a person, running errands, and distributing mail; (2) Optional activities such as activities as taking a walk to breath fresh air, standing around enjoying life, or sitting and sunbathing; and (3) Social activities; all these activities highly depend on the physical conditions of the outdoor in public space. If the outdoor area is of high quality, then many outdoor activities can take place with about the same frequency—although obviously, people tend to take longer, due to better physical condition.

3 Method

The research method used is a descriptive research method:

1. Literature study of the basic theory of public space.
2. Field observations at locations that have been identified and determined.
3. Analysis of data obtained in the field, using the GPSI method, using 6 variables (Mehta, 2007).

1.IU(Intensity of Use) :

$$\mathrm{IU} = \frac{\text{average number of people}}{\text{highest amount}}$$

2.ISU(Intensity of Social Use) :

$$\mathrm{ISU} = \frac{\text{the number of people involved in the group}}{\text{highest amount}}$$

3.PDS (People's Duration of Stay) :

$$\mathrm{PDS} = \frac{\text{average time}}{\text{highest time}}$$

4.TDU (Temporal Diversity of Use) :

$$\mathrm{D} = \mathrm{N}(\mathrm{N}-1)/\text{Total } \mathrm{n}(\mathrm{n}-1)\,(\text{Simpson's Diversity Index})$$

5.VU (Variety of Use) :

$$\mathrm{D} = \mathrm{N}(\mathrm{N}-1)/\text{Total } \mathrm{n}(\mathrm{n}-1)\,(\text{Simpson's Diversity Index})$$

6.DU (Diversity of Users) :

$$\mathrm{D} = \mathrm{N}(\mathrm{N}-1)/\text{Total } \mathrm{n}(\mathrm{n}-1)\,(\text{Simpson's Diversity Index})$$

By using the GPSI method, the activities and its users can be well studied with certainty and quickly. The sample in this study is all those who use public spaces in the campus UINAM. The study was conducted from Monday to Sunday, starting at 8:00 a.m. to 21:00 p.m. local time.

4 Results and Discussions

GPSI method was used to analyze the data and used as a tool to measure the quality of public space to work as planned. The effectiveness of public space was indicated by a score from 0 to 1 described as follows:

a. Basic interpretation
   - GPSI is obtained by adding up the values of all variables.
   - By using the six variables, where each variable has a range of values from 0 to 1 and also has the same interpretation where the value approaching 1 is positive; thus the minimum value is "0" and maximum "1."
   - A value close to "0" interpreted that the analysis segment has a very low value in terms of outdoor space utilization.

- Low scores are discussed in more detail by reviewing the value of each of the constituent variables: low number of users, low social interaction, not long duration of the activity, no diversity of activities or the dominance of certain groups of individuals in the use of space.
- GPSI values that are close to "1" indicate that the analysis segment has a higher democratic nature (used by diverse individuals), which is more responsive (able to accommodate diverse activities and more individuals) so that it is preferred by users because it has meaning.

b. Modification method

- This method can be used to analyze the use of space on a day of observation or use of space in a time segment, where the use of space in the morning compared with the use of space during the other times in a day, afternoon or night.

The average GPSI value of QUALITY PUBLIC SPACE at CAMPUS 2 STATE ISLAMIC UNIVERSITY OF ALAUDDIN MAKASSAR indicates a high level. Table 1 consists of the results of each variable index, where from the overall research zone there are 3 places that show a high significance value approaching the positive value of 1.

Figure 2 provides information about the analysis of the GPSI. It indicates that (1) Plaza UINAM, amounting to 0.776501291; (2) Basketball/Futsal Field UINAM, amounting to 0.775949823; and (3) Faculty of Health and Medicine UINAM, amounting to 0.732590436; where the values are approaching 1 which is positive, and have become great public spaces on the UINAM campus.

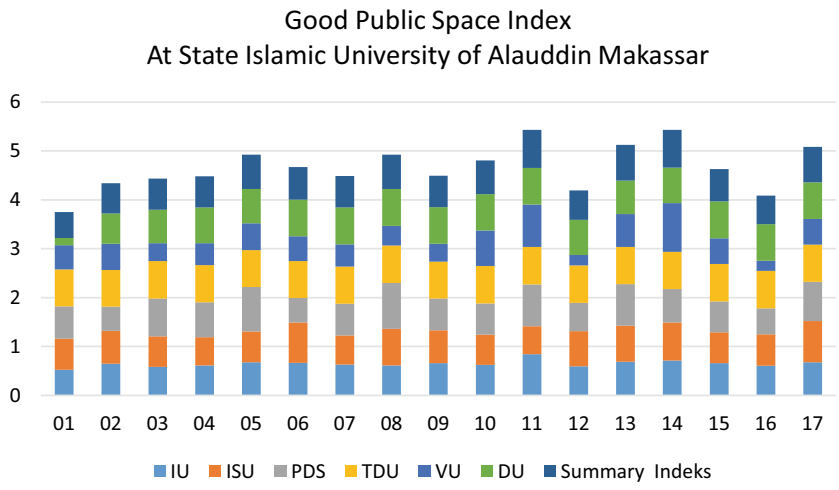
Nevertheless, the public space is still considered unresponsive to its users; as well as meaningless to them as a really comfortable public space for activities. Therefore, it is necessary to plan and design for improvement in order to increase the effectiveness of activities on the UINAM campus.

From Fig. 3, it can be seen that the highest of Variety of Use (VU) in the **Plaza UINAM** shows a value of 0.996443874, where the value approaching 1 is positive and is interpreted as a quality public space with a variety of activities from morning to night. Likewise, in the People's Duration of Stay (PDS) variable in the **Garden fountains of the university and its surrounding** shows a value of 0.937511, where the value approaching 1 is positive and is

Table 1 Summary of analysis and discussion of research data results (*Source* Researcher's Analysis, 2018)

	Instrumen / Ruang Publik	IU	ISU	PDS	TDU	VU	DU	Summary Indeks
01	Fakultas Sains & Teknologi (Titik 5A)	0.525823	0.637346	0.660714	0.753695	0.493327208	0.147058824	0.536327339
02	Fakultas Sains & Teknologi (Titik 5B)	0.648377	0.673214	0.493902	0.750794	0.536215051	0.620689655	0.620531951
03	Fakultas Sains & Teknologi (Titik 7A)	0.582938	0.624317	0.775111	0.765766	0.36786975	0.685785417	0.633631195
04	Fakultas Sains & Teknologi (Titik 7B)	0.614326	0.576841	0.713964	0.761141	0.450724591	0.728215328	0.640868653
05	Fakultas Sains & Teknologi (Antara Gedung C, Rektorat, & Ruang Dosen)(4)	0.676375	0.631944	0.910494	0.756411	0.547896397	0.699113079	0.703705579
06	Audiotorium UINAM & Sekitarnya (Titik 2A)	0.667062	0.825949	0.502778	0.750505	0.512450327	0.746629602	0.667562322
07	Audiotorium UINAM & Sekitarnya (Titik 2B)	0.633421	0.591121	0.648551	0.760976	0.458810281	0.752959892	0.640973196
08	Taman Air Mancur UINAM & Sekitarnya (Titik 11A)	0.613501	0.746971	0.937511	0.768067	0.404718153	0.751284912	0.703675511
09	Taman Air Mancur UINAM & Sekitarnya (Titik 11B)	0.659487	0.673451	0.650273	0.756098	0.362775708	0.748827951	0.641818777
10	Lapangan Sepak Bola UINAM (9)	0.623233	0.620915	0.637511	0.769231	0.723041153	0.744985843	0.686486166
11	Lapangan Basket/Futsal UINAM (10)	0.841667	0.575301	0.854369	0.764121	0.870087898	0.750153042	0.775949823
12	Fak.Kesehatan & Kedokteran UINAM (13)	0.597902	0.717448	0.577381	0.769841	0.209771751	0.723159228	0.599250497
13	Fak.Kesehatan & Kedokteran UINAM (14)	0.690476	0.736486	0.848921	0.765032	0.671232508	0.683395109	0.732590436
14	Plaza UINAM (03)	0.715972	0.775111	0.685938	0.760317	0.996443874	0.725225873	0.776501291
15	Fak.Ushuluddin & Filsafat (6)	0.659622	0.635057	0.627358	0.767881	0.526534135	0.75094258	0.661232453
16	Pintu 2 UINAM (8)	0.605442	0.646041	0.527083	0.770053	0.205260886	0.75262158	0.584416911
17	Depan Fak.Dakwah & Komunikasi (12)	0.675895	0.846939	0.802198	0.763012	0.520040764	0.751414605	0.726583228

Information: IU : **Intensity of Use,** ISU : **Intensity of Social Use,** PDS : **People's Duration of Stay,** TDU : **Temporal Diversity of Use,** VU : **Variety of Use,** DU : **Diversity of Users**



Information:

IU : **Intensity of Use**

ISU : **Intensity of Social Use**

PDS : **People's Duration of Stay**

TDU : **Temporal Diversity of Use**

VU : **Variety of Use**

DU : **Diversity of Users**

01 Faculty of Science and Technology (Point 5A)
02 Faculty of Science and Technology (Point 5B)
03 Faculty of Science and Technology (Point 7A)
04 Faculty of Science and Technology (Point 7B)
05 Faculty of Science and Technology (Point 4)
06 Convention Building (Point 2A)
07 Convention Building (Point 2B)
08 Garden fountains university (Point 11A)
09 Garden fountains university (Point 11B)
10 Football field (Point 9)
11 Basketball / Futsal court (Point 10)
12 Health and Medicine faculty (Point 15)
13 Health and Medicine faculty (Point 14)
14 Plaza University/UINAM (Point 3)
15 Ushuluddin and philosophy faculty (Point 6)
16 Gate 2 University (Point 8)
17 Da'wah and Communication faculty (Point 12)

Fig. 2 Good public space index at State Islamic University of Alauddin Makassar (*Source* Researcher's Analysis, 2018)

interpreted as a quality public space with duration time average in the place approximately 2 h.

5 Conclusion

The results showed that there were 3 zones of public spaces in the UINAM campus area which were classified as high, namely Plaza UINAM, Basketball/Futsal Field UINAM, and Faculty of Health and Medicine UINAM. Likewise, VU (Variety of Use) and PDS (People's Duration of Stay) showed a positive significance value. This can be seen from the values shown. Nevertheless, there are several gaps important to follow up. In general, the problem identified is the lack of lee, such as plant, to protect users of these public spaces from the sun's heat. Another problem is the dominance of passive activities, such as sitting, conversing, playing in cellphone, and taking pictures but they run short of supporting facilities for sports, pedestrians, and parking. This is not parallel to the concept and theory of quality of public open space which needs an active and festive environment and also supported by better physical conditions.

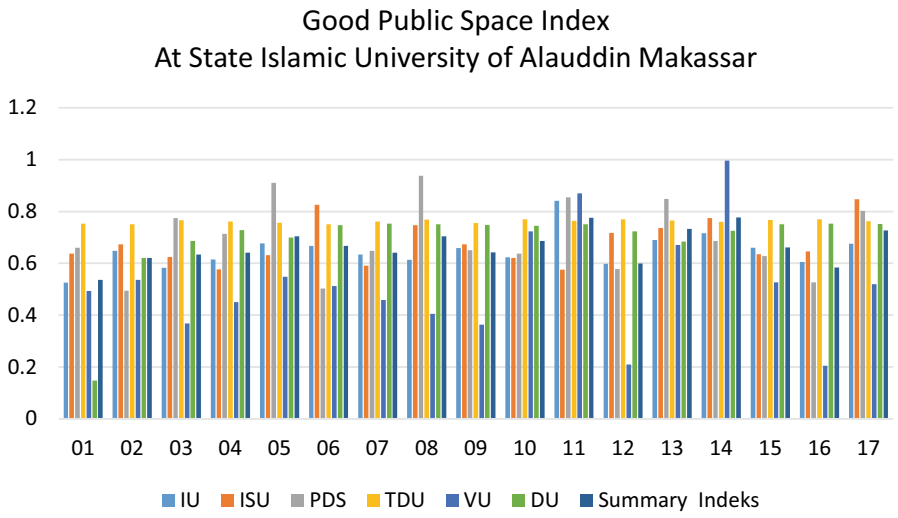


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Fig. 3 Detail of good public space index at State Islamic University of Alauddin Makassar (*Source* Researcher's Analysis, 2018)

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Understanding the Role of Slums as 'Poverty Traps' or 'Springboards': A Case Comparison of India and Latin America

Debakshi Mitra

Abstract

Over the course of an individual's life, one has the chance of falling into poverty or rising out of it, making poverty a dynamic concept. In order to measure this dynamic aspect, longitudinal slum studies are of prime importance. There are two contradictory slum theories that somewhat take into consideration the dynamic nature of poverty. One considers slums to be 'poverty traps' for its dwellers, whereas the optimistic theory regards slums to be 'springboards' acting as gateways into improved urban living for poor rural migrants. The focus of this research is to understand the aspect of intergenerational mobility for slum dwellers, by looking at longitudinal slum data, in order to categorise them into being poverty traps or springboards. The aim is to identify the main factors that traps or elevates people in and out of poverty. This has been attempted by looking at longitudinal slum studies from different metropolitan cities in India and comparing them with similar studies from Latin America. The empirical finding was that even though most of the slum cases showed significant improvement in the physical nature of the dwellings, basic amenities and literacy rates over years, they showed little upward intergenerational mobility.

Keywords

Intergenerational mobility • Poverty dynamics • Slums • Urban poverty

1 Introduction

Poverty and slums evoke certain notions—lack of control over one's destiny, filth, helplessness and despair. They are overcrowded, illegal, dirty, diseased, devoid of public services, infrastructure, and are informal. Slum dwellers are looked down with pity and their issues have traditionally been addressed with a 'to be provided for' attitude. Estimates show that the number of urban residents living in slums increased to 881 million in the year 2014 from 689 million in 1990, representing a 28% increase over a period of 14 years (UN Habitat, 2016).

Several theories revolve around the issue of slums. Some consider slums to be 'Poverty Traps'—places where individuals are stuck in deprivation over long periods of time and there is nothing they can do by themselves to escape this situation (Ortiz-Ospina & Roser, 2017). Whereas the modernization theory of slums considers it to be a transitory phenomenon (a stepping stone to success), where the dwellers eventually escalate to formal housing in the city, that is, a rise in their quality of life (Marx et al., 2013). These two theories are completely at odds with each other. If the modernization theory was true, then approximately 42% of Mumbai's population would not be residing in slums currently (Kamper, 2017). Over the years slums have evolved from being just a poverty issue, to being a massive real estate problem. Slums are a result of failure of public policy. The inability of the state to keep pace with the growth of the city.

Traditionally, poverty has mostly been looked at as a static concept, with slum studies restricted to large-scale census surveys or sample surveys (cross-sectional studies). But poverty is far from being so plain an issue, and a lot of its complexities and criticalities are lost in the simplistic ways of studying it. In order to cater to slums, what first needs to be addressed is an understanding of the 'dynamics of poverty'. And in order to capture the dynamic nature of poverty, longitudinal studies are required. In-depth longitudinal studies would help grading the evolution of slums into

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whether they act as poverty traps or springboards for its dwellers.

Slum studies, especially in the sphere of architecture and urban planning, generally tend to analyze the morphology and physical setting of slums. Which eventually leads to dealing with the nitty-gritties of multi-utility space efficiencies in slum dwellings. On the other hand, socio-economic slum studies usually conclude in standalone survey data collected at a static point in time. Another aspect that needs to be acknowledged is that, slums indeed have evolved over years and many seem to be catching up closely with that of an average urban area. The settlements that had been established over three to four generations ago are way more stable and in many cases even legal, compared to newly formed vulnerable slums.

This study attempts to look at slums 'differently' through the lenses of economics and policy. The aim is to understand the evolution of slum dwellers, from their rural roots to their final standing in urban living and not just be constricted by the physical boundaries and attributes of a slum. Ideally, including those members who have moved out of slums in recent times, but previously (or in previous generations) were first generation migrants residing in slums.

The other objectives of this study includes exploring the dynamic nature of poverty faced by slum dwellers and defining the root cause of their vulnerabilities and strengths. Focussing majorly on slums from different metropolitan cities of India, along with slum cases from the neighbouring country of Bangladesh, as well as examples from Latin America. This has been done by comparing the available longitudinal data in different slum contexts, in order to understand what are the differences and the common factors between them.

The research questions being addressed in this study are —Do slums act as poverty traps or springboards for their dwellers? What are the factors that trap slum dwellers in poverty and what elevates them? Are there any patterns (similarities/differences) observed in these aspects across different contexts?

2 Methodology

In order to trace the life trajectory of slum dwellers, longitudinal studies are of prime importace. But, there is an immense scarcity of longitudinal slum data. The sources used for this research are all secondary in nature as it was not possible to carry out primary longitudinal surveys. The following steps were followed to carry out this study:

Step 1—A general view of slums and poverty in the world, exploring its complexities and understanding the theories related to them. Going on to focusing on slums in India particularly. A wholistic view of how slums are defined legally in India and what kind of amenities they are endowed with, as per official census and related studies.

Step 2—Focusing on Mumbai, the Indian city with the largest slum population, to understand what goes into the formation of slums in terms of opportunities, policies, real estate forces, etc.

Step 3—Strengthening the research with other longitudinal/evolutionary slum case studies from different Indian metro cities, namely Bangalore and the capital of Delhi. Every case chosen was unique in its own way and had different techniques adopted to carry out the survey.

Step 4—Comparing the Indian slum cases with similar studies done in other countries, namely Bangladesh and Brazil. The case from Rio de Janeiro was one of the best example of a longitudinal slum study conducted till date. The aim of this exercise was to understand how the cases across different countries converge or diverge.

3 Slums—A General Introduction

The origin of slums dates to the period of Industrial revolution, when rural migrants flocked the cities to work as labourers in the industries. Tenement housings for workers were poor, dilapidated and never enough for all, resulting in slums and squatters. Over years, the developed countries have been able to get rid of slums, but they still pose to be a big problem in the cities of the developing world.

'Slums' are a world in itself, providing both housing and work, and come with their own economies (Prahalad, 2014). Most slum dwellers are usually engaged in informal employment, sustaining poverty and reducing resilience among slum dwellers. What is crucial to understand here is that slum economies provide important urban services. For example, it is said that the city of Mumbai would have drowned in its own garbage if Dharavi's waste recycling industries had not existed (Bansal & Gandhi, 2012). Therefore, slums cannot be viewed in isolation only on the basis of the quality of living it provides. But for a wholistic understanding one should view the economy it generates. It needs to be understood that slums are usually an inherent property of a successful city, that is, it's usually the successful cities which have opportunities and jobs that attract poor migrants (Glaeser, 2011), who take shelter in slums as they are a cheap form of housing.

3.1 Slum Theories

Several theories pertaining to the issue of slums have been developed by various scholars over years. The ones that are related to this research are discussed in this section.

It is a matter of common knowledge that only the city which has opportunities would attract people (pull factor). Cities do not make people poor, rather they attract the poor for better economic gains (Glaeser, 2011). Therefore, one can conclude that slums are an indicator of a city being successful, that is, having diversity in the job field as employment is easier. Rural-to-urban migration, one of the primary reasons for the growth of slums can be classified into two: pull factors (pulling of rural people to cities) and push factors (driving population away from rural areas) (Agouris et al., 2016). Contrary to the pull factor, the push factor states that the primary reason for growth of slums is because people get pushed out of rural areas, due to chronic under investment in areas outside cities (Davis, 2006). Two strong conflicting ideologies seem to play here. One, a very pro-city viewpoint propagated by economist Edward Glaeser, who believes that the main reason for rural-to-urban migration is the preference of urban poverty over rural poverty, due to services available, such as education. Glaeser believes that the economic problem of slums is not that too many slum dwellers come into the city, but slum dwellers are often disconnected from the economic heart of the metropolis. The other ideology is that of Mike Davis, who states that governments should work for the upliftment of rural areas, so that people do not have to migrate to urban centres for living. Empowering rural areas with social security and public facilities and developing new urban centres or tier-two cities to relieve the extreme stress generated on our existing urban centres.

Even though cities have more to offer, rural migrants face a lot of atrocities to get themselves infused in the urban sphere. Without legal identities, titles and with employment opportunities only in the informal sector, they fail to get a strong foothold in the city. As stated by De Soto, 'In every country we investigated we found that it is very nearly as difficult to stay legal as it is to become legal. Inevitably, migrants do not so much break the law as the law breaks them—and they opt out of the system'. The newcomers to the city quit the system and 'their only alternative is to live and work outside the official law, using their own informally binding arrangements' (Soto, 2001).

The theory of poverty trap says that a 'Poverty trap is a spiralling mechanism which forces people to remain poor. It is so binding in itself that it doesn't allow the poor people to escape it. Poverty trap generally happens in developing and under-developing countries and is caused by a lack of capital and credit to people' (The Economic Times, 2018). The concept is simple—poverty today causes poverty in the future, so households that start poor, remain poor. Policy efforts should make it possible to 'escape the trap' and have permanent positive effects (Ortiz-Ospina & Roser, 2017).

On the other hand, as per the modernization theory—slums are a transitory phenomenon characteristic of fast-growing economies, and they progressively give way to formal housing as economic growth trickles down and societies approach the later stages of economic development (Marx et al., 2013). This argument holds that slum living represents a transitory phase in the life cycle of rural migrants. The slum dwellers or their children eventually move into formal housing within the city. Therefore, according to this theory slums act as springboards or stepping stones for poor rural migrants, who come to the city, live in slums for a couple of years and eventually rise the economic ladder to formal housing. But this theory is questionable, as in many of the countries, slums have been growing since decades and countless people find themselves trapped in slums for generations.

3.2 Methods of Slum Enumeration and Poverty Studies

Comprehensive slum data is a primary requirement for a wholistic study of slums. But with the kind of slum data and studies available, reviewing the performance of slums become questionable. Slums being complex, diverse and dynamic in nature are tough to capture and survey. Lack of permanent address, absence of legal identity and with repeated evictions, tracking slum dwellers becomes impossible. The usual methods of studying slums are:

Census survey and data—From 2005, all but five countries of the world committed to conducting national census. However, the frequency of these surveys and the level of detailed information covered differs from one country to another. The problems in the slum census surveys are many—'A decennial census quickly becomes outdated and loses its reliability' (Chakraborty et al., 2015).

Statistical analyis and sample surveys—These are studies done by private organizations, academic institutes, NGOs and others public bodies. They are not of great value, as the base data is the same that has already been provided by the census. At other instances, such reports are even based on standalone sample surveys. Such surveys do not include a large portion of the population, and hence cannot be generalized.

Digital applications and data—Applications such as GIS, Google Maps and Open Street Map have become popular over the years, which enable mapping of urban areas through high-resolution satellite imagery. They can even be used to gather information about how an area has evolved over years, for example, the timeline option in Google Earth (Krishna, 2013). Such tools definitely help in supplementing large-scale surveys and studies. But the information provided is purely physical in nature and they fail to recognize socio-economic aspects.

All the slum enumeration methods used currently do not take into consideration the dynamic nature of slums. Therefore, they show a static picture of slums at a particular point in time. Comparing such data collected from different periods would not give accurate understanding of mobility in slums.

Poverty studies seem to focus more on the 'state of being poor', rather than the 'dynamics of poverty' (Banerjee & Duflo, 2011)—movement into and out of poverty (Bhide et al., 2011). As shown in Fig. 1, consider a tank with an inlet and an outlet. This tank represents poverty, with an inlet A—representing people getting into poverty and an outlet B—denoting people escaping it. Within this tank itself, a certain level is denoted as the poverty line. Therefore, poverty can be considered to be a dynamic phenomenon, as people fall into poverty, and at times get caught in it for long periods (chronic poverty) or escalate out of it in time (transient poverty). 'Static analysis of poverty does not shed light on processes that are central to the persistence of poverty and/or its elimination' (Bhide et al., 2011). Longitudinal studies and slum surveys have a central role to play in this field. However, not much literature or data is available on the aspect of longitudinal poverty studies, as they are difficult and at times not feasible to be carried out.

4 The Indian Context

As per the 2011 census 31.2% of India's total population lives in urban areas. Despite the economic boom in the country over the past couple of decades, slums have consistently been on a rise. An estimated 65.5 million Indians reside in slums, who make up 17% of the urban population (Ministry of Housing & Urban Poverty Alleviation, 2015). The national slum census was conducted in India for the first time in 2001. It identified slums at the neighbourhood level and defined them on the basis of satisfying any of the following three criteria (Ministry of Housing & Urban Poverty Alleviation, 2015):

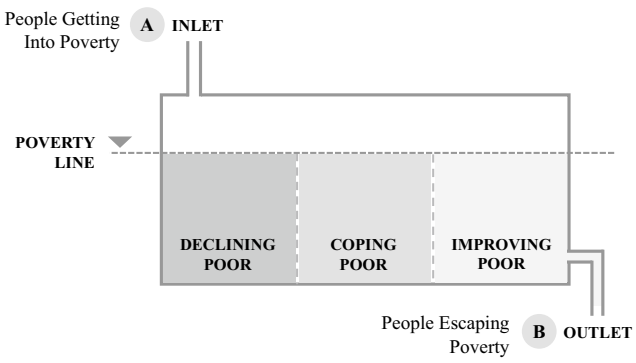

Fig. 1 Classification of poverty. *Source* Author

- All notified areas in a town or city notified as 'Slum' by State or Local Government, Housing and Slum Boards etc. under any statute including a 'Slum Act' are considered as notified Slum.
- All areas recognized as 'Slum' by State/Local Government, Housing and Slum Boards etc., which may have not been formally notified as slum under any statute are categorized as recognized Slum.
- A compact area of at least 300 populations or about 60–70 households of poorly built congested tenements, in unhygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities in the State are categorized as identified Slums.

The first two criteria refer to administrative classifications and require official recognition of neighbourhoods to be declared as slums. Whereas only the third criterion identifies slums on the basis of certain measurable attributes, similar to the UN-Habitat's definition of slums. However, 'the criterion of a minimum of 60–70 households clustered together fails to recognise smaller slum settlements, which may be more recently formed and house particularly disadvantaged households' (Bhatkal et al., 2016). Another drawback of this classification is the use of neighbourhood level instead of household level as an identification unit for slums. With this approach there are chances of better-off households to be designated as slum if majority of the neighbourhood has insufficient infrastructure. Studies reveal that notified slum households are 50% wealthier than non-notified slum households (Krishna, 2013), therefore illustrating the importance of legal recognition of slums and how that positively affects the lives of the dwellers.

Census and NSSO (National Sample Survey Office) are the only two official statistical surveys conducted in India. A detailed comparison of what these two sources say about slums in India is listed in Table 1. The credibility of these studies are somewhat questioned as they 'have come up with two completely different estimates of India's slum population, leaving both policy makers and the citizens puzzled' (Varma, 2014). A gigantic difference of about 21 million people is seen between census and NSSO. However, the methodology deployed by NSSO is considered superior to that of census, as it included even those settlements made up of just 20 households. The census, however, as per its qualifying criteria, only includes settlements with 60–70 households.

4.1 The Case of Mumbai

One of the most unique slum cases encountered in Mumbai was that of the M(E) Ward, which was once a government established slum resettlement; but over years had turned into

Table 1 Comparison between Census and NSSO. *Source* Author

	Slum census	National Sample Survey Office (NSSO)
Conducted by	Ministry of Housing and Urban Poverty Alleviation, Government of India	Ministry of Statistics and Programme Implementation, Government of India
Slum population (As on 2012)	65 million (approx.)	44 million (approx.)
Survey since	2001	1977
Latest survey	2011	2012
Survey intervals and methods	10 years, household surveys	Not fixed, range between 6 and 10 years, sample surveys
Qualizying settlement size	60–70 households	20 households
Negative finding (in terms of trend)	• Decennary data, which is not enough to identify trends in slum growth in India • Static data (cross-sectional) hence mobility analysis not possible	• Data not collected over regular intervals • Static data (cross sectional) hence not fit for mobility analysis
Positive finding (in terms of trend)	Comparing urban, rural and slum figures, a general idea could be drawn about where can slums be placed in terms of amenities, physical condition of houses etc	Method of counting slums was superior to census mostly because, the qualifying settlement size being smaller, a micro-approach could be considered
Analysis result	• Over years slums had rather become a typology of housing for the poorer sections in the city, sans the formal rights • From this data it could be said that slum areas are catching up with urban areas, in terms of services availed	• Over the years, not only did slums in India grow, but they showed attributes of transforming themselves into more permanent structures • Slums anchored themselves around income generating activities and neighbourhoods (e.g., commercial and industrial areas) • An increase was seen in the percentage of slums located on private lands, illustrating failure of the government in providing solutions to the poor

one of the most vulnerable forms of slum (Bjorkman, 2014). The history of this area goes back to the 1970s when the government was on a 'clean the city of its poor' spree. The ward which was initially industrial in nature and housed various oil refineries, power generators and a dumping ground was converted to a residential landuse zone for the resettlement purpose. Various governmental housing policies over years resulted in a steady flow of resettled poor in this area, which eventually became a hotspot for the vulnerable communities. What the government provided was a grid-iron layout of tiny plots of land, with community taps and common toilet blocks. The land had never formally been leased out to the people; however, they were to construct their own dwellings.

The problems with this settlement were many. The people had a horrific experience living next to the city's dumping ground. To make things worse, eventually the government discontinued the piped water supply to this area. The deteriorating quality of life drove many residents out of this area. However, this area was in high demand among the most vulnerable first-generation immigrants (Bhujbal, 2016).

The Tata Institute of Social Sciences (TISS), Mumbai carried out extensive surveys in this area, which was published in 2015 in the form of a report 'Social Economic Conditions and Vulnerabilities—A Report of the baseline survey of M(East) Ward, Mumbai' (Tata Institute of Social Sciences, 2015). In this study, only for the aspect of 'housing' an evolutionary approach was considered. The households were divided into three groups on the basis of their duration of stay—more than 16 years, 11 to 6 years and last 10 years before the year of the survey. Classifying it on the basis of duration of stay showed that as high as 86.93% of the households who had been in the area for more than 16 years had a metered electricity supply. In India, electricity supply with a meter means that the tenement is formally provided electricity and therefore gets due recognition. The study showed that the households settled after the year 2000 were more vulnerable than the ones settled before.

Therefore, it could be said that the number of years of stay in a slum could be directly related to its legal status and availability of amenities.

4.2 The Case of Bangalore

Professor Anirudh Krishna, of Sanford school of Public Policy, conducted a detailed research in Bangalore, starting in 2010. Fourteen Bangalore 'notified slum' communities were surveyed. This was further diversified with more recently formed slum types—'first-generation slums' as he called them. This study was done for an understanding of the aspect of intergenerational mobility in slums. The author mentioned how the unavailability of longitudinal data (re-surveys of the same slum household) made such studies difficult (Krishna et al., 2014). However, data pertaining to previous generations were traced from detailed and extensive household surveys.

The study gives an account of the differences seen in the first-generation slums and notified slums of Bangalore. The author had stated that it was possible that some of the dwellers in the notified slums, over the years had climbed the economic ladder and moved out of the slums. These households did not become a part of the slum sample studied. As the dwellers had left the premises and it was impossible to trace them. However, evidence showed that this phenomenon of escalation was not predominantly encountered during the research. Hardly any neighbour had moved out of the slums in five years preceding the survey. Those who had moved out, either had relocated to another slum or to another part of the same slum (Krishna, 2013).

According to this study, one of the main factors that distinguished between moving up or down over generartions was the susceptibility of the household to adverse events of illness or death. Of the households that went worse off over the period were seen to have a 65% higher medical expenditure among other households. The results showed that slum dwellers did advance economically over the years, but the extent of improvement was small in majority of cases, and in many cases, there are reversals of fortune (Krishna, 2013).

4.3 The Case of Delhi

The following case was that of a longitudinal slum study by the Council for Social Development (CSD), Delhi. Household surveys were carried out at two different points in time—first in 1987 and later in 2005. In 1987 the slum dwellers of Babu Park squatter in Kotla Mubarakpur, Delhi, were surveyed (Ghosh, 2006). The dwellers of this slum were relocated to a resettlement colony—Swarnajayanti Vihar in Tikri Khurd in north-west of Delhi in 1999. After which the second phase of the survey was carried out in this resettlement colony in 2005.

From the study, it was evident that even though the houses improved considerably in the resettlement colony compared to the slum, still very few households were seen to have amenities like a bathroom or a kitchen. Due to the availability of larger living space in the resettlement colony, more people were accommodated in the dwellings, in turn overcrowding the area (Ghosh, 2008).

The education cost was seen to decline in the resettlement colony compared to the initial slum, due to the efforts of the government bearing expenses and providing free textbooks, uniforms and so on. However, medical expenses were seen to increase substantially, from Rs. 23 (approx. 0.29 €) to Rs. 121 (1.5 €). This was due to the absence of a public dispensary in the resettlement colony; hence, the people were forced to consult private clinics which were expensive. Far off workplaces have in turn increased the travelling expenses in the resettlement colony.

5 Slums Elsewhere

5.1 Case of Rio De Janeiro

Janice Perlman's four-generational study of the favela residents of Rio de Janeiro was one of the best examples of a longitudinal slum study till date. She collected data initially in 1968–1969 and then updated it almost thirty years later in 1999–2003 (Perlman, 2010). The studies traced the trajectories of families and individuals from their rural fishing and agricultural roots to their stay in the squatters of Rio de Janeiro. Perlman observed that in spite of various governmental efforts to control urban poverty in Brazil, by eradication of squatters in the beginning, followed by measures to upgrade them, still favelas grew to twice as many in numbers as compared to 1969 (Perlman, 2006).

Even though in the favelas, a considerable improvement was seen over generations in terms of basic services, education and health, still it could not ultimately elevate their lives. The favelas in Rio, enjoyed de facto land tenure rights, so no threat of eviction. However, they opposed the regularization of land titles as it would mean paying property taxes and abiding by building byelaws. The people had no access to a steady regular job, and this forbade them from accessing formal credit systems as repaying debts became difficult. This intergenerational slum study by Janice Perlman was eye-opening as it showed how even improved access to land tenure, education, basic services and higher consumption patterns did not necessarily lead to an elevated quality of life. Therefore, implying that slums, in any which ways, acted as traps providing a lower quality of life. But

such longitudinal slum studies had rarely been conducted in other parts of the world.

5.2 Case of Bangladesh

The slums of Bangladesh are known to be particularly vulnerable, and longitudinal slum studies are hardly available. The following study was conducted by two professors, from London School of Economics and Bangladesh University, respectively. Household surveys were carried out in two slum neighbourhoods of Dhaka (the capital of Bangladesh), in the year 2001. A total of 616 households were surveyed, with a special focus on the children between the age group of 5 and 15 years (Kabeer & Mahmud, 2009). The study focussed on aspects of intergenerational education transmission in slums of urban Bangladesh. In-depth interviews were carried out with the children, their parents and school teachers. Even though this study did not give statistical data of their findings, and was not longitudinal in nature, still it gave useful insights about how parental levels of education and exposure had strong influences on the future of the next generation.

6 Critical Analysis

6.1 Comparitive Analysis of Cases

Table 2 gives a detailed matrix denoting the differences, similarities and main findings from the slum cases studied across cities and countries.

Similarities observed—In spite of different contextual settings of every slum case, some common observations were encountered. A greater length of stay in slums, usually over generations, resulted in better shelter structures which were more permanent and usually owned. However, land ownership was still seen to be a contested idea, with majority of the people not having titles to the land on which they had already built their homes over generations. With permanent shelters came amenities, such as electricity and water supply—which was seen to be almost universal. If not legal, at times they were provided informally by the local political parties in power, especially in India. Slum dwellers being major vote banks for political powerplay, a symbiotic relation exists between them. Almost all the slum cases showed improvements in the field of education, as literacy levels went up with every generation of slum stay. However, this enhancement in education failed to have corresponding betterments in occupations. A primary reason for this being the government failed to create enough employment opportunities for all, resulting in large-scale unemployment. Attainment of higher education was not seen to be very common among slum dwellers either. Change was seen in the nature of work which shifted from manual to non-manual jobs over generations; however, they remained majorly in the informal sector and low-security.

Differences observed—One of the main aspect of differences observed among the slum cases were the ones that rose out of local social customs. Many social reasons contributed to inequality. In the Indian cases they were—caste-based discrimination (a major factor), social customs leading to indebtedness, unexpected health expenses, assortative marriages, etc. These kinds of social norms were even seen to be prevalent among the Bangladeshi slum communities, with dowry practice, child marriage and inheritance practices common. Gender-based disparity was observed between female-headed households and male-headed households, both in India and Bangladesh. Brazil slums, however, showed none of these social problems in them. Their issues were different which were born out of drug abuse and violence, leading to weakening of the social networks, which further contributed to unemployment.

Overall, the cases showed more attributes of slums being traps. Even though betterment was seen in the aspects of physical condition of homes and availability of amenities, it failed to create a more secure and prosperous future. The improvements, however small, seemed unstable and far from creating a 'springboard' effect.

6.2 Country Comparison

India and Brazil both are known for their burgeoning number of slums and favelas. Table 3 gives an insight into the basic differences and similarities seen among the slums of India and the favelas of Brazil.

Improvements in education vs employment—Slum and favelas both showed an improvement in the field of education over the years. However, this improvement in education failed to get translated into better occupations. Greater mobility in education compared to occupational mobility. The following graphs were plotted in order to have a deeper understanding of how the improvements in the field of education differed between India and Brazil.

From the graph in Fig. 2 (literacy rate over years) the following inferences were drawn—firstly, even though, both India and Brazil showed betterment in the field of education over years, the educational standing of Brazil in general was way ahead of India. Secondly, the improvement in literacy rate for Brazil slums were sharper for the later generations, hence it eventually converged with the country average. Whereas, even though the slums in India showed considerable improvement in their literacy rates over years, they were still considerably below the country average. Figure 3 gave

Table 2 Comparison table for slum cases studied—differences and main findings. *Source* Author

Example from	M(E) Ward, Mumbai, India	Bangalore, India	Delhi, India	Dhaka, Bangladesh	Favela, Rio de Janeiro, Brazil
Research by	Tata Institute of Social Sciences (TISS)	Prof. Anirudh Krishna of Sanford School of Public Policy	Council for Social Development (CSD)	Naila Kabeer (Professor LSE) and Simeen Mahmud (Lead Researcher at University, Bangladesh)	Janice Perlman
Focus of study	Socio-Economic conditions and vulnerabilities	Social Mobility	Changing patterns of livelihood	Intergenerational education transmission	Changing pattern of marginality
Year of study	2010–11	2010 and 2012	1st—1987–88, 2nd—2005–06 (after 18 years)	2001	1st—1968–69, 2nd—1999–03 (after 30 years)
Study method	Household survey	Household survey and high-res satellite images from different periods	Household survey (at two points in time)	Household survey	Household survey (at two points in time)
Type of study	Not longitudinal	Not longitudinal	Longitudinal study	Not longitudinal	Longitudinal study
Tracing respondents	–	–	51% of initial respondents traced	–	41% of initial respondents traced
Number of households covered	–	32 settlements, 2112 HH	1st survey—180 HH, 2nd suvey—93 HH	2 slums, 616 HH	1st survey—750 people, 2nd survey—307 people
Number of generations considered for study	Mostly 1st generation	4 generations and more (notified slums)	2 generations	2 generations	4 generations
Residence of the generations stated above	Same slum	Same slum	Same house	Same slum	Different locations—favela, public housing and another neighbourhood
Shelter					
Building condition	Owned structures, more permanent over years (but, below Indian average)	Owned structures, more permanent over years	Owned structures, more permanent over years	–	Owned structures, more permanent over years
Land Tenure	No ownership, rented	Owned (in case of notified slums)	No ownership, rented	–	De facto ownership
Amenities					
Water	No supply	Piped supply	Provided	–	Provided
Electricity	Connection with meter	Connection provided	Connection provided	–	Connection provided
Health					
	Deteriorated due to environmental hazard	High medical expenses—trapped people in poverty	No health deterioration, but medical expenses increased	–	–
Education					
Illiteracy (over generations)	High illiteracy	Reduced (from 87 to 50%)	Reduced (from 69 to 45%)	Insufficient data	Abolished
Higher Education (among the younger generations)	Poor	Among few (due to poor returns)	Among few	Among few (many reasons keeping them out of school)	Among few (due to expensive preparatory courses)
Spending on education	16% of average income	For 35% of people – 1st spending priority	1.7% of average income (due to govt. subsidies)	Too expensive to continue education	–

(continued)

Table 2 (continued)

Example from	M(E) Ward, Mumbai, India	Bangalore, India	Delhi, India	Dhaka, Bangladesh	Favela, Rio de Janeiro, Brazil
Livelihood					
Avg. monthly income	Rs. 5333* (approx. approx. 66 €)	Rs. 8188* (approx. 101 €)	Rs. 5852* (approx. 73 €)	–	–
Occupation	Informal sector—temporary, contractual work (close by industries)	Informal sector—non-manual job growth (IT sector influence)	Formal (sweepers) and Informal—contractual work (close by industries)	Garment worker, casual labour	Non-manual job growth
Access to credit	–	–	Access to formal credit system and banking service	Less or no access	No access to credit as no steady jobs
Social					
Composition	Muslim and backward castes	Backward castes	Mostly backward castes	–	–
Social network	Strong	Strong	Strong	Social surroundings influence the young, but deteriorating social network due to rise in violence	Deteriorated over years due to drug abuse
Main findings					
Mobility (entry/exit in slums)		5-year mobility rate—negligible (no neighbours moving out)			Only 37% remained in favela over the years, rest moved out
Educational vs occupational mobility		Illiteracy reduced but none pursuing better higher occupational avenues, mostly in low security informal jobs	Illiteracy reduced, but unemployment among youth, work in informal sector, leading to greater marginalisation		Improvement in education did not get translated to better jobs
Main factors affecting mobility		Unanticipated medical expenses—one of the main reasons trapping people in poverty	Resettled in suburbs (increasing travelling time) which had corresponding effects on other aspects	Intergenerational transmission and neighbourhood effects—especially in education	Unemployment—suitable opportunities missing
Gender-related aspect			Working mothers—lives of children affected with no one to monitor them	Women headed HH– lives of children affected with no one to monitor them	
Outcome of govt. involvement	Political powerplay worsening the lives of the poor		Larger living space in the colony (as per govt. standards) attracted more people—overcrowding	Less support from govt. in urban education than rural, so many considered sending their children back to the village	Public housing not preferred by the people as they are non-incremental
Unique country specific aspect of vulnerability	• Majority residents belong to the backward or minority communities—ethnicity playing an important role in vulnerability • Age old customs of expensive social functions and marriages leading to indebtedness • Assortative marriages (between same caste, religion, and class) • Low growth in employment opportunities			Socially vulnerable society with dowry, child marriage, inheritance practices having impoverishing effects	Low employment opportunities and the ones available are considered too menial for the younger generations

*Average monthly income—as per 2010 levels, HH—Households

the Gross Enrollment Ratio (GER) for secondary school education in India and Brazil over years. The GER for Brazil was higher than that of India. However, the GER for India was observed to rise steadily over the past 60 years and almost converge with the Brazil country average. Both for India and Brazil, the GER for the slum cases were way lower compared to the country averages. Secondary school enrollment in the favela, which was zero for a long time, had risen post 2001 and the improvement was steeper in the recent years. The Delhi slum showed improvement as well and over years was seen to converge with the Brazil slum average.

Shift in occupation pattern—A visible shift from an agriculture to a non-agricultural sector was seen both in India and Brazil. A sharp rise in migration from rural areas and in non-farm occupations. However, the employment

Table 3 Country comparison—in terms of chronic poverty faced. *Source* Author

	Slums of India		Favelas of Brazil
Research by	Indian Institute of Public Administration	Indian Statistical Institute, Bangalore	Human Capital and Economic Opportunity Global Working Group
Focus of study	Chronic poverty in India	Intergenerational occupational mobility	To examine whether slums are barriers or stepping stones for lower skilled households
Year of study	1989–1999 (10 years)	1983–2012 (29 years)	1950–2010 (60 years)
Type of study	Not longitudinal	Cross-sectional study	Cross-sectional study
Method of study	Sample surveys	Statistical analysis of NSSO data (sample consisted of—co-resident father-son pairs)*	Statistical model developed from the following data: Brazilian Census data, Favela Census, social mobility supplement of PNAD (Pesquisa Nacional por Amostra de Domicílio), Groningen Growth and Development Centre database
Educational mobility	Households with literate heads (among severely poor) showed greater probability of moving out of poverty	Median years of education increased by 2–3 years for all workers in this period	Median years of schooling at the favelas were seen to considerably improve from approx. 2.5 years in 1950 to 6 years in 2010
Income mobility	–	Median income for all workers increased by almost 10 times over this defined period	-
Occupational mobility	• Low paying (daily) wage earning jobs grew the most in this period, more 'marginal' than 'main' workers • Agriculture as an occupation reduced over this period • More participation of women in labour force	Among both fathers and sons, there was a decline in the number of farmers, and rise in the number of non-farm occupations such as semi/skilled and white-collar workers	Majority employed in low-skill sector (e.g. maids etc.), workers, construction workers, etc. as the non-agricultural sector failed to create enough employment opportunities catering to the huge flow of rural migrants
Inequality	-	-	Mobility rates are higher outside slums than inside them, however they are higher in slums than in rural areas
Main findings	• Common features among chronically poor households – backward caste, no ownership of land or house, no skill, large family size, woman headed households, disabled dependents, no community support • Special mention of the vulnerabilities faced by the ST community[a]	The statistical analysis done led to these conclusions: • Intergenerational occupational mobility declined for all men in 1983–2012 • High overall economic growth did not contribute to upward mobility of low-skilled workers who are large in numbers in India • Mobility rates among the backward castes considerably lower than that of others	• This study analyses the issue of slums in Brazil, starting from the rural roots of migrants to their urban slum life, thereby giving a complete picture of progress • Statistical proof of improved income and education in slums than in rural areas. However, the numbers are always considerably lower than that of the urban average • Leaving the countryside is the first step to get better living conditions but living in slums is not a good option compared to cities. The next step is to move away from slums'

(continued)

Table 3 (continued)

	Slums of India		Favelas of Brazil
Research by	Indian Institute of Public Administration	Indian Statistical Institute, Bangalore	Human Capital and Economic Opportunity Global Working Group
Reasons stated	For escaping poverty: - Migration only in case of strong social networks which usually help in increasing benefits and reducing costs • Infrastructure and large urban population in the neighbourhood helps in escaping poverty For descent into poverty: • Distress migration • High health care costs • Social expenses on deaths and marriages • Indebtedness (from local moneylenders) • Loss of jobs	For inequality: • Educational immobility in India (stated to be stronger than Latin America) • Leading to immobility in occupational categories • Assortative marriages • Caste-based discrimination in labour market and the modern sector	• Poor quality of education imparted in the slum schools, which are attended by majority of school-going slum children • Slums provide a foothold to a life away from rural poverty, but it is important to provide avenues out of slums to a better urban living

*The sample excludes those households where the son moved out of the parental household at an early age. To compensate for this bias, a socio-economic analysis was carried out between sons who had moved out and sons who stayed with their father, and so substantial differences were seen among the two groups

[a]ST (Schedule Tribe) communities in India, traditionally consist of local tribal communities residing in the forest areas, with the forests being their core resource. With the advent of urbanization and developmental projects, these communities lose entitlement to their core resource. 'Over 20 million people, mostly tribal, have been displaced as a result of various development projects over years'. The ST households are characterized by remote habitation, asset-lessness and inability to benefit from the opportunities in nearby urban economies, keeping them in chronic poverty

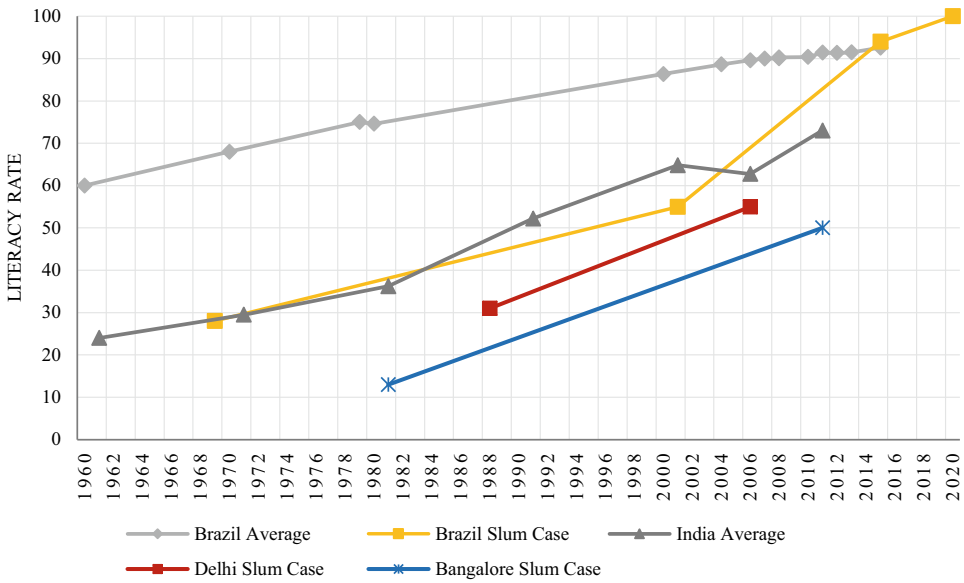

Fig. 2 Graph of literacy rates for India and Brazil across years—Country averages and slum cases. *Source* Author

opportunities in cities fell short of this growth in the non-agricultural sector, resulting in majority of the slum dwellers being employed in informal low-skill jobs. Such informal work is usually low-security and low-income in nature, resulting in vulnerabilities.

Social vulnerabilities—Vulnerabilities that arise from caste-based discrimination was a phenomenon seen only in India. Evidence showed that there were more chances of a poor household to belong to the lower caste communities in India. Their vulnerabilities arose primarily from poor endowment of assets and discrimination in jobs. Therefore, caste created a major barrier against intergenerational mobility in India. However, this was not the case in Brazil where the favelas faced a major deterioration in their social network structures due to the increase in levels of drug abuse and violence.

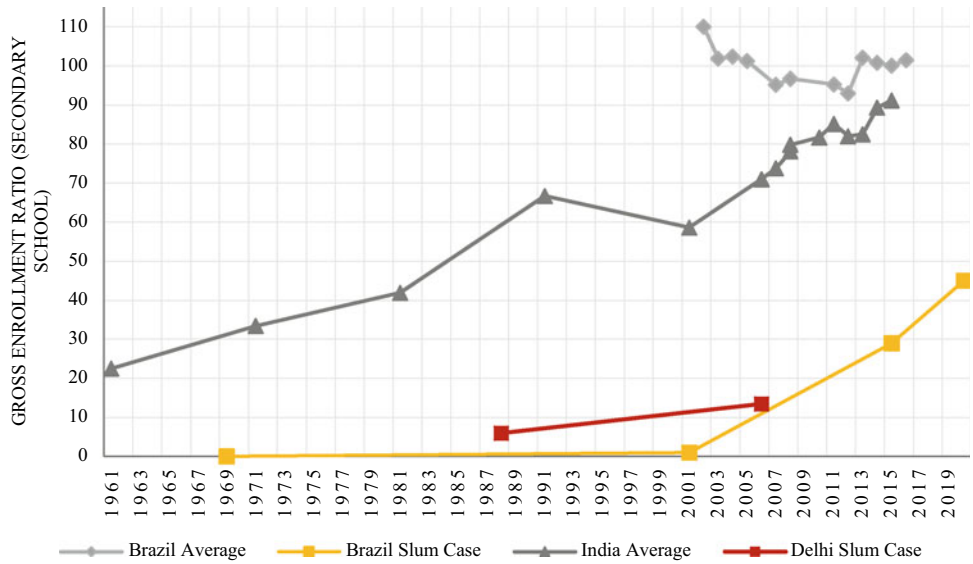

Fig. 3 Graph of GER (Secondary School) for India and Brazil across years—Country averages and slum cases. *Source* Author

6.3 Method of Identifying Progress or Regress

In order to identify if slum living results in progress of regress in the life of people, something called the 'Lenses Approach' was developed. This deals with breaking down the complete spectrum into smaller parts and then analyzing every segment individually.

The 'Lenses' Approach—In order to explain this, a typical life story of a random rural migrant is considered, as shown in Fig. 4. Considering the current year to be 'T', at a point 'A', 30 years prior to T, the person is in a rural setting and is typically poor. Over the years, migration to the city takes place, and at 'B', 15 years prior to T, the person is seen to be residing in an urban slum, still considerably poor. And at point 'C', in the current year T, the same person has escalated to formal housing in the city and can be considered a middle class.

Lens 1—Considers the evolution from B to C, which is that of progress where a slum dweller moves into formal housing. This evolution can take place over generations, not necessarily in 15 years as shown in the example. Therefore, using Lens 1, the change is that of a 'springboard' which would be visible and measurable. But, documenting this change is a challenge.

Lens 2—Considers the evolution of stage A to B, which is a case of migration from rural poverty into urban life. An economic upliftment would be seen, in the form of improved income, even though the improvement would be small and precarious. However, a big leap probably would not be encountered, hence suggesting more of a poverty trap situation. But, if one considers the social aspect, then this change has deeper implications, as urban ways help in getting rid of regressive social customs. Hence, if such social aspects are considered then even the inhuman conditions of

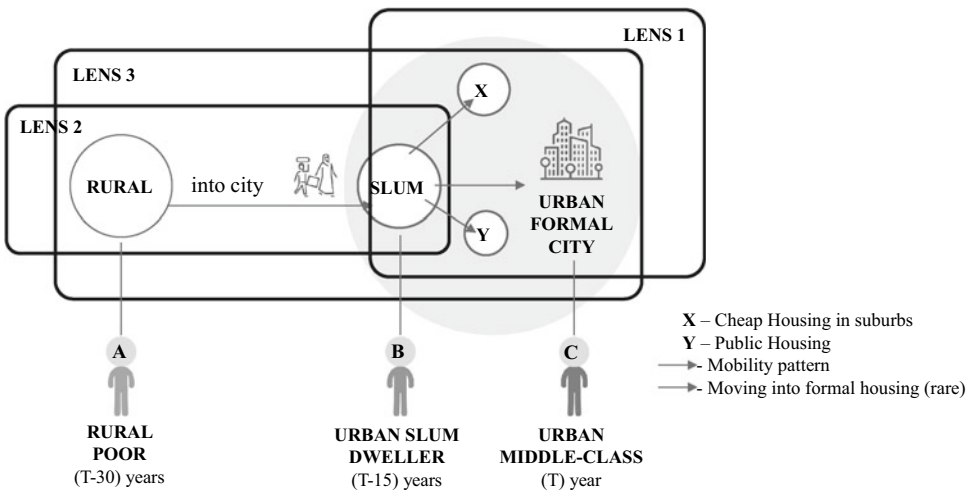

Fig. 4 The various 'Lenses' to identify progress or regress. *Source* Author

slum living provide an opportunity for upliftment, thereby a springboard.

Lens 3—This would include looking at the complete picture, from A to B and then to C, which in this case, as shown in Fig. 4, is that of a springboard. In this example, a period of 30 years has been considered, but this process of evolution from rural poverty to an urban slum living and eventually progressing into formal housing usually takes generations and, realistically, happens rarely. It is a long process to be tracked which makes such studies tedious and at times impossible.

It needs to be clear, that the example stated in Fig. 4 is just a random case, and varied scenarios can take place. Therefore, classifying a case into a trap or springboard is tough, as it is too complex to be identified and recording its dynamic nature becomes cumbersome.

6.4 Answering the Research Question

The question finally arises—so do slums act as springboards or poverty traps? It needs to be noted here that there could be no straightforward answer to this question. Rather it was too complex a subject to be compartmentalized into 'either-or' categories.

Answer lies in-between?—Slum living might not always prove to be a springboard for rural migrants who settle in them, but proximity to urban areas does bring them closer to opportunities. From the previous examples it was evident that with longer duration of stay comes improved amenities and a better chance to get legal access to the city. So, in a way slum living does improve the condition of a dweller, but as already stated previously, even the improved condition is way below the acceptable level of human living conditions. Even though Indian slums are productive and house the service-class, many face intergenerational poverty and 'it is not a problem of the slum itself but a larger problem of how the slum is seen within the city by planners and policy-makers, and even citizens themselves' (Naik, 2019). Transitioning out of a slum is not an easy process, as one would firstly need a steady and well-paying job, which can be achieved by obtaining skill sets and education and access to social networks.

Therefore, the basic point being slums do provide opportunities to its dwellers, which helps them survive, but in spite of it they get trapped in poverty over generations due to the eco-systems of our urban centres. It is the environment created by our governments, planners, policy-makers and even citizens who restrict the 'springboard' action from taking place. Poverty traps occur due to the external forces and not because of internal ineffectiveness of slums itself.

7 Recommendations

Slum census studies by the government should compulsorily require to be longitudinal in nature. They should be conducted more frequently in order to be able to document the dynamics of slums, understand the patterns of living of the dwellers and policy implications. Slum survey data across the world should use common basis and indicators for study. This would help in conducting comparative analysis of slums from different parts of the world.

Longitudinal studies are particularly challenging as tracking slum residents over years is cumbersome and at times even impossible. But, in the current age of Internet and GPS, and with the penetration of smartphones till the lowest segment of people in economies, tracking becomes possible and easy. These days almost everyone, across every economic profile, has accounts on Facebook and WhatsApp. Such Internet-based portals make tracking of people comparatively easy, even when they do not have permanent address or identity (typical of slum residents).

In order to have better informed slum policies, understanding of poverty and its dynamics is a must. The policy approach should focus on long-term services that are 'enabling and empowering'—which would empower people and make them capable in the long run. Dedicated policies need to be framed for slum dwellers, to cater to the following aspects—improvement in higher education, access to college education, employment opportunities across all levels, vocational training for job access.

National-level slum policies should consider mandatory rental slum housing provision for the more vulnerable (recent migrant) sections. This housing can be provided on a temporary basis, a lease of 10–15 years, for a nominal rent which progressively increases over years. This step would need support from all other levels of governance, from rural to the urban spheres. For a clearer understanding refer Fig. 5. The period of stay at the slum housing would be supplemented with other facilities such as access to education, employment benefit, health insurance, minimum wages in jobs, etc. With all these provisions put in place, and with a secure tenure for 10–15 years (removing the threat of eviction), the families are expected to improve their social and economic standing. Which would eventually help them, when the lease gets over, to shift to other owned affordable housings.

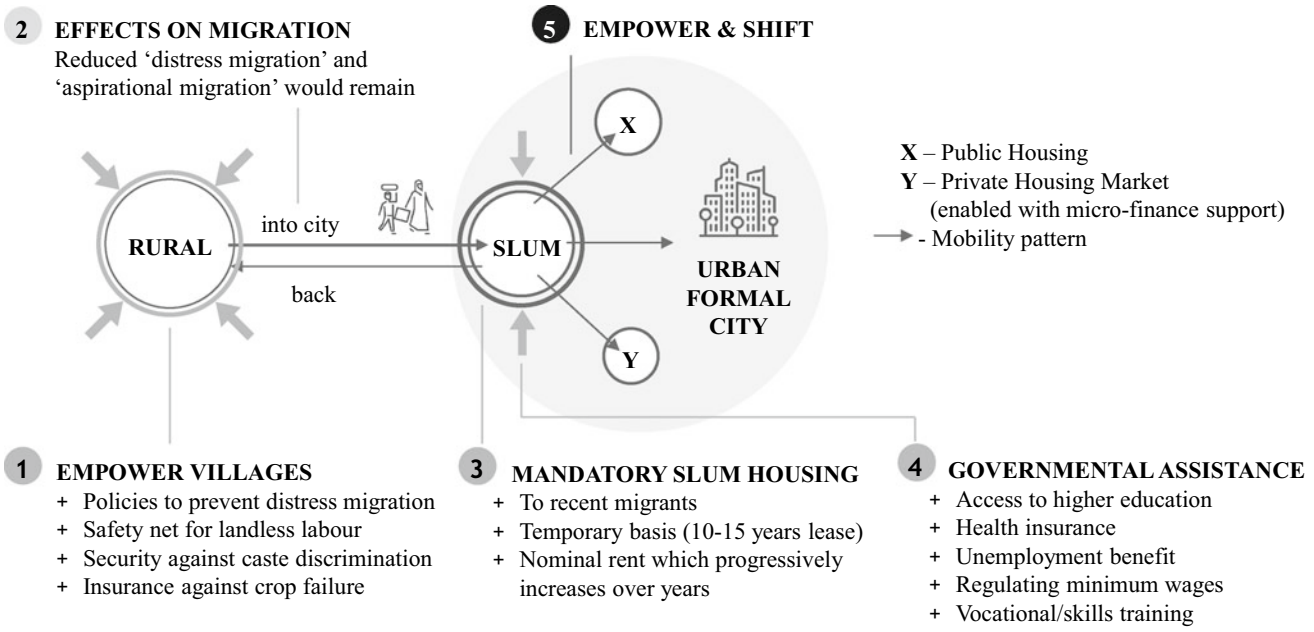

Fig. 5 Policy recommendations to tilt the balance away from 'traps' in favor of 'springboards'. *Source* Author

8 Conclusion

Overall looking at how the situation stands, slums can be positioned somewhere above rural miseries and below urban flamboyance. In spite of the positive improvements in the lives of slum dwellers over generations, vulnerabilities of different sorts prevail, preventing what can be called a 'springboard' effect. The sweeping outcome of slum living portrays more of a 'trap'-like situation. A trap which gets inflicted upon the sensitive segments of the population by our society, our government and our 'systems'. This is a field of study that requires a lot more attention, a lot more research and a lot more work. Not just by students, but by academicians, governments and most importantly policy-makers. With a collaborative effort, we can hope for a better tomorrow for all.

Slums don't form overnight. They are a result of collective policy failures, deprivation and vulnerabilities over generations. It is the 'system' that needs to change. The 'environment' that needs to be more 'enabling'.

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Changes in Urban Planning and Recommendation for Future Planning in Ho Chi Minh City

Pham Ngoc Quynh Giao, Pham Phi Phuong, and Petr Stanicky

Abstract

In Vietnam, Ho Chi Minh City (HCMC) is one of the largest populous cities. This city is also a relatively young city with less than 300 years of history. With a population increasing each year rapidly, a total of 8,837,544 million (2019), along with the rapid pace of economic and urban development, HCMC is facing challenges concerning urban planning that come into direct conflict with conservation efforts of its cultural heritage (Dynamics, World population review, 2020). This study aims to investigate existing urban planning issues and provide planning guidelines for HCMC. In addition to the study of the historical development of the urban planning of HCMC, this study attempts to analyze the existing problems of HCMC and tailor an urban planning design that fits its characteristic urban profile.

Keywords

Ho Chi Minh city (HCMC) • Urban planning • High-density sprawl • Population • Recommendation

1 Introduction

Ho Chi Minh City (HCMC) is the largest city in Vietnam with a total acreage of 30.404 km^2, located in the far south. As of early 2020, the total population of HCMC amounted to 8,837,544 million (Dynamics, 2020), making it the most populous city in Vietnam. It is estimated, however, that due to a large number of unregistered residents, the accurate population count may be closer to 14 million (Nguyen, 2017). In 2018, the city welcomed 70% of all tourists visiting Vietnam. In addition to being a financial and economic center in the country, HCMC has become an important trade hub in Vietnam and Southeast Asia, thanks to its strategic location. In the fields of education, media, sports, and entertainment, HCMC plays a significant role in the country (Trang, 2020).

Despite its economic and strategic strength, the city is facing various problems. Its rapid population growth is putting a strain on the city's services. In the inner city, the infrastructure has become abundant and cramped, with a line of road traffic because old heavy congestion often occurs during rush hours (Ho Chi Minh city, 2020). The underdeveloped public transport systems and road infrastructure also need tackling. High tides may cause flooding in the district, and the adversity of preserving cultural heritage, along with renovating the architectural face of the city, is proving to be a difficult task (Hoa, 2013).

This study includes a brief record of the history of HCMC's urban planning development process, in which we take into account the characteristics of urban planning. In the next section, we present the current situation and hobbles in the urban architecture planning of HCMC. Moreover, a study of the future challenges of a city developing sustainable urban planning is included in the next section of the study. Ultimately, we propose solutions for urban planning in HCMC in the final part.

2 General History of Urban Planning Development of the City

HCMC had a long history through time to begin to take shape and developed many institutional changes regarding urban planning. In this part, we recapitulate the critical

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points of four periods in the history of HCMC based on characteristics of the changing rule of regime, particularly related to planning and urban development.

2.1 Nguyen Dynasty Period—Before 1859

History records HCMC's first period in immemorial times when until the sixth century, the region was owned by the Kingdom of Nokor Phnom, which today comprehend parts of Thailand, Cambodia, and Vietnam. In the period afterward, Chinese and Vietnamese people arrived in the area. However, there are not enough historical records regarding those earlier kingdoms. The late seventeenth century during the Nguyen Dynasty marked the beginning of the history of HCMC.

Regarding Chenla's history (ancient name of Vietnam), the Nguyen Dynasty commanded establishing a town from two old seaports, Prey Nokor and Kas Kropey. Those two ancient towns were the precursors of the Cho Lon area and Saigon today. At that time, this town was called Gia Dinh. The Nguyen Lords relaxed the governance policy to implement new immigration strategies: the freedom to occupy the land, encouragement of trade, and private ownership. That policy had created an urgent task of setting up a hamlet and turning rice into a commodity. Since rice became a commodity, Saigon had many more streets to store goods and developed trade markets. The Saigon town area had been formed in the context of prosperity created by agricultural products. During this time, the general public could more or less freely consume and expand their land (Wook, 2018).

In 1772, Luy Ban Bich citadel was built in Saigon as well as the surrounding walls, rendering the city into a unified geographical, economic, and national defense. Before 1790, Gia Dinh had officially started to be remade in the shape of octagons. With the formation of the two elements, "citadel" and "street," Saigon area became a "city" with full meaning (Dau, 1987). Urbanization in the late eighteenth century developed rapidly. Thanh Quy is the first citadel built based on combining the synopsis of Eastern feng shui with the construction technique of the Western style of Vauban in Vietnam (Wook, 2018). The two sides facing the Ben Nghe and Thi Nghe rivers of Thanh Quy were crowded and dense with streets. Along the road and the river connecting Saigon and Cho Lon, villages flourished (Dau, 1987).

In 1802, Thanh Quy citadel was replaced by a smaller one and was renamed, Thanh Phung. Saigon returned to be regarded as a small province and renamed Gia Dinh citadel, yielding its political position to the Hue capital. At that time, the population of the citadel was 100,000 (DOAP HCMC, 2020) (Fig. 1). Despite the recession, the market area of Saigon (Gia Dinh) continued to grow rapidly (Vo, 2011). Saigon was still a busy and wealthy commercial hub. People from every part of Vietnam and surrounding countries flocked to the city to live and trade. Consequently, Saigon's population consisted at that time of many nationalities such as Vietnamese-Chinese, Khmer, Europeans, and others, which can be seen right from the early nineteenth century (Bouchot, 1927). Saigon had taken the shape of an international city. Furthermore, this is a significant heritage that Saigon left to this day, leading up to the process of urbanization in new ways since the second half of the nineteenth century (Vo, 2011).

2.2 1859–1954, French Colony Era

In 1859, the French colonialists destroyed Thanh Quy and erased traces of the former citadel in Saigon. This historical event marked the end of the royal court's urban planning method. The old Nguyen Dynasty's defensive fortress style was replaced with a western driven modern urban style (Cuong, 2015).

In 1862, a new design project was given to French engineer Lieutenant Colonel Coffyn. The original plan of Saigon, including Cho Lon province, had a capacity of about 500,000 people and a total area of approximately 20,000/km^2. This plan had many similarities with that of Nguyen Cuu Dam general in 1772 when the population of Saigon was only about 20,000–30,000 people. The French at this point planned to turn Saigon into an administrative and commercial center of southern Vietnam (Bird, 1883).

Coffyn's plan clearly showed the zonation of functional areas with separate administrative, commercial, industrial, military, and residential areas. The plan had a straight-line structure with a grid pattern, expanding the road width from 20 to 40 m (Fig. 2). Nonetheless, Coffyn's project for the new colonial city was too ambitious for the French authorities, and they were unable to implement it (Truong & Nguyen, 1997). Saigon exclusively implemented urban planning only in a minimal area (3 km^2) in 1963 (Saigon 1772 Planning goes beyond the French vision 1865, 2016). Specifically, highlands became administrative centers and residences of Westerners, while low-lying lands were a commercial and popular space for indigenous people. This planning process created a culturally segregated portrait of urban architecture in Saigon, specifically in the division of areas of a European city in the center of Saigon (District 1, District 3 today). Chinese trade guilds were located in the center of Cho Lon area (district 5, district 6), while Indian townhouse areas took to the market areas. In addition, there was a network of small and narrow alleys of Vietnamese residential areas in the surrounding suburbs (Truong & Nguyen, 1997).

Determined to "separate the gem from its shell" later plans of Ernest Hébrard (1923) (Nu Quynh Tran & Hoang

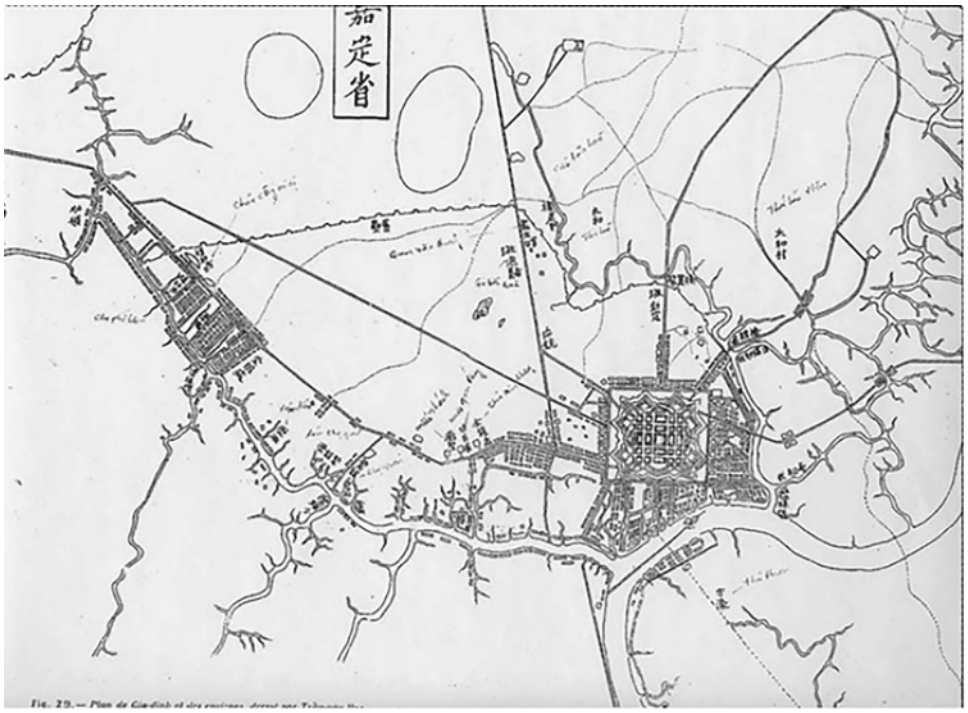

Fig. 1 Citadel of Saigon 1815 (Ho Chi Minh city, 2020)

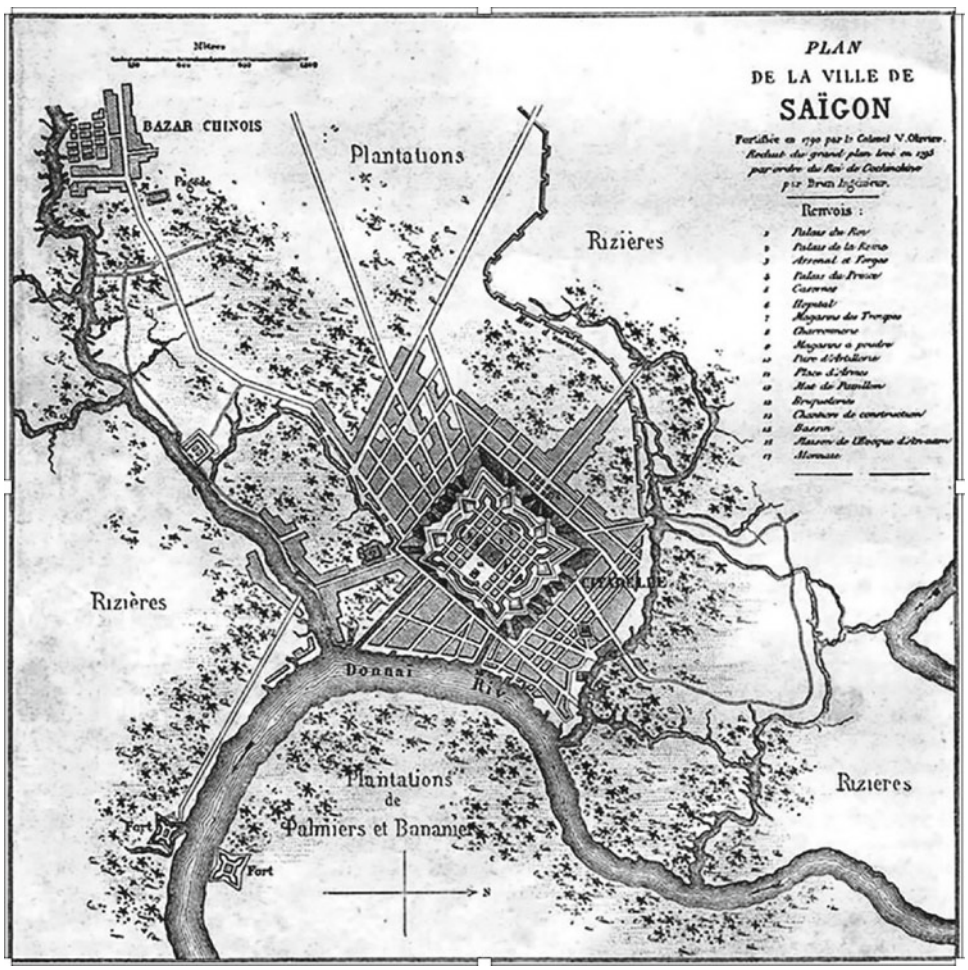

Fig. 2 Citadel of Saigon with the orthogonal street grid of the nineteenth century (Charton, 1861)

Truong, 2011) and Cerutti (1942) appeared. Saigon was transformed from a town into a modern city on a par with other big cities like Hong Kong and Singapore. The principal layout of the city was a straight line with enormous boulevards and tree-lined parks on both sides of the road (Fig. 3). This change brought a new face to the international atmosphere and became famous for the beauty of urban planning throughout Southeast Asia at that age. "Pearl of the Far East" was the new name given to Saigon since it was courtly and became a city of legend (Nguyen et al., 2016). It was a cordially momentous premise for Saigon's new direction of development after the end of the First World War (Cuong, 2015). With time, under the changing of government management and climate, a significant part of those achievements deserves to be respected as an urban architectural heritage of Saigon—Ho Chi Minh City today (Phu Cuong & Khoi, 2012).

After nearly a century, the United States replaced the presence of the French military in Vietnam after the Geneva Agreement (1954). Vietnam was divided into two parts with different governments. The Democratic Republic of Vietnam was influenced by socialist ideology from the former Soviet Union, with Hanoi as its capital in the North. Moreover, in the South, the Republic of Vietnam, which was influenced by the United States and a capitalist social regime with Saigon as its capital (1954–1975), the city served as the depot for US military forces in the area (Nguyen et al., 2016). With that change in mind, finding development directions for an increasingly populated city was an urgent task that needed to be addressed (Hai, 2011). Subsequently, Saigon urban planning developed according to the dynamic model which was an unstable type of planning model, the strength of which is capable of adapting to various real social situations (Truong & Vu, 2018).

From 1960 to 1970, there was a sudden increase in population as a result of millions of immigrants from the countryside pouring into the city to avoid war, leading to the city becoming overcrowded (Goodman & Franks, 1975). The Vietnamese government had earlier created master plans to suit the development of Saigon, such as Hoang Hung plan (1958), Ngo Viet Thu plan (1960), Doxidis plan (1962), to address these issues but were prevented by the war (Thai, 2013).

2.3 1975–1990, After Civil War

The government unified the North, and the Communist Party of Vietnam abolished the Republic of Vietnam regime in the South. In 1976, the city officially changed its name from Saigon-Gia Dinh to Ho Chi Minh City (National Assembly Resolution, 1976).

The state carried out campaigns in the South to eliminate the bourgeoisie and implemented nationalization according to the principles of socialism. Many business owners assembled into cooperatives had to go to new economy areas or switch to agricultural production. Housing and land transferred ownership to the government. The bureaucratic policy had made the economy and urban planning in HCMC not see significant development, with almost no spatial events taking place in the first fifteen years after the war (Truong & Vu, 2018).

Within 1979, under economic difficulties and concerns about the risk of the Southwest Border war, more than half of the Chinese left the city during this period. Notwithstanding, the number of people who lived in HCMC still accounted for a significant amount (Kim, 2012). The shortage of housing continued in the absence of land and lack of planning, leading to the creation of many small alleys and narrow roads in HCMC until nowadays (DOT HCMC, 2014).

Consequently, in 1986, The Comprehensive Doi Moi economic reform was enacted to render HCMC a place that attracts foreign capital, technology, and investment. In 1987, after the Law on Foreign Investment was enacted within three years from 1988 to 1990, 88 business licenses were granted with an investment capital of US $ 976 million (Ho Chi Minh City Statistical Office, 2011). The light industry gradually shifted to heavy and export-oriented industries. This reform led to a dramatic change in the city's infrastructure, transportation, and economy. However, the architecture was limited due to the conditions of equipment and materials; basically, the principles of modern architecture combined the influences of other socialist countries. The land law in 1988 notably prohibited many types of land transactions. In addition, although this law granted land usage rights to organizations and individuals, it still affirmed that only the state is the sole administrator of the land.

2.4 Until Now

Under the 1991 State Land Law decision, state-owned land would be sold to individuals to help promote urban development and mobilize private capital (Andrew et al., 2000). In 1993, the authorities promulgated a new land law, making all property owned by the government, even though it concluded five land rights: transfer, lease, exchange, right, of inheritance, and mortgage rights. The law established the fundamental legal basis for the emergence of the land use market in Vietnam by providing regulations on trade land use rights for real estate, land prices, and land use rights (AusAID, 2001).

In the next ten years, in 2003, the government enacted a new land law, introducing administrative procedure reforms

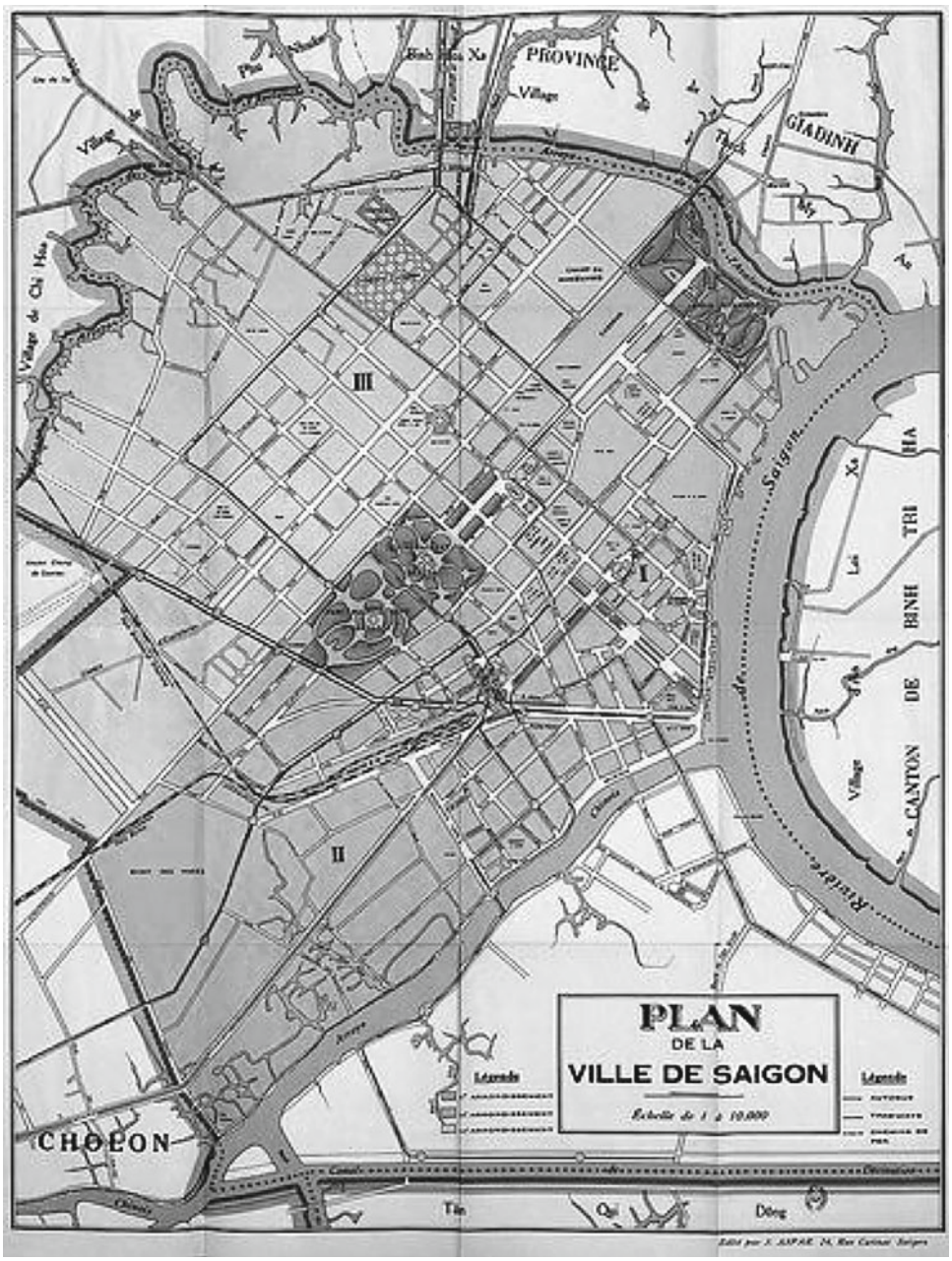

Fig. 3 Plan de la Ville de SAIGON 1942 (Hai, 2011)

that helped reduce the burden on landowners, giving equal treatment to land users and public transparent land-use planning (Nguyen et al., 2016).

With the massive reformation of land laws, Ho Chi Minh City's landscape saw much change over the years. Major planning projects include constructing the Nhieu Loc-Thi Nghe canal system, Vo Van Kiet highway, Nguyen Van Linh Boulevard, Phu My Hung new urban area, and the construction of 4 bridges connecting Thu Thiem, which the Government approval and successfully implemented.

Faint urban management and the pressure of population growth were issues that delayed urban planning change. High-rise buildings in the city center were characterized by their podium layout with a function of trade and service, helping to create a link between new buildings and existing low-rise spaces and maintaining the lively street landscape (Cuong, 2015). Nonetheless, from a practical perspective, regarding land use in HCMC, there was no recommended zoning system as there was no separation between residential and commercial areas in HCMC, despite its urban form. The metropolitan area has gradually shifted to a kind of capitalist urbanism (Nguyen et al., 2016).

According to the general adjustment plan approved by the Prime Minister on January 6, 2010, this project is expected

to help orient city space development in the direction of multi-polarity. HCMC would develop four more level centers in four directions to reduce the population density pressure on the existing downtown area. This development would create a driving force for urban development in many directions and attract residents to move evenly throughout the metropolitan area, stretching the urban population. The city would develop in three main directions: East and south toward the sea, north, and northwest, and west and southwest (Anh, 2015).

3 Urban Planning in Ho Chi Minh City

3.1 Current Urban Planning Status in HCMC

Formerly in 1860, the French designed a planning map for the city of Saigon aimed to accommodate a population of 500,000 people. Until the Republic of Vietnam period, the city had a population of 3 million. Forty years after the end of the Vietnam War, until now, the city has reached more than 10 million inhabitants (not counting several unregistered immigrants), leading to the undeniable truth about the overloaded urban structure (Cuong, 2014).

Previously, Saigon was envisioned as a city with many trees and harmonious architectural spaces. After that, with the rapidly growing population, the city had to yield much of its green space to housing construction. Subsequently, the architecture became cramped and crowded with a lack of uniformity.

Currently, there are about 800 planning projects in 13 districts. Based on the seminar "Urban management in Ho Chi Minh City, the situation, problems, and solutions," the city has four main issues to organize in the city planning space. These issues range from city master planning, economic function, and structure, conflict of population growth and technical infrastructure to administrative management models (Bien, 2018).

Currently, housing development attracts outsized-scale urban expansion projects like Thu Thiem New Urban area at the edge of the Phu My Hung New City center's city center at the southern city. These unbuilt areas have a huge potential due to their position adjacent to the inside city and the occasions to invent entirely modern neighborhoods apart from traditional ones. Notwithstanding, even these modern buildings mostly ignore the climate-related risks for their inhabitants. One study of the current housing practice by Eckert proved that the emergence of neighborhoods with a classical design might lead to an increase in motorized transport. Subsequently, public transport approach capability becomes more complex, as well as the constitution of working facilities, community, and transaction infrastructure becomes insufficient (Eckert, 2008).

3.2 Existing Central Issues of Urban Plans

3.2.1 Megacities Divided to the Central Area and Satellites Around Plan the High Density Sprawl Result

As defined by the Asian Development Bank, a Megacity defines a population of over 10 million. This evolution is explained in a Population and Development Review paper: "Although it is in common use, the term megacity has no agreed definition. For the UN, it is a city with a projected population in 2000 of 8 million or more." (ADB, 1997).

In addition, the geographical location and criteria of the international economy are also additional factors for the population limit. The complexity of the growth models of megacities and significant cities worldwide poses a significant challenge to urban planning. HCMC is also considered a megacity under these criteria (UN. Department for Economic & Social Information & Policy Analysis, 1995).

It recognizes the possibility of overloading of the population shortly, Ho Chi Minh City People's Committee, which shall organize the implementation of the Constitution and laws in its locality and implementation of the resolutions of the People's Council, and perform the tasks assigned to it by state agencies at higher levels. The Committee proposes to organize the Ministry of Planning and Investment of Vietnam. Accordingly, the project of urban government apparatus is organized into two complete levels: one center city and four satellite cities around it (Construction, 2019). Specifically, the authorities of HCMC will establish four urban areas (or cities), including East, South, West, and North. Each area would encompass a municipal government level directly under the HCMC city government. The government of 4 urban areas is designed in the direction of substantial decentralization, increased budget, autonomy, construction, management, and development of municipal services (Quang, 2010) (Fig. 4).

- The Eastern area (or Eastern city) includes districts 2, 9, and Thu Duc District with 211 km^2. The center is Thu Thiem new urban area. This region aims to develop high-end service industries and high-tech industries.
- The Southern area (or Nam city) includes district 7, Nha Be District, a part of district 8 (southern part of Te canal), and Binh Chanh District with an area of 194 km^2. It aims to develop port services in association with other commercial facilities.
- The northern area (or North city) includes district 12 and most of Hoc Mon District with an area of 149 km^2. Here, the development of eco-tourism and high-tech agriculture is the main priority.
- The Western area (or West city) includes Binh Tan District, a part of district 8, and Binh Chanh District, with an

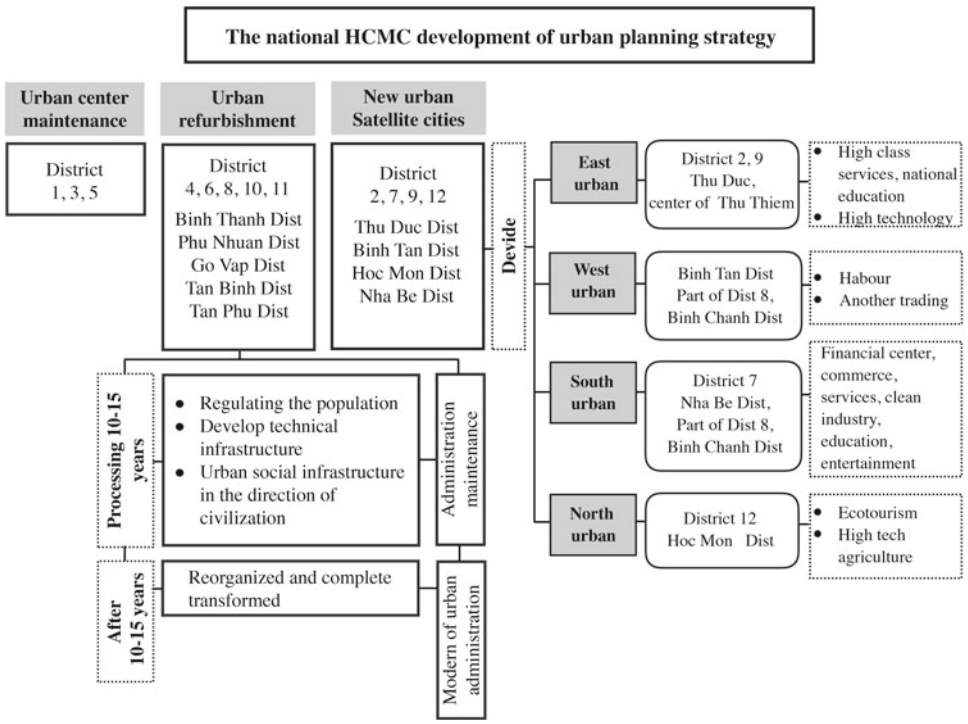

Fig. 4 The national HCMC development of urban planning strategy to 2025 (Author figure)

area of 191 km^2. This area would be the urban center of economic exchange in the Mekong Delta.

- Regarding rural areas, there are three districts of Cu Chi, Binh Chanh, and Can Gio about 1300 km^2. In this area, the city committee proposes to reorganize the urban government in the direction of changing the current district government level into the administrative level

In theory, this plan seems a suitable solution for HCMC. However, the authorities of HCMC do not have complete autonomy in matters of urban planning. The majority of these matters and other policies such as economy, finance, culture, education, and medicine still depend on the final decision of the central government. In short, the executive power of the central government and its illogical administration procedures can become an obstacle. The land disputes are mainly caused by the particular compound and segmentation land administration system. Accessibility to be aware of the substantive amount of stalled development in HCMC. It has resulted from the lengthy procedure of obtaining a development permit from the state (Nguyen et al., 2016).

As mentioned before, the 1993 Land Law eventually led to unsustainable urban forms in HCMC (Zhu, 2012). During the city redevelopment time, some owners built on their small plots of land without regulation, leading to a piecemeal development pattern. Consequently, the use of the land became unsustainable. Zhu believes that fragmented land ownership has led to undefined urban forms between high and low-rise buildings and, in turn resulted in high-density sprawl in the city (Gibert, 2014) (Fig. 5).

3.2.2 The Disparity of Population Growth in Plan and Real Statistics

Urban planning and growth propose to attend the lives of the people of the nation, so it is substantial to predict future demographic trends accurately. Unfortunately, the population growth forecast for Ho Chi Minh City has lost its credibility so long ago that it has not played a significant role in the city's planning scheme (Huynh, 2015).

The 1993 plan was aimed for a city population of no more than 5 million in 2010. Ensure constant development in satellite planning districts. However, in 1998, the official population exceeded 5 million, and 7.4 million in 2010. These numbers did not account for the estimate of 2.2 million immigrants in 2007 (Dapice, 2010). Consequently, the actual population was 9.6 million, double the predicted value of the 1993 plan. Similarly, the new updated plan 1996 had several other population projections, such as 7.4 million but still fell short of the actual number (8.837 million) (Fig. 6).

It is worth noting that the 1996 plan aimed to relocate the rising population from the central districts to the rural areas and effectively reduce the risk of infrastructure overload. After many iterations of relocating people out to the countryside, the results from 2009–2019 showed that the

Fig. 5 HCMC inland city 2002 (left) and reflect a high-density sprawl 2012 (right) (Eckert & Waibel, 2013)

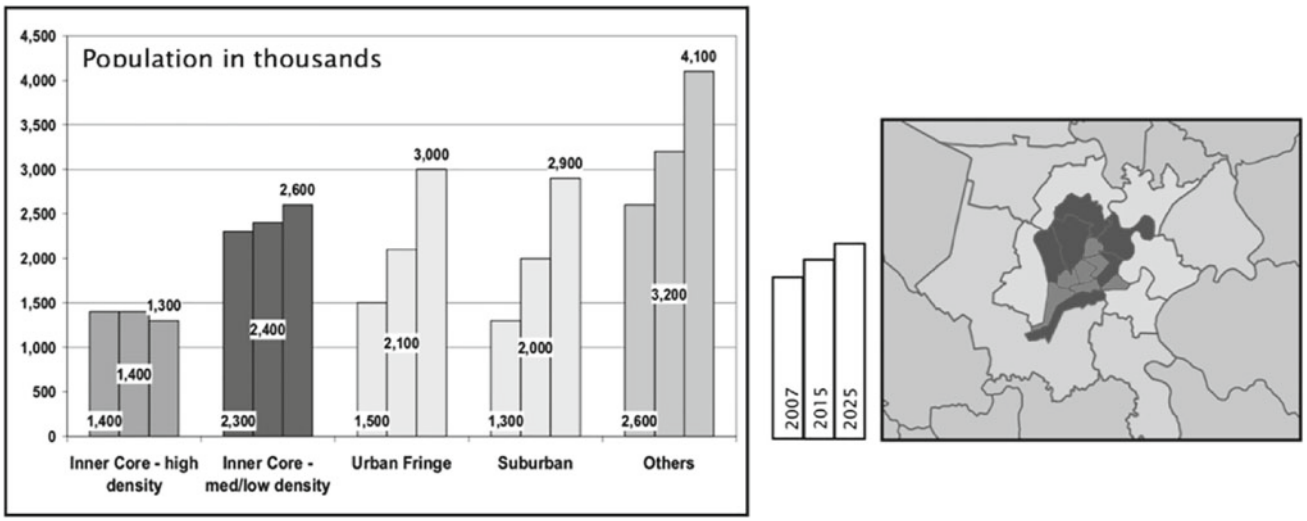

Fig. 6 Population estimates for 2007, 2015 and 2025 by study area types (Bank, 2010)

proportion of the population in rural areas increased rapidly with an average increase of 4.47%/year, three times higher than the growth rate in the urban area 1.77%/year (Thanh, 2016).

In addition, the separation of districts in the satellite area as the initial planning scheme was also a factor contributing to uncontrolled population growth. The local states did not control the precise number of people while enforcing the separation of districts, which led to an overload of the population in the new community. Evidently, in 1999, the people of Binh Chanh District were 332,089 people. After the authorities divided the section into Binh Tan District and Binh Chanh District, it reached nearly 1.5 million, and people had a 4.5 fold increase (Ha Anh, Minh Trang, 2019).

3.2.3 Unstable Urban Planning Development Direction and Transportation Policies

According to the HCMC planning project in 1998, the main direction of development was determined to be a quarter of the northeast corner. In addition, the project also added other directions to the south and northwest. However, in the planning project of 2010, the development direction changed drastically. It can be seen that the northeast part was no longer mentioned in the plans and the main development direction had shifted to the east and south to gain access to the sea (Huynh, 2015). The Northwest, West, and Southwest became the secondary development directions. The change in the direction of development planning showed the lack of integrated knowledge and the outdated state of urban planning.

Meanwhile, the planning management faced many limitations during the implementation of urban transport. The characteristics of urban portage in Ho Chi Minh City mainly focused on roads and certain vehicles, which led to increasing traffic overload in the city (Fig. 7). For example, as of June 2014, the number of vehicles registered in the city amounted to 6.5 million, of which cars were 497,586 and motorcycles were 6,090,198 (DOT HCMC, 2014).

The total number of people traveling during the day in 2010 was 24.3 million people/day. In 2015, it reached 29.4 million people/day (increased by 1.21 times), and in 2020, it is projected to reach 36 million people/day (an increase of 1.22 times) (DOT HCMC, 2014). Accompanied by this increase, the city's mode of public passenger transportation demands a switch to large-volume vehicles such as underground resources, ground-based trams, belt roads, interregional highways, and elevated roads.

Plans for a new metro railway were scheduled to open in January 2020. As of August 2012, the development stagnated due to a lack of investment resources and internal problems (Cong, 2019). The increasing tide encroachment in the rainy season every year has been exacerbated in recent years, leading to flooding, traffic jams, and paralysis of the city's transport system (VOV journalist, 2018).

3.2.4 Impact of Climate Change and Flooding

Ho Chi Minh City is located in the south-eastern region of Vietnam with an average elevation of 19 m above sea level. The city has a typical tropical climate in which the temperature average is between 27 and 28 °C and maximums of up to 40 °C simultaneously. Specifically, a tropical savanna climate has an average humidity of 78–82% in this big city. (ADB, 2018; DOAP HCMC, 2020).

The same as other developing cities in Southeast Asia, HCMC is undergoing dramatic changes in land use rights in neighboring rural areas during urbanization (Storch, 2008). Compared to 1980–1989, the city experienced a period of climate change that made the average temperature increase about 1.4 °C higher in 2005 (ADB, 2010). In addition, with rapid infrastructural development, housing-dense cities experience temperatures up to 10 °C higher than rural areas, a phenomenon known as the urban heat island effect. (Thi Van et al., 2009).

With its geographical position in the lower reaches of the Saigon and Dong Nai rivers, the southern part is adjacent to the East Sea with relatively flat terrain, creating a close relationship between the city and the sea (Katzschner et al., 2016). HCMC was built in a low-lying, swampy area in the lower Saigon River and was sensitive to climate change in the history of construction and formation. This element affects the city by tidal fluctuations from the heterogeneous network of canals, rivers and the weighty rainfall each year (Nhan, 2006; Phi, 2007). Yearly HCMC suffers many severe floods, mainly during the rainy season from May to November, where the monthly average rainfall reaches 250 mm. Moreover, the high tide season occurs between September and January (Harry Storch, 2010).

Because of this specific geographic location, this metropolitan region permanently faces floods and potential natural hazards. For example, the big flooding on November 25, 2018, paralyzed the traffic for more than 20 h and was made even worse due to the rush hour at that time. Consequently, it took 4 days to repair the damages and return the traffic to its normal state (Phuong, 2018; Quan, 2018) (Fig. 8). Before any decision-making regarding urban planning in HCMC, it is necessary to examine the impacts of a

Fig. 7 The daily transportation on a road in Ho Chi Minh City (Tran, 2019)

Fig. 8 Tide flooded the wheels, car, and all of vehicles the day after the storm on November 25, 2018 at HCMC (Quan, 2018)

change in global or regional climate patterns affecting the land use structure, the population, and its natural resources (Harry Storch, 2010).

4 Proposals and Recommendations for Future Planning Solutions

4.1 Connect Land Use and Urban Development Planning

The Department of Natural Resources and Environment (DONRE), the Department of Architecture and Planning (DPA), and the Department of Construction (DOC) are the essential agencies that determine overall land use, spatial zoning, and environmental standard in HCMC (Storch & Downes, 2010). Storch and Downes propose land-use recommendations for managing the risks of tide inundation and heat waves due to the building density in big cities. The designation of environmental functions and increased surface runoff would incorporate into these in-front agencies' land-use plans and decisions (Storch & Downes, 2013).

However, the gap between awareness and action is entirely different when the city government is planning expansion in low-lying, and flood-prone areas. This plan clearly shows that the city lacks accurate planning information and lacks in making detailed and sustainable plans for the city's future (Huynh, 2016).

The planning system has revealed limitations such as ineffective delivery of city-wide urban development goals and inadequate integration of policies for decision-making at lower levels of government. For this reason, the Urban Planning Law of 2009 had to be reformed to promote integrated urban planning approaches in the city (Vietnam, 2009). It is easy to see that the most urgent task of the HCMC government is to issue a clear and well-thought-out land planning policy before making land-use decisions and to prioritize new housing developments in urban areas. The area has a safe geographical position, and it is not sunken or flooded is vitally important.

4.2 Overall Travel Demand

It is rather imperative to improve and organize public transport services to create opportunities to impose restrictions on the use of personal vehicles and in turn encourage sustainable transport. In addition, the state should take measures to deter and impose new laws on the people. If implemented correctly, these policies would ensure the promotion of economic and social growth in the city and the smooth transition to an accessible transportation system for all people regardless of age and social strata (Bank, 2010).

Transfiguration in the scenario of opening the MRT (massive rapid transit), the trams will undergo restructuring to adapt to the population's travel. First, the new stations' old bus and subway systems will have to be considered for conversion. Even after the restructuring of Transport and Public Works departments in 2002 (VnExpress, 2001), the bus system of HCMC still maintains old facilities and busses and lack of investment in a transit station. We might suggest restructuring all bus routes and expanding transit stations, and any new bus transit stations should be in the proximity of the MRT (Bank, 2010).

The second problem comes from people's habit of transferring by private vehicle, which will arise the relationship between individual and company parking lots. Although it is unnecessary to provide parking at all stations in this information interface plan, it is nevertheless necessary to provide policy support to support commuting and parking near the lower train station compared to parking in the city center. Therefore, we recommend that the urban transport government body study and determine the optimal locations and integrated designs for parking facilities (Bank, 2010). Hopefully, this policy will be able to encourage and support the usage of public transport. In addition, it would limit the number of vehicles in the center metropolitan area.

4.3 Suggestions for Building Construction for Climate-Responsive Neighborhoods

Currently, the prominence of building density in HCMC is high and requires a modified ratio of built and unbuilt surfaces in purpose-driven, climate-responsible neighborhoods. Open space for recreational and climate functions has been sacrificed and has been replaced by contemporary housing, which is an issue that needs to be rectified. An emphasis should be put on enhancing the local ventilation by properly orienting buildings. Consequently, this should provide space for sufficient vegetation and in turn increase oxygen in the air, provide shade, and absorb excess rainwater.

Regarding the urbanization of wetlands, future constructions ought to be concentrated in areas with a raised elevation or in large-scale uplifted land (Eckert & Waibel, 2013). Additionally, a green city has an extraordinary impact not only in the making less in amount air temperature but also in creating dealing with water overflowing storage situation. Building contractors should also consider green roofs, which may redound to the overall water continued possession volume, which is currently typical of sustainable development. Some additional findings from our research are:

- Engineers and planners should strive to orient buildings according to the main wind direction and in turn reduce the air temperature along with the reoriented blocks. On the other hand, the balanced cooling for the whole area failed due to the micro-ventilation clogging effect from newly built buildings with no proper orientation (Victor Olgyay et al., 2015).
- With the assistance of further additions related to urban temperature, trees and street population have a massive impact on increasing pyretic comfort and reducing heat to the air (Gill, 2009; Nyuk-Hien Wong & Chen, 2009; Spangenberg, 2008).
- A study on the temperature effects of green roofs has shown that roofs with lots of trees will decrease energy through heating the roof, although there is no impact on the overhead temperature street (Eckert & Huyn, 2016).

5 Conclusion

Urban planning is a physical shell to create an occupation environment for the people inside, and it also reflects the socio-economic activities of a country. The restructuring of urban development should be based on the socio-economic condition development circumstances of each urban area while at the same time inheriting the lessons learned from international urban planning under Vietnam's policies and laws (Fanny Quertamp, 2019).

Vietnam is on the list of developing countries with the fastest urbanization rate in Southeast Asia, and Ho Chi Minh City is expected to become a megacity by 2030. With the number of people increasing, the city struggles to provide employment, urban amenities and utilities, and public services. Therefore, planning for HCMC's future is a difficult challenge and a continuous investment.

A big question for HCMC in the coming years is whether the city with a history of more than 300 years will lose its national and cultural identity, its urban characteristic structure, and through future planning projects with the stickiness of urban clusters and linear transport axes according to the current planning theory (DOPAA HCMC, 2016). Answering this question will also partially lead to solutions to the sustainable development of planning in Vietnam.

This research outlines the main issues that remain in the planning design of the city. However, issues such as the face of climate change, proper housing planning for migrants, water supply, and drainage systems designed in parallel with the city's crammed canals, fine dust pollution, and the effect of greenhouses remain complex issues to be solved in the future projects.

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The Impact of Public Participation on Implementing Landscape Urbanism Projects

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Abstract

In the past decade, researchers in the fields of urban design and landscape architecture have introduced the term "*Landscape Urbanism*" as a comprehensive approach for city planning. Supporters believe that landscape should be integrated with the built environment, in order to provide suitable public parks required for human interaction. In the same context, public participation is crucial for the implementation of Landscape Urbanism projects. The research investigates the role of public participation at the various phases of Landscape Urbanism projects, including decision-making and the implementation process itself. An analytical review for selected case studies will be done to highlight the impact of public participation on Landscape Urbanism projects, in addition to the social and economic factors related to this process. By the end of this research, the results of the reviewed cases will be illustrated to introduce the possible impact of the participatory act of the local community on Landscape Urbanism projects.

Keywords

Public participation • Landscape Urbanism • Social interaction • Social inclusion • urban parks • Public spaces • Sustainable development

1 Introduction

This paper investigates the role of public participation in implementing Landscape Urbanism projects. The two sections below identify Landscape Urbanism as a terminology and its origin, in addition to investigating the impact of the public participation in the field of urban design.

1.1 Landscape Urbanism Project Identification

In recent times, both urban design and landscape were considered as two separate domains, over and above, both infrastructure and buildings were regarded as a major determinant of the city's shape, and landscape as a complementary or auxiliary component (Reis & Kageyama, 2009). However, the landscape has taken the lead due to its environmental impacts on urban quality of urban life (Sbacchi, 2017). Therefore, the term "Landscape Urbanism" has been widely used in recent scientific researches, in order to create a hybrid that integrates both urban design and landscape.

Despite the relative novelty of Landscape Urbanism as a term, the roots of Landscape Urbanism extend to the past. In fact, the term itself has emerged in the mid-90s, specifically in 1994 by the landscape architect and researcher Peter Connolly, who coined the term "Landscape Urbanism" within the title of his master's degree thesis, where he stated that Landscape Urbanism is already applied but the term itself needs explanation (Crăciun & Dan, 2014).

In the same context, in 1997, Turner claimed that the city of the future will be an infinite series of landscapes, this concept is capable of changing the face of cities. Furthermore, in the early twenty-first century, the term began to spread widely, including large-scale infrastructure projects and open spaces, then extended to be associated with public buildings, multi-phase urban parks (Vicenzotti, 2017).

As a result, it can be supposed that introducing a Landscape Urbanism project within a city would have environmental, cultural and social, and economic impacts of urban quality of life. Moreover, urban voids could be used as a potential for applying Landscape Urbanism projects (Klever et al., 2017). In fact, urban voids can be identified as spaces

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that are in-between spaces among public and private realms, either on the urban macro-scale or on the architectural micro-scale. That is to say, underutilized lost spaces are areas that are neither city, nor nature (Carmona et al., 2010).

In the same context, the previously mentioned underutilized urban voids can be converted into participatory Landscape Urbanism projects, that have social, economic, and environmental impacts on the built environment as well as the surrounding community.

Furthermore, landfills and Brownfield lands can be regarded as underutilized urban voids, that have the ability to be converted into Landscape Urbanism project. Firstly, landfills as a terminology can be given to sites that are customized for waste disposal by burial (Hauser et al., 2001). Whereas the Brownfields are areas that are established for industrial purposes, with known or expected contamination (Page & Berger, 2006).

To sum up, the site selection according to the land-use for both of landfills and brownfield lands are usually located outside cities. However, due to the city gradual expansions, these locations may be converted to be inside the city itself (Gul, 2016). Thus, the new situation is inappropriate to the quality of life in cities. These ideas are illustrated in (Table 1) as shown below.

1.2 Phases of Landscape Urbanism Projects

It is crucial to highlight the fact that public participation is crucial for the implementation process of Landscape Urbanism projects. In this context, this section highlights the phases of Landscape Urbanism projects.

Consequently, the phases of Landscape Urbanism can be mentioned as follows: identifying the convenient sites for Landscape Urbanism projects, data collection and site studies, project idea and preliminary proposals, public community consultation, re-evaluation and participatory decision-making, project implementation, monitoring and maintaining the project (Thompson-Fawcett & Bond, 2003).

First of all, the first step is identifying the convenient sites for Landscape Urbanism projects. At this stage, it is required to identify the underutilized wasted spaces within city fabric, and set priorities according to the need of the surrounding communities (Lydon & Garcia, 2015).

Afterward, data collection and site studies are required to distinguish the social, economic, and environmental factors associated with the selected sites. In addition, it is crucial to determine the stakeholders, main initiators, and sponsors for the project (Dyer et al., 2014).

Subsequently, generating a project idea and preliminary proposals for site utilization is crucial. This process can be done either by holding an architectural and urban design competition, or assigning this role to a proper urban designer or an urban design firm (Palazzo & Steiner, 2012).

Accordingly, it is required to make a public community consultation to discuss the proposed idea with the public community, either via voting, questionnaire, or discussing the idea with public community representatives. This step is important because the public community will be the end-user of this project. Therefore, it is recommended to assure that the proposed ideas meet the need of the people (Renn et al., 1993).

And then, based on the previous stage, reevaluation is crucial for ensuring that the design meets the real needs of the community. This is mandatory to take advantage of the public community consultation phase. Thus, the social, economic, and environmental factors are taken into consideration by public reviewing (Palazzo & Steiner, 2012).

Thereafter, the implementation phase can be achieved after all the previous preparatory stages, where the approved, reviewed and criticized design can take place in the real world. Finally, after the implementation phase is done, it is required to maintain the operational workflow of the constructed Landscape Urbanism project, to make sure the

Table 1 Potential underutilized sites for applying Landscape Urbanism projects

Potential land-use for applying Landscape Urbanism	Description and explanation
Landfills	Landfills are used as a site for waste disposal by burial. (Hauser et al., 2001) Landfills are usually located outside the border of the cities. However, due to the city gradual expansions, these locations may be converted to be inside the city itself. Thus, the new situation is inappropriate to the quality of life in cities (Gul, 2016)
Brownfield lands	Brownfield lands are used as a site for industrial purposes, with known or suspected pollution. (Page & Berger, 2006) Brownfield lands are usually located outside the border of the cities. However, due to the city gradual expansions, these locations may be converted to be inside the city itself. Thus, the new situation is inappropriate to the quality of life in cities (Gul, 2016)

project performance is meeting the expectations of the public community (Wang et al., 2003).

To sum up, after reviewing the main stages that the Landscape Urbanism project encountered with, it is clear that the role of public participation is mandatory in most of the stages, from the start of the project to the end, and even before starting the project and after closing it. That is to say, public participation is the main catalyst for Landscape Urbanism. See (Table 2) for a demonstration of the landscape urbanism workflow.

1.3 Identifying Public Participation

As has been noted, the issue of public participation can be summarized in the necessity of the involvement of citizens in the process of urban development and placemaking, in all phases, starting from decision-making until the management and operation process. This includes both natural and built environments (Kovachev et al., 2018).

The interference of people in Landscape Urbanism projects is an approach for fulfilling the social, economic, and environmental needs of the surrounding community. Their participation is the main guarantee for maintaining the project, this is because they will tend to solve their own real problems, and it keeps them loyal to the project. That is to say, the sense of affiliation increases as public participation increases (Bryson et al., 2013).

2 Public Participation Domains Within an Urban Context

First of all, in this section, we investigate the role of public participation in the urban design process and its implementation. In this context, public participation can be applied within an urban context using several domains. This participatory act includes generating the idea itself. In addition, it can extend to the process of providing information, and resolving the identified social, economic, environmental, and spatial conflicts.

Moreover, measuring public opinions and reviewing Landscape Urbanism projects can be considered as public participation. In like manner, local people can participate in the construction process, as well as the managerial and operational processes.

2.1 Generating Ideas

As a matter of fact, determining the problem is the first step to solving it. Accordingly, contacting people and knowing their contextual problems could be useful for generating ideas. Notably, the idea itself may be originated as a result of their spatial suffering or even from their aspirations (Renn et al., 1993).

For example, Tempelhofer Feld airport in Berlin in Germany is one of the examples of the impact of public participation in generating ideas. After being out of service, the government decided to convert into a mixed-use project.

Table 2 Demonstrating Landscape Urbanism projects workflow

Phases of Landscape Urbanism projects	Description and explanation
Identifying the convenient sites for Landscape Urbanism projects	Identification of the underutilized wasted spaces within city fabric (Lydon & Garcia, 2015)
Data collection and site studies	Collecting data related to the selected site and its context and determining the stakeholders and project initiators (Dyer et al., 2014)
Project idea and preliminary proposals	Generating preliminary ideas for site utilization and upgrading via either holding an architectural and urban design competition or assigning this role to a proper urban designer or an urban design firm (Palazzo & Steiner, 2012)
Public community consultation	Discussing the proposed idea with the public community, either via voting, questionnaire, or discussing the idea with public community representatives (Renn et al., 1993)
Reevaluation and participatory decision-making	Based on the previous stage, reevaluation is crucial for ensuring that the design meets the real needs of the community (Palazzo & Steiner, 2012)
Implementation	According to the approved design, all the stakeholders are supposed to do their tasks as per the community needs (Wang et al., 2003)
Monitoring and maintaining the project	During this phase, monitoring the project after its implementation is done, by taking the performance of the project into consideration (Wang et al., 2003)

However, people prevented and refused this option and they demanded to convert it into a public park. Fortunately, the former airport was successfully converted into a public space (Haase et al., 2017).

As can be seen, public participation in generating ideas has an impact on social, environmental, and spatial aspects of quality of life in cities.

2.2 Providing Required Information

It is important to realize that providing the required information is an essential step of any urban design project in general, and any Landscape Urbanism project in particular. This is required in order to make the design compatible with the real needs of the community (Farr, 2011).

To point out, the project of Ezbet Abu-Quarn urban development is an example of public participation by providing the required information, where the project stakeholders depended on the local citizens to define their problems and configure out a proper imagination of their social, economic, and environmental needs (Habib, 2014).

2.3 Resolving Identified Conflicts

With attention to the discovered conflicts that people declared in their shared information, public participation can be configured out through resolving their own conflicts, that is to say, the local citizens can intervene to solve their economic, social, or environmental issues. Through customizing their public spaces according to their needs, without neglecting the deterministic coordination with the concerned authorities in their district or city (Kovachev et al., 2018).

With this in mind, the Vrijmarkt flea market in Amsterdam in the Netherlands is an example for making an auxiliary solution for the unemployment and the need for new income resources for the local cities. That is why they utilized the available public space into a flea market that attracts tourists and other citizens to buy their old properties and antiques. This is an example of economic urban intervention by local citizens.

2.4 Measuring Public Opinions and Reviewing the Proposals

In the same way, one of the approaches for initiating a Landscape Urbanism project is to create an architectural and urban design competition, where local architects and specialists, in addition to other competitors can join together to create a proper design that suits the public. In addition, the selected top designs by the jury can be reviewed later by the public to give their feedback (Renn et al., 1993).

For instance, the Aberdeen public recreational park is an example of using the technique of declaring an urban design competition and allowing public reviewing for the ideas. Accordingly, Diller Scofidio and Renfro were selected to make the macro social and economic transformation of their park into a recreational hub that responds to site conditions and constraints. This project is an example of social urban intervention (Low et al., 2014).

2.5 Participating in the Construction, Operation, and Management Processes

In this case, people can effectively participate in Landscape Urbanism projects by available means of urban intervention, including social, economic, environmental, and spatial urban interventions. This is because each community has its own experts and labors (Farr, 2011).

In this context, urban agriculture is one of the approaches for this intended intervention, where people are allowed to share social interaction as well as economic benefits. Moreover, this technique has its impact on the environment, as it helps to increase the green space ratio per capita. For example, Agripolis is an ambitious French project in Paris for creating the largest urban agricultural farm in the world, in addition, this project depends on Aeroponics. See (Table 3) for identifying public participation's possible interference in urban design (Keniger et al., 2013).

3 Methods of Public Participation in Landscape Urbanism Projects

In general, applying public participation to achieve the intended Landscape Urbanism projects requires the use of certain methods, including some data collection methods as a tool for public involvement. These tools can be either interviews or surveys or both of them. In addition, reviews of studies and structured observations are crucial. Moreover, it is essential to take advantage of case studies and site visits. Besides, small group methods are also effective, as well as the ethnographic methods.

Foremost, data collection is required as public involvement. Thus, interviews can be used as a tool for getting detailed data analysis, based on user experience. However, it is relatively time-consuming and cannot be generalized. In the same context, surveys can be used as a tool for extracting results that can be used in statistical analysis easily. In spite of the difficulty of reaching the right intended target audience can be challenging (Queirós et al., 2017).

Table 3 Public participation possible interference in urban design

Public participation possible domains	Description and explanations	Applied cases and examples
Generating ideas	Determining the problem is the first step to solving it. Accordingly, contacting people and knowing their contextual problems could be useful for generating ideas. Notably, the idea itself may be originated as a result of their spatial suffering or even from their aspirations (Renn et al., 1993)	Tempelhofer Feld airport in Berlin, Germany was one of the examples of the impact of public participation in generating ideas. After being out of service, the government decided to convert into a mixed-use project. However, people prevented and refused this option and they demanded to convert it into a public park. Fortunately, the former airport was successfully converted into a public space (Haase et al., 2017)
Providing required information	It is an essential step of any urban design project in general, and any Landscape Urbanism project in particular. This is required in order to make the design compatible with the real needs of the community (Farr, 2011)	Ezbet Abu-Quarn urban development project is an example of public participation by providing the required information, where the project stakeholders depended on the local citizens to define their problems and configure out a proper imagination of their social, economic, and environmental needs (Habib, 2014)
Resolving identified conflicts	Public participation can be configured out through resolving their own conflicts, that is to say, the local citizens can intervene to solve their economic, social, or environmental issues. This can be achieved by customizing their public spaces according to their needs, without neglecting the deterministic coordination with the concerned authorities in their district or city. (Kovachev et al., 2018)	Vrijmarkt flea market in Amsterdam in the Netherlands is an example for making an auxiliary solution for the unemployment and the need for new income resources for the local cities. That is why they utilized the available public space into a flea market, that attracts tourists and other citizens to buy their old properties and antiques. This is an example of economic urban intervention by local citizens
Measuring public opinions and reviewing the proposals	One of the approaches for initiating a Landscape Urbanism project is to create an architectural and urban design competition, where local architects and specialists, in addition to other competitors can join together to create a proper design that suits the public. In addition, the selected top designs by the jury can be reviewed later by the public to give their feedback (Renn et al., 1993)	Aberdeen public recreational park is an example of using the technique of declaring an urban design competition and allowing public reviewing for the ideas. Accordingly, Diller Scofidio and Renfro were selected to make the macro social and economic transformation of their park into a recreational hub that responds to site conditions and constraints. This project is an example of social urban intervention (Low et al., 2014)
Participating in the construction, operation, and management processes	People can effectively participate in Landscape Urbanism projects by available means of urban intervention, including social, economic, environmental, and spatial urban interventions. This is because each community has its own experts and labors (Farr, 2011)	Urban agriculture is one of the approaches for this intended intervention, where people are allowed to share social interaction as well as economic benefits. Moreover, this technique has its impact on the environment, as it helps to increase the green space ratio per capita. For example, Agripolis is an ambitious French project in Paris for creating the largest urban agricultural farm in the world. This project depends on Aeroponics (Keniger et al., 2013)

By the same token, the reviews of studies and structured observations are important to realize, in the event that the previous studies for the same context can be a source of learned lessons. Although this may be true, this tool cannot compensate surveys and other tools to get the updated information (Swanson & Fouad, 2014).

Additionally, case studies and site visits are markedly important in giving a holistic overview and in-depth information. At the same time, it is recommended to recognize that each case has its own characteristics (Patten & Newhart, 2017).

In like matter, small group methods are effective, including focus groups, and other similar methods. These methods provide a proper brainstorming and user interaction between stakeholders, designers, and other experts. Even so, these methods require the presence of an adapted moderator, to control the procedures and assure the agreement. (Wade & Greenberg, 2011).

Correspondingly, ethnographic methods include both field studies and participant observations. In view of this, ethnographic methods can produce grounded data and results, in addition, it is also appropriate and useful for documenting results. Nonetheless, there are challenges that affect this type of study, including the time and effort consuming. In addition to the need for proper funds (Rappaport, 2008). See (Table 4) for identifying methods of public participation in Landscape Urbanism projects.

Table 4 Demonstrating methods of public participation in Landscape Urbanism projects

Methods of public participation in Landscape Urbanism projects		Strengths and advantages	Costs, weaknesses, and disadvantages
Data collection as public involvement	Interviews	A tool for getting detailed data analysis, based on user experience (Queirós et al., 2017)	Relatively time-consuming and cannot be generalized (Queirós et al., 2017)
	Surveys	A tool for extracting results that can be used in statistical analysis easily (Queirós, et al., 2017)	Reaching the right intended target audience can be challenging (Queirós, et al., 2017)
Reviews of studies and structured observations		Previous studies for the same context can be a source of learned lessons (Swanson & Fouad, 2014)	This tool can not compensate surveys and other tools, to get the updated information (Swanson & Fouad, 2014)
Case studies and site visits		Reviewing case studies gives a holistic overview and in-depth information (Patten & Newhart, 2017)	It is recommended to recognize that each case has its own characteristics (Patten & Newhart, 2017)
Small group methods	Focus groups	These methods provide a proper brainstorming and user interaction between stakeholders, designers, and other experts (Wade & Greenberg, 2011)	It requires the presence of an adapted moderator, to control the procedures and assure the agreement
	Delphi methods		
	Charette methods		
Ethnographic methods	Field studies	It can produce grounded results and data, it is also appropriate and useful for documenting results (Rappaport, 2008)	There are challenges that affect this type of studies, including the time and effort consuming. In addition to the need for proper funds (Rappaport, 2008)
	Participant observations		

4 Exploited Reviewed Cases for Public Participation in Landscape Urbanism Projects

In this section, an analytical review of two cases for Landscape Urbanism projects will be discussed, with the aim of exploring the impact of public participation in the aspects of the life of the surrounding community. These two reviewed cases are Parc de la Villette in Paris, the capital of France, and Al Azhar Park, at Cairo, the capital of Egypt.

In fact, the two cases were inappropriate to their contexts before upgrading. To demonstrate, the Parc de la Villette was a Brownfield land before being converted into an urban recreational park. Comparatively, Al Azhar park was a landfill before being transformed and reshaped into the largest urban park in Cairo.

4.1 Parc De La Villette, Paris, France

As an illustration, Parc de la Villette can be considered as a demonstration for applying public participation within a Landscape Urbanism project. After upgrading, it became one of the most considerable parks in Paris, as it became the third-largest urban park in the area. See Fig. 1 for a comparison between the Parc de la Villette before and after applying Landscape Urbanism principles.

In reality, this project was formerly a slaughterhouse, that is to say, it became a Brownfield that need an action to convert it to make it exploited. Fortunately, in 1983, an architectural competition was launched to convert this piece of land into a massive urban park. This competition allowed Bernard Tschumi, who has French origins, to win the competition (Hatuka & D'Hooghe, 2007).

To put it differently, this project had notable social impacts on the public community there. Tschumi was targeting users of all ages to interact together and participate in a wide range of activities. The park helped in combating social exclusion. On the contrary, it helped the local people for more social inclusion, as it attracted a lot of visitors and tourists belonging to all races and ethnicities (Meyer, 1991).

Moreover, the park is considered as a crucible for urban intervention and participatory acts, where local innovators, performers, actors, visual artists, and sculptors are able to share and show off their talents and shows to the local and nonlocal audiences and spectators.

Fig. 1 The Parc de la Villette before and after applying landscape urbanism principles. (*Source* https://www.archdaily.com/899597/how-the-parc-de-la-villette-kickstarted-a-new-era-for-urban-design, retrieved May 28, 2020)

4.2 Al Azhar Park, Cairo, Egypt

In the same context, Al-Azhar park can be considered as a Landscape Urbanism project, where a landfill full of poisonous and salty materials since the late Mameluke Era, within Islamic Cairo urban tissue is converted into an urban park (Salama, 2011). In other words, converting this large-scale urban void into a useful park is a method for improving the quality of urban life in Cairo city, which in turn affects environmental, social, economic, and cultural aspects of life. See Fig. 2, which clarifies the changes that occurred at Azhar park before and after applying Landscape Urbanism principles.

Furthermore, Al Azhar Park has several proven impacts on the quality of urban life, because the park provides several participatory acts that can be considered as social, economic, and environmental urban intervention.

That is to say, from an economic point of view, this park provides funds for local citizens as a support for their small-scale projects. In addition to providing educational services to the community via the local citizens in particular. From the environmental point of view, this park replaced the largest landfill in Egypt, where it has been a landfill since about one thousand years ago. Accordingly, the percentage of green space per capita for local citizens increased (Nassar, 2013).

Moreover, this park contributed to many social activities for all ages, which helped in combating social exclusion. That is to say, it established initiatives for helping both children and adults to learn art, music, and performances.

5 A Potential Node for Applying Public Participation for Landscape Urbanism Spreading

In this section, a land plot was selected to investigate the potential utilization of public participation in the implementation of Landscape Urbanism projects. This site is fulfillment and hope landfill, which is located in the southeast of Cairo, between Nasr City, The Fifth Settlement, and Almoqattam district. For the location of fulfillment and hope landfill, see Fig. 3.

Fig. 2 Al Azhar park before and after applying landscape urbanism principles. (*Source* https://www.akdn.org/gallery/creating-urban-oasis-al-azhar-park-cairo-egypt, retrieved May 28, 2020)

Fig. 3 The location of fulfillment and hope landfill at Cairo. (*Source* https://goo.gl/maps/gXZpMgk4cKxcnjjM9, retrieved May 28, 2020)

5.1 The Landfill Urban Context

In fact, the fulfillment and hope landfill was established in the 80s of the past century. At this time, this location was at a desert location outside Cairo toward the east, and was far away from the residential regions.

However, due to the gradual eastern expansion of Cairo toward the east, this location became surrounded by residential regions and cities, including Nasr City, which became one of the most crowded districts of Cairo. Afterward, The Fifth Settlement started to get attraction as well, in addition to the Almoqattam district. Moreover, The Fifth Settlement itself became a node in the New Cairo Region on the eastern side of Cairo. In addition, a large-scale project called New Administrative Capital has been under construction since 2015, and it is situated at the east of the New Cairo Region.

In this context, the fulfillment and hope landfill contains more than thirteen tons of garbage. Additionally, the garbage height has exceeded twenty-five meters high. In 2016, the national for mobilization and statistics has declared a report which indicated that about twenty percent of the deaths in East Cairo are due to respiratory diseases. 1,400 deaths out of a total of 8,000. Most of these cases were a result of the poisonous vapors that spread to kill and cause illness for the inhabitants of East Cairo.

According to local newspaper reports, many of the inhabitants of the surrounding areas of the landfill have declared the harmful impacts of this landfill on their quality of life and health. Fortunately, the minister of environmental affairs, said that there is an ambitious plan for converting this landfill into an urban park, which is a Landscape Urbanism project that can make a macro social, economic, and environmental transformation for the surrounding community.

5.2 The Suggested Public Participation Interference

As mentioned before, Fulfillment and hope landfill has the potential for applying Landscape Urbanism concepts, in addition, it is recommended to involve the public community in all the phases of this project as follows.

First of all, at the stage of data collection and site studies, it is recommended to create a volunteering platform, using virtual and physical approaches, to take advantage of the enthusiastic local guides. By performing this action, it is expected that people will be able to declare their own problems in a proper way.

Afterward, at the stage of processing project ideas and introducing preliminary proposals, it is recommended to Establish an open architectural competition as a chance for grabbing local and international ideas for the Landscape Urbanism project. By performing this action, it is expected that social inclusion will be reduced and minimized, because creating this Landscape Urbanism project in real life would be an intended wish of local citizens.

Subsequently, at the stage of public community consultation, it is recommended to declare the intended design for the public and measure their responses and feedback. As a result, people will be able to get involved in the decision-making process.

Thereafter, re-evaluation and participatory decision-making are required to make the best use of the public community consultation stage. This can be done via creating focus groups that include the stakeholders, designers, and local activist representatives. Accordingly, the expected impacts will be ensuring a higher quality urban product and estimating a more durable project for the public community.

Table 5 Suggested public participation interference at fulfillment and hope landfill at Cairo

	Phases of Landscape Urbanism project for converting fulfillment and hope landfill into a public park	Suggested public participation interference	Expected impacts
01	Data collection and site studies	Creating a volunteering platform, using virtual and physical approaches, to take advantage of the enthusiastic local guides	People will be able to declare their own problems
02	Project idea and preliminary proposals	Establishing an open architectural competition as a chance for extracting local and international ideas for the Landscape Urbanism project	Social exclusion will be reduced and minimized Creating an intended wish for local development
03	Public community consultation	Declaring the intended design for the public and measuring their responses and feedback	People will be involved in the decision-making process
04	Reevaluation and participatory decision-making	Creating focus groups that include the stakeholders, designers, and local activist representatives	Ensuring a higher quality urban product Estimating a more durable project for the public community
05	Implementation process	Local citizens can participate in the construction and logistical processes of Landscape Urbanism projects, to take advantage of the local manpower and existing laborers	Promote a sense of affiliation Social interaction will be raised People will have a better social life and they will share the same objectives
06	Monitoring and maintaining the project	Participating in the construction, operation, and management processes Submitting their post-occupancy evaluation and giving their feedback for future improvements	Producing a new generation that respects and protects the product of their ancestors Unemployment will be reduced due to the expected emerging job vacancies

Following that, the implementation process can be performed, where local citizens can participate in the construction and logistical processes of Landscape Urbanism projects, to take advantage of the local manpower and existing laborers. Accordingly, it is expected that the sense of affiliation will be promoted, in addition, social interaction and positivity will be raised. That is to say, people will have a better social life and they will share the same objectives.

Finally, monitoring and maintaining the project after its implementation is crucial. At this stage, it is recommended to make the local people participate in the construction, operation, and management processes. Moreover, they can share their post-occupancy evaluation and give their feedback for future improvements. As a result, a new generation that respects and protects the product of the ancestors will be produced. In addition, it is expected that unemployment will be reduced due to the expected emerging job vacancies. See Table 5 for identifying the suggested public participation interference at fulfillment and hope landfill at Cairo.

6 Conclusion

Under the previous circumstances, it is obvious that public participation plays an irreplaceable role in Landscape Urbanism projects. And its impact extends to social, economical, and environmental aspects of the community.

It is recommended to involve the community members as much as possible, in order to get the best use of their energy, ideas, and enthusiasm. By involving the community in all the phases of Landscape Urbanism projects, it is expected that people are allowed to declare their own urban problems, their daily threats and challenges. In addition, it is expected to combat the phenomenon of social exclusion, on the contrary, social inclusion for all community members and orientations will be considered.

One of the most important impacts of public participation is that people will be involved in the decision-making process. In addition, this is the appropriate approach to a higher

quality urban product and a more durable project for the public community.

From the social perspective, applying public participation in Landscape Urbanism projects will promote a sense of affiliation. Moreover, it will increase social interaction and positivity at the people's attitude. That is to say, people will have a better social life and they will share the same objectives.

From the economic perspective, unemployment will be reduced due to the expected emerging job vacancies. In addition, this will produce a new generation that respects and protects the product of their ancestors.

To sum up, the success of Landscape Urbanism projects depends on many factors, among them, the proper use and utilization of public participation.

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Defining Sustainable Involuntary Resettlement Policies for Project-Affected Women Through Qualitative Review—A Case of Mumbai, India

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Abstract

Involuntary resettlement is an inevitable phenomenon in many urban scenarios. Sustainability in this article refers to the survival and sustenance of the affected population. Several researchers point out the dire need for the inclusion of gender dynamics in resettlement policy studies, based on the fact that if vital land deals flout gender issues they will further widen the disparities and resource paucity. Time and again researchers have enlisted many gender biases in involuntary resettlement processes but whether these discussions reach the common mass and create any awareness is the question we speculate upon here. This article consists of a study of recent media articles from five leading Indian English newspapers and a quantitative as well as qualitative analysis of how well Project-Affected Women's needs are communicated to the mass. Post analysis the article concludes with policy recommendations for sustainable and gender-sensitive resettlement planning.

Keywords

Rehabilitation and resettlement • Displacement • Policy frames • Gender issues • Resistance • Policy instances

1 Introduction

The governments of developing countries are implementing pro-investor policies for land deals (Behrman et al., 2012) which include seemingly agreeable resettlement plans. The gender dimensions of such large empirical projects are rarely addressed in the literature (Daley & Englert, 2010), without which their social impacts are not entirely recognized. 'Sustainability' of policies has the potential to be a suitable measure for such impacts. The term 'Sustainable' is not a very commonly used adjective to describe policies. A sustainable policy is one that supports new interests and generates self-reinforcing dynamics over time and diminishes the traditional interests and bases of support (Patashnik, 2003). The context regarding women and gender in this case is whether the new amendments of a policy display sensitivity to the gender bias and women's needs. Indian Government's rehabilitation schemes, be it slums or development projects, are supposed to improve the well-being and quality of life of the PAP (project affected people) but this is observed mostly on paper (Bardhan et al., 2019). The gender issues of Land Acquisition Rehabilitation and Resettlement (LARR) policies have been documented and discussed by several researchers. While gender disparity issues like education and health access, property rights, employment, and violence are global (United Nations, n.d.), there's surely a noticeable contrast in developing and developed countries (Cohen, 2006) which provided motivation for this study. Works by Thukral (1996), Pervez (2008), Contractor (2008), etc. give interesting and important insights into the topic. Getting women actively involved in surveys, policy framing, and implementation has often been overlooked due to the challenging nature of the process. There are numerous articles about how and why women are often left out of the survey and interview processes. But here the aim is to examine that even if they had been interviewed, whether the Project-Affected Women (PAW) would be able to make their needs documented and recorded precisely. It has been realized how women of higher ranks/senior women representatives are often adhered to internalized patriarchy and do not object to the practices keeping women home and kitchen bound, damaging their economic independence and livelihood (Fernandes & Raj,

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1992). In this situation, it's not just important to keep asking women what they need, but also to educate them regarding their own benefits and sincere reporting of the problems they undergo during involuntary resettlement.

In this paper, we have carried out a Media Survey of the articles published in 5 leading English newspapers in India about the afflictions of women. The Media acts as the primary source of common knowledge and understanding for the public and plays a significant role in shaping their political and social preferences (Gamson, 1992; Neuman et al., 1992; Zaller, 1992). Hence, the media survey helps us to understand the people's perception of gender bias in Land Acquisition, Rehabilitation and Resettlement (LARR). For this, we needed to fix a time period for the study. If we look at India's timeline of LARR's development, significant changes can be observed in the early 2000s when the National Policy of Rehabilitation and Resettlement and The LARR Bill was brought in. The time span of 5 years (2014–2019) seemed like a perfect duration to draw our conclusions from, regarding the feedback effects of this policy as this period witnessed the most political debates and restlessness regarding this policy right before the pandemic hit. This analysis is very similar to what Steensland had performed for analyzing the American Policy of Guaranteed Annual income from the 1960s–1980s (Steensland, 2008). There are several things we had to decide upon before beginning the media survey, like the newspapers, the number of articles we would review, functional categories we'd divide them into, the policy frames, frame packages, or organizing ideas, and the unit of analysis we'd work with. The existing literature on gender bias in R&R policies helped us in fixing several parameters. Most of the content analyses or media surveys carried out for the Indian scenario offer language, clarity, readership, or accuracy critiques. With this study, our intention is to check PAW issues' representation, their reception, and impacts to some extent. The expected outcome was a set of recommendations towards more efficient conveyance and sustainable and gender-sensitive resettlement policy design.

2 Research Methodology

Our study began with a parallel literature analysis of gender issues with resettlement policies in academic and research articles as well as news articles. Fixing our focus upon a particular time span, observations were made regarding the main actors behind the articles as well as the coverage of the issues. This was followed by forming our own definitions of policy frames and calculation of their instances in the number of relevant articles we had fished out of the mass. The analysis availed us of the actors' representation and the coverage of issues over the years in illustrative and numerical form. The functional approach of these policy frames also exhibited how the problems were being addressed by the media. Also, the locations from where the articles were reported also gave us insights into the representation of the various Indian states. After identification of the problem areas, we concluded the paper with some recommendations and aspects which require attention by the policy-makers as well as mass communicators. For selecting our newspaper sources we referred to the content analysis done by Barclay et al. (2014), which ranks The Times of India (TOI), The Hindustan Times (HT), The Hindu, Mumbai Mirror (MM), and The Telegraph as 5 topmost English newspapers in terms of readership and popularity. Since here we are discussing the impacts of media on the perception of people readership is the most important quality to be considered. Similar to Steensland's work, and after an initial pilot study of roughly 70 articles, we chose the three basic functions as—F1 Diagnosis of Gender bias in R&R by reporting women's issues, prescribing the solutions for the issues arising out of the gender bias F2, and lastly F3 covering the policy shortcomings in a general way which indirectly and eventually affect the lives of PAW.

3 The Primary Gender Issues of the Policy

It's important to note here that we are analyzing these through the lens of displacement and involuntary resettlements only. The biggest concern has been around the exclusion of major (aged 18+) women from R&R benefits as the schemes consider only major males as family heads and eligible (Thukral, 1996; Pervez, 2008). The prevalence of this gender bias is at the full display when R&R jobs are offered to 'most eligible male member' of the Projected Affected Family (Fernandes & Raj, 1992). Whenever there is a lack of employment, women are often the ones to lose it (Thukral, 1996) and the resettlement scenario just worsens this. Researchers try to provide solutions such as skill training and employment schemes that should be taken up for the PAW (Kumar & Mishra, 2018). Another aspect of this very concern regarding women's livelihoods is the fact that these megaprojects often lead to a shift from traditional jobs (forestry, fishing, weaving) to unskilled labor jobs which harden women's lives (Fernandes & Raj, 1992). When we tried to access the coverage of these issues by the newspaper articles we used search words like 'Project-affected women', 'Women's employment', and 'Women's livelihood'. For our designated time period, TOI fetches us about 52 articles. Most of the articles cover the issues of LARR on a basic level but refrain from mentioning women's plight specifically. There were 3 news articles that captured the issue and its solution to some extent by reporting skill training being given to some rural women, the

high proportion of female workers in families below poverty line Uttarakhand villages, and the seminar organized in Goa to bring notice to the decreasing feasibility of traditional occupations and environmental degradation in Goa. The HT offers a couple of articles about the struggle of women farmers and agriculturists. The Hindu had 3 significant articles as well covering the major contribution of female farmers in cotton farming in contrast to their ownership of farmlands in India, the demands of women's rights groups of interest-free loans for women of self-help groups, and the protests by single women demanding their share of R&R benefits in Kommepalli village. Out of Mumbai Mirror's 50 articles as well, a proper documentation of PAW's economic woes wasn't found. The Telegraph's search by the words 'project-affected women' fetched a massive compilation of about 75 articles, but after going through them we realized most were about women's struggle in general with employment or women affected by floods, diseases, or articles completely unrelated to our study interest. There were a few articles in all the newspapers about women putting up violent protests, self-immolation threats, self-harm, or drastic forms of putting their views forth.

Another primary gender issue is the exclusion of women from land and property rights. Researchers have repeatedly mentioned how this further leads to their weakening and makes them completely dependent on the male members of the family (Bisht, 2009). While some R&R schemes ensure that properties given are in the names of both spouses, maximum projects lack this basic feature (Pervez, 2008). The situation is worse for the projects which provide monetary compensation as the only R&R return. It has also been observed that even in the households with two incomes, the control over the money has been mostly patriarchal (Dwyer & Bruce, 1988) hence the issue's severity increases in displacement cases. To read about these issues search words like 'project-affected women', 'women's property rights', and 'rehabilitation and resettlement' were used. Out of the 50 articles by TOI, none of them explicitly discussed or reported this skewed system of R&R benefits although there were few articles that discussed women's struggle for their property rights from an international, community, or regional angle. The Hindu had 2 articles that detailed the demands raised by elderly and single women toward slum clearance boards and state government of Telangana for being excluded from resettlement benefits and another one about the Republic Party of India claiming to take a sincere stand against resettlement laws biased against the weaker sections of the society (which apparently includes women). Gender-based violence is often associated with the list of resettlement issues faced by women when they're displaced with broken social connections and less security. Unemployment and alcoholism in men are often the causes of gender-based violence in resettled households, whose aspect are often overlooked (Moser, 1993). The morbidity associated with the displacement also affects women worse with high mortality rates (Thukral, 1996). This grave issue attracted feeble attention from the media with just 3 out of the total 275 articles we overviewed partially covering it. TOI had an article about the vast percentage of Mumbai women who faced domestic violence and one about the awareness campaign conducted by Mumbai Metro Rail Corporation for Eklavya Adivasi Sewa Trust Andheri for their rights against gendered violence and how they could protect themselves lawfully. An international report by World Bank in HT provided an outlook about how ownership of land and properties by women can reduce gender-based violence and evil practices. There were a couple of articles about how women had been strongly condemning the free supply of alcohol near slum resettlement areas and how it contributes to so many family issues in the mass. Lack of toilet and sanitation facilities can result in women's lives becoming hell. Collection and management of drinking water is also almost a women's task in households (Thukral, 1996). These problems affect everyone in general but the social stigma, pregnancy, and higher health risks make this issue very prominent in this case. Even organizations like NALCO have provided resettlement housing without proper toilet and sanitation arrangements (Thukral, 1996). An article of TOI enlists the laid-out budget of Odisha Mineral Bearing Areas Development Corporation (OMBADC) for the necessary infrastructure which includes sanitation, health, drinking water, education, livelihood, rural connectivity, and environmental conservation. While a MM article covers in detail, the sad state of Aarey Colony and Vikhroli Park sites where women have to resort to open defecation for survival and bear the social stigma and disgust of the people living in towers nearby. An enormous municipal colony gradually like Shivajinagar Baingadwadi turned into a slum-like sprawl due to the controversies and inadequacy around water supply and other basic services (Bjorkman, which brings it to our attention, that the degradation of a housing colony begins when it's denied basic physical infrastructure.

When women shift to new sites post resettlement, the social resistance they face can also be through the negligence and negative attitude they receive from nearby existing medical staff. Hence, hospitals, maternity health care, and clinics are an integral part of R&R (Contractor, 2008). Several times the hospitals or clinics set up at the resettlement sites remain dysfunctional and women have to resort to other nearby facilities as its difficult for the authorities to appoint full functioning staff at such locations. It's ironic that at a place where regular professionals refuse to operate from, we expect newly displaced people to establish whole new lives. While going through articles we found a couple of them discussing the plight that women in poor resettlement colonies go through during pregnancy and change of environment (from bigger hutments to smaller concrete

tenements). With barely an article suggesting the betterment of healthcare facilities, the depiction of this concern was surely feeble. The pace of the displacement or the transition is an important factor as well. If the progress is extremely slow or hastened, it burdens women with extra household duties and uncertainties (TISS, 1993). This transition phase, which is harsher on women, can be made smoother by the timely implementation of the plan and provision of good temporary settlements if needed (Thukral, 1996). Authorities resort to urgent resettlement or inexplicable delays as per their own convenience. The Hindu has two very latest articles from 2019, one of which records the details of very aggressive protests by villagers with pesticide bottles and threats to the authorities regarding the irregular nature of the R&R implementation of the JVR Opencast project which had several women in active roles. They blamed the corruption and inefficiency of the authorities for the delays. The other one is about the Chikalda village, where the authorities had flooded the houses of 1366 families with dam water just to make them quickly evacuate the site despite of the fact that their money and other resettlement benefits hadn't been provided. Women of such families have to relocate overnight, uprooting their household and assets. Even the laborers, most of whom had been women, were struggling immensely to find work. Several women interviewed by the newspaper complained how they had lost farm produce and even cattle to the submerge. TOI had an article about the Bombay High Court's questioning to the state government regarding the record of repeated delays in R&R implementation in 2013. Some women have even told researchers that they have serious trust issues with temporary allocations and fear being left in temporary plots forever (Blank et al., 2019). While there were several pieces about people complaining delays or hastened acquisitions, prominent interviews of women or mentions of women's issues, in particular, were covered only in these very few.

Treatment and sensitivity toward women of marginalized and indigenous populations and the conduct they receive at the host site are raised as a noteworthy concern in studies. Sudden impacts from the host communities can either be good or even bad for the women settlers. Some communities have seen improved education in girls while some have witnessed orthodox traditions like dowry and purdah creep into the resettlers' lives (TISS, 1993). The social bonds women form over the years, tend to be shattered by resettlement processes, and hence attention must be given to preserving women's social autonomy (Bisht, 2009). Women from marginalized communities are more vulnerable in such cases. Women's activities of cooking and collecting water outside often served as opportunities for socializing for them (Blank et al., 2019) and the drastic change of lifestyle impacts the social well-being. Apart from TOI's article about the awareness campaign for *Adivasi* women, a couple of recent articles from The Hindu cover the Telangana High Court's direction to the State government to provide accommodation with basic amenities to members of 16 tribal families, who were evacuated from the forest in Komalgondi village of Kumram Bheem district. The report covered the plight of several tribal women along with men, though not exclusively. Other similar articles regarding courts' verdicts regarding tribal rights on their land and minerals were also found. For overall satisfaction in a neighborhood, social and community ties have been observed as significantly contributing factors (Davis & Fine-Davis, 1981). Specifically for PAP of involuntary resettlement, their community strength needs to be reinforced with necessary infrastructure. It has been observed that even after resettlement these people are often followed by economic, social and psychological marginalization (Cernea, 2000). If a resettlement is socially effective, it's usually an economically efficient resettlement as well (Asthana, 1996). Hence the needed social infrastructure for strengthening women's solidarity must find a way into the R&R agenda.

Availability of children's facilities like schools, play areas, tot-lots, parks, etc. not only helps their enhancement but also makes childcare a convenient job which is a domestic duty which mostly falls on women. Post resettlement, if good schools are not present in walkable distances, young girls drop out from schools and it also burdens the mothers either with idle children bereft of education or the stress of sending them further for school daily. Reasons for selecting or rejecting a site can vary to a great extent between the genders (Parasuraman, 1993) and this can be one of those important but easily overlooked aspects. Authorities often don't find it difficult to construct these facilities on-site, but the maintenance and running of these are the main hurdles (Mathur, 2000). TOI's article about OMBADC's budget for infrastructure included schools. In an interview of ours with an official from the Mumbai Metropolitan Development Authority (MMRDA), we were told how the absence of flour mills and other grocery stores in resettlement colonies create turmoil for women. For women, gender-based domestic violence isn't the only threat to their safety. The overall safety of the community depends on the location and other external factors. Resettlement colonies too close to hazardous factories, high noise level railway lines, or areas prone to communal violence can't be ideal choices for resettling a population whose properties and livelihoods have already been deeply affected. An apt example is the Mahul resettlement colony in Mumbai which has made the residents' lives hell with high levels of pollution and an inhospitable environment (Sundar & Sharma, 2002). About two or three articles are dedicated to the plight of Mahul residents in 4 out of 5 newspapers, about the pollution, the nearby refineries, interviews of women, and the verdict of Bombay High Court. Well-lit colonies with no

unsafe corners and constant surveillance are the needs of women to lead an unafraid life. There have also been some reports which highlight the problems regarding theft and rogue behavior by miscreants among the residents. Stolen bulbs, night lamps, broken elevators, dark alleys, dark stair wells, and unkempt yards create breeding spots for criminal activities. Now, these issues are mostly maintenance issues rather than provision deficiency.

The inclusivity and sensitivity toward the transgender women and specially abled women and ensuring their share in the R&R benefits is also an inconsistent aspect in most plans. While the needs of specially abled people are covered at times in these plans, most seem to turn a blind eye to the transgender community and their safety. The internal variations and differences of PAP are often overlooked when they are treated as family units or just male members and their related ones (Colson, 1999). Women should not be treated as a target group or as an additive category to men (Bisht, 2009), but as set of individuals constituting half the resettlement population, with needs as basic and important as men. A very positive outlook of the work done by an NGO in a Chennai resettlement area named Kannagi Nagar can be found in one of The Hindu's articles where the active involvement of trans women in artistic activities in the area are lauded. Apart from this, resettlement and the cooperative conversation of transgender rights in R&R policies wasn't found in any of the articles. A couple of articles have mentioned the plight of disabled people in general. Lack of representation and participation of women in surveys and designing process of the R&R plans is prevalent in Indian scenario and is repeatedly pointed out (Asthana, 2012; Contractor, 2008; Kumar & Mishra, 2018; Moser, 1993). Details about how women are engaged and interviewed even while conducting surveys must be laid out clearly in a plan as there's clearly a lack of trained gender-sensitive data collection in most cases (Pervez, 2008). We came across a couple of articles, where human and women's rights groups were recorded demanding more and significant involvement and inputs by women and their representatives. The lack of awareness of their own rights has made women unable to pronounce and enlist their demands clearly.

4 Unit of Analysis

It's always an interesting task to provide the subjective nature of policy framing and policy-making literature (Steensland, 2008) an objective, analytical angle. Going through the 275 articles on certain topics of our interest for a time period of five years, we developed an insight into the representation of PAW's problems in the Indian media. But here in our study the number of articles or which newspaper they belong to, don't matter. Our unit of analysis or for drawing any conclusions is not the newspaper or the number of articles precisely. We are more interested in the following questions—Whose voices or opinions are being represented in the media most? How well women's issues are being captured? How well is the message of sustainable R&R policies for women being received? To answer these questions, we need to finalize majorly two indicators—the actors (the ones leading the discussion in the article) and the policy frames/ main social problem being dealt with by the policy in question. After analyzing the articles, we came up with the main actors behind these news articles and the major Organizing Ideas (OI) behind them. The actors are the group of people whose opinions or stances have shaped the spine of the article. In this case, the actors are—A1. PAW, A2. Media Experts or Researchers, A3. Court and Judiciary, A4. Central/State Government, A5. The Opposition, A6. Women's Organizations and NGOs, and A7. Government Officials and Bureaucrats. Under these 7 broad categories, all the classifications of actors in the articles can fit in. As per the discussion before, the social and gender issues which would form the policy frames are—Employment and Economic S1, Property Rights S2, Gender-Based Violence S3, Sanitation and Water S4, Health S5, Childcare and Family S6, Transition S7, Social Autonomy of Marginalized women S8, Transgender Rights S9, Barrier Free Living S10, Overall Safety of the site S11, and Representation of women S12. The policy frames are formed by the combination of two factors we have discussed till now—the gender and social issues and the main functions of the article. For example, if the article attempts to diagnose and report about a certain social issue it's a frame through which it's contributing toward the policy's amendment. A single article may contain multiple frame instances. With our assumptions and selection of 52 relevant articles out of the whole lot of 275, the possible range of frame instances falls in the range of a minimum of 52 to maximum of 1872 frame instances. Our number would fall somewhere in this range and each frame signifies the input made by the media toward policy enhancement. Other aspects which we're interested in are the driving actors and the yearly trends of these frames.

5 Results and Discussion

On analysis we found the total number of frame instances to be 132. Here onwards, the importance of a number of articles is diminished and we move ahead by measuring frame instances and their frequencies of the aspect in question. Table 1 provides the record of the frame instances' frequencies with respect to every social issue we have enlisted. Each article has had one or more frames in it and these instances per gender issue aren't mutually exclusive. Each particular amalgamation of function and issue tells us the

Table 1 Frequency table of frame instances with respect to issues and functions

Gender and social issue	Frame instance frequency per function			Total percentage of frame instances (%)
	F1 diagnosis	F2 prescription	F3 indirect impact	
S1 employment and economic loss	18	10	9	35.6
S2 property rights	13	5	12	22.72
S3 gender based violence	2	1	0	2.27
S4 sanitation and water	3	1	3	5.3
S5 Health	1	1	0	1.51
S6 childcare and family	1	1	0	1.51
S7 transition and pace of resettlemnt	8	1	8	12.8
S8 social autonomy of marginalized women	8	4	1	9.84
S9 transgender rights	1	1	0	1.51
S10 barrier free living	2	0	0	1.51
S11 overall safety of the site	4	1	0	3.78
S12 representation of women	1	0	1	1.51
Total 132 frame instances (neither mutually inclusive nor exclusive)				

approach toward the policy through feedback by the media. For instance, we can see how Employment and Economic issues are the most covered ones in these frames, but they are captured mostly in diagnosis function, i.e., media has over these many years often pointed out the issues, located the weak spots of the policy but discussed comparatively less about the solutions and remedial measures. Similarly, there's a mass of discussion in the media about the issues regarding property rights of the PAP in a general way, but discussion about dealing with this issue specifically from a gendered perspective is lesser. Issues like lack of frame instances around issues like women's health, transgender rights, barrier-free living and child care are concerning. Gender-based violence and the overall safety of the resettlement sites also don't seem to stir much attention from the media. The pace of acquisition and transition is a topic that affects everyone in general, the organizers, officials, PAP, the government, and not just the women. Hence, it can be seen that this issue is still fairly covered compared to the issues which have more gender-specific impacts like women's representation, gender-based violence and child and family care facilities, etc. The more widespread the impact of the issue, the more weight it gets in the media while transgender rights are almost absent from the mass discussion. When women all over the country read about LARR and R&R topics, it's very unlikely that these details and loopholes in their own rights are realized by them. There are obvious overlaps in these different subjects. For example, a conversation and demands about better sanitation facilities and safer pollution and stench-free locality is indirectly a conversation about health. It depends on the perception of the researcher if they want to treat these droplets of discussions eventually seeping into the bigger cause of women's safety as a positive or negative sign. But no one can deny the need for the discussions to happen directly from women's POV and not just as an additional point to the general debate. The issues like barrier-free living and older women's difficulties are often covered under the wide umbrella of other people's demands generally. We've also included policy frames from articles that have just mentioned the problems and not really gone into any depths depicting their negative impacts. This is a limitation of this study and needs to be refined through further research and more refined models. Hence, the results we see here are surely slightly exaggerated than the real scenario of PAW depiction. In an ideal situation, the functional approach of articles would be almost equal in both diagnosing and prescribing solutions for the social challenges as this would ideally mean that the problems being reported are not going unnoticed and not acted upon but simultaneous attempts are also being made to solve those problems and there are equal numbers of success stories.

It's interesting to note how the media not just brings the country's attention to several matters but also works as a platform that provides completely contrasting scenes to the Acquisition implementing bodies' ornate facade at times. When the sponsored reports of the projects' funding bodies enlist the benefits of a project and its feasibility, the media highlights the wave of outcries and protests by the affected people, shattering the Utopian picture. For example, highly

celebrated and internationally appreciated ambitious projects in Mumbai, like the Navi Mumbai Airport Influence Notified Area (NAINA), and Mumbai Metro or the Mumbai Bullet Train project, the media brought in the striking disagreement of the public and newspapers like Mumbai Mirror published about NAINA's authority which evicted about 3500 village families to some resettlement sites. Unnecessary acquisition, unfair compensation, and the fact that the resettlement sites had not even been ready by the eviction date were major causes behind farmers' hearing boycotts in 2010 and violent protests in 2017. MM has also published a series of reports from 2017 to 2019 covering the protests by tribal farmers and residents losing their homes to the project. The 508 km long bullet train corridor, apart from affecting forest lands and mangroves, is overrunning 828 commercial and residential structures in Vasai-Virar in exchange for very meager compensation. All such articles fall under the diagnosis function raising the issues regarding employment and snatching of property rights, which explains the high number of frame instances under these categories. The fact that women's particular issues get less coverage, which results in less awareness which in return result in women being less vocal and aggressive while expressing their needs forms a self-derogatory cycle for the policy. In Policy Feedback Approach (PFA), this is known as the Lock-In Effect (Pierson, 1993). The lock-in effects of a policy can be reversed with the help of self-reinforcing measures being weaved into a policy. But the lack of frequency of prescriptive function frame instances is a proof that this isn't the case with the current scenario, which contributes to the gender un-sustainability of India's LARR. Following this, our analysis shifts to the actors involved and the happenings over the time span through years. Unlike Steensland's work here, which involved calculations of various indicators and rates, we opted for a simple graphical representation of patterns to derive our outcomes.

The actors play an important part in any newspaper article as the choice of the actor reflects the major stance that leads the article. Also, the actors have the power to mold the narrative about an issue in completely diverse directions. The emergence of the 7 actors varies over the course of time. Although, it can be clearly observed from the graph from Fig. 1 that lately the involvement of most of the actors have increased along with the increase in the number of frame instances. The graph shows the trends of all the 7 actors throughout the time period. The high number of frames led by the PAP and PAW reflect how media captures their woes when they set out with protests raising their voices. Meanwhile, the frames led by experts, researchers, and even the judiciary are on the lesser side. It's important to remember that here for this study, the selection of articles has been done through several filters, like PAW, LARR, R&R, PAP, etc. which also affects the actors whose stands make it to the study sample. There seems to have been a sharp increase in PAP and PAW led frames from 2018 to 2019 and the frequency decreases in 2020 which might be due to the fact that the year 2020 has seen much more prominent issues and isn't over yet. It's also important to consider the main limitations of this study. This study doesn't do an in-depth analysis of the whole content of the articles. An article might be covering a gender concern but might be having the exact opposite impact or may even try to downsize the matter, but here we have considered the conversation incidence itself as a positive sign. This whole power of igniting or suppressing a concern lies in the hands of the actors involved and a deeper analysis is yet to be done.

The graph in the following Fig. 2 shows the major reporting locations. The national-level policies or amendments mostly make it to the headlines through the county capital, which explains the high frequency of reporting from New Delhi in the following graph. Other states like Chhattisgarh, Assam, Meghalaya, Goa, Uttarakhand, and Madhya Pradesh have had comparatively much lesser coverage. The less reporting from such states also explains the lesser exposure of marginalized and indigenous women's anguish to some extent. Meanwhile, another reason behind more reports from cities like Mumbai and Delhi is the fact that these are rapidly growing and urbanizing with several infrastructure and development projects occurring, which keep stirring involuntary displacements and resettlements. States like Telangana and Gujarat have had moderate attention from the media, which might be due to the fact that Telangana is a relatively new state and Gujarat's acquisition and land readjustment activities are well known in India. Telangana also has seen some recent resistance and clashes of authorities and farmers over land rights while the development of its cities. Apart from Mumbai, other cities of Maharashtra like Nagpur and Pune also gain temperate attention. We also observed how the women of states bereft of the limelight have resorted to extremely aggressive disputes to gain the attention of the media. Beating up mining officials, being drowned under dam water, threatening to commit suicide, brawls with police, etc. are some of the common headlines of articles covering such states. Also, most of the news about successful seminars, positive steps, women empowerment endeavors, and other constructive remedial measures often came from the bigger cities. Most of the states with less reporting have a higher number of tribal populations like Northeastern States, Chhattisgarh, Jharkhand, Odisha.

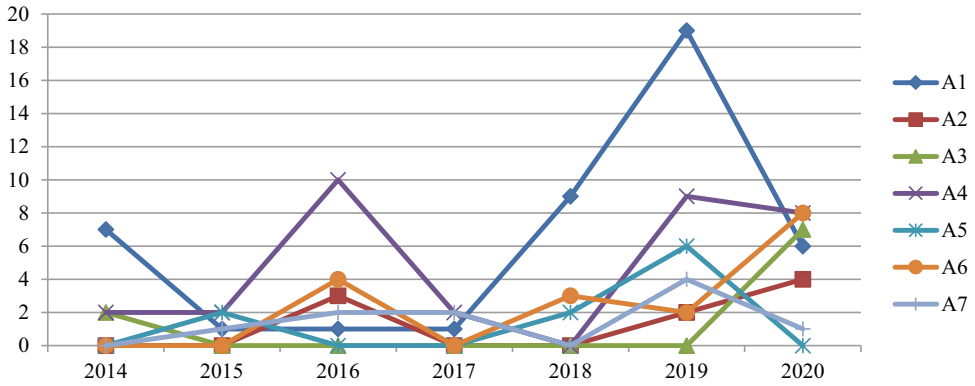

Fig. 1 Yearly involvement of actors

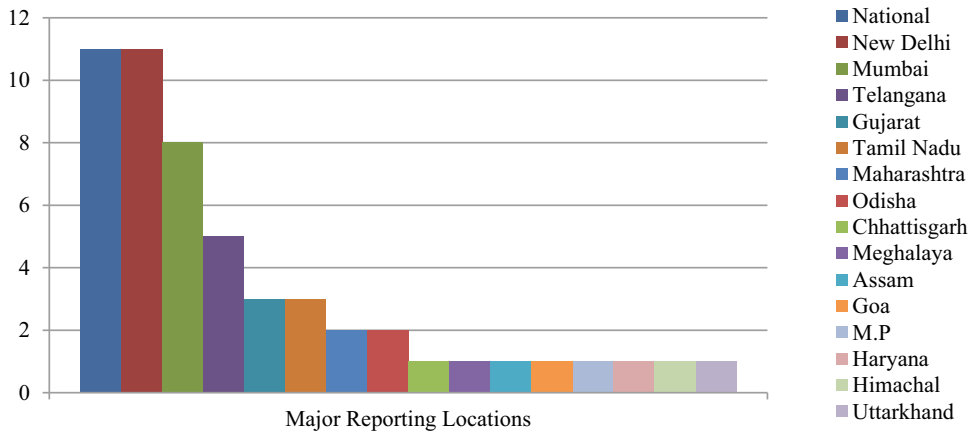

Fig. 2 Major reporting locations

6 Sustainable Resettlement for Project-Affected Women

In this section, we'll amass all the take-away points from this study and try to frame some recommendations toward a more sustainable policy of involuntary resettlement for women. This study caters to some basic global Sustainable Development Goals (SDGs) by intriguing a discussion about PAP's good health & well-being (SDG 3) through gender-sensitive rehabilitation planning (SDG-5) and wish to develop a tool to identify and highlight these inequalities. For a sustainable development of urban communities (SDG-11), such quasi-quantitative models of problem identification are conversation catalysts for overlooked setbacks. For resettlement policies to be sustainable for women, both the officials and policymakers in charge and the media reporters need to be vigilant toward PAW's issues. Following are some points which we'd want to get accommodated in data collection and reporting of LARR subjects. Trained and professional interviewers with a complete understanding of gender sensitivity are required to be present during the data collection of such projects. Many times, women do not interact with data or information collectors as they do not feel safe or trustworthy to them. It's also important to record their needs in a precise way with no unnecessary sensationalizing. The severity of their problems could be more effectively captured with specific remarks about the lack of facilities objectively. Gathering information regarding subjects considered taboo (menstrual hygiene, sexual health, pregnancy aid, etc.) can be very challenging. Hence direct or indirect involvement of medical professionals and experts should be sincerely considered for documentation and coverage. Also, the more marginalized the target group is, the more essential the interaction with their women is. Marginalized, tribal, indigenous, or suppressed class women often go through silent struggles which modern-day common women (who are often the researchers, officials, or reporters) might not even be aware of to consider documenting. 'Helicopter Journalism' or reporting everything from a distant point of view, often paints a very impressive image of the measures taken by the authorities but despite being useful information, these things stand far from the actual reality of those affected areas (Schechter, 2005). 'We also see this situation where writings cover a wide range of general points including some of women's issues as well. This often dilutes the attention of recipients and must be replaced with attempts entirely focused on women's necessities'.

Patrilocality (the practice of women shifting to their husbands' family homes post-marriage) (Bardhan et al., 2019) causes women to already suffer a lack of social connection in their homes. This lack of social autonomy and security often gets worse with displacement and involuntary resettlement. Hence, the cooperative societies or PAP groups must definitely have women's bodies with strong voices and freedom of opinion. Policies have the power to enforce such organizations. Lastly, it's vital to involve women of all ages and classes while documenting their problems. Senior PAW who are often designated to lead and represent women's stance are themselves unsighted by internalized misogyny and believe in ancient traditional constructs (Fernandes & Raj, 1992) which is against the basic principles of sustainable policies.

7 Concluding Remarks

In the long run, this research aims to bring gender equality through RPs has numerous benefits. Increasing women's authority over land, physical, and financial assets has shown betterment in children's health, education, and nutrition in families. A well-designed plan would ensure fair distribution of local resources and opportunities and also properly utilize skills in men and women which eventually would benefit the investors (Behrman et al., 2012). Provisions for equal comfort for nearly half of the resettling population cannot be treated just as a splinter of the R&R policy critique, because access to private family life, safety, and habitability are elements of basic human rights. Resettlement processes have time and again proven to be ideal instruments of upliftment of communities in several countries, and steps toward sustainability can fetch the same results in India as well. Lastly, the issues here raised are not necessarily shortcomings of the authorities or the government. These can be the result of negligence and lack of responsibility by the people, their organizations, and their patriarchal resistance to progress as well. But whatever be the cause, the tribulations must firstly reach the horizon of attention to be addressed with authenticity. And even if susceptible to deviations and deviating ideologies, mass reporting of issues by the media hardly ever misses the attention.

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A Critical Review of the *Villes Sans Bidonvilles* Programme in Morocco: Lessons to Be Learned Towards Inclusive Urban Growth

Maria Rita Gisotti and Elena Tarsi

Abstract

Over the past 15 years, the debate within urban studies regarding informal settlements has become quite lively, thanks to several outstanding voices that have brought dignity back to urban topics regarding the Global South. Despite this, the limited production of programme analyses by planning scholars is indicative of how the subject is still delegated to international agencies. By critically reviewing the framework, the goals, the implementation and the results of the program 'Villes sans bidonvilles' (VSB), launched by the national government of Morocco in 2004, we underline the principal limits linked to political, economic, social and environmental dimensions. The VSB program was created with the aim of solving the precarious conditions of housing in slums and the socioeconomic marginalization of its inhabitants and was pushed by the need of eradicating potential subversive forces, in the aftermath of the Casablanca attacks of 2003. Such critical review of the programme, developed thanks to the reference to the international literature, allows us to suggest more sustainable and inclusive policies and practices to address the informal settlements' question for the next future.

Keywords

Informal settlements • Slums • Urban regeneration • Eviction • Displacement • Housing

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1 Introduction

According to the most recent UN-Habitat data in 2018 (UN, 2019), over a billion people in the world live in slums. The nations with the highest percentages are in the Global South, particularly Asia and sub-Saharan Africa, and the numbers are destined to grow.

In these countries, the urbanization process of the mid to late 1900s took place without planning, without effective state participation in the management of housing problems and without the development of a real estate market that was accessible to the low and middle classes. This gave rise to vast areas within cities and metropolises based on spontaneous development, illegal allotments, and self-built houses that had no primary or secondary services. Despite the many differences in these manifestations, these urban areas present similar, multidimensional problems. UN-Habitat (2007) defines a slum as an area that lacks one or more of the following aspects, which are fundamental to the quality of urban life: (1) durable housing; (2) sufficient living space; (3) easy access to safe water; (4) access to adequate sanitation; (5) security of tenure.

The challenge of sustainable management of urban areas has been established on an international level, firstly, in 2000, through Goal 7 of the UN Millennium Development Goals (MDGs) and then reiterated, in 2015, in the UN Sustainable Development Goals (SDGs), the latter programme is also known as Agenda 2030. Among these, Goal 11 (Sustainable cities and communities) aims to 'ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums'.

The COVID-19 emergency has shown the criticality of urban areas with high population densities, inadequate housing conditions and lack of basic infrastructures, which are home to populations that are socio-economically fragile. This indicates with renewed insistence how sustainable management of informal settlements is one of the greatest challenges for contemporary society on a global level.

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Urban planning has described, interpreted and attempted to manage and intervene in these situations in quite different manners over time and in various geographical areas.

From an academic point of view, the topic of informal settlements has been ignored for a long time and only recently revived, thanks to the importance that some Global South countries and their metropolises have acquired in the global economy. Over the past fifteen years, the debate within urban studies regarding informal settlements has become quite lively, thanks to several outstanding voices that have brought dignity back to urban topics regarding the Global South. Despite this, the limited production of programme analyses by planning scholars is indicative of how the subject is still ignored and often delegated to international agencies.

The present article wishes to contribute to filling this gap by critically examining the *Villes sans Bidonvilles* (VSB) programme in Morocco, which is the Moroccan version of the United Nations 'Cities without Slums' initiative, and by underlining the strengths and weaknesses in its strategy, implementation and results.

The analyses contained in this text are the result of the authors' shared thinking, which was based on a wide range of research regarding the dynamics of formation and transformation of informal settlements and their related policies and programmes (Tarsi, 2013, 2014a, b, 2020), as well as the metropolitanisation process in Morocco (Gisotti & Carta, 2017, 2018; Gisotti, 2019; Gisotti et al., 2020).

The paper is structured as follows: firstly, the interpretative framework was rebuilt to read the phenomenon of informal settlements over time and how this led to the development of profoundly different policies and programmes. Considering this framework, the Moroccan case was read and a deep analysis of the VSB programme is presented, highlighting its strengths and weaknesses. In conclusion, we point out the need to re-orient further interventions in consideration of the analyses and assessments of the programme that has been implemented thus far to contribute to both inclusive urban growth and the building of urban areas that are sustainable from an environmental, social, and economic point of view.

2 Approaches and Programmes Targeting Informal Settlements: The International Framework

Objective 7 of the MDGs, which is to improve the lives of at least 100 million people by 2020, appears to have been achieved globally, if not actually surpassed. From 2000 to 2010 alone, which is ten years ahead of target, 227 million people have been liberated from slum conditions (UN-Habitat, 2010). According to the World Bank, the percentage of the world's urban population living in slums has gone from 39% in 2000 to 29% in 2014 (World Bank, 2014).

This success is thanks to policies and programmes spearheaded by governments of individual countries. International agencies have collected and analysed data to both delineate good practices and support projects in cooperation with national governments. According to a 2019 report on Target 11 of the SDGs (Make cities and human settlements inclusive, safe, resilient and sustainable), 150 countries have developed national plans for their urban areas, half of which have already been implemented (UNDP, 2019).

It is important to recognise how improving the life of slum dwellers means not only upgrading their living conditions but also their access to water and waste disposal systems to improve their health and their access to transport and public spaces. It also means increasing their social safety and generating a positive spiral from a social and economic point of view.

Therefore, if there is no longer any doubt that designing policies and interventions in this direction is so urgent and effective, it is surprising how the analyses of policies and processes of urban governance are so limited in the discipline of urban studies (UN-Habitat, 2016). It is worth looking at national strategies that address the challenge of sustainable management of slums, as they are rarely based on studies and debates produced in the academic world, but rather remain the prerogative of technicians and administrators, of which there is a very limited number in the Global South[1] and who often lack a vision of the whole picture and the skills needed.

2.1 Solutions for Informal Settlements

Lack of interest in planning regarding informal cities is not a recent fact, with roots reaching back to the epistemological paradigms of the discipline. Looking back over the course of informal manifestations and planning responses in both Europe and the Global South beginning in the mid-nineteenth century, we can find changes that have only recently touched the reference sphere upon which the knowledge building is based.

Despite the informal construction of cities being an issue that begins simultaneously with the urbanisation process, discussions on this topic within urban planning are incredibly limited. For a long time, spontaneous spatial manifestations have been described and interpreted as a reflection of

[1] "Planning capacity is grossly inadequate in much of the developing world. In the UK, there are 38 planners per 100,000 inhabitants, while in Nigeria and India the figure is 1.44 and 0.23, respectively" (UN-Habitat, 2016, p.136).

poverty and social marginality and, consequently, criminalised and addressed with denial and repression. This has led to massive social housing interventions by the state, similar to the post-war period in European countries. However, in the Global South, where the urbanisation process took place slightly later, national governments did not have the same economic capacity of intervention. This was due to: the impact of international policies on welfare (structural adjustment plans); the greater size of the phenomenon to be managed; the inexperience of technicians and local administrations. The first voices to discuss the phenomenon of informal settlements placed it within a different framework, Turner[2] (1976) and De Soto (1989), allowing them to develop innovative interventions, even if these were judged to be insufficient or ineffective in the short term (Owens et al., 2016).

Only more recently have scholars of international repute provided a systematic reading of the phenomenon, linking it to global economic restructuring from a neoliberal perspective, of which informal settlements are a consequence (Davis, 2006; Harvey, 2008), and giving it a central role in the 'struggle over the right to the city' (Roy, 2005; Roy & Alsayyad, 2003). Finally, thanks to the establishment of a post-colonial approach to reading spatial manifestations, informal settlements are described as 'another way of urbanisation' (Robinson, 2006, 2011; Roy, 2005; Watson, 2009). Despite the innovative character of these theoretical contributions, strategies put in place by various countries oscillated substantially between interventions of 'clearing and rehousing or resettlement', which was considered the only possible option for a long time, and upgrading, which has recently become of more importance. In this sense, international agencies have provided a great contribution, developing a reading of the phenomenon based on scientific data and collecting the most innovative experiences produced on local or national levels. They have also done much to decriminalise the informal habitat, describing its causes and combating eviction practices, which is a solution that does not protect inhabitants but rather renders them even more vulnerable economically and socially.

Despite this, intervention policies and programmes to improve the living conditions of slum dwellers often have major issues, due to the complexity of the phenomenon to be managed. With regard to the African continent, the problem of informal settlements is added to many other critical issues on urban and regional levels, which are specific to their geography and history. So much so that UN-Habitat (2014) has suggested that there is a need to radically rethink its own approach to urban planning, which until now has been 'imported' from Europe, and create a true 'African way'. Perhaps this is an even greater challenge.

2.2 Metropolitanisation Process in Morocco

Over the past decade, the traditionally rural African continent has become more urban, with an urban population growth rate exceeding European countries by 11 times (UN-Habitat, 2016, p. 6). So much so, that one trend estimates that African cities will be home to 350,000,000 inhabitants by 2030 and that half of the entire continent's population will be living in cities (Pieterse & Parnell, 2014). Along with an increased demographic, the rapid urbanisation of Africa is due to rural-to-urban migrations, avoidance of unstable political situations or the effects of emergencies caused by climate change, such as advancing desertification, flooding, etc. (UN-Habitat, 2016).

Morocco is no stranger to these dynamics. Since 2000, it has become one of the emerging MENA (the Middle East and North Africa) countries, with the launch of a modernisation policy spearheaded by its king, Mohammed VI, which has helped achieve important advancements on economic, social (fight against poverty, increased access to basic services) and infrastructural (expansion of road, water, electrical and sewer networks) levels (Chauffour, 2018). All these changes have significantly softened the impact of the movement known as 'Arab Spring', which has had less repercussions in Morocco. However, modernisation has been accompanied by rapid and chaotic urban growth (Figs. 1 and 2). Morocco's urban population, which was 13,871,000 inhabitants in 1995, grew to 20,439,000 in 2015 (UN-Habitat, 2016, p. 197). For example, the urbanised surface of a large city like Fez, which now has about 1,500,000 inhabitants, has gone from 2,041 hectares in 1982 to 4,503 hectares in 2014 (El Garouani et al., 2017 , p. 1).

This new model of urbanisation and development has created numerous negative external and environmental effects, as observed by UN-Habitat, 'Cities, with their vast and concentrated accumulations of people, new patterns of production and consumption, pose a major environmental burden. They not only affect the environment directly, but also challenge municipalities' capacity to provide access to water and sanitation, as well as solid waste management. Risks associated with climate change and natural hazards in cities need to be better understood, and measures to increase resilience to the impacts of climate change and reduce disaster risks will be essential and will necessitate cooperation between states on certain issues. Improved enforcement of building codes and disaster resilient construction methods and strengthened institutional capacity to do so is also very much needed' (UN-Habitat, 2015, p. 6).

[2] Turner (1976) defined informal settlements as a strategy of Self-Help. Such interpretation was fundamental to develop the Site and Services World Bank program.

Figs. 1 and 2 Two examples of the contrast between self-built informal housing and formal building in Fez (photo by M.R. Gisotti)

It must be pointed out that this major period of urban growth in Morocco is not directly related to factors that have traditionally been associated with typical modernisation processes in European countries (Robiglio & Chionne, 2017), such as increased job opportunities offered by the city and improved overall income of the population. This ongoing metropolitanisation process, which has been encouraged since 2004 by state policies for regional planning on a national scale (first of all the SNAT, *Schema National d'Aménagement du Territoire*), appears to lead to a physical expansion of cities for which there is no corresponding proportional increase of job offers and services. This has created massive expanses that are ever more polarised in terms of the spatial distribution of social classes and disparities in available housing, services and community facilities.

3 Villes Sans Bidonvilles Programme

3.1 Origin of the Programme

In early 2000, the informal habitat phenomenon was widespread in Morocco and involved both non-regulatory settlements (built without the necessary permits and, thus, lacking primary urbanisation infrastructures) and actual slums. In 2001, 14% of the entire urban population lived in non-regulatory settlements (Iraki, 2009, p. 109), with 33% in actual slums (Bogaert, 2013, p. 42) (Figs. 3 and 4).

For the most disadvantaged people, the habitat problem had been dealt with through various policies in previous decades (Le Tellier, 2009a), from the end of the protectorate to the 1970s, which gave rise to the 'development of allotments for affordable housing' and the creation of dedicated state agencies, such as the first public operators of social housing (OPH) and regional institutes for planning and building (ERAC). In the 1980s, which saw a significant increase in slums following migratory influxes from other African countries, the *Agence Nationale de Lutte contre l'Habitat Insalubre* (National Agency for the Fight Against Unhealthy Housing) was created and its approach aimed to improve settlements and provide facilities. The '200.000 Social Homes' programme was launched in 1994.

However, the banner year for policies against unhealthy habitats was 2003, when 30 people were killed by terrorist suicide bombers from some of the city's slums. The Moroccan government quickly launched the VSB programme aimed at dismantling slums in Moroccan cities that were considered possible hotbeds of Islamic radicalisation, which were impenetrable from a spatial point of view, notably by law enforcement, and impossible to integrate with urban society in general. Therefore, the programme was launched for serious security reasons, to which was added the expressed desire to improve living conditions for slum dwellers, in accordance with Goal 7 of the MDGs.

The programme aimed to eradicate all Moroccan slums (about a thousand) present in 85 cities by 2010, which was

Figs. 3 and 4 Slum in fez/the alley of a slum in rabat (photo by M.R. Gisotti)

equivalent to about 270.000 households composed of about 1.500.000 people (Toutain, 2009). The programme deadline was first extended to 2012 and then subject to progressive modifications that have still not led to its completion. Government data from 2019 (MHPV, 2019) show that the programme 'dealt with' (under various policies that we will look at later) 277.583 households, which is about 66% of the total. This has now become over 420.000 households, with respect to the initial number considered, as the slum population has grown considerably over the years. In 2019, 59 of the 85 cities involved in the project's inception have been declared free of slums (Bentaleb, 2019; MHPV, 2019). Each city had a *contrat de ville* (city contract) which, at least at the launch of the programme, involved the Ministry of Housing and Urban Policy (MHU), local authorities and technical operators and identified the number of households involved along with their dwellings and estimated costs.

With regard to programme funding (Dref, 2018[3]), the overall cost was estimated at 32 billion Moroccan dirhams (Dh), which is about 2.8 billion euros. Thirty percent of that amount was subsidised by the state through the *Fond de Solidarité pour l'Habitat* (Habitat Solidarity Fund), which was financed by taxation on cement. The remaining 70% was covered 56% by 'equalisation revenues' and 16% by contributions from programme beneficiaries.

This is expressed quite clearly in a 2006 statement by King Mohammed VI that, on one hand, presents a decisive change of direction, as the programme promotes a vision of the habitat problem as more complex than the simple allotting of newly built housing, and on the other hand, describes its economic aspects, 'what we are ultimately aiming for is not only to have cities without slums but not to replace them with soulless concrete blocks that are intractable to any form of sociality. We rather intend to erect our cities as spaces conducive to living in harmony, conviviality and dignity and make them into investment and production hubs, as well as agglomerations related to their specific nature' (MHPV, 2019).

3.2 VSB Strategies and Innovations for Habitat Policies

From the perspective of its adopted strategies, the VSB programme was divided into three main phases (Atia, in press; MHPV, 2019):

- *Restructuration* (upgrading): interventions aimed at infrastructuring slums with streets and primary urbanisation networks (electricity, water, sewers), which was immediately financially and logistically problematic, as the spatial and social contexts had a certain degree of impenetrability.
- *Relogement* (rehousing): relocating slum dwellers to housing in newly constructed districts, often located far from their original settlement. The practice of rehousing was not well accepted by the people (estimates say it made up less than 10% of the programme implementation); we will return to this later.
- *Recasement* (resettlement): which was seen by the population as the most effective and appreciated method. It involved attributing 80-square-metre lots (sold for 20.000 Dh each) to two concessionaires, for the self-construction of four-storey (ground floor plus three storeys) above-ground buildings. In many cases, the scarcity of financial resources of the concessionaires led to them involving a third party who would do the construction in exchange for the sale of the ground floor to be used commercially.[4] "While this exchange was technically illegal, the state, well aware of the arrangement, turned a blind eye" (Atia in press).

Moreover, the VSB programme has signalled a change of direction with respect to previous policies for the informal habitat. The main innovative elements that were to be introduced were:

- transition from a pointed approach to the problem to a systematic and uniform approach across the entire nation;
- massive use of public-owned land for rehousing and resettlement;
- apply a participatory and inclusive approach with the populations, based on guidelines contained in international policy documents (UN-Habitat, 2003);
- develop funding mechanisms for the beneficiary households of the programme.

Some of these innovations were derived from an analysis of informal habitat policies from previous decades (Navez-Bouchanine, 2002; Le Tellier & Iraki, 2009), which was conducted during the so-called 'alternate government' (1998–2002). This analysis highlighted the need to put 'social engineering' mechanisms and instruments in place to resolve two of the main issues that arose in previous programmes: conflict with inhabitants and their widespread, structural lack of financial resources to deal with rehousing and resettlement. The former was dealt with through the introduction of a *Maitrise d'ouvrage social* (Social housing

[3] These are the most recent and reliable data, as those found on the official websites of promoters are very outdated.

[4] According to Atia (in press), this is a typical example of 'socialisation of the state', in other words when social demand (what Atia calls 'the art of presence') can change the response of institutions.

authority, MOS), followed by the *Accompagnement social* (AS, Social assistance), which were both mechanisms to incentivise the participation of inhabitants (Navez-Bouchanine, 2004; Navez-Bouchanine & Agence de Développement Social, 2005). While the latter was resolved through the creation of financial strategies such as the *Fonds de garantie en faveur des populations à revenus irreguliers ou/et modestes* (Guarantee funds in favour of irregular/low-income populations, FOGARIM) and microcredit. We will briefly examine both solutions.

3.3 Social Housing Authority and Social Assistance

As Hichem Berra—who is the former head of the '*Département 'Développement Social Urbain* (Department of Urban Social Development) of the *Agence de Développement Social* (Social Development Agency, ADS) and one of the main figures in charge of slum eradication projects—so aptly explained, assessments of habitat policies carried out during the alternate government 'notoriously criticised the focus on technical aspects of interventions and insisted on the need to put the human element first in defining projects. The government encouraged the non-demonisation of slum dwellers, who have often been seen as opportunists and accused of acting solely for financial gain, particularly due to the widespread phenomenon of *glissement*; i.e., when households benefiting from an operation illegally sell their property access rights to well-off third parties' (Berra, 2011, p. 245). Seminal studies conducted by Navez-Bouchanine (2002) have shown that slum rehabilitation projects could not have been anything but social projects and that the size of the housing was nothing but a part of it. Berra explains that the MOS[5] was created with the objective of understanding the existing composition and social dynamics at the launch of operations to develop more adequate and effective policies. It quickly emerged that this objective was extremely ambitious, 'we realised that we risked waiting too long for an exemplary project and ideal intervention conditions, with a formally appropriate social study conducted prior to any technical thinking: it was necessary to embark' (ibid, p. 246). Thus, we created a 'lighter version' of the MOS, which was reduced to a type of AS to the slum dwellers in the execution of the programme.

Thus, the AS became an obligatory mechanism for the Groupe Al Omrane, the main MHU operator for the implementation of the VSB programme and a holding company founded in 2004 through the merger of various bodies responsible for urban planning and social housing. Officially, the contracts that Al Omrane stipulated with social operators in charge of AS included (Le Tellier, 2009b):

- promoting the project through communication and awareness-raising;
- accompanying households when complying with all bureaucratic procedures;
- defining and proposing financial solutions to contribute to rehousing and resettlement;
- mediating conflicts between inhabitants and all institutional operators involved in the programme;
- supporting the identification and development of actions that generate income for the population.

As Le Tellier first observed (2009b), it is true that not all these aspects received adequate treatment, as this depended on the character of the operator put in charge by Al Omrane to be the AS, which could be of three types: the ADS, national and international non-governmental organisations (NGOs) and private agencies or firms. With the ADS and NGOs, Al Omrane can stipulate *conventions de partenariat* (partnership agreements), whereas, with private firms, they usually stipulate contracts in which funding is conditional to the results achieved, which include both the number of shacks demolished and the number of inhabitants rehoused. Therefore, in the case of private firms, it is obvious that the work of the AS is aimed at maximising these results. Thus, the objectives of AS (i.e., support in finding employment, defending rights and seeking social empowerment, although the latter is more likely present when the AS is the ADS or an NGO) usually end up being ignored.

Al Omrane prefers collaborating with private firms, under the guise of 'working faster at lower cost' (Le Tellier, 2009b, p. 205). The relationship between Al Omrane and both the ADS and NGOs is much more problematic and conflictual, as it is a battleground between two different rationales: Al Omrane takes a commercial point of view, while the other two use an integrated approach to the housing, social and economic issues of inhabitants in informal settlements. Moreover, another factor that works against the ADS and NGOs is that their involvement in the operation has higher costs, due to a reduced number of competent personnel for AS and, therefore, higher fees. All this pushes Al Omrane to prefer private firms, which are less costly (as they do less work and act within a competitive market framework), have a more minimalist vision and merely execute their slum eradication mandate. This statement from an interviewed operator eloquently reveals this approach, 'We are a private operator; we answer to calls for public contracts. We have to keep ourselves to the public plan … we don't do MOS …

[5] The MOS was inspired by the *Maitrises d'Oeuvres Urbaines et Sociales* employed in France in the 1980*s* for the recovery of *Hebergement Loyer Moderé* (low-income housing) neighbourhoods.

and actually we don't do AS either, we rather do administrative accompaniment. I talk in terms of results. We arrive at a number of 300 destroyed shacks per month, while public operators such as the ADS arrive at an average of 10 shacks per month. We achieve five times the number of the ADS. In four years' time, we have eradicated more than 4.000 shacks, while the ADS has only arrived at approximately 1.000 over the same period. We are happy with Al Omrane and Al Omrane is happy with us' (Bogaert, 2013, p. 49).

3.4 Funding Issues

The other social engineering innovation generated by the VSB programme was the development of such funding strategies as the FOGARIM and microcredit The FOGARIM, which was created in 2004, is an instrument designed to give low- and/or irregular-income populations access to a loan of 200.000 Dh at a 6% interest rate with a state guarantee of up to 70% (Toutain 2009; Bogaert 2013). Microcredit has existed in Morocco since the late 1990s and saw a rather rapid rise in just a few years, becoming a particularly high-performing financial instrument (Le Tellier 2009a, b: 208). However, neither of the two strategies has laid down strong roots among the slum dwellers. In the first two years of the programme, the World Bank observed in 2006, that one-third of the target population did not have financial resources, could not access the FOGARIM or microcredit and, thus, were excluded from the programme (Le Tellier, 2009b, p. 206). No matter how much both instruments are promoted by national and international campaigns, they are only used by the less poor segment of the population ('the less poor of the poor', Le Tellier, 2009b, p. 208). Particularly regarding microcredit, for which the state is not a full guarantor as it is with the FOGARIM, the reasons for its unsuccessfulness are as follows (Le Tellier, 2009b, p. 208):

- population has little or no possibility of offering solvency guarantees;
- general conditions regarding amounts and duration are unsuitable for the means of potential recipients;
- financial instrument does not meet the needs of people accessing the programme, as the microcredit ceiling is 50.000 Dh, while the required investment to become a property owner is 60.000 Dh;
- interest rates are too high;
- mutual distrust between microcredit agencies and potential recipients.

In a study of operations within the PARHIB programme (i.e., a project within the VSB programme that involved some of the same major cities), Toutain & Rachmuhl (2014) observed that self-financing was the main method adopted by households to construct their own buildings downstream from resettlement operations, 'the number of families using bank credit (less than one fifth) remains low, regardless of the FOGARIM. The resulting indebtedness is one of the main constraints and a source of concern for a great number of families, who risk insolvency. The phenomenon is seen in many cities. There are also poor households, in variable proportions, for which no funding solution is adequate' (Toutain & Rachmuhl, 2014, p. 43). Most observatories—some, like Bogaert (2013), based on a series of studies tracked by Roy (2010)[6] and Harvey (2010)[7]—support the contention that these forms of financing within the VSB programme are instrumental to the objective of including poorer population segments in the market (Bogaert, 2013, p. 55). 'Is state support, via subsidies, tax cuts and financial guarantees, in the VSB programme a way to give the urban poor new hope for the future, or is it a rather convenient (class) instrument to privatise benefits and socialise risks and losses?' (Bogaert, 2013, p. 52).

According to Ismail (2006, p. 67), this is 'marketisation of the social'. The basic idea is to 'bring the market to the poor and, if necessary, adapt the products to their possibilities' (Bogaert, 2013, p. 54). The VSB programme appears to be a strategy through which the Moroccan government, which was occupied with Mohammed VI's ascension to the throne and developing neoliberal policies, aims to insert the most disadvantaged segments of the population into the capitalist economy circuit, among other objectives (Arabindoo, 2011; Bogaert, 2011; Parnell & Robinson, 2012). For this interpretation, Bogaert refers to Harvey who 'considers neoliberal politics above all as class strategies that privilege the creation of new opportunities for capital accumulation over the social wellbeing of (urban) citizens' (Bogaert, 2013, p. 42).

Toutain also noted that, through the above-mentioned financial strategies, 'The state tried to pass from a logic of grants and assistance to slum households to one that sees them as customers, making them access the formal circuit of the national economy and the modern banking network' (Toutain, 2009, p. 215).

[6] "The creation of poverty capital is established by methods of political intervention that attempt to bring all human action into the domain of the market" (Roy, 2010, p. 32).

[7] "Poverty capital delineates and opens up new spaces of investment in order to solve future 'capital surplus absorption problems'" (Harvey, 2010, p. 53).

Fig. 5 The "ville nouvelle" of Tamesna in 2020. (*Source* GoogleEarth)

4 What Did not Work? Issues in the Programme Fifteen years After Its Launch

The VSB programme has received significant international recognition: the World Bank has called it a 'good practice' that is replicable in other areas (World Bank, 2006); UN-Habitat defines it as 'the best of its kind in Africa', awarding Morocco second place after Indonesia, 'for delivering one of the world's most successful and comprehensive slum reduction and improvement programmes' (UN-Habitat, 2010); the Ministry of Housing in Tunisia and Egypt have implemented similar policies (Atia, in press). Despite this, eight years after its extended deadline, the VSB programme has not yet achieved its established objectives. In 2019, only 59 of the 85 cities involved since the beginning have been declared 'slum free' (Bentaleb, 2019; MHPV, 2019). The main reason for this serious delay is due to planning and timing: the growth rate of slums during the period covered by the VSB programme was much faster than that of the resorption (the 277.583 households that were involved when the programme was launched in 2003 have now become 420.000). As the need for a solution to the informal problem grows, public action has not responded with timely and effective policies, due to issues that we will now summarise.

The first major problem was spatial and regarded the architectural and urban choices that were made (Le Tellier & Iraki, 2009; Toutain & Rachmuhl, 2014). The areas designated to host resettlement operations are usually far outside the city, in very disadvantaged locations due to the presence of natural barriers that accentuate their physical distance. In the case of households being relocated to *villes nouvelles* (new cities, Fig. 5),[8] these areas can be as much as 30 kms from the city of origin (Harroud, 2017). Location choices are based on wanting to relegate social building (or developments for low-income populations) on public soil to less profitable urban areas with lower real estate values and, thus, peripheral areas.[9] Thus, a segregative urban model without any social diversity was designed and implemented. The impact on the environment is also notable: the spread of new settlements accentuates the consumption of land and

[8] This is another large government initiative launched in the same years as the VSB programme (2004), which aimed to create synergy and failed.

[9] See the interview on this topic with Minister Fassi-Fihri in *Liberation Maroc* 18 May 2019.

Figs. 6 and 7 Failure to manage infrastructure and public space in a newly built neighborhood in Fez (photo by M.R. Gisotti)

incentivises the formation of more informal districts, which tend to be pushed ever further to the margins of urbanised areas. Another highly critical factor from an urbanistic point of view is the lack of completion of widespread and systematic operations, especially regarding primary infrastructural works (e.g., roads and water, light and sewer networks), and community services and facilities (e.g., health care, education, public transport) (Figs. 6 and 7).

In particular, the lack of efficient public transport impacts primarily on school-aged children and the female population, while heads of families maintain a certain mobility even outside the new district (Toutain & Rachmuhl, 2014).

With regards to spatial choices, the settlement models adopted for the creation of these new districts, which were usually very functional, turned out to be highly inadequate to accommodate a population coming from the opposite housing model, which reworks the settlement principles of the Arabic Medina with makeshift materials. The models offered are usually a bad match for local housing customs and the extended family structure that is typical of this segment of the Moroccan population.[10] To this regard, while it is true that the *Enquête nationale pour l'évaluation des impacts des programmes de luttes contre l'habitat insalubre sur les conditions de vie des ménages* (National inquiry to assess the impact on household living conditions of programmes for the fight against unhealthy housing) of 2015 revealed that 90% of the population benefiting from improved housing conditions were greatly satisfied (MHPV, 2019) it is also true that 'most of the inhabitants feel that their living conditions have deteriorated. They have a strong, shared feeling of a "less easy life than before", and a "deterioration of their housing conditions" and "more isolation". Even if they were happy to have finally been able to build their "real" home, they had to rebuild their social bonds, find new points of reference and organise their daily life at the same time' (Toutain & Rachmuhl, 2014, p. 45).

There was also another huge issue on an economic level. As previously mentioned, the majority of the population was excluded from the type of funding allocated to support the costs of resettlement (i.e., only one-fifth had access to funds, according to the most recent facts found on the matter, Toutain & Rachmuhl, 2014) and, thus, had to find forms of self-financing, such as private loans or resorting to the *tiers associé* (associated third party) mechanism. We must also consider that the available housing offered often had highly inadequate costs that made it inaccessible to the population served by the programme (Le Tellier & Coslado, 2014; Iraki, 2009). The problem, which was particularly evident in settlements created through the national *Villes Nouvelles* programme, led to many unsold lots and the *glissement* phenomenon. Moreover, added to the costs of the rehousing and resettlement payment were costs for electricity, water, and natural gas, along with an overall cost of living that was higher in the new neighbourhoods than that of the slums. Regarding income, it was seen that the economic status of the families became more fragile, due to the loss of income from the informal economy that is typical of the slums, the increased precariousness of work (while it is true that the unemployment rate in some resettlement districts is lower than the national average, it is also true that most of the work is on a daily and not permanent basis), and the vertiginous drop in women's jobs (Toutain & Rachmuhl, 2014).

For all of these concrete reasons, along with the understandable opposition to being uprooted from their places of belonging, the population expressed a strong resistance to being moved to new districts (Le Tellier & Bogaert, 2011, 2013; Coslado, 2014; Iraki, 2009; Atia, in press). The AS, applied in the previously described reduced version, did resolve this issue and was most often exclusively limited to convincing households to leave their shacks and move away. The people saw themselves as pawns in an entirely top-down operation that only benefited its managers, particularly in economic terms.

Finally, a further set of problems relates to the political and administrative spheres, with regards to at least two points. The first is that local authorities are actually responsible for the patronage sale of illegitimate building

[10] Many problems were caused by the fact that families refused to move because the 'household' was bureaucratically split up between those entitled to rehousing and resettlement and those who were not (Atia, in press).

rights (especially in proximity to elections) or for having tolerated the creation of slums and informal settlements (see King Mohamed VI's speech on this matter on 21 August 2001). A 2004 bill to repress this modus operandi has been systematically rejected (Iraki 2009, p. 129). This point must be acted upon decisively if resorption policies are to be preceded by prevention policies. It is also fundamental that, in addition to an approach based solely on extraordinary measures like the VSB programme, a systematic consideration of the informal problem within ordinary planning instruments on an urban/metropolitan scale must be implemented. A second important point concerns obstacles that city contracts often encounter, especially in the implementation and management phases, with undependable partnerships between local and national levels and among key figures within the municipalities themselves. It is easy to understand how the realisation of urbanisation, service and community works, evidently the least profitable part of the entire operation, will pay the price for this inefficiency.

5 Conclusion

On 19 March 2020, the Moroccan government declared a health state of emergency due to the COVID-19 pandemic. The restrictive measures taken to contain outbreaks have emphasized the differences between regions and citizens. The most devastating impact was felt by the most fragile segment of the population, which lives in slums and works in the informal economy that makes up 20% of the country's GDP (CGEM, 2019), for whom social distancing and daily hygiene are a luxury. The living conditions of inhabitants in informal settlements have been revealed by the pandemic in all their fragility. The lack of space, basic services, adequate ventilation and lighting, as well as overcrowding, are conditions that create a profound inequality between citizens. Interventions to improve the living situations of people in slums should always be a priority in the agendas of governments and international agencies, particularly to avoid humanitarian tragedies linked to health emergencies.

In the past 20 years, while there have been many programmes and interventions aimed at improving the living conditions of slum dwellers, we are still quite far from having found a 'recipe' that will address the phenomenon. Our analysis of the Moroccan VSB programme has enabled us to highlight the largest issues of an initiative that was created with the best of intentions and many innovative aspects. Consequently, we can offer the following proposals:

(1) Adopt a preventive approach to be implemented through the systematic and consistent inclusion of the housing precariousness issue within ordinary urban planning. This in order to generate a stable housing stock intended for disadvantaged segments of the population to avoid creating emergency situations that, as we have seen, cannot be fully resolved by such extraordinary intervention programmes as the VSB.
(2) Adopt a differentiated approach to solving the informal settlement problem that does not exclude the possibility of upgrading where conditions render it practicable. This could contribute to reducing the issues created by uprooting inhabitants, relocating them to areas that are physically and socially marginal and expelling them from more economically vital areas that offer greater income opportunities.
(3) Adopt an integrated approach to social and housing policies as a whole, as well as rehousing and resettlement projects, that include support for households, employment and access to basic services, going from the so-called 'help for the brick to help for the person'.
(4) Integrate incentives for inhabitant participation throughout the entire urban planning process and not solely in the implementation phases of resettlement and rehousing operations.

A new, favourable edition of the programme should be based on an analysis of the limits encountered to orient new interventions towards greater efficacy, above all in terms of social, economic and environmental sustainability. Finally, the Moroccan experience of slum eradication, with both its innovative features and problems, could be useful as an example of the need to build integrated interventions, both in other African areas specifically and in the Global South generally.

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In-Between Spaces in the Expanding City: Their Role in Designing New Urban Centralities

Iacopo Zetti and Maddalena Rossi

Abstract

Planetary urbanisation expands incessantly and urban space occupies an ever larger share of the earth's surface. There is a pressing need to elaborate innovative interpretive models to better understand the ongoing radical transformations of the city. One of the consequences of these dramatic changes has been the emergence of a plurality of what have been called 'in-between' spaces. In-between spaces are the residual sub-products of current urbanisation processes, and assume as many different forms as the processes behind their formation, but they are also important reservoirs of social, ecological and imaginative diversity. Our research suggests that the way these two aspects mutually reinforce each other can be used as the basis for a much-needed innovative approach to planning socially and environmentally sustainable cities. This paper proposes an approach to analysing and categorising in-between spaces and observes their rhythms, borders and evolution. In the light of this analytical framework, we suggest some specific planning and design strategies for grasping the inherent social potential of these in-between spaces and for creating a network of public spaces which will provide new centralities for in-between cities.

Keywords

In-between spaces • Urban planning • Urban design • Public space

1 Introduction

> "Cities have become extraordinarily intricate, and for this, difficult to generalize. We can no longer even agree on what counts as a city" (Amin & Thrift, 2002: 1).

In the past 30 years, the debate surrounding the present-day meaning of the term 'city' has thrown up a variety of different opinions, none of which converge on a single definition. Academics do all agree though, that the categories adopted in the past for understanding cities no longer provide satisfactory explanations for the phenomena the urban world is currently experiencing. Today's cities are being subjected to structural transformations on a scale never seen before. Their physical, social and economic characteristics have radically changed and the evidence of this change leads us to ask ourselves how everything that has long been associated with the idea of what constitutes a city is being reconfigured, thereby transforming the typical characteristics of 'cityness' (Brenner et al., 2009), those elements which make cities unique, distinguishing them from other forms of social life. Academic publications testify to how research is now focused on a new urban organism; they also highlight how the variety of forms generated by this organism has resulted in a wide range of interpretations. The phenomena pushing towards this new type of urbanisation have given rise to spaces whose shapes, functions and roles not only vary greatly but are at odds with the idea of urbanisation that prevailed until the 1980s and 1990s. The definitions of this new form of urbanisation derive from these varied interpretations and include: Polycentric Urban Region,

This text is the result of a long collaboration between the authors. Nevertheless, in this shared writing exercise, it is possible to attribute chapter 2 to Maddalena Rossi; chapter 3 to Iacopo Zetti. Introduction and epilogue are written with four hands.

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Functional Urban Region, Polycentric Metropolis, Mega-City Region, Polynuclear Urban Region, Polycentric Network, Edgeless City, Endless City, City-Region, Regional City, etc. (Gillham, 2002; Hall & Pain, 2006; Keil, 2011; Kloosterman & Musterd, 2001; Lang, 2003; Roy, 2009; Scott, 2001). The general phenomenon requires the definition of new interpretive paradigms of which Planetary Urbanisation, Postmetropolis and Suburban Planet, are among the best known (Brenner, 2014; Keil, 2017; Schmid, 2015; Schmid et al., 2018; Soja, 2000). The starting point for the research presented in this article is the analyses of the new urban phenomenon that seek to highlight the regional, trans-scalar and interconnected nature of this emerging city form (Hall & Pain, 2006; Soja, 2011a, b; Taylor, 2004). Soja has aptly described this urbanisation which gives rise to "the emergence of a distinctive new urban form, the extensive, polynucleated, densely networked, information-intensive and increasingly globalised city region" (Soja, 2011a, b: 24), whose development has been accelerated by economic globalisation "and the facilitative effects of the revolution in information and communications technologies" (Soja, 2011a, b: 18). In European contexts, this new trend in urbanisation tends to create city-regions that take the form of vast metropolitan areas. Within these areas, the inhabitants find that the new urban lifestyle has structured their life trajectories in terms of work, training, communication, commerce, consumption and leisure (Soja, 2011a, b; Calthorpe & Fulton, 2001; Balducci et al., 2017); it has also structured the physical shape of the urban landscape, fragmenting and juxtaposing unrelated pockets of urbanity. This physical shape has been given the name of 'in-between city' (Sieverts, 2003).

The Italian context stands out because, perhaps more forcefully than elsewhere, it compels these global processes to interact with a particularly rich and complex built environment. How this new urbanisation unfolds is heavily conditioned by the physicality of the areas involved, i.e.by the persistence of geographical and geohistorical matrices that characterise the built environment. In our interpretation, which applies especially to contexts deeply marked by their past, contemporary built environments are being remodelled thanks to the "dialectic between heritage and change, between the resistance of geohistorical and geophysical matrices on the one hand and the growing strength of expansions, connections and long-distance relationships across space, on the other. […] It is precisely the intertwining between place and world, between social overhead capital and connections, between local and global, between path-dependence and innovation, between fixity and motion (Schmid, 2015), which characterise the increasing evolution of [contemporary] landscapes" (Paba et al., 2017: 118). The image which best describes this situation, this relationship with the historical and geographical signs present in a new form of city, is that of a complex territorial palimpsest, where a palimpsest is literally a page from which the text has been erased and another text written; this process may be repeated over time, as was the case with parchment manuscripts, but signs from the past will still re-emerge. Those who think they can create new urban forms by making drawings on blank sheets of paper are mistaken because, in the contexts, we are describing, it is respect for these signs and the ability to skilfully reinterpret them which create high-quality urban spaces. This is the main theme to which we shall return throughout this article which primarily focuses on developing a taxonomy for recognising in-between spaces. In this endeavour, we consider in-between spaces as structural components of these new urban forms in the conviction that describing them is the first step towards understanding them and understanding them is a necessary requisite for redesigning them with the involvement of the inhabitants and for seeking to renew/revitalise urban forms and daily life.

2 In-Between Spaces and …

2.1 Borders

The picture we have briefly outlined exposes us to subjective experiences that, until recently, would have been an unexpected component of life in urban areas. It involves us all in an encounter between the global momentum of expanding connections and a local dynamic made up of ties to and relationships with places and with the previously mentioned palimpsests of signs. These diverse perceptions of urbanisation, and the impact of the contrasting dynamics involved, make the concept of border a problematic issue. Described as "territorial markers and functional-fluid vectors of demarcation" (Brunet-Jailly, 2011: 1), borders not only contribute to rewriting the geography of relationships between cities, but are also protagonists of an 'entanglement' (Tagliagambe, 1997: 12) of the elements that historically constitute the urban environment. Contemporary cities, therefore, increasingly resemble intermediate spaces: they have opened up as a consequence of ever-more pervasive movements of goods, people, services and capital and are subjected to rescaling (Allmendinger & Haughton, 2009) of governance processes and institutional structures that change and re-aggregate in accordance with geographic variables determined by their immediate needs/opportunities. At the same time though, these cities are also places where physical and semiotic borders and barriers proliferate, which gives rise to a fractal morphology within new settlements and creates an environment where fragments and pockets are the dominant features. The paradox of this situation can be understood from two contrasting trends. Firstly, the state

borders that emerged from events in the twentieth century testify to how socio-political transformations have weakened traditional administrative boundaries. These borders have been invoked in the management of crises, such as the one we are currently experiencing, but their efficacy is fading. Secondly, local administrative boundaries, which in certain contexts may now be more significant than state borders, have to become (and often have become) geographical markers which visualise inter-institutional collaborative processes rather than rigid barriers. Conversely, within the spaces which characterise this new form of urbanisation, some urban planning measures are creating exclusion and redefining borders. Although these borders are at first symbolic and cultural, they rapidly become landmarks, rigid immovable objects: walls isolating migrant detention centres; gated residential communities nestled behind insurmountable walls; offshore manufacturing areas disconnected from local contexts; isolated areas exclusively dedicated to entertainment and global trade; this list could continue at length.

The current trends are partly border-crossers although they do also have a border-reinforcer side (Cella, 2013). Within this post-metropolitan framework, we intend to explore other interpretations which differ qualitatively from urban analyses of the recent past and which aim to overcome traditional dichotomies (city/countryside, centre/periphery, local/global). In fact, our analysis will focus on the dynamic aspects that characterise post-metropolitan cities. In contrast to the traditional approach, we shall focus less on the state of things and more on change, less on the 'thingness of things' (Heidegger, 1935) and more on the interactions among things, on the relationships that give things a meaning.

2.2 In-Between Spaces

The term 'in-between' has an enigmatic nature: it is the translation of the Greek word *metaxú*, a prepositional adverb, made up of *metá* (in the middle, between) e *sún* (with, together, alongside). It denotes both the space in the middle and a bringing together, so it is a word with two logically antithetical meanings: on the one hand, it indicates a state of separation, on the other a movement of coming together. So 'in-between' lends itself to underlining both the distance between two terms and their proximity. It can indicate a demarcation line, a place of transit, or even a meeting place.

Plato provides the earliest important philosophical reflection on this notion (Perniola, 2007), using the term *metaxú* to indicate the paradox of the instant encapsulated between 'no longer' and 'not yet' (Pinotti, 1997). The concept of *metaxú* was later replaced by *mésos* (middle, in the middle, central): in Aristotelian philosophy, this term is used in the search for a middle ground, considered the best method for resolving conflict between two opposing sides (Perniola, 2007).

In Romance languages, the term *entre-deux* designates the interval that separates two things. The prefix *entre* is also widely used before verbs, to underline reciprocity or the beginning of an action, thereby introducing an active dimension to the semantic-conceptual field of 'in-between' (Perniola, 2007).

Researching the meanings of *metaxú* and *entre-deux* is propaedeutic to understanding the German term *zwischen*, a keyword for Heidegger (Perniola, 2007), which emphasises *unter-schied*, a term meaning difference, hybridisation and creolisation. The concept of 'in-between', seen from the perspective of a hybridised space, brings to mind the reflections of post-colonial studies which highlight the importance of intermediate urban spaces as the only places where cultural transition and hybridity are possible.

The works of the Japanese philosopher, Watsuji Tetsurō, further our understanding of the notion of 'in-between'. Watsuji's reflections revolve around the meaning of the Japanese word *ningen* which contains two closely related aspects: an individual dimension which cannot be separated from a social dimension. The original meaning of the Chinese characters for *ningen* lies precisely in the betweenness displayed by human beings, in other words, by the 'public'; it was only when this ideogram was transposed into Japanese that it also acquired the meaning of individual human beings (Perniola, 2007). For this reason, *ningen* cannot be considered as a substance: it implies a "constantly moving interconnection of acts" (Watsuji, 1996: 19).

This brief exploration of the meaning of the term 'in-between' (for a more detailed discussion see Rossi & Zetti, 2018), brings to light how this concept can be simultaneously defined in terms of plurality, action, difference and relationship: semantic dimensions which have been used in the research presented in this article. According to this perspective 'in-between space' is likely to become the preferred space for research and design involving contemporary urban issues, a concept that provides the structure for a new urban narrative. This concept offers an alternative to an analytical approach to the city which focuses on hierarchical structures, dichotomous and dualistic conceptions and dividing logics; it embraces an idea of contemporary urban areas which rejects dichotomous mechanisms and instead focuses on aspects and mechanisms which facilitate unity, i.e. areas where social relations and relations between local communities and the natural environment take place. This represents a significant departure from the usual way of thinking: the focus on substance is replaced by the idea that relationships can be considered as a primitive and equivalent mode of becoming a city (Tagliagambe, 2008). This opens up a new understanding of the urban environment, whose

structuring element is 'betweenness', i.e. the relationship structure on a physical, symbolic and political level. The finding that a complex system of spatialities emerged as a characteristic feature of contemporary cities (Amin & Thrift, 2002), grafting its own narrative onto the meaning of 'in-between', has reinforced this interpretation.

2.3 In-Between Cities

The term 'in-between' city (Sieverts, 2003) has been used to describe cities that have formed beyond the confines of twentieth-century urbanisation and are often regarded as incomplete urban forms. We do not consider in-between cities to be imperfect or degraded: instead, we see them as a recent evolution of the city, unfinished because they are still in transition and therefore worthy of careful investigation.

The term 'in-between city' is the translation of 'Zwischenstadt' (literally 'between-city'), a term first used in 1997 by Thomas Sieverts (Sieverts, 1997). According to this meaning, the expression 'in-between city' defines areas that have been settled for a few decades only, areas which are neither city nor countryside and which do not have the characteristics of suburbs. In-between cities look as though they have been assembled in an environment that tends both physically and symbolically towards infinity (Bonomi & Abruzzese, 2004), the materials used in their construction have totally different morphologies, sizes, functions and uses, and are randomly set down alongside one another. Contradictory and intermittent criteria determine the distribution of buildings over the geo-historic structures of different sites and sanction the crisis of public urban spaces as spaces conducive to relationships and well-being (Secchi, 1999).

From a morphological point of view, the 'in-between city' was formed after the physical boundaries of historic cities were removed and the city spread into the surrounding rural areas. In the Italian context, many academics (Sieverts, 2003; Governa & Memoli, 2011; Indovina, 2009; Lanzani & Pasqui 2011; Magnaghi, 2001) maintain that its characteristics derive from the early capitalist cities which followed the development timeline: industrial city, city with urban sprawl, contemporary city (in-between city). Although the characteristics of this evolution have varied from one place to another it is nonetheless a global phenomenon, the outcome of a process of expansion that follows a highly discriminatory and unsustainable capitalist development model. This process has produced a settlement morphology characterised by fractal, fragmentary forms which are spread over entire urban regions in a pervasive, undifferentiated manner (Sieverts, 2003). These forms have been described in the literature and will be briefly explained in the following paragraph: large abandoned or unfinished areas, twentieth-century peripheries and the peri-urban transition areas associated with them, agricultural areas incorporated within metropolitan sprawl, enormous logistics, trade and services platforms, massive infrastructure, etc. (Cavaliere & Socco, 2007a; b; Augè, 2003). An urbanisation is all too often abandoned to the flow of silent time, where it waits or is suspended (Berger, 2006; Clément, 2004; De Solà-Morales, 2009), but sometimes also a place where spontaneous spatial practices creatively reinvent places where life can flourish. A post-suburban city (Phelps & Wu, 2011) for which we propose urban planning strategies that interpret its complexity in terms of rebuilding relations, of the poetics of relations which by definition are hypothetical and conjectural but never ideological (Glissant, 1990).

2.4 Espèces D'espaces

'Il y a dans l'idée que rien au monde n'est assez unique pour ne pas pouvoir entrer dans une liste, quelque chose d'exaltant et de terrifiant à la fois. On peut tout recenser' This quotation is taken from one of George Perec's works, 'Penser/Classer', published in 1985. Perec's objective was to experiment with a form of description that would guide readers towards an awareness of something they usually ignored, namely, that space is not absolute but a discursive construction. Perec worked around the concept of deconstructing traditional assumptions about how living spaces were organised: this organisation was internalised which caused relationships with living spaces to be standardised. Our research team decided to 'adopt' Perec's technique method in an attempt to understand at least something of the steadily increasing complexity of the contemporary urban environment. Within such an environment we used a process of deconstructing the traditional internalisation of subdivisions, based on differences created by the persistence, or gradual fading away, of the twentieth-century spatial partitions, to try and understand not so much the differences they mark, but the nature of what happens in-between. We prepared a taxonomy matrix (Fig. 1) that would help describe in-between spaces (Fig. 2); data relative to their physical size were cross-referenced with a series of interpretive categories (remains, abandoned, suspension, political resistance, design, control) used to try and identify their management; these categories were deduced from a network of factors such as current use of each in-between space, their transformations over time and a root-cause matrix of their formation and, where appropriate, of their abandonment.

INTERstitial spaces were the first type of in-between space we encountered: they are residual spaces of all sizes and they are found in planned cities where they represent a grey zone (Fig. 3) (Brighenti, 2013). They are "'in-between' spaces, under-utilised and often deteriorated" (Loukaitou-Sideris, 1996: 91), neglected spaces (Carmona,

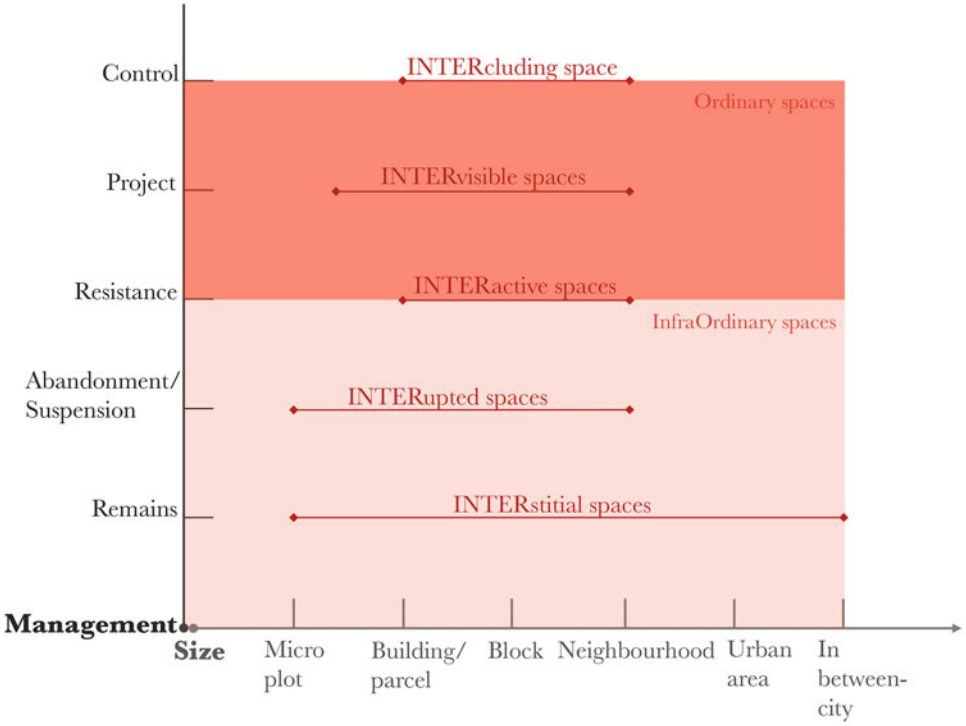

Fig. 1 Taxonomy of in-between spaces

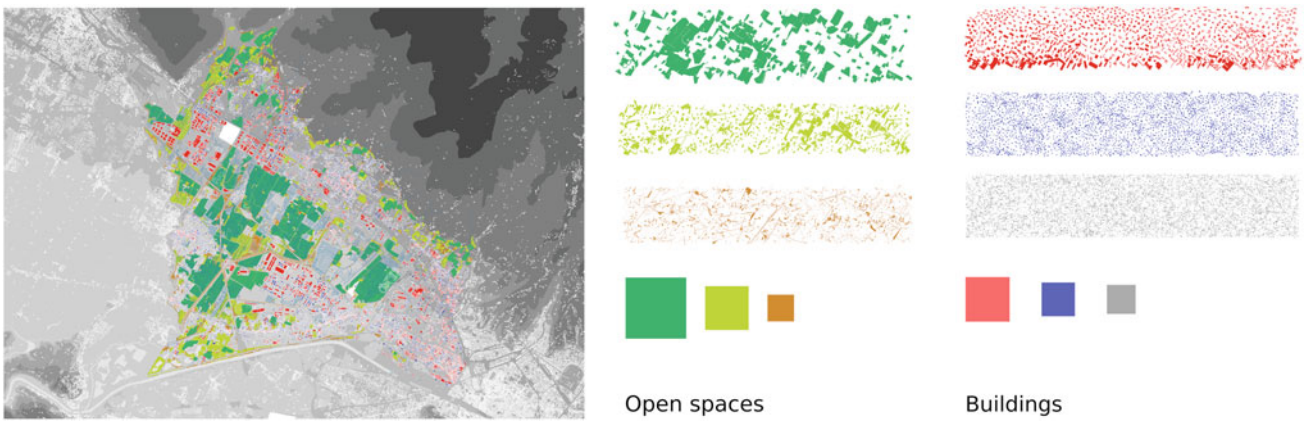

Fig. 2 The map of in-between spaces, and their rhythm, in the Florentine valley

2010a) which are to be found at all scales of the city-region, from small architectural spaces to vast tracts of land enclosed by the spread of settlement. They constitute a reverse city (Viganò, 2012), an inverted city whose centre is empty rather than full. Within INTERstitial Spaces voids become the structuring elements in recent contemporary urban profiles. These spaces are formed as a result of one or more sector and/or area plans tacitly assigning them the role of residual areas in the vicinity of projects for large, isolated, 'autistic', self-referential and 'mute' infrastructure systems and settlements (Fig. 4). INTERstitial Spaces may also be created when planning is deregulated and individual and private sector initiatives are facilitated: a failure of planning processes which are replaced by a culture of exemptions and an untrammelled right to build. In this situation, in-between spaces come into being as the residual fruit of very small-scale individual initiatives such as small extensions to dwellings (Brighenti, 2013), which involve inserting and/or incrementing, the effects of which can be compared to a very fine dusting of powder (Lanzani, 2011) which, over time, does profoundly modify the areas impacted. The presence of INTERstitial Spaces indicates a vulnerable area: land consumption may be a problem and much of the area will be compromised and decayed. There is an impelling need for regeneration, requalification, renovation and recycling of these contemporary urban spaces.

Fig. 3 INTERstitial spaces photo: M. Rossi A small re-used interstice

Fig. 4 INTERstitial spaces photo: I. Zetti Residual space under a 'mute' infrastructure

INTERrupted Spaces are a special category of in-between spaces whose essence derives from their relationship with the temporal dimension. They are configured as space-time intervals and as spaces for passing, suspension and waiting. Observing the tendency of contemporary cities to expand, an expansion which is characterised by a continuous high-frequency cycle of destruction/reconstruction of fixed urban assets, it is immediately obvious that recent urbanisation has developed in parallel with a constant production of urban waste, abandoned voids (Crack Spaces) and suspended voids (*Squelettes à habiter*), all of which generate widespread decay (Figs. 5 and 6). The causes underlying the proliferation of these spaces are to be found in a complex intertwining of factors: these include the spatial logics underpinning the capitalist development model, this model's indifference to local resources, the current economic crisis and a chronic lack of ideas and projects for cities. Container Spaces, huge constructions for storing goods, means of transport and, temporarily, waste materials, are also considered INTERrupted Spaces. Various causes underlie the

origin of Container Spaces but the most important one is the enormous increase in the international transport of goods and materials, brought about by the globalisation of industry and capital and an exponential increase in consumption, which makes it increasingly difficult to manage the 'cycles' associated with urban metabolism. This means that materials and waste products spend more time waiting in Container Spaces. Overall, INTERrupted Spaces leave a legacy of decay, which is often linked to serious environmental problems and to a general sense of abandonment because they are totally bereft of dynamic human activity.

INTERactive Spaces are formed as a result of the combined action of phenomena arising from two different logics (local and global) and the reactions that are generated in response to the complex relationship which is sometimes established between them in the areas where their impact is felt. They are, for the most part, spaces where actions and reactions take place and their physical and spatial conformation is varied. INTERactive Spaces are usually divided into two categories which are determined by the type of action that brings them into being: those with a predominantly conflictual nature are denominated Spaces of Conflict, and those which are generally propositive and project-oriented are denominated Spaces of Resistance. The construction of cities is, to a large extent, aligned with the rhythms, logic and methods of a global rationale so involvement of the inhabitants is generally excluded. This means that urban development is frequently determined by a global rationale that ignores the impact it has on micro-economies and cultures and does not take local spatial and social characteristics into account. In some cases, this can result in a significant social protest being mobilised and if this protest is mostly antagonistic and conflictual then these spaces are transformed into Spaces of Conflict. If the protest is oriented towards transformation and projects, then Spaces of Resistance are created where there is much discussion on issues such as the collective use of local resources and the right of inhabitants to participate in decisions that impact the environment they live in. Although INTERactive Spaces can leave some areas with significant social conflict (Fig. 7), they are also invaluable reservoirs of creativity and diversity where inhabitants are gradually reclaiming local resources (Fig. 8), an example of a slowly dilating form of urban regeneration based on the vitalistic and relational aspects of making cities.

INTERvisible Spaces are the fourth type of in-between space. These spaces are the outcome of projects where urban planning standards and the planning process completely ignored aesthetic criteria and ecological principles (Sieverts, 2015). The urban quality of these spaces is generally low and they are often found in settlements within the in-between city (Fig. 9). When aesthetic and ecological principles are not applied to city design and when planning has lost its vision, the result is a succession of alienating spaces that multiply among the buildings of in-between cities. These spaces have not been designed or thought about: the best that can be said of them is that they are the fruit of a design process that has lost its senses. They create a hollowed-out urban space that for the most part is covered in cement, characterised by unempathetic, generic, ecologically-unbalanced spatial configurations and incapable of inspiring its inhabitants who generally avoid it.

INTERcluding Spaces are the outcome of exclusive urban planning: this type of planning is defined as institutional practices of spatial zoning, based on a selective, segregating and 'hard' use of space, which produce evident effects of social segregation (Graham & Marvin, 2001; Wissink et al., 2012). Exclusive planning results in urban spaces being

Fig. 5 INTERrupted spaces photo: M. Rossi Crack space

Fig. 6 INTERupted spaces photo: M. Rossi Squelette à habiter

Fig. 7 INTERactive photo: M. Rossi space of conflict

criss-crossed by a series of new, concretely physical borders which create a mosaic of anonymous, introverted, camouflaged and tightly closed entities. This type of planning results in contemporary settlements becoming increasingly disconnected, fragmented and often violent (Boano & Floris, 2005); gated communities, danger zones, ghettos, violent decayed peripheries, nomad camps and migrant detention centres are the new 'hetero-utopias' (Foucault, 2006), exclusion zones (Agamben, 2005), the result of forced or self-induced confinement of citizens, which mark out precise urban and territorial geographies. Among the typologies of space generated by exclusive urban planning, there are two distinct typologies of INTERcluding Spaces: Segregated Spaces (Carmona, 2010a) or ghetto neighbourhood

Fig. 8 INTERactive spaces photo: I. Zetti space of resistance

Fig. 9 INTERvisible spaces photo: I. Zetti

(Fig. 10), to which discriminating distribution logics decree that the following categories should be relegated: 'miserablés, populace, classes dangereuses, loubars, racaille, zonards' (Secchi, 2013: 21), and Unfair Spaces, all the structures used for the administrative confinement of migrants and/or ethnic minorities. INTERcluding Spaces have no regulatory logic and their distribution is contingent, so their location is random and unpredictable. These factors, along with others, contribute to making discrimination, and the physical and social fragmentation it creates, structural characteristics of contemporary space (Fig. 11).

3 In-Between Spaces: Rhythms, Borders and Evolution

3.1 Worthless Spaces or New Centralities?

The spaces which we have attempted to name, if not to describe, are frequently presented negatively in the literature, or at best they are seen as challenging, and every so often redevelopment policies and projects seek to address their problems. Here we would like to offer a different

Fig. 10 INTERcluding spaces photo: M. Rossi segregated space

Fig. 11 INTERcluding spaces photo: I. Zetti segregated space

perspective, a more propositive lateral view, and address the issues of redevelopment by suggesting a design philosophy that tackles the objective of improvement using an approach that Patrick Geddes would have called 'intimate', meaning involved and interactive, which relies on a rhizomatic idea (Deleuze & Guattari, 1976) of the urban environment and its implicit material and social resources. This article was written in Florence when the city was in lock-down and all activities were severely curtailed. During this period the impressive reversal of the city's vital functions, which has taken place in recent years, was all too evident. Centre–periphery relationships based on a hierarchical model no longer exist. Central city areas (in Florence and elsewhere) were completely empty during the lock-down because there were no tourists and the commercial activities related to tourism were closed, but public spaces in the pockets of in-between cities continued to be frequented, albeit less intensely. This highlights at a perceptual level how everyday life has been pushed into the 'in-between' cities and how essential services have followed. Although this situation is now perfectly evident, the community as a whole still perceives the relationship between the centre and the periphery as hierarchical and characterises their public spaces differently. According to this view, the public spaces of in-between cities bear the stigma of marginalisation; they are not seen as possessing their own unique characteristics and, situated as they are in hinterlands, they are usually not considered for innovative planning strategies or government projects that would transform them into spaces of opportunities (Sieverts, 2003). However, if we bear in mind that we are dealing with border areas, which are barriers if interpreted negatively but also places of communication, osmosis and contact, then we discover, as the COVID 19 lockdown highlighted, they are also the places where social networks are reconstituted; where the strength of urban ecologies and natural metabolism rapidly shows itself if given the chance; where innovation and new forms of production often associated with modernised agriculture are present; where new forms of citizenship and inclusion are trialled. The uniqueness of the temporal rhythms and components of the geographical palimpsest emerges here and it is possible to read a geography of place, the minutiae of everyday life, in personal daily trajectories. Everyday times and spaces, a bricolage of how the city is used and an unconscious counter-geography that silently emerges, building up alternative maps. When in-between spaces are considered in this light, it becomes obvious that they open up new opportunities for public cities, that they are constantly evolving, and that they are the key for realising the potential present in their midst. Borders are no longer barriers but bandages, that is to say, spaces with the potential for binding different areas together, spaces that establish relationships and opportunities for regenerating various contemporary urban contexts. The global pandemic crisis has seriously tested cities' resilience, but in-between spaces can play an important role in providing opportunities for decompression and for new ideas to develop, where new INTERrelation spaces can be reinvented and INTERconnections between the city and the countryside can be renewed. These opportunities make it essential that further urban planning efforts be urgently undertaken, given that in-between cities contain within themselves an 'implicit project' (Dematteis, 2002).

3.2 A New, But Old, Philosophy of Urban Design

As we have explained, one of the objectives of the project is to renew relationships so one of the first questions that need to be asked will relate to the type of community that should be used as a benchmark: who lives in the in-between spaces and what are the dynamics involved? How does this particular city fit into the contemporary urban environment in relation to the flows and transformations that a global system of relationships generates, proposes and sometimes imposes, even when negatively impacted by the current health issues? If we consider the question from the point of view of a city region, it acquires meaning thanks to a 'proliferation of […] scalar complexity' (Amin, 2002: 387); it is dynamic and it is also a system made up of parts that acquire meaning within their relationships thanks to the localised interaction of new spatio-temporalities where place-making activity is carried out 'through the myriad network practices' (Amin, 2002: 391–392). The outcome, in terms of forms, of this type of interpretation, is to be found in the qualities of the public space, qualities that, in our opinion, should permeate all areas of the city region, and, most importantly should become the focus for a project for regenerating the in-between city. These qualities should preserve the characteristic which, more than any other, has contributed to making the history of European cities so important. Ivan Illich defined it as *conspiratio*, shared breathing (the translation of this Latin word presents difficulties which will be addressed below). To quote Ash Amin again: public spaces should be 'marked by the unfettered circulation of bodies […] a field of emergence, constantly producing new rhythms from the many relational possibilities' and again 'open, crowded, diverse, incomplete, improvised, and disorderly or lightly regulated' (Amin, 2008: 8). Amin views positively, as do we, the margin of creative opportunity found in indeterminate spaces, where traditional urban zoning plans were fortunately unable to force the many possible relationships to conform to a rigid organisation determined by function and where, as a result of this failure, there are still spaces of change and innovation. If the city is an instrument 'to reconnect our lives with the lives of others in ways that are inherently meaningful' (Friedman, 2010: 152) it is clear

that reconnecting should be allowed to take place without interference, but it is equally clear that claiming this space does not exclude disputes arising (disputes are part of city life), because if a space is open, there will always be contention as to how it is to be used (Amin & Thrift, 2002; Sennett, 2018). The translation of *conspiratio* no longer has much to do with 'shared breath' but is commonly translated as 'conspiracy': the city becomes conspiratorial, an interesting short circuit between the original meaning of the expression and the later one, which makes reference to an idea that the city is contested (INURA, 2004; Sandercock, 1998). This implies that any project for building or regenerating these spaces will require a strong deliberative component and the participation of the inhabitants, especially if it involves new communities, which typically settle in in-between spaces and build a mixed, multiethnic, pluralist social nucleus. In summary, we have: a geographical palimpsest to be used to guide the project; new communities and a concept of open, inclusive urban space that questions the fragmentation and borders of the in-between city and instead recreates bandages that bind together to replace demarcations. From this starting point, we need to define the process that will lead to the design of new spatialities, and we need to reconsider the idea of *conspiratio* since the current Covid crisis is certainly questioning the individualistic lifestyle embedded in the fragmented city environment.

In Italy, as early as the 1960s, Giancarlo De Carlo advocated the need for multi-scalar, non-mechanical urban planning that abandoned the banality of additive processes. The objective of urban planning should be to combine a general level, where shared principles that did not involve considerations of rental income would guide strategic planning, and a detailed level that dealt with 'objectives qualified by the introduction of voluntary elements that pose the problem of how the space should be organised'. The palimpsest, therefore, is reinterpreted in the light of the 'relationship established between the original architectural values and the modifications […] that subsequently overlaid it, in the counterpoint between the intentions of the creator of the architectural work and the manifestations of the society that used it' (De Carlo, 2008: 127). A design which centres around people.

For the designer who follows De Carlo's approach, architecture is modelled on the basis of informality and everyday life and assumes a tactile, continuously changing value thanks to the uses to which it is put. The user/transformer and object/space relationships are light and flexible but not casual.

3.3 Urban Design Suggestions for the In-Between City

The state/market dialectic has often influenced the debate surrounding the regeneration of degraded urban areas, and the policies for alleviating the hardship frequently found in these areas. In more recent times, capabilities that spontaneously condense in some contexts have attracted considerable attention and interest, although the state/market dichotomy, an extremely simplified model of reality, tends to ignore them. In-between spaces play a role in hosting these capabilities which are concentrated wherever inhabitants possess self-organising social skills (Palermo, 2009). This part of the city often hosts self-promotional activities which use unintentional landscapes (Grady, 2016), on the condition that their uniqueness as a dynamic, shared place, with significant natural components, is preserved. Obviously transforming a physical space provides no guarantee that the social space and the quality of life will also improve, but if we accept the idea that urban quality might improve if a network of public places is created and these places evolve from their present emarginated condition to become new centralities, then it is necessary to rethink the relationships between local inhabitants and the geographical palimpsest and set up a framework of co-production (Albrechts, 2013) involving multiple public city stakeholders. When urban design is introduced to this cultural context it develops through the interactions with local stakeholders, through the "dialectic between reality and aspirations" (De Carlo, 2008: 26). The urban design referred to here is not the concrete physical form of a public space created by a designer, but an open and unfinished framework. In this way, messiness, a typical characteristic of in-between cities, becomes a resource, raw material for innovation rather than a constraint (Sennett, 2008). After all this there remains a further question: how to devise urban design that utilises this messiness within a co-design mechanism with local communities? There are probably several answers but what is absolutely certain is that standard text-book solutions are not suitable and proposals inspired by best-practice may not be either, as they risk providing trivial loopholes which distract attention from this difficult task. What we would like to propose is a reflection on some ideas, a path for a discussion that we would like to instigate that would reflect the experience acquired through working and teaching. There are six points to reflect on for this discussion (they are not listed in order of importance):

(1) The project is exploratory and will contain no resolutions (another one of De Carlo's principles). It will interpret traces of the history of the site which is considered to be a highly complex, living organism (Magnaghi, 2000), not a banal space requiring a quick fix, it will test solutions that seek to restore social and environmental equilibrium in a dynamic horizon where time is one of the factors of the project.
(2) It follows, therefore, that the project will be a co-evolutionary process involving interaction between project designers, local communities and the environment. It must never be the work of a single genius.
(3) Each project is a collective learning journey (Forester, 1989), but for this to be effective the routine mechanisms of urban planning need to be set aside because they do not allow for 'effective social exploration' (Sennett, 2008: 142).
(4) Each project is a form of active experimentation within a range of possibilities (Palermo, 2009).
(5) As we are dealing with places used for communication between communities whose use of urban space, and their strategies for identifying within this space, are not predictable we must be aware that this implies multiple temporalities and variable design solutions. So positive and negative feedback mechanisms are essential for long-term projects.The designer no longer designs fixed solutions but critically evaluates possible solutions that arise from experimental interaction in the field and visualises medium-long term scenarios and places them in a context of multi-scalar relationships.
(6) In order to do this, it is necessary to identify an executive rationale and a process logic and to avoid mechanical design rationality and a rigid cause-effect nexus. We have to move within complex, adaptive systems and refer to the domain of research and thought on complexity to create a project iter, which is adaptive and not banally hierarchical and predictive.

From these six points we can draw some conclusions to better focus on the role of the designer or at least modify the characteristics we believe this role requires. Firstly he/she should be aware of the importance of developing a personal relationship with places and bodies whose physicality is paramount. To make this assertion at a time when our relationships have had to be transferred to digital networks may seem almost provocative, but we repeat that it is impossible to rebuild relationship networks in in-between cities without physical contact with the material, physical and sensorial aspects of space. We felt it was necessary to underline this because using the powerful instruments available online (which, there can be no denying, are extremely useful) leads us to think and plan for technology-mediated versions of places. Keep in mind too, that locals, for whom this work is being carried out, have their own autonomy which is a valuable asset. So the designer's first task is to coordinate locals with the relevant skills, who bring essential, contextual knowledge to the project which is useful, indeed essential, for transforming problems into opportunities and subsequently into project focal points.

Finally, it is important to imagine the project as a possibility matrix to be tested in the various forms that it can take in relation to the in-between city and to the local community: a spatial event that derives from a practice of space commoning (Stavrides, 2016).

3.4 Design in the In-Between City

In-between spaces have, or at least can have, if projects are properly managed, a fundamental role in determining the quality of life of those who live there or who gravitate towards them. In-between spaces play a role in maintaining ecological functions and in safeguarding biological and also socio-cultural diversity. Borrowing the language which Clément used to define the 'third landscape', they are places of species settlement and pioneering experiences (Clément, 2004). The theme of design criteria for urban spaces, of a 'Cities for People', the title of a popular book written by Jan Gehl (2010), is certainly not new. There are many writings that link the interpretation of urban structure to design, some of which had a great impact and were very influential (for instance, to name just a few: Alexander et al., 1977; Lynch, 1960 and more recently Carmona, 2010a, b and the previously cited work by Gehl, 1987, 2010). More modestly, we shall try and list some strategies that seem to be in line with the attitude and the role the design should take, in the light of what we have previously written, so it will be rhizomatic, open, inclusive, respectful of local differences and 'intimate' (quoting Geddes again). These are suggestions just mentioned in passing, ideas for dealing with urban architecture in the company of non-architects, as De Carlo suggested, imagining it first at the palimpsest of signs level. Some suggestions are listed individually, others are listed in sequence and in two cases they are listed as alternatives.

Connect. This strategy exploits the multidimensionality and the relationality inherent to in-between spaces and also tries to 'redeem' them from their residual and generic nature. In order to regain urban quality a network of continuous, connected and lived spaces that reconnects the central historic city with the system of new centralities is needed. These spaces can be likened to hardware that sustains the public structure of the city and the areas surrounding it (Pinto & Brandão, 2015 who also quote Friedman, 2006).

Disappear—never finish—explore. Sometimes 'disappear' means to let natural cycles do what needs to be done using the force of slow transformations, or it may mean working with these cycles, which might involve planning the withdrawal of not only the designer but also users and inhabitants. Sometimes it is 'lack of interest […] that guarantees the maintenance and deployment of diversity' (Clément, 2004: 54), other times you might 'give up, wait, read, understand and perhaps decide not to do anything, or you might do it by removing something that detracts attention from the space which holds within itself its own meaning and sense' (Marini, 2010: 97). Over long periods of time this strategy has the further advantage of bringing to light new opportunities from networks of people and of regenerated natural places. Never-finished operations are those that, over time came to a halt, perhaps because their outcomes were not satisfactory or proved to be problematic or harmful. In these places of suspension, recreated natural and human conditions are sometimes found, and assisting and promoting them is a strategy to consider. Exploration has been an implicit project strategy many times (from Geddes' exploratory walks to situationist drifts) and it seems that some places are designed to make the game of discovery fascinating, to surprise those who pass through them, not because there is spectacular architecture to discover, but because they offer a chance to discover 'of ordinary things the meaning of ordinariness' (Kaprow, 1993: 9), interpreting their real meaning and finding something extraordinary (Solnit, 2000).

Care for. In-between spaces are often home to new communities that have brought innovative productive and/or recreational experiences with them. The geographical palimpsest is reinterpreted as an active subject and this means that the site is not a three-dimensional Cartesian space, but a living object which communities consider to be a common good; a genetic patrimony that is a prerequisite for the vitality of local communities and, at the same time, a product of their action of transforming the site itself (Magnaghi, 2000). So, when the project creates possible new ways for using the site palimpsest it becomes an instrument for enhancing spontaneous community action of caring for their way of life.

Expand/erode. If positive processes of caring for the land, which is seen to be a common good, are present in in-between spaces then it is likely that a design strategy of this type would be more effective in a design that linked different urban scales. In-between spaces are normally 'attacked' because the prevailing model of land use allows their land to be consumed at increasingly high rates. This is a planning decision though, not destiny, so it can be reversed. The reverse strategy is to erode, to slowly dismantle banal, monofunctional spaces. Buildings and places that are no longer useful can obviously be demolished and quickly replaced, but in a situation where resources for regeneration projects are increasingly scarce, it is likely that they will be gradually dismantled, reutilised, modified over long periods of time and their purpose and importance may also change in the process of making them more useful for new user communities (for some interesting research on this topic see: Re-cycle Italy; the Re-Cycle exhibition, Ciorra & Marini, 2012).

Densify/rarefy. As has already been noted, the more in-between spaces are linked in networks of public places the more likely it is that they will enhance the quality of life in the city in which they are located. To achieve this outcome two strategies, one based on adding and the other on subtracting, must be deployed together, even though logically they contrast one another. We use the term 'densify' to signal an intention to increase the number of objects and, more importantly, the number of functions, the number of things that happen and ultimately the number of people, because agoraphobia negatively characterises some large monofunctional spaces in in-between cities, at least for part of the time they are in use. At the same time, though, there are other places where excessive congestion causes problems and where living spaces, where life happens at a slow pace and where mobility is sustainable, are needed: these objectives can be obtained by reducing density.

Blur/subvert. Blurring and subverting spatial logics are strategies that should be presented together because they refer to the same field of action. Blurring opposes the sharpness of many of the borders of in-between spaces which hinder network connections; it also opposes the mono-functionality which sometimes characterises these borders and which reduces complexity (for example, the strong infrastructure barriers that separate natural areas or residential neighbourhoods from other parts of the city and the monofunctional logistic and commercial platforms). It is hard to imagine changing their isolated and isolating nature, at least in the short term, but we can design strategies for gradually mitigating their negative effects. These strategies need not be limited to timid steps: the first stage involves blurring actions which can be followed by a subversion of the spatial logic that created the problem. It cannot be denied that this strategy is difficult to implement, especially its more radical version, but we have mentioned it because it seems that in some in-between spaces it has been possible to construct multi-scalar and multi-actorial networks of alternative public spaces (for example the creation of peri-urban agricultural parks which have modified how the metropolitan periphery is perceived).

The essential prerequisite of all these proposals is a 'light' and attentive design whose goal is to 'empower' the area where it is to be applied and whose poetic manifesto wants to overturn the commonly held perspective that assigns a negative connotation to fragile territories.

4 Epilogue

This paper has presented the case for considering in-between spaces as opportunities, arguing that the words commonly evoked for describing these spaces (separation, barrier, containment and fragmentation), ignore latent semantic content embedded in their relational nature such as mediation, connection and transition. This semantic context enhances permeable, multi-signed places: 'it is the same in mathematics, where the set of points that belong to both the internal and external space are called boundaries' (Lotman, 1985: 58). From this perspective, in-between spaces could play a key role in reconstructing a holistic approach to the city and the areas surrounding it which would substantiate their potential for regenerative action. To this end, in-between spaces should not be treated as unique but rather as phenomena of multi-relational reality and therefore characterised by reciprocal influences: 'the glue holding together the starfishes and sea anemones and redwood forests and human committees' (Bateson, 1979: 13). This determines a gradual, deliberate detachment, as we have repeatedly observed elsewhere, from the analytical and interpretive criterion of the urban environment which focuses on the indivisible, dichotomous aspects of becoming a city, on the state of things rather than on their changes, on substance rather than interaction, to embrace a concept of new contemporary urbanisation which decides to work on unifying aspects and mechanisms and therefore on physical and human relationship areas which are found in these in-between spaces. Reversing the view of their nature, their 'in-betweenness' means these spaces can become places capable of offering us the possibility of a radical perspective from which to look, create and imagine alternative new worlds. In-between spaces can become connecting spaces with which to renew textures and urban geographies with a regional 'eccentric' nature, off-axis with respect to centrality and traditional borders.

In this context, their in-between state may not only refer to a purely topological meaning, in the sense of 'being in the middle of something' (be it of a physical, political or semiotic nature); reconnecting with the various meanings 'in-between' has assumed, in different cultural contexts throughout history, can open up this concept to latent meanings such as plurality (*metaxú*), action (*entre-deux*), difference (*zwischen*) and multitudine (*aidagara*). In this perspective, which is yet to be explored, of adopting an approach which is oriented towards the context and the stakeholders, in-between cities can be reinterpreted as variable fields, the result of diverse, reciprocal forms produced and modified by various urban and territorial stakeholders. In-between spaces can become guiding concepts for attempting to definitively transform in-between cities into semiotic spaces, the sum of the translation filters (Lotman, 1985), where they become places of reciprocity and mutuality. In a territory that is no longer just Cartesian space, but an area of reciprocal exposure generated by interaction, in which new territorial identities are created because this territory is rich in qualities that develop within the connection between people and things (Arendt, 1964). This means the ambiguity of INTER is eliminated and the clarity of TRANS acquired, key elements of another conceptual transition: the shift from relationship/interaction to a transaction.

But that is another matter which alludes to further research.

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Sustainable Regenerative Strategies for the Inner Areas: An Example of "Civic Design" in Marradi (Tuscany)

Francesco Alberti, Sabine Di Silvio, Ilaria Massini, Sara Naldoni, and Simone Scortecci

Abstract

Accessibility to public services, social inclusion, local development, revitalization of public spaces and well-being of the inhabitants: these are just some of the issues raised by the Italian National Strategy for the Inner Areas, that concern over 60% of the national territory but only 7.6% of the Italian population, continuously decreasing. The pursuit of sustainable urban development through the promotion of urban regeneration, as a strategic alternative to land consumption, and the improvement of the quality of life are also some of the objectives of regional planning in Tuscany. Sharing these aims, the Municipality of Marradi in the metropolitan area of Florence, in cooperation with the spin-off of the University of Florence Urban LIFE, developed *Con.Marradi* (*Urban connections for a more attractive and sustainable territory*), an urban regeneration project co-financed by Region Tuscany on the basis of a funding call for inner areas. The project is intended to reconnect fragmented public spaces and facilities located at the entry point of the town, in order to create a multifunctional hub of social-welfare services and recreational activities, both surrounded by nature and recognizable as a new "urban gateway", aimed at improving the liveability of the place as well as its attractiveness for sustainable tourism development. At the scale of a small town in a fragile territory, the project is presented as a case study of "civic design", an approach to spatial planning and design pivoted on urban welfare provisions, which pursues urban sustainability and resilience objectives by integrating innovative principles and techniques—such as civic participation, universal design, walkability, renewable energy and nature-based solutions.

Keywords

Urban regeneration • Connections • Public spaces • Accessibility • Inclusion • Well-being

1 Introduction. Urban Regeneration for the Relaunch of Inner Areas in Italy

Urban regeneration processes are a central issue of the European development strategy envisaged in the 2014–2020 Programme (EC, 2015), which assumes a specific connotation in the framework of regional cohesion policies with special regard to those areas, often rural and mountainous ones, that, due to their low competitiveness, have been cut off from the dynamics of development that have affected the member countries. This condition of territorial imbalance has historically depended, at first, on geographical factors (characteristics of the territory not compatible with the establishment of productive activities, physical distance from the leading urban centres, poor territorial accessibility, etc.),[1] which, in the absence of targeted policies supported by the public sector aimed to the enhancement of local

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[1] It has been observed that, in present days, less favourable geographic conditions don't lead automatically to, nor are the only cause of marginalization processes, that can instead be determined by the exclusion from political and economic networks, regardless to the physical distance of the concerned territories from the main urban centres—as in the case occurred after the German reunification to the eastern part of the country on the border with Poland. In this perspective, the problem of *shrinking areas* (ESPON, 2017a) has been recently addressed in the more general terms of "inner peripheries", introducing the concept of 'connectivity' as a key for interpreting the level of the socio-economic and political connections between cities and territories (ESPON, 2017b).

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territorial capital,[2] can lead from the isolation to the "de-sertification" of large territories—a risk that, according to Roberto Camagni (2011), is common to all southern countries: Italy, Portugal, Spain, France and Greece.

In the Italian peninsula, the process of marginalization of the so-called *inner areas (aree interne)*, characterised by the abandonment of settlements, population ageing and fewer services on offer, has gradually affected since the Second World over 4,200 Municipalities, covering in the whole three-fifths of the country,[3] whose economic and human resources are now structurally insufficient to tackle local regeneration projects, which are necessary to their relaunch.

Although the main economic activities, better employment prospects and a wider range of services are concentrated in the largest urban centres, these "peripheral" territories represent in any case, with their distinct features, a strategic asset for Italy. The relevance and importance accorded to the values of the territory, proximity and community in view of the country's relaunch are confirmed in the reflections developed during the emergency brought about by the COVID-19 epidemic. As recently highlighted by Giuseppe Provenzano, Minister for the South and Territorial Cohesion,[4] and several scholars and professionals, including Stefano Boeri,[5] who even speculated that there could be an exodus from the large Italian cities to the "old villages", now more than ever the inner areas have the chance to become places of innovation and development. This topic was brought back to national and international attention at the Venice Architecture Biennale 2018,[6] in the *Arcipelago Italia* pavilion by the architect Mario Cucinella, which was dedicated to those "territories that are distant in time and space from large urban areas, but holders of an invaluable cultural heritage, with peculiarities that place Italy in discontinuity with respect to the European urban armour" (Cucinella, 2018).

In the variety of geographic contexts that characterise the different Italian regions, the relaunch of the inner areas requires multi-level actions capable of enhancing "the potential of economic development in terms of the unused territorial capital in each territory: the natural, cultural and cognitive capital; the social energy of the local population and of potential residents; the production systems (agriculture, tourism, manufacturing)" (Barca et al., 2014). With this approach, combining policies on sectors of national and regional competence (e.g. education and health) and local development projects, the *Strategia Nazionale per le Aree Interne* (SNAI) (National Strategy for Inner Areas)[7] was launched in 2014, the priority objective of which was to invert the current demographic trends by reducing emigration, attracting new residents and the resurgence of births. This objective is linked, at local level, to an increase in well-being and social inclusion of the resident population (intensive development) and, from a national perspective, higher employment and use of the territorial capital (extensive development).

As of today, the National Strategy is operative for 72 inner areas selected on the recommendation of the Italian Regions. These correspond to a surface of 51,366 km^2 and a population of over 2 million inhabitants, divided into 1,077 municipalities, classified on the basis of their distance from regional urban "centres" equipped with healthcare services and schools at supralocal level and an average level railway station.[8]

The Tuscany Regional Government, on the basis of a study by the Regional Institute for Economic Planning of Tuscany (IRPET), has introduced a further classification based on the potential of economic development in the territories concerned: "Inner Areas with development potential; Highly Touristy Inner Areas with development potential; Slightly touristy inner areas with development potential; Inner areas with a residential specialisation; Fragile inner areas" (Iommi & Marinari, 2017).

In keeping with the choices and initiatives pursued in recent years by the National Strategy for Inner Areas and with the objectives of the Regional Law on the governance of the territory (Tuscany Regional Law No. 65/2014), focused on promoting the sustainable development of the territories and reducing soil consumption, in 2019 the Tuscany Regional Government issued a call notice[9] for the

[2] The definition of "territorial capital", first provided by the OECD in 2001, refers «to the stock of assets which form the basis for endogenous development in each city and region, as well as to the institutions, modes of decision-making and professional skills to make best use of those assets» (OECD, 2001).

[3] According to the ISTAT (National Institute of Statistics) census of the population in 2011, Italy's inner areas cover over 60% of the country and are organised into 4,261 municipalities (53% of the total number of Italian municipalities) with over 13 million inhabitants (around 23% of the population).

[4] http://territori.formez.it/content/provenzano-confronto-sindaci-federazione-aree-interne (04/2020).

[5] Coronavirus, Boeri: "Via dalle città, nei vecchi borghi c'è il nostro futuro" [Our future lies away from the city, in the old villages], Brunella Giovara's interview with the architect Stefano Boeri, "La Repubblica", 20 April 2020.

[6] 16a. International Exhibition of Architecture (6 May-25 November 2018). The theme chosen by the curators Yvonne Farrell and Shelley McNamara—Freespace—concerns the quality of public and private space, urban space as a whole and the landscape.

[7] The national strategy for the development of inner areas was proposed by the then Minister for Territorial Cohesion, Fabrizio Barca, with the support of the Technical Committee for Inner Areas.

[8] On the basis of this classification, municipalities belonging to the inner areas are broken down into: intermediate municipalities (located over 20 min away from the "centre"), peripheral municipalities (over 40 min away) and ultra-peripheral municipalities (over 75 min away) (Barca et al., 2014).

[9] The "call notice for the allocation of regional contributions for urban regeneration interventions to benefit municipalities in the inner areas of Tuscany—2019–2021 Annuity (Regional Council Resolution no. 175 of 18 February 2019)" provides for the allocation of €4,036,000 over the period, divided as follows: 2019 (€916,000), 2020 (€1,220,000) and 2021 (€1.900.000).

co-financing of urban regeneration projects in favour of individual or associated municipalities belonging to the Tuscan inner areas, the purpose of which was to:

- encourage the reuse of already urbanised areas to avoid further soil consumption and increase the attractiveness of the places;
- encourage the densification of urban areas to reduce public transport costs;
- maintain and increase the attractiveness of the urban contexts on the basis of the plurality of functions present;
- ensure the ordinary and extraordinary maintenance and renovation of public infrastructure and facilities;
- encourage civic participation in defining the community benefit of urban regeneration interventions;
- improve relations with the surrounding urban fabric and redevelop the urban fringes;
- improve and strengthen provision of infrastricture, services and urban green areas;
- ensure the joint presence of diversified and complementary urban functions and encourage a balanced social composition.

More specifically, the co-financing is earmarked for interventions aimed at improving the availability and accessibility of school and social care services; supporting and enhancing the local economic activities; countering demographic decline; making the territory safe and protecting the environment. These objectives are to be pursued through the reorganization of existing buildings, the redevelopment of degraded areas, the functional reorganization of disused areas, the reuse and redevelopment of large disused building complexes, and the improvement of connections with the urban context.

This last type of intervention refers to the case study illustrated in the following paragraphs, located in Marradi, a municipality counted among the peripheral and fragile inner areas[10] of Tuscany.

2 The Con.Marradi Project

2.1 Reference Context

Marradi (Figs. 1 and 2) is a small town of around 3,000 inhabitants within the Metropolitan City of Florence, situated in the Apennine area on the border between Tuscany and Emilia Romagna. It is a settlement at the bottom of the valley; the River Lamone runs through it, and it was built near a fort of Roman origin (Castellum) constructed to defend the road connecting the cities of Florence and Faenza. The town's name dates back to one of the farms around the Castellum, known as Marrato (i.e. "hoed") due to its well-cultivated fields. Marradi became the most important centre in the valley, and between the twelfth and sixteenth centuries it witnessed the construction, by important families, of what are still today the most important buildings in its historical centre (the Fabbroni, Torriani and Ceroni palaces); whereas the Teatro Degli Animosi (1792), the hospital (1803) and the new vehicle road connecting to Florence date back to the Lorraine period. During the Second World War, the town, located on the Gothic Line, was destroyed by bombardments, which were followed by major reconstruction work and the expansion of the town (Matulli, 1965, 1988).

Nowadays, Marradi is a mountain resort, a historical–cultural, naturalistic and gastronomic tourist site which, above all during some seasonal events (the chestnut festivals, held in both summer and October) has seen a strong increase in visitors, including fans of "slow" tourism, holidaymakers and "second home" owners.

The disadvantages of the municipality's peripheral location in relation to the main regional routes are partly offset by some positive factors which make Marradi a particularly attractive location for the development of sustainable tourism:

- the territory has a high-quality landscape;
- it has a direct railway connection with Florence (1 h and 15′) and Faenza (40′);
- it is in a barycentric position within a system of small mountain villages distributed between the regions of Tuscany and Emilia Romagna (Palazzuolo sul Senio, Casaglia, Brisighella, Modigliana, etc.);
- its fame is linked to distinctive elements of the place, in terms of culture and typical productions—Marradi is the birthplace of the famous Italian poet Dino Campana (1885–1932), to whom a Cultural Centre is dedicated, and high-quality chestnuts are named after it (Marrone di Marradi);
- it belongs to the Italian network of "città del buon vivere" [cities of good living] ("Rete Città Slow"—Slow Cities Network[11]) and the "Romagna Toscana" territorial promotion network[12];

[10] "The fragile inner areas are areas that have undergone long processes of depopulation and are today sparsely populated, elderly, with unused and low value real estate, low tourism, a low level of productive activities and low income" (Iommi & Marinari, 2017).

[11] https://www.cittaslow.it/ (05/2020).

[12] https://www.romagnatoscanaturismo.it/ (05/2020).

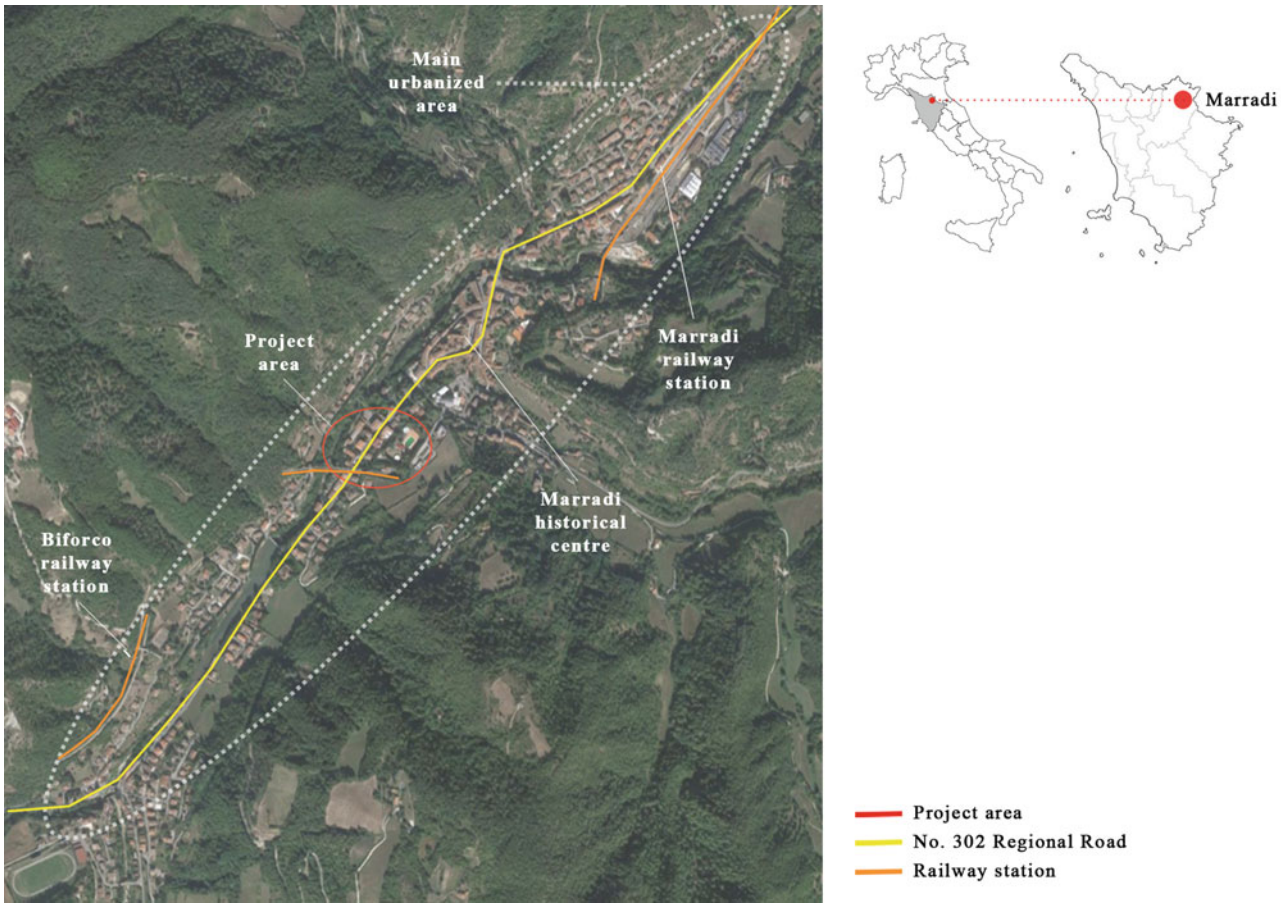


Fig. 1 Reference context (territorial area)

- it is a stage on the hiking, cultural, historical and spiritual itinerary known as "Il cammino di Dante" (Dante's Path),[13] which is linked to an important tourist offer;
- the town is high liveable and in recent years has undergone numerous public space redevelopment works and cultural spaces have been created (a new Urban Centre and the transformation of the inner courtyard of the Dino Campana Cultural Centre into an event space[14]).

With a view to further improving the attractiveness and liveability of the place, as well as the tourist offer and citizens' services, the Municipality of Marradi, with the support of the University of Florence spin-off Urban LIFE (Urban Liveability & Innovation For Everyone), defined a project to redevelop an area on the banks of the Lamone River near the historic centre, used for tourist activities, sports and social-welfare functions, entitled "*Con.Marradi—Urban connections for a more attractive and sustainable territory*". The project was selected from a shortlist of 58 entries, and was among the 14 projects financed by the Tuscany Regional Government with the "Inner Areas" call, receiving a contribution of € 220,000.

The involvement of a university start-up and spin-off specialized in urban innovation projects following an integrated approach geared towards urban sustainability was the key factor to identify, with a limited budget, the strategic interventions for the regeneration of the area capable of attracting regional funding. On the other hand, these interventions were conceived by the Urban LIFE team, like the earlier transformation of the courtyard of the Dino Campana Centre, as "building blocks" that act as catalysts for a wide-ranging regeneration process, with a view to development based on the enhancement of local resources, fully consistent with the National Strategy for Inner Areas.

[13] https://www.camminodante.com/tappe-e-percorso/ (05/2020).

[14] The renovation of the inner courtyard of the Dino Campana Cultural Centre (the former school "Giovanni Pascoli") was based on a design by the Urban LIFE team in 2019. The design was one of the 15 winners of the 2018 competition for "Active Spaces" announced by the Fondazione Cassa di Risparmio di Firenze to finance projects for the regeneration, renovation and reactivation of existing spaces and buildings for long-lasting and sustainable social, cultural and creative functions in the "minor" municipalities of the Metropolitan City of Florence.

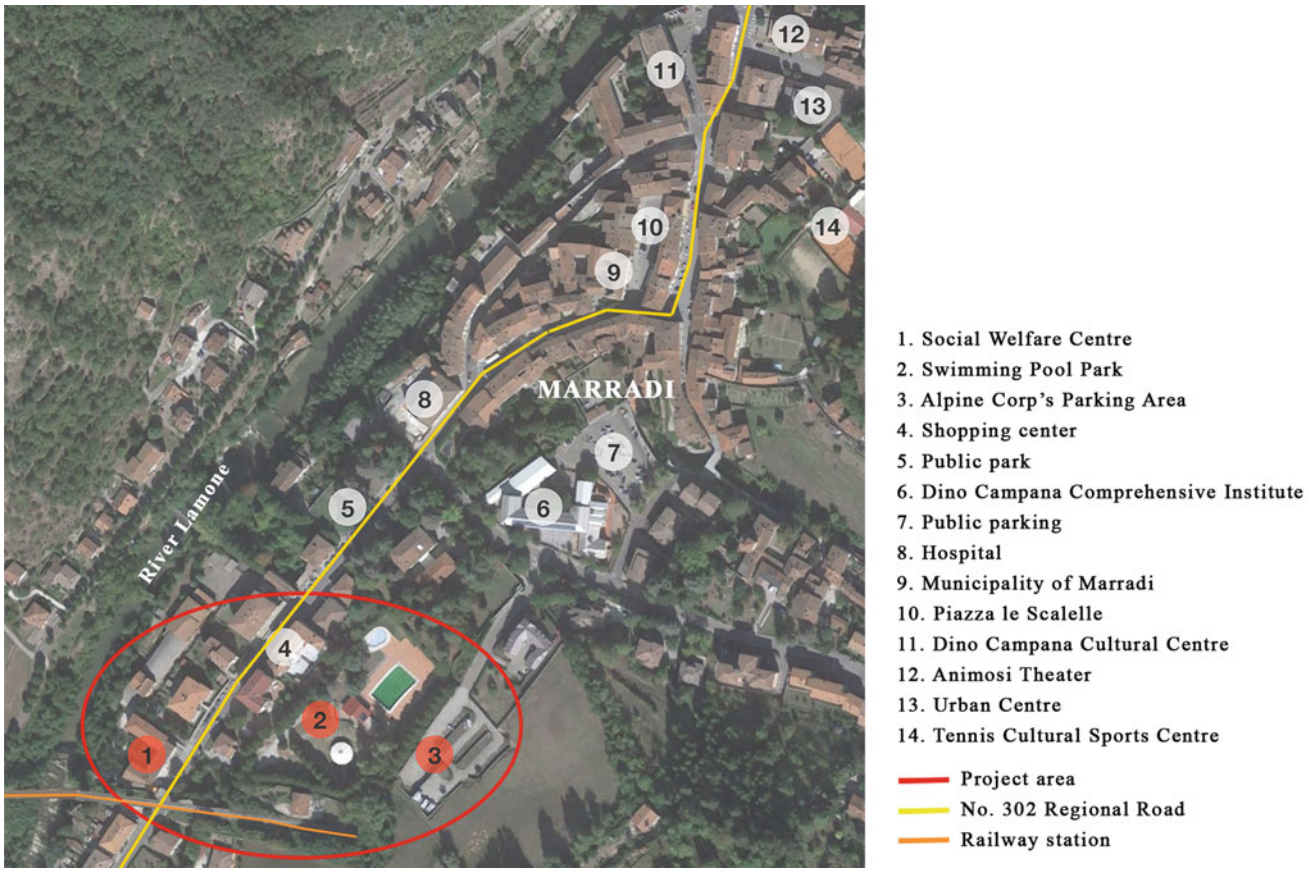


Fig. 2 Reference context (local area)

2.2 Project Strategies

More specifically, the project concerned three different areas of public property which include the Marradi Social Welfare Centre, a large green area for sport and recreation ("Swimming Pool Park") and a car park of 2,600 square metres recently built and partly intended as a camper parking area ("Alpine Corp's Parking Area") (Figs. 3 and 4a,b). These areas, despite being close as the crow flies, are perceived as distant and disconnected due to the different altitudes at which they are situated and because they are separated by the main connecting road, the No. 302 Regional Road "Brisighellese-Ravennate". Other weak points that have led to its underuse are the lack of spaces for meeting up, the presence of strong architectural barriers and the poor state of maintenance.

The central theme of the *Con. Marradi* project is improved connections between the three areas—the centre of Marradi, the river and the surrounding natural environment—through limited interventions on the road network and the creation of pedestrian and cycle paths (Fig. 5).

The proposed interventions, therefore, mainly concentrate on public open spaces and connections, with the aim, on the one hand, of creating a system of places, that are easily reachable with sustainable modes of transport, social inclusive and fully accessible to disabled people, and, on the other, maximizing the potential inherent in each part, so as to provide the territory with a new "hub" of qualified services for both residents and visitors.

In detail, the project aims to enhance the location of the Social Welfare Centre at the entry point to Marradi, characterizing it as an "urban gate"; the interventions include the redevelopment of the small square in front of it with new urban furniture, trees and scenic lighting, the creation of a large pedestrian precinct with no architectural barriers, as well as green areas and natural paths between the building and the bank of the Lamone River (Figs. 6 and 7a,b). In order to limit the traffic created nowadays by cars looking for parking spots along the regional road, the reorganization and streamlining of the existing parking lot serving the structure was planned.

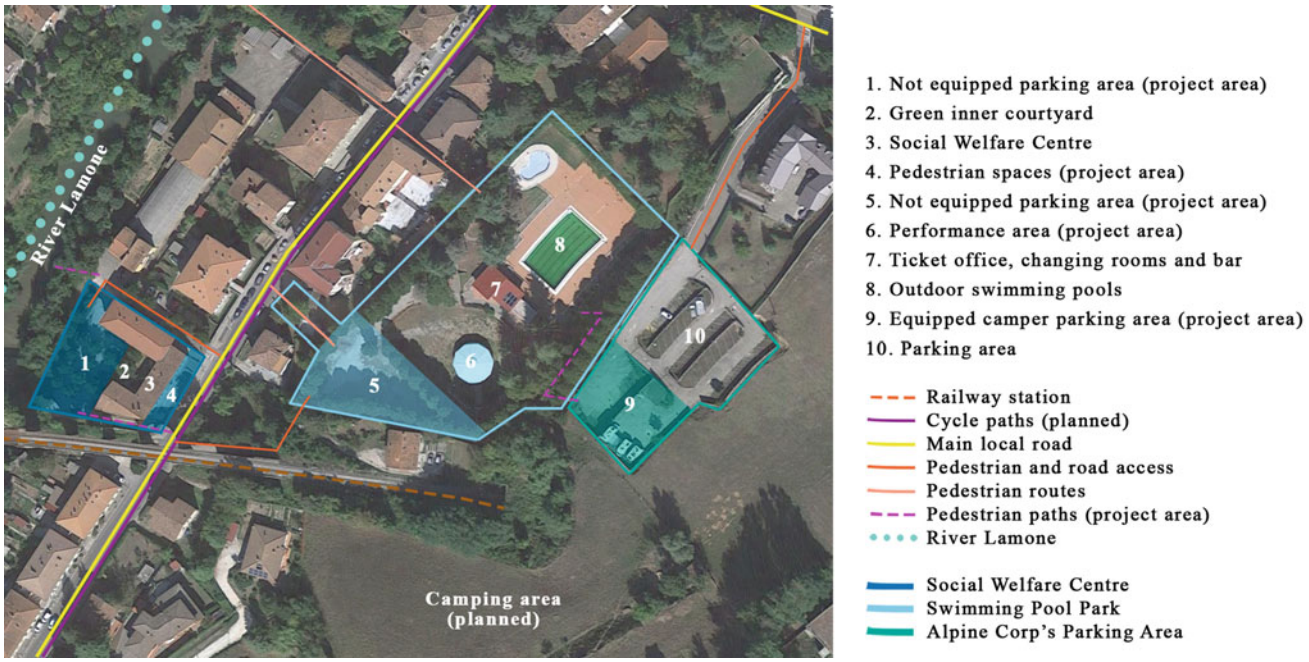


Fig. 3 Project area

Fig. 4 **a** The No. 302 regional road, the Marradi Social Welfare Centre and the Lamone river. **b** Swimming pool park and Alpine Corp's parking area

In the Swimming Pool Park area, in addition to extraordinary maintenance work on the existing summer equipment —consisting of two outdoor swimming pools and a performance area—the project included the introduction of new services for users of all abilities, such as the creation of an inclusive playground, i.e. equipped with games that can also be used by disabled children, and spaces set up for families fully accessible to all kind of users.

Finally, for the Alpine Corp's Parking Area, landscape engineering works to strengthen and improve the connections with the other areas included in the project and the construction of a platform roof covered with photovoltaic panels capable of making the project energy self-sufficient were planned.

3 Actions for Sustainable Regeneration

The *Con. Marradi* project is based on an approach to the urban project described as *civic design,*[15] where the regeneration of spaces and equipment for community use are combined with the search for low-cost and high-value environmentally-friendly intervention methods, to mark "what we could define as a new 'responsible urbanity'" (Alberti, 2015). This approach is confirmed, in the construction of the project, in the combined application of some principles and innovative techniques, specifically: civic

[15] Defined as the urban planning of the constituent elements of the "public realm" (Scott-Brown, 1990).

Fig. 5 Concept plan

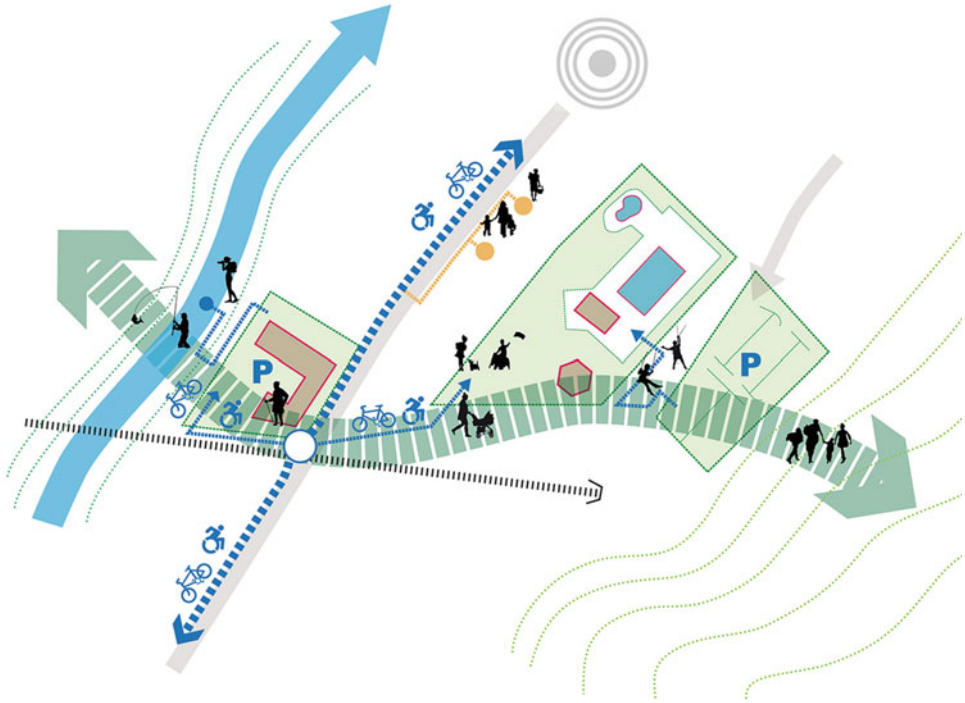
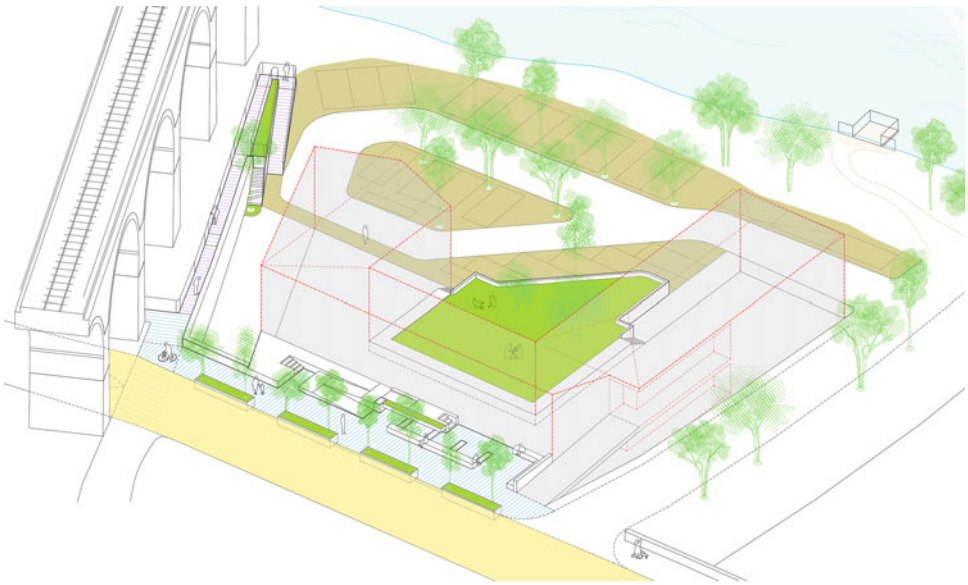


Fig. 6 Project for the Social Welfare Centre



participation, universal design, walkability, energy from renewable sources and nature-based solutions.

3.1 Civic Participation

In order to facilitate verification of the collective usefulness of the proposed interventions, professionals from Urban LIFE and the Municipal Administration held several discussions with the potential beneficiaries of the project, as part of a participatory approach that included stakeholders and territorial associations, most of which were already active and engaged in the areas concerned.[16] The intervention strategies were, therefore, put together by integrating the objectives of the public administration with the wishes of the residents, which were collected through surveys and

[16] The use of participatory practices to "strengthen the capacity to construct, define and develop public policies" is expressly provided for in the legislation of the Tuscany Region (Tuscany Regional Law No. 46/2013).

Fig. 7 **a** Social Welfare Centre (current state). **b** Natural paths between the Social Welfare Centre and the Lamone River (project)

reconnaissance trips and followed by public meetings in each phase of the creative and decision-making process. The outcome was a collaborative project, the result of a broad sharing of intentions (Fig. 8a,b).

3.2 Universal Design

The expression *Universal Design*, coined by the US architect Ronald L. Mace, refers to an approach to the design of objects and spaces that renders them usable and accessible to all people, without the need for adaptation or design specifically thought out for disabled people[17]: this principle was endorsed by the Convention on the Rights of Persons with Disabilities adopted in 2006 by the UN General Assembly. "While the UN Convention states that accessibility as a special and different path, when it is not a reasonable and accommodating solution for a state that cannot otherwise be resolved, is nevertheless a discriminating action, the different approaches teach us that the accessibility of places, goods and services concerns sensory aspects (proposing experiences that at the same time involve sight, hearing, touch and smell, which for some are dominant senses), as well as perceptive (the ability of individuals to process sensory data and attach meaning to it), cognitive (the ability to define strategies on the basis of stimuli) and cultural ones (using trans-cultural means that overcome linguistic limitations […]) (Rossi, 2017).

In the *Con. Marradi* project Universal Design solutions were adopted in relation to the following aspects:

- accessible routes—overcoming height differences through the use of ramps for all users; the use of smooth, non-slippery paving, with appropriate slopes, materials and solutions to facilitate water runoff; the use of coloured asphalts to indicate pedestrian routes (Fig. 9a,b); traffic moderation interventions;
- lighting—the use of appliances that take up minimal floor space, providing diffuse lighting of public spaces;
- urban furniture—characteristics (shapes and materials) and placement of the furniture elements, designed so they can be used by all without limitations; the installation of games that are also accessible to the visually impaired in the equipped area of the Swimming Pool Park (Fig. 10a,b).

3.3 Walkability

The term *Walkability* means a system of solutions to encourage walking and cycling as alternatives to vehicle mobility, with a view to promoting environmental sustainability and people's well-being (Rattan et al., 2012). Taking into account that physical inactivity is the fourth most significant mortality risk factor in the world for non-communicable diseases, such as cardiovascular diseases, cancer and diabetes, on the recommendations of the World Health Organization (WHO) the member states have committed with a resolution of 2013[18] to reduce physical inactivity by 10% by 2025 through policies aimed at promoting walking and cycling and other forms of active mobility in safe and accessible conditions for all. Several environmental factors are however capable of discouraging soft mobility in urban settings, such as scattered facilities and the lack of sufficiently wide and protected pedestrian

[17] The seven key principles of Universal Design were codified in 1997 by the Center for Universal Design of North Carolina State University: 1. Equitable Use, 2. Flexibility in Use, 3. Simple and Intuitive Use, 4. Perceptible Information, 5. Tolerance for Error, 6. Low Physical Effort, 7. Size and Space for Approach and Use.

[18] World Health Assembly resolution WHA 66.10 on follow-up to the Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Noncommunicable Diseases. Geneva: World Health Organization; 2013, http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R10-en.pdf (05/2020).

Fig. 8 **a** Civic participation (31 May 2019). **b** Civic participation (8 November 2019)

Fig. 9 **a** The No. 302 regional road (current state). **b** Pedestrian routes in coloured asphalt for the No. 302 regional road (project)

Fig. 10 **a** Swimming pool park area (current state). **b** Inclusive playground (project)

routes, which, even in small towns such as Marradi, make most people use the car or the scooter for very short journeys.

The objective of making the village walkable is pursued in the *Con. Marradi* project through the creation of a network of safe pedestrian spaces and paths linking up the three functional areas considered in the project (access ramps to the Social Welfare Centre and to the Swimming Pool Park; a connection between the latter and the Alpine Corp's Parking Area, Fig. 11a,b): through the area concerned, this system also serves to reconnect the city centre with the riverbank, giving visitors a pleasant and healthy experience as they get to know the places.

3.4 Energy from Renewable Sources

At global level, the European Union has taken on a leading role in the fight against climate change and in the promotion of renewable energy sources. This commitment is reflected in the "20-20-20 Climate & Energy Package", approved by the European Commission in 2009 (Directive 2009/29/EC), which sets a 20% cut in greenhouse gas emissions on 1990 levels, the achievement of 20% of the energy produced from renewable sources with respect to a 20% reduction of consumption as comprehensive targets to be achieved by 2020 for all member states. European Directive 2018/2001 set new objectives for 2030, updating the rets referred to the cut in emissions and the energy produced from renewables respectively to 40% and 32%. The same directive pointed out how "small size plants can be very useful in increasing public acceptance and ensuring the diffusion of projects involving renewable energy, in particular at local level".

From this perspective, the *Con.Marradi's* project includes installing a photovoltaic plant on the platform roof covering the car park in the Alpine Corp's Parking Area (Fig. 12a, b). The plant is made up of 48 photovoltaic modules in monocrystalline silicon capable of ensuring a peak power of approximately 10 kW. The Grid-Connected photovoltaic generator will cover a surface area of around 82 square metres and will have a total power of 14.4 kWp. Average annual production of around 18,000 kWh/year is expected, which will autonomously power the LED lights of the parking area and all pedestrian paths.

3.5 Nature-Based Solutions

Recent European planning identifies Nature-Based Solutions (NBS) as a range of interventions capable of both providing environmental services and social advantages, and of increasing urban resilience to climate change and natural disasters (EC, 2016). As was also apparent in the European project EKLIPSE[19] and the REBUS (Renovation of public Buildings and Urban Spaces) research promoted by the Emilia Romagna Regional Government[20] "nature, if reintroduced into the city, can act effectively, be very performing and even less costly than other solutions to reduce the impact of climate change and make the urban environment more resilient" (Dessì et al., 2016). A well thought out urban green system, adequately interconnected and accompanied by suitable rainwater disposal solutions can actually reduce pollution and improve air quality, absorb rain and reduce the risk of flooding, as well as encourage physical exercise by bringing nature into people's daily lives with positive effects on public health.

Due to the climatic difficulties that could potentially affect the territory of Marradi, the nature-based solutions included in the project mainly aim to increase the permeability of the soil as an adaptation measure for rainstorms: water-draining pedestrian paths in the Social Welfare Centre (Fig. 13); flower beds with high draining capacity at the edge of the No. 302 Regional Road; steps made of a draining conglomerate, edged with weathering steel elements in the green areas around the swimming pool.

4 Conclusions

The *Con. Marradi* project is an attempt to unite themes concerning sustainability and urban resilience, the smart and healthy city, and civic inclusion and participation with an integrated design approach focused on the regeneration of the public space seen as a fundamental asset to increase the liveability and attractiveness of a territory: aspects that are clearly complementary from the perspective of sustainable development in an inner area such as that described above.

The multi-criteria approach put in place by the Urban LIFE team made it possible to link together modest interventions, adjusted to the small budget available, but nonetheless inspired by innovative criteria and included in an overall vision, with a view to amplifying the benefits and the positive effects on the territory.

From a social point of view, these involve rebuilding a positive relationship between the population and the territory

[19] The Expert Working Group on Nature-based Solutions to Promote Climate Resilience in Urban Areas (EKLIPSE), in collaboration with the European Commission, has developed a basis of scientific evidence on the benefits linked to the application of nature-based solutions to increase the resilience of cities to the different effects produced locally by global warming (urban heat islands, torrential rain, drought, etc.).

[20] Training course and design laboratory on urban regeneration for the mitigation and adaptation of public spaces to climate change (Emilia-Romagna Regional Government 2015). The research was developed as part of the European project REPUBLIC-MED (REtrofitting PUBLic spaces in Intelligent MEDiterranean Cities).

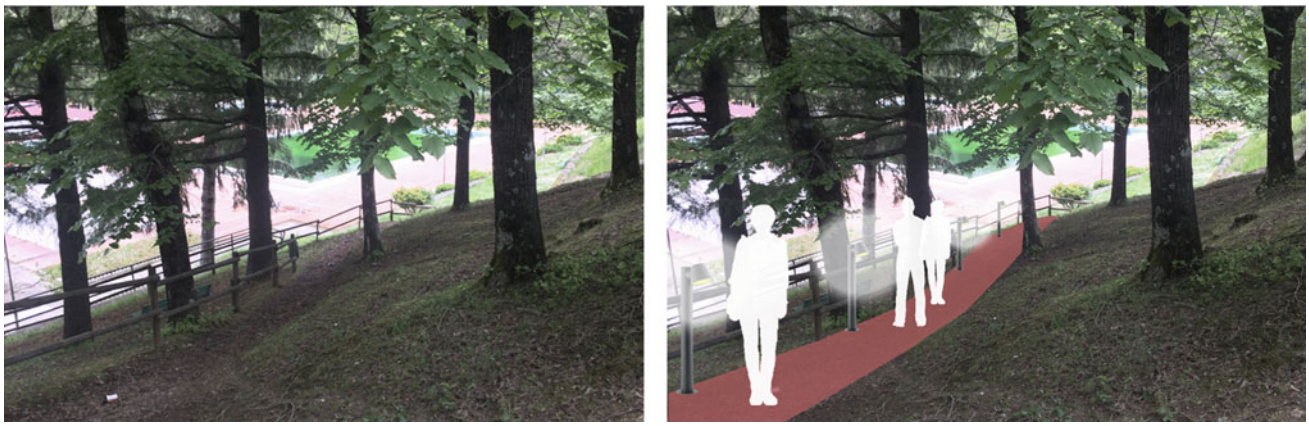


Fig. 11 **a** Pedestrian paths between the swimming pool park and the Alpine Corp's parking area (current state). **b** New connection between the swimming pool park and the Alpine Corp's parking area (project)

Fig. 12 **a** Alpine Corp's parking area (current state). **b** Photovoltaic plant (project)

by restoring or strengthening proximity relationships, which represent an essential element that brings communities together. On an economic level, as highlighted by the National Strategy for Inner Areas, enhancing the territorial capital through the prudent use of existing resources, is the *sine qua non* for any relaunch initiative.

It should be noted that, despite the intentions, the opportunities offered by regional or national funding for inner areas, such as that recently allocated by the Tuscany Regional Government, are rarely effective in these extremely complex territories, both in terms of their inadequacy and because most of the time they end up being used to achieve precise interventions rather than bringing about progress, albeit in small steps, in the implementation of long-lasting development strategies. From this point of view, Marradi, therefore, represents an experience that bucks

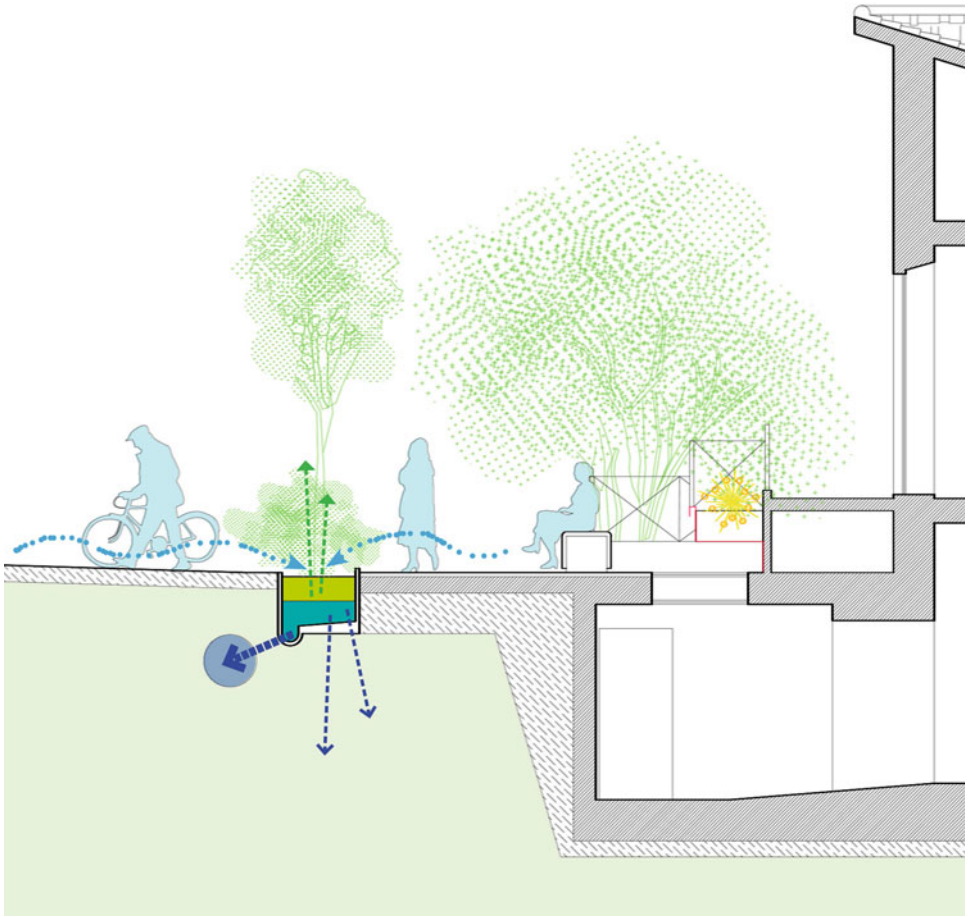


Fig. 13 Nature-based solutions for better climate resilience

the trend, exemplifying an incremental regeneration model for a peripheral area that can also be replicated in other contexts.

It is hoped that the renewed interest in "old villages" as a reaction to the COVID-19 pandemic will not end when the emergency is over, but instead that it will act as a stimulus for a new and more decisive phase of the National Strategy for Inner Areas.

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The Use of Semi-public Spaces as Urban Space and Evaluation in Terms of Urban Space Quality

Melike Orhan

Abstract

The rapid physical change and increase in density of today's cities lead to changes in urban space usage and habits in urban life. This change negatively affects the description and use of public spaces as socialisation spaces, which are one of the most significant urban components. As a result, city dwellers satisfy their need for public spaces with the use of different urban spaces. Urban life shifts from urban public spaces to semi-public spaces. Semi-public spaces are qualified and accessible spaces that ensure transition between private spaces (buildings) and public spaces. These spaces gain different attributes according to the characteristics (commerce, housing, tourism, etc.) of the urban spaces they coexist within and to the functions and designs of the structures surrounding them. These attributes determine their configuration as integrated or dissociated with the city and thus specify their relationship with the city. This relationship changes 'city–space–structure–human' interaction, and this change affects urban quality with the spatial quality of semi-public spaces. The aim of this study is to present how and related to which characteristics the use of semi-public spaces as urban spaces has changed, to detect the effects of this change on the urban environment and to establish the role of semi-public spaces in terms of urban quality. In conclusion, semi-public spaces with different characteristics located in different urban spaces will be examined as regards physical, schematic, functional characteristics and use within the scope of this study. In accordance with the data obtained by comparative analysis method, approaches to facilitate their use as urban spaces and to ensure their integration with the city will be introduced. Accordingly, criteria that semi-public spaces should possess in order to increase and sustain urban space quality will be determined.

Keywords

Semi-public spaces • Semi-public space design • Urban spaces • Urban space quality

1 Introduction

The process of globalisation creates significant changes and transformations in the spatial structures of cities. Public life is diverted to new centres along with the change observed in the urban dwellers' expectations of public life and public space. The relationship between structures, streets and voids, which are defined as the fundamental elements of urban space, is reorganised in order to form different public spaces of use. Thus, semi-public spaces have been started to be utilised as new centres to socialise and communicate as a result of the needs of urban dwellers and public relationship forms. Although urban public spaces still preserve their charisma in terms of public life, semi-public spaces have become more preferable as well-designed urban environments.

Semi-public spaces are those formed between structural groups including 'housing/dwelling groups, office buildings, common areas designed between/within plazas' and 'common areas surrounding shopping centres' and are open to the usage of individuals remaining outside the structural group.

The correct structural relationship constructed between semi-public spaces and the city itself relies on the accurate formation of design approaches. The physical–design–functional attributes of the structural group these spaces are found within or are neighbour to directly affect its perceptibility, accessibility and utility, which all determine the role semi-public spaces play in social interaction and overall spatial quality.

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2 Urban Public Spaces

Cities are places where societies and individuals coinhabit and socialise. Urban space is not only a 'place' where structures form. It is also a social and cultural concept where public events take place and individuals shape their relationship with their environment. Therefore, besides its physical dimension, the design of urban space that has a significant impact on human and social behaviour possesses a social and cultural aspect (Ozparlak & Meshur, 2012). Regardless of the size and scale of the urban space, the human factor should not be ignored because these spaces exist for people just like other places. What transforms a space into a place is how it is used and experienced by people (Resuloglu, 2020).

The relationship of space users (society and the individual) with the physical surrounding, their perception and interpretation or sense-making of the space and their behaviour within the physical environment plays a vital role in the shaping of urban spaces. With their determinative position particularly in the formation of cities, public spaces are those where all social classes and cultural groups and people with distinctive characteristics coexist. Individuals have the opportunity to break their shells and experience divergent and new ideas in these public spaces (Erdonmez, 2014).

According to Rapoport (1977), public spaces are those where people can freely express themselves, carry out daily activities and communicate with others. In other words, public spaces are defined as potential socialisation spaces that enable different groups and communities to come together, and hence differ from private spaces with this attribute (Amin, 2008).

Social and spatial changes occurring in recent years have shifted the perspective to public spaces, the value given and usage characteristics (Lopes et al., 2012). Boundaries that separate private and public spaces appear in discourses regarding spatial separation of social life. The architectural and geographical order of the boundary is the formal aspect of separation and social order signs (Madanipour, 2003).

Urban space is shaped by manifold forms and boundary degrees containing multi-layered constructs and meaning. In certain cases, the notion of boundary constitutes a flexible structure allowing for permeability and social interaction. The ordering of spatial boundaries signifies establishing a bond between areas. These bonds are of paramount importance in terms of generating social interaction and vitality in the public space (Madanipour, 2003). Ideally, 'public spaces' and 'private spaces' cannot be sharply separated from each other but are connected with transition zones with semi-public space and semi-private space uses (Newman, 1996).

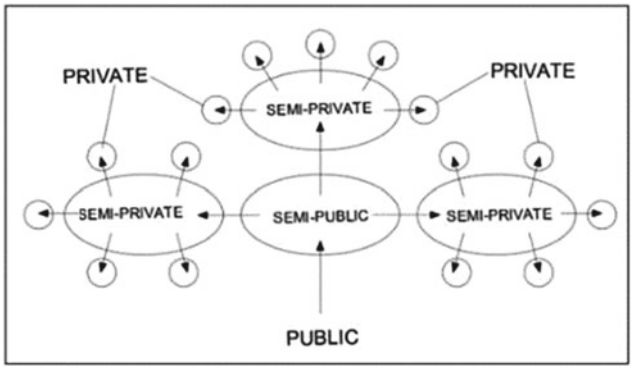

Fig. 1 Diagram showing public, semi-public, semi-private and private spaces (Trancik, 1986)

While public spaces are defined as spaces belonging to the society as a whole and are open to public use, private spaces are defined as those of private property where private needs of the individuals are met. However, despite being clear in theory, this division is not as clear in practice. While the boundary between public space and private space is sharp in certain cultures, the interwoven structure of public and private spaces can easily be seen in some cultures as well (Uzgoren & Erdonmez, 2017). As seen in Fig. 1, the element softening the boundary between public and private spaces is semi-public/semi-private areas. This semi-public and semi-private condition enriches the city by diversifying activities in the urban space since it increases the diversity found in urban areas (Uzgoren & Erdonmez, 2017).

3 The Change of Public Spaces at the Present Time

At the present time, public spaces go through various fractures. The rapid physical change and increase in density of today's cities lead to changes in urban space usage and habits in urban life. This change negatively affects the description and use of public spaces, which are one of the most significant urban components. As a result, city dwellers satisfy their need for public spaces with the use of different urban spaces.

There is a renewed interest in public space that while modern life no longer depends on the city square for basic needs, good public space is required for the social and psychological needs of modern communities (Mehta, 2013). Several urban theoreticians argue that even with this interest in public space, the variety of functions of public life is decreasing (Zukin, 1996).

Van Melik et al. (2007) declared that public space design has in recent years responded to two trends. On the one

hand, security anxiety causes people to avoid the public space and prefer the private space. Yet, the appeal of urban entertainment induces people to indulge in new experiences outside the home. These preferences produce two distinct types of public space (Carmona et al., 2008):

- Secured public space which aims to create a sense of safety through security tools.
- Themed public space which aims to create various activities and ambience to increase the use of public space.

Predispositions towards public life and spaces justify the changing approaches to city and city dwellers. With the transformation and reshaping of cities, people prefer a more isolated lifestyle, choose more safeguarded areas for socialising and do not use public spaces like squares and piazzas with significant values (Uluoglu, 2007).

Functionality and aesthetic of the buildings surrounding public spaces have yielded prestige and a show of strength. Factors affecting the transformation seen in public spaces are mostly global. One of the reasons is the specialisation of urban functions and emergence of new centres in cities. Privatisation of administrative functions in cities has brought along the privatisation of public spaces. This privatisation has not only been felt in housings and dwellings but urban spaces have started to gain value with new megastructures and commercial areas. While special functions have been introduced to certain zones in cities, some areas have been privatised for some activities. Newly developed centres are usually situated on transportation axes. Existing centres have alternate functions (Gokgur, 2008). 'Office parks' comprising plazas and similar new structural groups have become areas open to office workers only by grouping within an enclosed court. These areas that carry the characteristic of public spaces are now being used only by a specific group of people (Gokgur, 2008).

Banerjee (2001) noted that public life occurs in privatised spaces, as well as the public space. He defended that it should be minded more on public life besides the limited focus on public spaces. Residents of the city deserve an examination of the quality of these public spaces (Mehta, 2013). Hence, providing spatial quality of each and every kind of public space is necessary not only for the life quality of city dwellers but also for urban quality.

4 Semi-public Spaces

An urban space shaped by necessities and behaviour is classified into four different headings regarding forms of use. These classifications include 'private spaces', 'public spaces', 'semi-private spaces' and 'semi-public spaces'. Private spaces are controlled by individuals and are intended for personal use. Public spaces are those that can be used by everyone and where public events take place. For semi-private spaces, the user of these spaces is the property owner. They may be any structure that can be seen only from the outside. Semi-public spaces are those that enable passage between private and public spaces and can be seen, accessed, observed and examined by individuals (Erdonmez & Aki, 2005).

This definition, also referred to as spatial hierarchy, is one of the actors determining the level of success of urban design. The success criterion here is the procurement of continuousness between the spaces in question (Ozparlak & Meshur, 2012). The ratio between structures, streets and voids, which are defined as the fundamental elements of urban space, and the provision of continuousness of quality–quantity are important for a successful urban texture (Fig. 2).

Being the most important binding element within the open space construct that was first split into categories by Newman (1972), areas of 'semi-public space' quality are key evaluation subjects for urban design and planning practice (Fig. 3). Spaces open to all parts of the society but more frequently addressing the users within their sphere of influence are issued with high importance as the interaction interface between public and private spaces (Sinmaz, 2017).

Once outside the boundary of a private space, semi-public spaces are those that can be used by all classes of the society but are more frequently controlled by users within their sphere of influence (Gehl, 2001). Examples of these spaces can be as follows: housing groups, common areas designed between–within office buildings, common areas surrounding shopping centres and city block structures with dead end streets (approach to developing semi-public spaces in public spaces).

According to the PPS-Project for Public Spaces (2008), a semi-public space is a transitional area that extends from the edge of the building to the public sidewalk and creates a semi-public zone. This zone includes all the 'civic spaces' surrounding a public or private building (Fig. 4).

Fig. 2 Leon Krier's European public space quantity ratio (Krier, 1998)

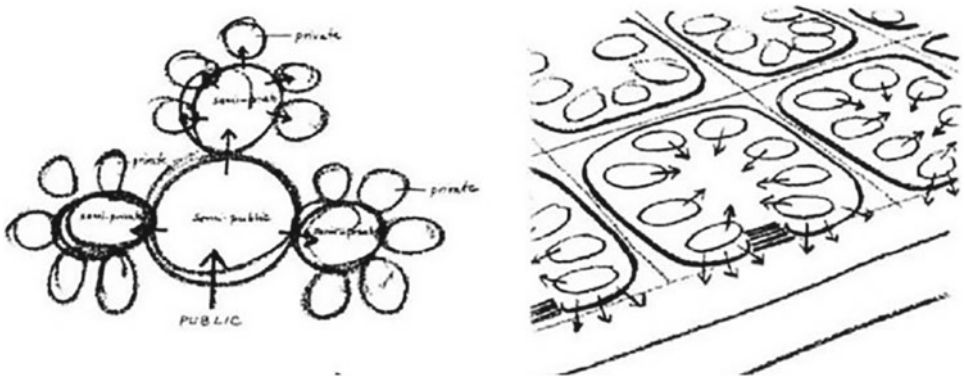

Fig. 3 Transitional spaces between public (Newman, 1972)

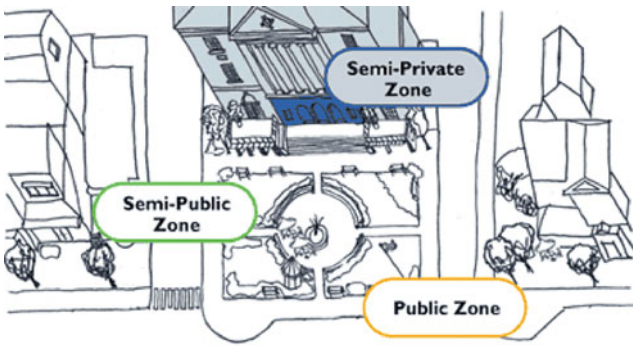

Fig. 4 Forms of public space (PPS-Project for Public Spaces, 2008)

There are many issues influencing the formation of semi-public spaces, one of the significant elements of urban space. Apart from physical elements, these spaces shaped by social and psychological elements experience change in connection with the differentiation oriented at expectations towards city life. Life in a building complex designed for communal living with security and boundaries is constructed on high-rise structures, which have become indicative of new living spaces, and the open spaces generated around it have come into prominence (Ozparlak & Meshur, 2012). Areas where semi-public space use is seen most prevalently are these places, and they are considered as a new public space alternative to urban outdoor spaces.

4.1 Kinds of Semi-public Spaces and Their Use as Urban Spaces

Semi-public spaces attain various attributes according to the characteristics of the public space they are located in (commercial, housing, tourism, etc.) and function and design of the surrounding buildings. These attributes establish their configuration as integrated or dissociated with the city and their relationship with the city thereof.

Attributes, user profile, usage density, perception and socialising opportunities of semi-public spaces situated in a housing zone differ from those situated in a commercial zone or between office structures. These differences are determinants of the physical–social status of semi-public spaces and are reflected in schematic/design approaches. The relationship of the space with the city, connection points and degree of closedness are also formed according to these attributes.

Additionally, properties of urban areas and/or structure blocks with different characteristics that change with respect to 'location–time–need–function' also shape semi-public spaces. Nonetheless, in designing semi-public spaces as part of the urban structure, decisions should be made within the scope of 'accessibility–reachability' (Figs. 5 and 6).

Accessibility is the most significant condition that should be provided for in a public space. Accessibility in public spaces can be considered in two angles: physical and social. 'Reachability' of a space is as crucial as the 'accessibility' criteria. Reachability of semi-public spaces is valid in cases where 'opportunity to access, involve in and use the space' is created.

In this context, when semi-public spaces are analysed schematically, it has been seen that they show resemblance to town squares found in cities in terms of location and formal classification. For instance, Zucker (1959) classified town squares into five archetypes in a study conducted on public squares (Fig. 7):

- The closed square, in which the space is held within (independent),
- The dominated square, in which the space directed to the main building,
- The nuclear square, in which the space is formed around a centre,
- The grouped squares, formed by spatial units interconnected to make longer compositions,
- The amorphous square, in which space has no boundaries.

As seen in the classification of Zucker, squares have different elements determining their characteristics like

Fig. 5 Tepe prime, mixed use center of office, retail and residential units, Ankara, Turkey (A Tasarım Mimarlık, 2020)

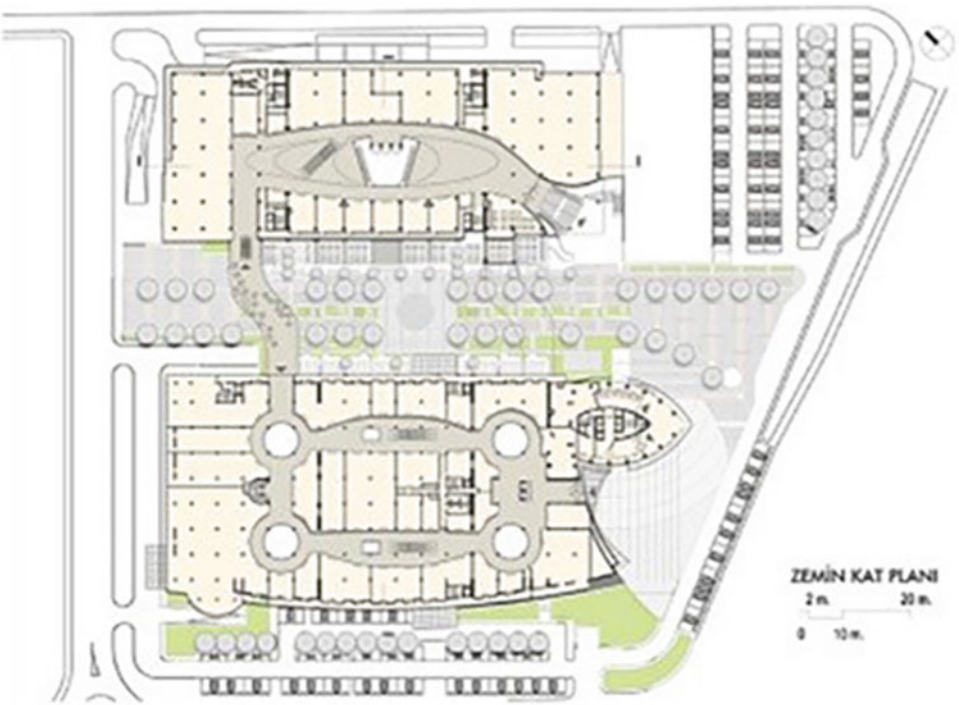

Fig. 6 Armada, Double Mall, Ankara, Turkey (A Tasarım Mimarlık, 2020)

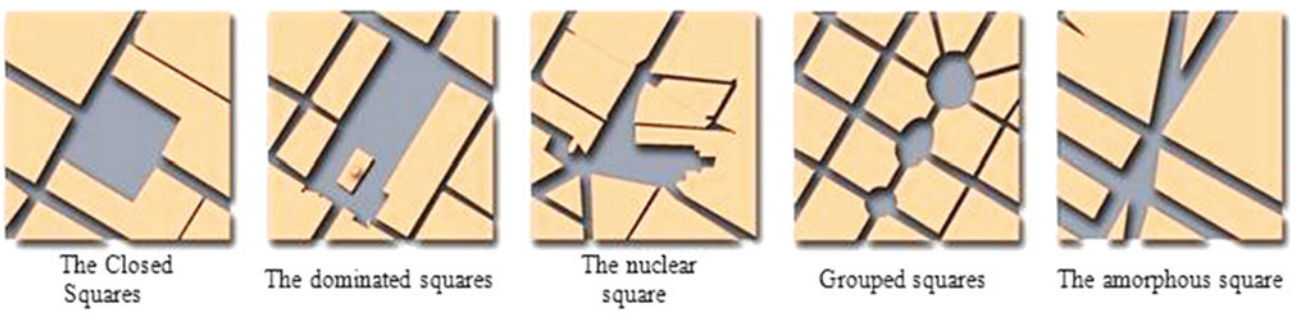

Fig. 7 Zucher's urban square categories (Zucker, 1959 cited in Mahmoud & Ghanem, 2019)

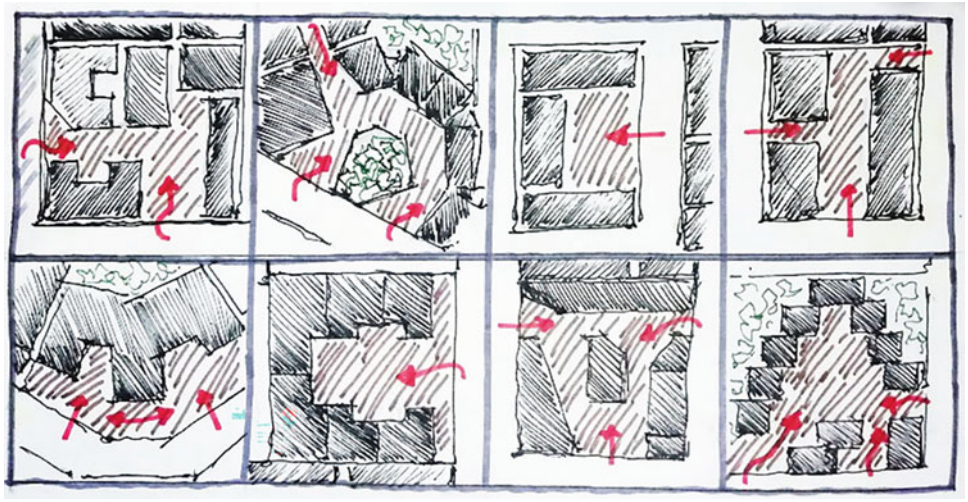

Fig. 8 Different semi-public space design approaches in the city (edited by author)

location, status, accessibility and perceptibility including 'structures forming the boundaries of the square', 'formal properties of these structures (height, width, length, transparency and permeability)', 'transportation-connection axes establishing the relationship of the square with the milieu', 'duty cycle', etc. (Fig. 8).

5 Public Space Quality and Parameters

Quality today, is the primary matter to be discussed in every aspect of life influencing human beings. Quality is the attributes in total, making it possible for the needs to be met. Urban quality is ensuring urban comfort and meeting user needs in all kinds of urban spaces. Urban quality is possible with the correct urban design and affects all layers of life. The more perceivable, the more legible and integrative an urban space is, the more successful it is in terms of urban quality. Quality of urban space is not only related to the functionality of the space, but also to its each descriptive attribute (Orhan, 2015).

Quality is a multi-layered concept perceived differently as per the area used or the subject at hand. There are several approaches and various criteria of many theorists on city and urban quality.

Lynch (1984) tried to find an answer to the question: 'what makes a city beautiful?' in his book titled 'Good City Form' through an analytical approach. Lynch's main focus is to argue the importance of sense of place in people's lives. Lynch (1984) defines the two criteria of 'Efficiency' and 'Justice' and determined five basic dimensions for ensuring urban space quality and good urban form by placing these two concepts as metaphors:

- Vitality (sustenance, safety and consonance),
- Sense (identity, structure, congruence, legibility and transparency),
- Fit (adaptability, manipulability and accessibility),
- Access (to people, human activities, services, material resources, natural environment and information)
- Control (congruence, responsibility and certainty)

PPS-Project for Public Spaces (2008) identified four main functions for a successful public space: 'Access and Linkages', 'Uses and Activities', 'Comfort and Image' and 'Sociability'. It developed the Place Diagram as a tool to define any place, good or bad (PPS-Project for Public Spaces, 2008) (Fig. 9).

Whyte (2000) also addressed four fundamental attributes necessary to create urban public spaces. These include 'accessibility', 'various activities for people to be engaged in', 'the space should possess comfort and a good image' and 'spaces that support social activities and intimate spaces where more opportunities for social interaction are provided for'. Greene (1992) determined four main principles for space quality, each of which contains four separate quality parameters:

- 'Function': Connection, Security, Comfort and Variety
- 'Formation': Consistency, Clarity, Continuity and Balance
- 'Identity': Focal, Unity, Character and Feature
- 'Attraction': Scale, Consonance, Vitality and Harmony

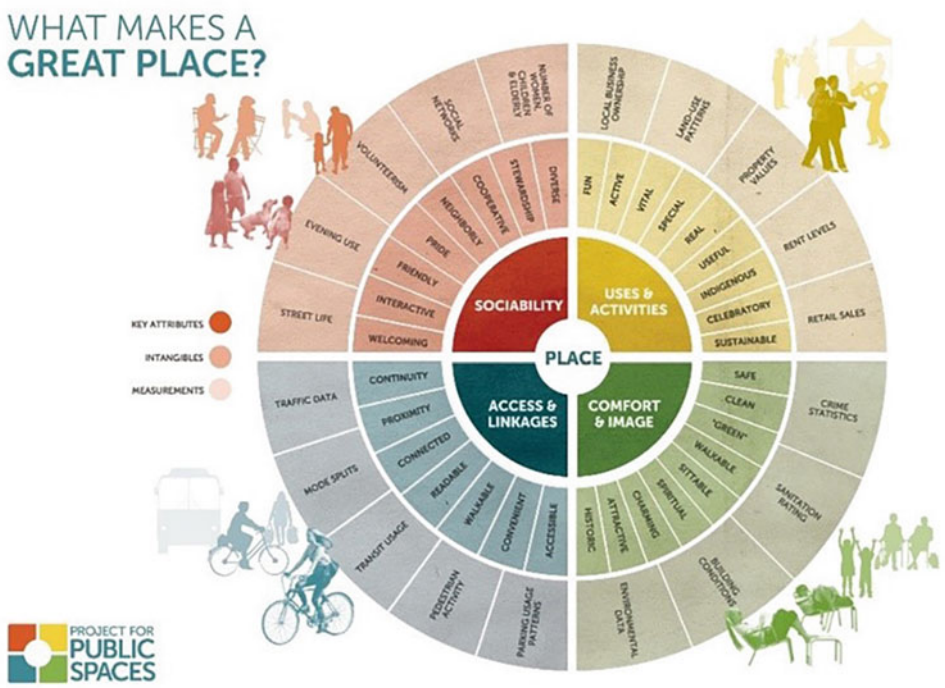

Fig. 9 The place diagram (PPS, 2008)

6 Space Quality in Semi-public Spaces

Semi- Semi-public spaces are perceived and preferred as sheltering spaces bringing in privileges for their users. Therefore, how the space design of semi-public spaces affects people's choices is a significant matter of debate.

Is it sufficiently used by the citizen? Does it meet user needs? Is it democratic? Does it have a structure strengthening the urban environment? Can the space be used for different purposes? Does it address sensual experiences as much as it addresses physical ones? The answers to these questions are vital to define semi-public spaces in themselves.

Accessible–reachable–perceivable semi-public spaces can be defined and used easily within the city itself. In this context, approaches required to enable the use of these spaces as public space will bring along public space quality as well.

Spatial quality parameters mentioned above and put forth by different researchers contain necessary criteria for semi-public spaces. Furthermore, PPS-Project for Public Spaces (2008) discussed necessary criteria for the design of semi-public spaces and structure blocks these spaces are located 'within–between–bordering to' under the headings of 'Civic Spaces' and 'Building Base' principles.

- *Civic Spaces' Principles:* Connecting the Sidewalk to the Building; Providing Focal Points; Image and Identity; Programming and Management.
- *Building Base Principles:* Human Scale; Active Ground Floor Uses; Transparency.

Considering all criteria mentioned above in order to provide and sustain spatial quality in semi-public spaces, a table involving the 'dimensions of quality and their attributes for semi-public spaces' has been prepared (Table 1).

Within this scope, the factors determining the formation/design of the semi-public spaces were classified. Upon determining the place/design/formation of the semi-public space within the city itself, the main determinant of the semi-public space is its usage attributes and function. This function is connected to 'quality components'. Function puts forth which quality criteria should be prioritised in the space.

Quality components were groups based on the quality parameters defined and determined by various theorists in the 'Public Space Quality and Parameters' section. Quality components provide a connection to 'quality sub-components' that present further attributes.

In conclusion, as shown in Table 1, the attributes of semi-public spaces, such as 'their structural relation with the city, design approaches, the physical and functional attributes of the structural group they are located within etc.', were accepted as super determinants, and other quality parameters were placed in necessary areas. Quality determinants can be added or developed according to the determinative attributes of semi-public spaces not found in Table 1.

Table 1 Dimensions of quality and their attributes for semi-public spaces

Semi-public space features—formation						
Borders	Enclosure degree with structures	Urban connection points	Urban area function	Function and identity of surrounding structures	Location in the city	Focal points
↓						
Semi-public space usage characteristics (commerce, housing, tourism, etc.)/function						
↓						
Quality parametres						

Quality component	Quality subcomponent	Quality attributes
Reachability/accessibility to people, human activities, services, material resources, natural environment, information	Linkage	Involvement, providing focal points, ground floor uses, transparency, perceptibility, availability, transportation urban connection points, transparency
	Movement	
	Connection	
Vitality	Sustenance	Aesthetics, usage, space, life
	Safety	Responsibility, certainty, programming and management, comfort, design, perceptibility, transparency, clarity, continuity, connection
	Consonance	Scale, eligibility, harmony, usability
	Comfort	Focus, integrity, character, feature (exemption), diversity
	Attraction	Usage and activities, social interaction, feature, diversity
Formation	Location	Availability, transportation, usage and activities, design, active ground floor uses, urban connection points, connecting the sidewalk to the building, scale
	Structure	
	Space	
Fit (adaptability of a place) Consonance	Adaptability	Involvement, Social Interaction, Belonging
	Manipulability	Scale, Eligibility, Harmony, Usability
Control (responsible control over the environment)	Security	Responsibility, certainty, programming and management, comfort, design, perceptibility, transparency, clarity, continuity, connection, financial status
	Maintenance	
	Safety	
Sense	Identity	Responsibility, certainty, programming and management, comfort, design, perceptibility, transparency, clarity, continuity, connection, financial status
	Character	
	Structure	Design, Usage and Activities, Active Ground Floor Uses, Clarity, Continuity, Balance
	Congruence	Image, design, usage and activities, space, Eligibility, focal, unity, feature, transparency
	Legibility	

Within the framework of these principles, providing urban space quality is possible with correct space design. All layers of urban life are affected by increasing, providing and sustaining quality in these spaces where life is experienced and shaped. The more perceivable, legible and integral an urban space is, the more satisfying it becomes in terms of space quality and urban life quality.

7 Conclusion

At the present time, the expectations of city dwellers regarding public life and public spaces have changed, opting for a more isolated lifestyle and more protected and safe-guarded areas to socialise. Therefore, public life shifts from public spaces to semi-public spaces. The relationship between structures, streets and voids forming urban space is reorganised in an attempt to construct these areas. With changing urban design–settlement approaches, 'semi-public spaces' are presented to us as a new public life model maintained between high buildings and densely formed in city boundaries.

Establishing the correct structural relationship between semi-public spaces and the city itself is possible with the correct construct of design approaches. The physical–functional attributes of the structural group located within or neighbouring these areas directly affect its perceptibility, accessibility and utility, which determine the role semi-public spaces play in social interaction.

Nonetheless, the utility attribute of semi-public spaces must be well defined. Should these spaces address a specific group of users, their publicness diminishes and is hence led to be perceived as semi-private spaces. For the sake of increasing publicness in these spaces, the concept of 'accessibility' should be handled with both physical and social dimensions. There must be no transportation difficulties to the space and social aspects of accessibility obstacles must be questioned. Individuals must equally access the public space, and its usage must be ensured to all.

Since semi-public spaces have marked boundaries and are more sheltering and designed-built when compared to urban public spaces, user needs and wishes differ, which become determinative in classifying quality components.

As seen in Table 1, some quality parameters that are secondary for urban public spaces can be a priority for semi-public spaces. This difference is directly related to the use of urban public space and semi-public space and the needs and wishes of the users.

Urban experience is a common experience of spaces and voids. Today, this experience is sought in semi-public spaces. The design of these spaces must be addressed holistically reckoning every condition affecting urban life, including physical, social, cultural and economic dimensions.

For the sake of providing space quality, established quality parameters must be implemented exclusively to space. It is necessary to evaluate the quality criteria it should possess and to take into account these criteria during the design and utility phases of semi-public spaces.

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Rethinking Residential Neighborhood in Dhaka, Bangladesh: Jane Jacobs's Urban Design Principles for Improving Livability

Nazmun Akter Pia

Abstract

Dhaka, the capital of Bangladesh, is a dysfunctional city partly due to political crisis but, more importantly, because of poor planning decisions and lack of vision for community design. It is also one of the least livable cities in the world, however, a vibrant network of self-sufficient neighborhoods can gradually improve the city's condition. Community and neighborhood play a very crucial role in our mental, physical, and social well-being as well as in our overall quality of life. Therefore, in order to alter the scenario of Dhaka, neighborhoods are the ideal units to study, analyze, and test different initiatives. Through this process, we can come up with the required bottom-up solution to create a healthy and sustainable urban environment. Jane Jacobs (1916–2006), a highly influential urban thinker, championed the community-based approach to designing a city. This paper analyzes the existing situation of a dense residential neighborhood in Dhaka and conceptualizes how implementing Jane Jacobs's urban design principles can restore the sense of community and enhance livability.

Keywords

Urban design • Dhaka city • Livable neighborhood • Jane Jacobs • Community-based approach

1 Introduction

The Global Livability Index 2019 declared Dhaka as the third least-livable city in the world. An uneven urbanization process, weak urban authorities, irresponsible political actions, and a lack of vision for future developments all shape this city as a symbol of inequality (Fig. 1). One of the key challenges in this situation is how to improve the current conditions and create a livable, comfortable, attractive, and safe place for people. Dhaka is also the sixth densely populated city in the world. In this bustling megacity, twenty million people are living in only 325 km^2 area and by 2030, the population will increase to thirty million (United Nations, 2018). Population density plays an important role in the case of understanding cities. Understanding the impact of density and addressing it with proper planning and design guidelines is crucial for Dhaka's situation. However, this kind of conversation among planners, government leaders, and advocacy groups yet has not started in the planning context of Dhaka.

Jane Jacobs's *The Death and Life of Great American Cities* provides an introduction to the concept about how density can support the formation of a healthy urban community. At the beginning of the twentieth century, building/population density was considered undesirable in planning theory and practice (Moroni, 2016). Cities were understood only on the basis of spatial fabric and infrastructure and the essential characteristics for the city were efficiency and mobility. During mid-century urban renewal in the United States highways were built through vulnerable urban neighborhoods. It destroyed their intricate social relations and affected the entire neighborhood negatively. Jacobs's writings and protests began with strong opposition to urban renewal, and her argument was that cities are for people rather than automobiles. She drew attention toward the flaws and negative impact of urban renewal and stressed the importance of population density because she believed it encouraged economic diversity, vitality, and could increase

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Fig. 1 The dark side of Dhaka's urbanization. Left (Saber, 2017), right (Joiseyshowaa, 2008)

the social value of a city neighborhood. Jacobs argues that a lot of people packed into a relatively small area could benefit a city economically and culturally (Jacobs, 1961). Jacobs observes how cities actually work, rather than how they should work according to urban designers and planners. She transformed the way we understand the city and introduced new principles of city planning and rebuilding. Although Jacobs's theories and ideas are central to many urban design and planning practices worldwide, in the case of Dhaka, she is still an unknown figure. The continuous failure of urban government and planning authorities to envision a livable city system is pushing Dhaka toward a point of saturation and the city is becoming a high-density congested sprawl.

Jacobs highly criticized the low-density sprawl development and the resulting automobile-centric neighborhoods that were detached from the rest of the urban context. Sprawl commonly refers to the low-density, automobile-centric, and aggregate development of single-use zoning. However, sprawl can occur at any density. Whereas the United States and the developed parts of the world have low-density sprawl, high-density-congested sprawl is the reality of many developing megacities including Dhaka, Mumbai, Delhi, and so forth. The key attribute is the same for every type of sprawl that restricts interaction, isolates people, and segregates them into economic division and land-use division. On the contrary, to make a city livable we must shape it in a way that encourages interaction. That is why Jacobs advocated for a livable alternative to sprawl which would be a compact, dense, and walkable mixed-use development. Neighborhoods are the primary testing ground for Jacobs's theory. In this paper, Jacobs's urban design visions are discussed in relation to neighborhood design in Dhaka. Concentrating on the need for an effective neighborhood development vision, the evaluation is structured in the following four sections. Section 2 presents a systematic review of Jane Jacobs's urban vision articulated in *The Death and Life of Great American Cities* and their application for neighborhood development. Section 3 explores why Jane Jacobs's wisdom is relevant in the context of Dhaka. Sections 4 and 5 attempt to correlate the neighborhood development principles of Jacobs with the current condition of the Dhanmondi residential area in Dhaka, Bangladesh, and offers recommendations that should guide future development.

2 Urban Design Principles of Jane Jacobs

Jane Jacobs is one of the most influential thinkers in urbanism who contributed to the revolutionary intellectual currents of the 1960s (Hirt, 2012). Her seminal book *The Death and Life of Great American Cities* (1961) had an enormous influence on urban design theories and practices. She observed how the principles that underlie the automobile-centric city planning process were essentially destroying the intricate social balance of city life. Jacobs saw cities as living ecosystems, where every part joins to create an interconnected larger system (Jacobs, 1961). She was one of the first urban thinkers who studied cities through a research-oriented approach and identified the gap between theoretical planning practice and the lived experiences of people in places. David Seamon argues, "In terms of focus, method, and discoveries, Jacobs (1916–2006) can fairly be described as a phenomenologist of urban place. Conceptually, her work points toward a phenomenology of the city and urban lifeworld. Methodologically, she illustrates a manner of study whereby citiness reveals itself in the course of every day, taken-for-granted life" (Seamon, 2019).

Undoubtedly, *The Death and Life of Great American Cities* is one of the most important books on cities and city life. She explained the seemingly incomprehensible mechanism of cities in an utterly clear and simple manner. Her narrative is grounded in the theory and practice of placemaking (Adhya, 2012). Based on her own lived experiences Jacobs described the underlying structure of the city and understood the city as a system of organized complexity. Through this book, Jacobs introduced a huge paradigm-shifting urban planning principle: cities are for people where the vibrancy of the neighborhood is created by

mutual community interactions and both economic and social support. The main assumption of *The Death and Life of Great American Cities* is that cities frame and shape our everyday lives and change the social and physical dimensions of life. This book also argues that economic viability is rooted in diverse and dense mixed-use development. Jacobs further discussed that the social and spatial dimensions are essential for livable urban fabric and sense of place.

2.1 Social Dimension: Safety, Interaction, and Privacy

Jacobs suggested different strategies for creating a safe urban environment. She begins the book with an in-depth conversation about the importance of the sidewalk as a central mechanism in maintaining the order of the city. She elaborates on her unique safety concept—eyes on the street, the spontaneous sense of protection from the direct and indirect contact between people in neighborhoods. She emphasizes how the safety of a neighborhood is achieved, not by the surveillance of the police, but through an almost unconscious network of constant voluntary controls and reflexes on the peoples' part (Guerra, 2014). Introducing the concept of an "intricate sidewalk ballet," Jacobs's city design principles try to evoke social interactions in lively neighborhood streets (Jacobs, 1961). Healthy urban spaces exert a strong pull upon their inhabitants to engage with one another. In the case of neighborhood life, as much as we celebrate interconnectedness, we also value privacy. Jacobs acknowledges both our search for belongingness as well as our desire to remain as an individual. The resident may not be in direct social contact with everyone surrounding them, but they should feel at home in their neighborhood and keep an eye on the street for ensuring others' safety.

2.2 Physical Dimension: Mixed-Use, Street, and Public Space

Jacobs wrote, "Cities are thoroughly physical places" (Jacobs, 1961). She observed and wrote about the city's built environment and explored the effective spatial arrangement of the city. For successful neighborhood planning, she recommends a lively, interesting, and continuous street network. She also recommended that public spaces and buildings should be part of the street fabric, as they increase the fabric's complexity and promotes diversity of uses. The idea of safe and sociable streets leads to her next principles: functional identity and mixed-use development at the scale of the neighborhood. She argued that like streets and public spaces foster multiple uses, successful neighborhoods must have a strong diversity of uses (Wooten, 2013).

Jacobs believes that appropriate physical form can create social and economic conditions that allow urban life to thrive. She argued that a mixed-use urban fabric is a vital precondition for creating socially diverse and healthy communities that allow their residents to evolve into productive citizens. To generate diversity and create healthy neighborhoods, four conditions are crucial:

- Mixed primary uses to create vibrancy throughout the day.
- Shorter blocks to make neighborhoods more porous to the pedestrian.
- Mixed-age buildings to enable a diversity of businesses.
- Varied population density.

Jacobs stated, "In combination, these conditions created effective economic pools of use. All four in combination is necessary to generate city diversity; the absence of any one of the four frustrates a district's potential" (Jacobs, 1961).

3 Jane Jacobs's Relevance in the Context of Dhaka

Though Jacobs's theories of city design and development were crafted by an engagement with the urban context immediately around her almost fifty years ago, her urban vision is still very much relevant in the case of understanding cities and neighborhoods regardless of geographical, cultural, and contextual differences. The urban characteristics vary significantly between New York City during Jacobs's time and present-day Dhaka. However, her arguments were based on the observation of ordinary city life and grounded in the universal desire for an engaging urban life. That is why Jacobs's ubiquitous city design principles are well received worldwide. Though the adoption of her ideas varied widely, many professionals understand her theories as a set of ideological principles and some consider them as a source of inspiration (Hirt, 2012; Page & Mennel, 2011; Schubert, 2014). She inspired one of the most important planning movements to emerge in the last decades of the twentieth century, New Urbanism—a community design approach that advocates dense, walkable, mixed, and attractive urban settings. (Page & Mennel, 2011). Jacobs's principles are timeless, comprehensive, and holistic regarding the understanding of a city and planning for its development. Unfortunately, Jacobs is never discussed in the planning context of Dhaka.

Jacobs placed emphasis on studying the city and learning from the people who live there. She stressed the need for planners and designers to understand how cities work in real life. The planning of Dhaka was first institutionalized by the British rulers. Unfortunately, planning practices remained

much more linked to the tradition of the British colonial past and the trend of not understanding the city through local conditions and needs is continuing to this day. From the very beginning, there seems a huge gap between the formal planning theories and practices as opposed to how Dhaka actually works as a city. The planning authorities continuously produce unrealistic master plans based on aesthetic aerial views but, in reality, Dhaka is growing in a chaotic, high-density sprawling form. Dhaka is badly in need of a research-based design approach that will look at the everyday life experience in the city and the approach will reflect positive changes in the built environment and social structure.

In 1917, British town planner Patrick Geddes envisioned Dhaka as a Garden City, however it was not implemented. In the Pakistani era, the first master plan was developed in 1959. No effort was made to evaluate the future growth of Dhaka. This master plan led to striking differences with the existing land use of that time. Old Dhaka was filled with shophouses, narrow and winding streets, and crowded bazaars. Planners envisioned the new Dhaka as a segregated city with residential areas, industrial areas, and a central business district distributed in different parts of the city. The first step in the implementation process started with the development of solely residential neighborhoods, starting with Dhanmondi, and later followed by Gulshan, Banani, Uttara, and Baridhara. The formal planning for Dhaka started with neighborhood development plans but, unfortunately, it shared a similar vision as the modernist city planning movement and American suburban trends. The idea of separating every use was a paralyzing decision for the city and Dhaka started to lose its capacity to support diverse socio-economic mixtures. Gradually the city has transformed into a dysfunctional juxtaposition of unplanned and unregulated mixed uses. It is the reality of all most every citizen that they live in one place, work in another area and, for different urban amenities, they have to travel to different parts of the city on a daily basis. Every day, people lose a significant amount of precious time being stuck on the roads of Dhaka and the vicious cycle of traffic jams continues. This is one of the major factors responsible for the frustrating relationship between the city and its people. This situation has almost reached a point where people stop caring about the city and think that nothing can be done to improve their living conditions.

For too long Dhaka has relied on the old model of zoning and it has led to a large sprawling city. Currently, this confused city is a bizarre mix of inconsistent land-use transformations in the planned area, lack of cohesiveness in the organically developed area, and chaotic informal settlements. Dhaka is badly in need of a new urban vision that will address the present limitation of the physical settings with a proper measure. Jacobs wrote, "Dense concentrations of people are one of the necessary conditions for flourishing city diversity" (Jacobs, 1961). Though she perhaps never anticipated the kind of density Dhaka has currently, her urban design principles offer great guidelines for improving Dhaka's living conditions. The first step in this process requires addressing the overcrowding density and exploring a new planning approach focused on mixed-uses and optimum densities. The future urban design vision for Dhaka should recognize the complexity and fragile intricacy of this megacity and redevelop the city on the basis of organized complexity.

Jacobs understands the life and promise of cities on their experiential merits rather than commercial means alone (Cherry, 2011). While Dhaka is successfully working as the economic engine for Bangladesh, it is gradually becoming a placeless urban realm. It should plan for the high population density with a variety of mixed-use developments, and a convivial hustle and bustle in the neighborhood commercial streets. Unfortunately, the streets of Dhaka reflect an exaggerated, congested, and unorganized version of Jacobs's vital city image. At present, city planning experts have lost control of the growth and development of Dhaka. Moreover, their minimal piecemeal planning measures are also not aligned with the existing urban fabric and, as a result, the city is growing haphazardly. One of the major crises in the context of planning and development of Dhaka is that the rules and regulations are only based on single plots rather than an entire neighborhood or community. Those plot-based guidelines are also followed at a minimum scale in the implementation process. Dhaka is enormously expanding the city boundary by converting adjacent agricultural land into residential areas with limited urban amenities and infrastructures. For the present and future well-being of the people, Dhaka should focus on developing self-sufficient neighborhood networks with an effective public transportation system. Jacobs emphasized the social consequences of a fine-grained diversity in land use and argued for inviting and diverse neighborhoods. She also stressed the importance of the human scale in public spaces and streets. The next section of this paper attempts to correlate the neighborhood planning principles in Jacobs's writing with the current state of the Dhanmondi neighborhood.

4 Description and Analysis of the Study Area

For this study, the Dhanmondi residential area is chosen because of its potential for community development and community engagement in terms of improved public spaces and livability. Dhanmondi is one of the most exclusively planned residential areas of Dhaka (Fig. 2). It was planned in the late 1950s as an upmarket and affluent residential area with large plots and a wide grid pattern road organized

Fig. 2 Dhanmondi residential area (Public Works Department, 1958)

Land Use of Dhanmondi Residential Area

Land Use	Area (acre)	Area (%)
Total residential area (plot)	298.3	61.4
Roads	89.6	18.4
Water body	44.6	9.2
Park and playground	44.7	9.2
Mosque	4.7	0.9
School(public and provided in the original plan)	4.4	0.9
Total Area	**485.9**	**100**

around an existing water channel. (Mridha, 2015). A good amount of land was allocated to public spaces, water bodies, and infrastructures, also vegetation was planted along the roadside. However, this exclusively planned residential area with no commercial functions created a significant contrast with the fabric of Dhaka at that time (old Dhaka), which was defined by mixed-uses. Initially, the planning authority did not allow any commercial uses and zoned the plots of Dhanmondi as exclusively residential (Afrin et al., 2012). In the early 1970s, due to the increased pressure on city land, that restriction was waived. Gradually Dhanmondi transformed into a busy commercial area with large numbers of schools, offices, shopping malls, hospitals, and other such uses (Mridha, 2015). However, this transformation did not result in a live-work-play environment, rather the unplanned and unregulated commercial growth made the living condition worse.

4.1 Present Condition of Dhanmondi

Originally, the residential area comprised of 0.55 ^{2} of land area and remained the same though plots have been subdivided internally. The buildings were mostly two stories with an abundance of open space all around but, currently, it is more of a concrete jungle of multi-storied buildings with minimum setbacks (Fig. 3). It is considered as the most likely location for high-rise apartment construction by real-estate developers (Haque & Asami, 2011).

A large body of scientific research indicates that the physical setting and neighborhood condition plays a vital role in peoples' well-being (Ellen & Turner, 1997). Recent research by Mridha (2015) suggests that nearly half of the residents of Dhanmondi are not happy with the physical quality of the neighborhood (Mridha, 2015).

4.2 Social Dimension

The social dimension of any urban environment is one of the significant drivers of enjoyable urban life. It seems true across cultures that happiness results from community engagement (Kahneman et al., 2006). Communal bonding within a neighborhood is also crucial for acquiring identity. However, it is the prevalent reality of every city and megacity of the world that rapid urbanization, globalization, and technological advancement resulted in a socially isolated urban life. This is also true in the context of Dhaka, a city burdened with an extremely large population. Eminent urban sociologist Louis Wirth described how people living in cities come in close physical contact but have distant social relations that are impersonal, superficial, transitory, and segmental (Wirth, 1938). Although culturally and historically the people of Bangladesh were strongly connected with

Fig. 3 Left: 1970s Dhanmondi by the lake (Yaqub, 2019), right: Dhanmondi in 2016 (Khan, 2016)

family and social ties, currently, in big cities like Dhaka, most people live in a nuclear family and do not feel neighborly concern for each other. Much significant research has investigated the relationship between social isolation and mental health. Now, we know for a fact that social isolation does not bring happiness (Leigh-Hunt et al., 2017). Jacobs considers unsuccessful city neighborhoods as areas that lack mutual support between people and this description correlates with present-day Dhanmondi. The central element of Jacobs's philosophy is the sidewalk; however, it is not the central mechanism for this neighborhood and the street setting makes it impossible for children to be in the street for supervised or unsupervised play. Sidewalk characters who are mandatory for initiating and maintaining the "sidewalk ballet", contact, and safety are also absent.

4.3 Physical Dimension

In *The Death and Life of Great American Cities,* Jacobs framed her analysis of successful city life with a sequential treatment of different urban physical elements such as the sidewalk, street, park, and neighborhood. Based on her analysis of urban dimensions, she sets forth the principle of close-grained diversity of uses, buildings, and people. She also emphasizes that the key to a vital city neighborhood is diversity.

4.3.1 Public Space and Street

Public space is one of the most integral parts of our urban existence. The Dhanmondi residential area is blessed with Dhanmondi Lake, a rare opportunity for being close to nature in the concrete jungle of Dhaka (Fig. 4). The surrounding public park is used for diverse purposes and the park remains busy the whole day as people use it for different activities at different times. Dhanmondi Lake works as a successful public space for the overall city. The lakeside development provides local and city dwellers with a place for cultural gathering, jogging, social interactions, and street food. Jacobs explicitly criticized distinctly separated neighborhood streets, and she proposed that successful streets are physical, social, and economic continuity (Jacobs, 1961). However, the physical setting of Dhanmondi does not foster interesting and lively streets (Fig. 4). This area was designed as isolated pods of residential buildings. Therefore, buildings lack a connection with the street and the open spaces, and the street works as a form of buffer rather than an element that integrates the overall area.

Fig. 4 Left: Dhanmondi lake ((Khan, 2016), right: street of Dhanmondi (Google, n.d.)

4.3.2 Diversity Generator

Jacobs describes four conditions essential for city diversity and exuberant street life: a lively mix of primary use, small walkable blocks, mixed-age buildings, and population density. A detailed investigation of the physical setting of Dhanmondi can inform future planning initiatives for the well-being of the residents. The following sub-sections analyze the current condition of the neighborhood compared to the four principles of livable neighborhoods by Jane Jacobs.

Mixed Primary Uses

The neighborhood should include a mixture of primary uses. Jacobs advocated for the intermixing of function rather than separating the commercial, industrial, residential, and cultural spaces into different areas. Jacobs asserted, "the district, and indeed as many of its internal parts as possible, must serve more than one primary function, preferably more than two. These must ensure the presence of people who go outdoor on different schedules and are in the place for different purposes, but who are able to use many facilities in common" (Jacobs, 1961). Primary uses are necessary to ensure the safety and economic viability of the neighborhood. These uses bring people to a specific place and induce them to spend time in the area—essentially residences, businesses, and a few special institutions like museums or libraries.

The current land-use of Dhanmondi shows that it is still a predominantly residential area (Fig. 5). While there is a mixed land use pattern, there is little or no mixed-uses in building scale. In 2006 there were 53 schools and 50 health facilities in the Dhanmondi area, which caused tremendous traffic throughout the day (Haque & Asami, 2014). This situation is now even more uncontrolled and residents' daily commute to different parts of Dhaka for work, making the overall traffic situation of Dhaka even worse. In this neighborhood, a bundle of mismatched uses is put together rather than fine-grained mixed-use blocks. Some uses are incompatible because of factors like noise or traffic generation. These cannot be located close together. Often planners blame the deviation from the original plan of keeping Dhanmondi as a purely residential area responsible for degraded neighborhood life. However, in a dense urban situation like Dhaka, it is absurd to think about a neighborhood without commercial, office, institution, etc., supporting facilities. Residential and work as primary uses and other supporting secondary mixed-use functions can create a healthy neighborhood fabric, which will also put less pressure on the traffic congestion situation with fewer daily commutes for work, education, grocery shopping, etc.

In *Responsive Environments: A Manual for Designers*, the authors recommended variety as the second most important requirement for a successful neighborhood as it affects the range of uses available to people (Bentley et al., 1985). In the case of Dhaka, it is important to understand that variety cannot be achieved merely by dumping a mix of activities on a site. To work well, the uses should give each other mutual support. This is where the mixed-use development throughout Dhaka faces problems. The authors also gave clear instruction on how we can increase variety; first, we need to assess the levels of demand for different types of functions in this neighborhood and establish, to what degree, a mix of uses is economically and functionally feasible. The next step is to assess the existing buildings for spatial desirability to judge whether they can accommodate the desired mix of uses. Finally, the generation of a reasonable land-use plan for Dhanmondi with mixed-use in both zoning and building scale can create a livable vibrancy throughout the day.

Block Size

Block size is a crucial determinant of urban health. Jacobs suggested, "Most blocks must be short; that is, streets and opportunities to turn corners must be frequent" (Jacobs, 1961). The short block will allow high pedestrian permeability and make the neighborhood walkable. The average block size of Dhanmondi is very short and walkable, the longest block is 250 × 90 m and the shortest block is 180 × 50 m (Fig. 6). The average block size of Manhattan, New York City, per the Commissioners' Plan of 1811, is 900 × 200 m, which does not offer a good pedestrian flow. In comparison to that, one of the most walkable cities in the United States Portland's average block size is 200 × 200 m.

Despite the significantly smaller block size, this neighborhood is not walkable. In *Responsive Environments: A Manual for Designers,* permeability is mentioned as the first requirement and the authors mentioned the block structure, block shape, and intersection design are important considerations to increase permeability. Also, an accessible place can be of no use if it does not provide a choice of experiences. Therefore, permeability always should be considered with variety. Dhaka is filled with mostly shorter blocks, but the city does not foster walkability. The main problems behind this situation are the increased scale of development, the use of hierarchical layouts, and most importantly, some problematic cultural attitudes. While many residents walk in the park for health issues and enjoyment, walking for daily commutes is not a common case for middle-class and wealthy people (Sharmeen & Houston, 2019). They prefer rickshaws, a slow-moving vehicle, and the excess use of rickshaw create less walkable conditions for the inner road of Dhanmondi (Fig. 7). The streets of Dhanmondi have a great potential of becoming a vibrant place for socialization,

Fig. 5 Existing land use distribution of Dhanmondi residential area (Haque & Asami, 2014)

as well as offering a sound mode of internal circulation. Effective planning decisions along with social and cultural awareness among residents are necessary for that.

Mixed-Age Building

Jacobs suggests that there should be a mixture of old and new buildings to create an availability of low-rent spaces for small businesses and low-income residents. She was very concerned with providing housing opportunities for low-income tenants within successful neighborhoods in order to maintain economic diversity and avoid class-based segregation, which is common to most cities and megacities in the world.

Most of the houses in Dhanmondi are owner-occupied and the rest are occupied by high-income tenants: business owners, foreign diplomats, and high-earning consultants. Over the years the old two-story buildings that had plenty of

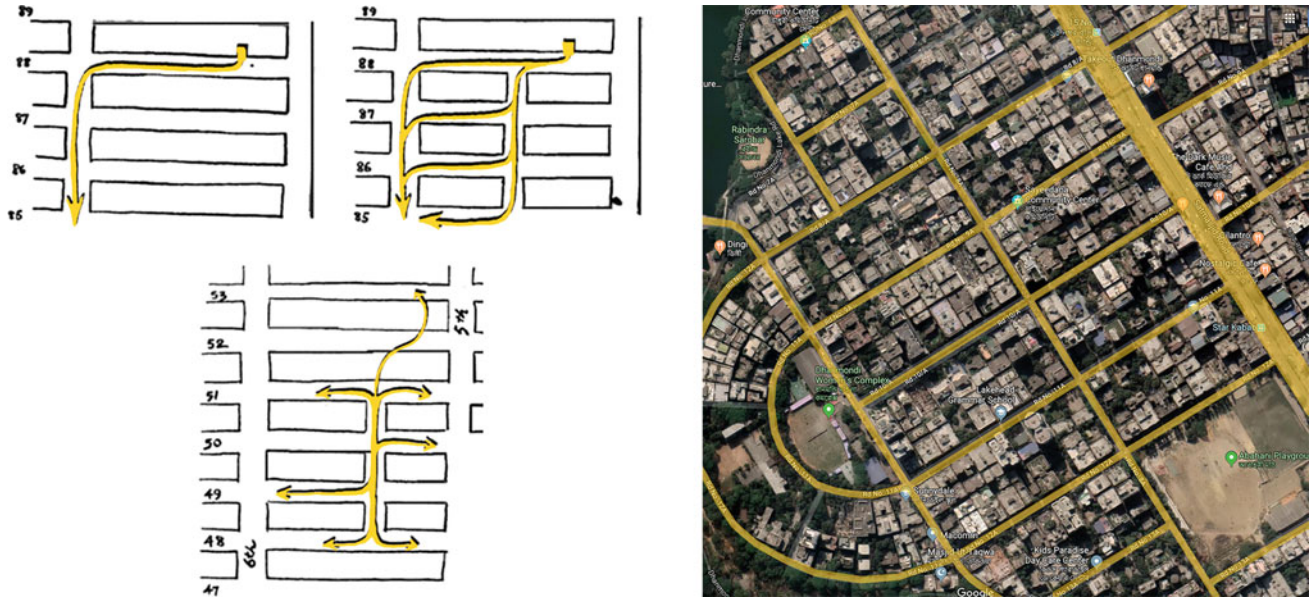

Fig. 6 Left: short block necessity (Jacobs, 1961), right: block size of Dhanmondi (Google map, 2019)

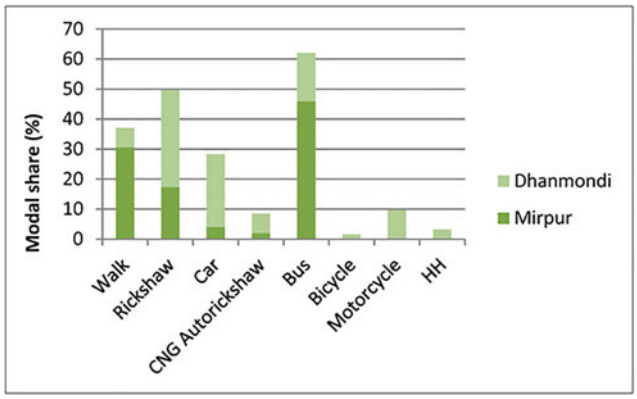

Fig. 7 Left: area-wise modal share (Sharmeen & Houston, 2019), right: inner road crowded with rickshaw (Rahman, 2006)

surrounding open spaces are replaced by congested multi-storied buildings. Though this subdivision of plots resulted in some variety of mixed-age buildings, most plot divisions occur at the family level. For this reason, there is little scope of economic diversity. Mixed-uses at building scale can incorporate different types of businesses with different economic scope.

Concentration/High Density of Residents

In her last principle, Jacobs suggests, "There must be a sufficiently dense concentration of people, for whatever purpose they may be there" (Jacobs, 1961). In Dhaka, there are people everywhere. Overcrowding is a burning reality for Dhaka and affecting the development process greatly. While sufficient measures should be taken to control the population growth and come up with an optimum density, proper action also should be taken for the effective distribution of our limited land, resources, and energy. Jacobs criticized the low-density development like suburban sprawl and rejected segregated land-use. Unfortunately, Dhaka is turning it into a mega-sprawl, which is far from the desired live, work, and play environment.

5 Recommendation for Future Development

Retrofitting an already developed neighborhood is indeed hard, but not impossible. For improving Dhaka, it is important to understand and analyze the impact of the diverse forces that shape the built environment—social, economic, cultural, political, ecological, technological, aesthetic, and so forth. Jacobs broadly discusses the general impact of these forces in city life and provided guidelines for building a livable neighborhood.

The neighborhood should be redeveloped around the theme of placemaking with effective public space and street

design. Overall, in Dhaka, it is more than necessary to develop a pedestrian-focused street design manual with the aim of increasing social solidarity and flexibility in public spaces. The acknowledgment of the informal characteristics of public spaces and traditional neighborhood streets is important. Jacobs formulated the theories of "the sidewalk ballet" and "eyes on the street" based on her own experience on the active and lively streets like Hudson Street. Causal and trustful community life in Dhanmondi can be achieved through a well-functioning street network and adaptable public space. As Dhanmondi is an already developed area, the changes and development should be flexible and incremental. Initially, the monthly events can be organized when the territory of pedestrian activity will be enlarged, restricting automobiles and other vehicles. Periphery road surrounding Dhanmondi lake can be exclusively designed with accommodating sidewalk and street vendors. The mixed nature of people and activity, children on the vibrant street, coherent pedestrian and bike path design, and active public spaces should be our ultimate goal.

It is essential to initiate a community-based planning process and the formation of successful, localized self-government. In most neighborhoods of Dhaka, there is an existing administrative structure based on political agendas. They are not responsive toward the social, spatial, and economic needs of the neighborhood. These local authorities can be guided toward the formulation of a localized self-sufficient government. Solely, the central city government and planning authorities failed to evolve simultaneously with city growth and complexity. Effective locality coordination with the aim of effective neighborhood physical planning should be the future goal for Dhanmondi and other distressed neighborhoods in Dhaka.

Citizens should be involved as important stakeholders in the development process. Because they are one of the most important initiators of change and they also get affected the most. Jacobs's theories are equally influential for city planners, city governments, and common citizens. She always advocated for common citizen's active participation in the city planning and development process. Her books can increase the importance of looking to, and perhaps even aspiring to become a good creative neighborhood resident. Rethinking neighborhoods as a self-governing socio-physical unit with an active and responsible resident can bring positive change to Dhaka's urban fabric.

6 Conclusion

To organize the unorganized haphazard complexities of Dhaka, it is urgent to initiate a community-based planning process. This study explored how *The Death and Life of Great American Cities* can be a great source of inspiration in this transformation process for both planners and common people aspiring to become good and creative neighborhood residents. Jacobs's insights should be our inspiration source rather than ideology, based on which we can set new planning standards for healthy self-sufficient neighborhoods. Effective planning vision along with responsible citizens can turn Dhaka into a livable and happy place. The neighborhood should be our key scale for policy intervention and planning decisions around which a vision for the livable city will evolve. Alteration of the distressed urban conditions of Dhaka requires a serious revision to the overall planning and development process of the city. This paper contributes to an emerging platform for experimental ideas and actionable knowledge to guide the transformation of Dhaka's complex urban fabric over the next decades.

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Socio-Economic and Political Dimensions and Their Impact on the Urban Form of the Kuala Lumpur Metropolitan Region

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Abstract

Kuala Lumpur became the capital of the newly independent Federation of Malayan States in 1957. The capital of the new nation had then a population of 357,000. In the last six decades, the city expanded into a main urban regional conurbation called 'Greater KL' or the Kuala Lumpur Metropolitan Region (KLMR). As of today, the KLMR has a population of 8.2 million and an area of 2793 km^2. The transformation of KLMR is similar to patterns applied in the other capitals of the Southeast Asian region. It is mainly driven by market forces and promoting the policies of fast-track development. The transformation has a strong emphasis to provide quality urban infrastructures such as; roads, airports and transport hubs. Following the basic precepts of neoliberalism, property-led development has become the main national economic driver. Since the 1980s the KLMR has witnessed a surge of new development, including residential townships and complexes, commercial and office centres, industrial and technical parks, mega shopping malls and specialised centres. The main aim of this study is to evaluate how political and economic trends such as neoliberalism and property-led development, determined the reinvention of Kuala Lumpur's cityscape. The main findings of this research reveal how globalisation and neoliberalism have impacted Kuala Lumpur's traditional urban environment. In the conclusion, necessary actions and measures to achieve more sustainable physical, political, social and economic urban environments are discussed.

Keywords

Urban transformation • Climate-responsive urban planning and design • Neoliberalism and property-led development • Regional planning

1 Introduction

The transformation of large metropolitan areas in Southeast Asia presents a challenge to governments, decision-makers and urban planners. According to Hamnet and Forbes (2011), the new development in Southeast Asia is emerging at an enormous paste having a detrimental impact on the traditional urban fabric and questioning the way people perceive cities. This has opened an on-going urban discourse on the future global urban outcomes. In a similar way to other capitals of Southeast Asia, Kuala Lumpur has been successful in attracting global enterprises and conducting large scale urban projects that improve the quality of the city centre and infrastructure (Morshidi & Abdul Rahim, 2011). It has also attracted a large number of visitors and tourists and capitalised on its geographical location. The authors further argue that the new megaprojects may improve the global standing of the KL but can be harmful and disruptive for its residents.

The current risks and threats resulting from the consequences of climate change and lately pandemics require to rethink the current development trends and re-evaluate the outcomes of the existing development paste in one of the largest urban conurbations of Southeast Asia.

The main objectives of this paper are to identify the urban evolution of Kuala Lumpur since its beginning; to ascertain the role of political, social and economic dimensions in the development process, and to identify the global forces that shape the urban form and structure of the Kuala Lumpur Metropolitan Region today.

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This article examines the socio-economic and political dimensions and their impact on the urban form of the KLMR during four periods: the colonial period, the post-independence period, the Mahathir era and in the first two decades of the twenty-first century.

2 Methodology

In this research, a multi-dimensional approach in urban planning and development analysis was introduced. The main components of the qualitative analysis include conducting an extensive literature review, research and policy analysis. The literature review includes professional literature and planning documents indicating the growth patterns of KLMR and the responses from the government at all three levels (federal, state and local). A large section of this study is based on secondary data sources such as local statutory plans, strategic plans, urban studies and policies. This research also included analysis and extracts from refereed journals.

To address the objectives, this study focused on the use of qualitative research methods. The major qualitative research methods are qualitative analysis and observations.

3 The Colonial Period: From a Tin Mining Settlement to a National Capital

Kuala Lumpur is a major urban conurbation of Southeast Asia. The city administrative area has a population of 1.7 million and an area of 243 km^2. The population of the Kuala Lumpur-Klang Metropolitan Region, covering an area of 2790 sq.km., is 7.7 million (World Population Review, 2019).

The city's beginnings were strongly associated with the tin mining industry. The first settlement of Kuala Lumpur as a trading post for tin mining was established by Raja Abdullah in 1857 at the confluence of the Klang and Gombak Rivers. A direct translation of the Malay term 'kuala lumpur' into English means'muddy confluence' (Seng Fatt, 2004). In the early stages of the city development, the rivers were both a major source of transport supporting the tin mining industry. After 1910 the city started to expand away from the rivers' confluence, and their importance as major movement corridors was gradually diminishing (Shamsuddin et al., 2013).

During this first period in Kuala Lumpur's development, the first streets were established linking the Klang/Gombak River confluence with the tin-mining fields in Ampang, located further to the east. Several of the key streets of modern Kuala Lumpur such as Jalan Ampang, (Ampang Street), Jalan Java (Java Street) (now Jalan Tun Perak) Jalan Petaling Petaling Street and Market Street were formed during that early period. At the beginning of the twentieth century, Jalan Tuanku Abdul Rahman (Tuanku Abdul Rahman Street) became the main shopping and activity street of the city. The Chinese neighbourhood, laid out on a gridded street system, was located in the south around Petaling Street, now very popular with foreign tourists. The west bank of the Klang River became the new location for the British residency and the administration buildings. Dataran Merdeka (Independence Square), opened in 1957, lies 150 m to the west of Masjid Jamek. It was the former site of the Selangor Club, a social club founded in 1884 to serve the British colonial elite (Seng Fatt, 2004).

Throughout the colonial period, which lasted until 1957, economic determinants were the main drivers of urban development. The early urban settlement resembled a 'cowboy style town' full of gambling saloons, opium dens and brothels. It was mainly inhabited by migrant workers from China and other parts of the South Asian and Southeast Asian Regions (Seng Fatt, 2004). The Chinese merchants and business operators introduced a new architectural typology into the built environment called the Chinese shop-house. The Chinese shop-house was a mixed-use two to three-storey building constructed from a timber frame and with a tiled roof. It had commercial/retail space on the ground level and residential area on the upper levels. The characteristic feature of the shop-house was a five-foot-wide colonnade (called five footway) along its street frontage. The Chinese shop-house became one of the dominant features of cities in peninsular Malaysia, Borneo and other parts of the Southeast Asian region (Too, 2007).

As a result of political and economic decisions, the British colonial powers contributed to the growth of the city by developing major institutional buildings including the Kuala Lumpur Railway Station and the Sultan Abdul Samad Building. Their main objective was to leave a permanent colonial legacy in the urban landscape of Kuala Lumpur. Both buildings are the best showcase examples of the British Raja architectural style featuring Mogul, Moorish and European neo-gothic styles enhanced by oriental decorative fantasies. Both buildings are among the most celebrated landmarks of Kuala Lumpur until today (Bunnell, 2014). The 1920s and 1930 s witnessed the emergence of the art deco style while the international modernism made a strong presence after the Second World War (Tajuddin, 2007).

Another political move that influenced the development of Kuala Lumpur was a decision made by the Sultan of Selangor in the early 1900s to grant to the Malay Muslim population a 223-acre land located to the north of the city centre for permanent settlement. As a result, a Malay village called Kampung Bharu (new village) was established on the northern fringe of Kuala Lumpur (Ujang, 2016). This move was supported by the British administrations that were

Fig. 1 Kuala Lumpur in the 1960s. *Sources* https://www.pinterest.com/pin/428756827008946343/ and https://www.pinterest.com/pin/321866704598182097/. *Note* These images are more than 50 years old so they constitute public property

uneasy about the overwhelming Chinese population dominance in the city (Seng Fatt, 2004). The Malay population opted for their traditional timber kampong houses built on stilts which were in a total juxtaposition to the solid Chinese shop-houses. With the arrival of migrant workers from India who settled in Masjid India and Brickfields areas, Kuala Lumpur became a well-established multi-ethnic and multi-cultural urban centre at the beginning of the twentieth century (Seng Fatt, 2004). This ethnic diversity had a profound impact on the built environment as all the four major groups (the Chinese, Malays, Indians and the British) left their mark on the urban landscape of Kuala Lumpur.

Although Kuala Lumpur grew throughout the twentieth century its population at the brink of the Second World War in 1939 just surpassed 170,000. Even on the eve of independence in 1957, it reached only 316,000 (Yaakob et al., 2019). The images of Kuala Lumpur from the early 1960s portray a medium-size city embedded in rich tropical landscape foliage (refer Fig. 1). Many major streets were lined up with tall canopy trees providing shade and thermal comfort for the pedestrians (Cheah, 2008).

4 The Post-Independence Period

In 1957 Kuala Lumpur emerged as the national capital of the new Malay Federation. Kuala Lumpur was still a medium-size city, significantly smaller than other capitals in the Southeast Asian Region and even within the Malay Peninsular it was overshadowed by Singapore and Penang.

The major challenge for the new Malaysian government in 1957 was to identify a new image and sense of place for Kuala Lumpur and to encourage Malay population to settle in the city which is overwhelmingly inhabited by Chinese and Indian population. Therefore, the growth of Kuala Lumpur and surrounds in the 1960s was very much motivated by political reasons.

The enlargement of Kuala Lumpur commenced in the 1960s with the development of the new satellite cities including Shah Alam and Petaling Jaya and new residential districts to accommodate the Malay population (Isa & Kaur, 2015). After independence, the main political decision of the government was to construct new satellite cities and encourage Malay population from rural areas to move into the new urban environment. This action had a significant impact on the physical, economic and social environments of Kuala Lumpur and triggered the development of large urban conurbation. The first planned township of Petaling Jaya has developed into a major city with a population over 500,000 (Petaling Jaya City Council, 2018).

The rivers started to decline as the city's major transport corridor after the First World War. By the 1950s the city was becoming increasingly congested with squatter development spreading along the banks of the two rivers. In 1925 and 1971 Kuala Lumpur witnessed two major floods which killed thousands of people. By the 1970s the road network and rails system become the dominant transport corridors of the city and both rivers turned into 'urban sewers' (Abdul Latip et al., 2009; Shamsuddin et al., 2013; King, 2008).

Economic factors also played an important role in the development of Kuala Lumpur and the surrounding urban centres. The 1970s witnessed a gradual makeover of the retail sector. The traditional shop-houses and department stores were gradually replaced by new indoor shopping complexes which were very much modelled on the western type shopping malls. Ampang Park was the first indoor shopping centre opened in 1973 triggering future similar shopping centres in Kuala Lumpur and surrounds and as a result changing the shopping habits among the local population. Other major shopping centres that opened in the same period include Wisma Centre, Sungei Wang Plaza and the Bukit Bintang Plaza. Private offices located in shop-houses also stated to relocate to modern air-conditioned self-contained complexes. (Varghese & Keogh, 2007).

In the 1960s and 1970s, public architecture in Malaysia was very much influenced by the modernist style championed by leading international architects including Le Corbusier and Mies Van Der Rohe. Sun-shading devices and

façade articulation were often used to integrate international styles with cultural identity and the local tropical climate (Kassim et al., 2017).

Kuala Lumpur only received city status in 1972. This was followed by the formulation of the Kuala Lumpur Federal Territory in 1974, and the establishment of a local authority Dewan Bandaraya Kuala Lumpur (DBKL) (Kuala Lumpur Municipal Council) (DBKL 2019).

5 The Mahathir Period (1981–2003)

The period when Malaysia was governed by Prime Minister Tun Mahathir (1981–2003) witnessed rapid development in Kuala Lumpur and the surrounding area. The major developments that took place in the 1990s include Kuala Lumpur City Centre (KLCC), Kuala Lumpur International Airport (KLIA) and the Multimedia Super Corridor including Putrajaya (the new administrative capital of Malaysia) and the multi-media city of Cyberjaya. All three developments had a profound impact on reshaping the image of the newly developing Kuala Lumpur agglomeration. The reasons behind these major developments were both economic and political. The new Kuala Lumpur International Airport was a necessity to improve the international links with Malaysia. The new airport significantly boosted international tourism and the national economy (Airport Guides, 2019).

KLCC is located on land previously occupied by the Selangor Turf Club, a British colonial-era horseracing track which had been a popular social venue for the British ruling elite. The Club also became a symbol of the gambling Chinese culture and was one of the main activity nodes of central Kuala Lumpur. The Selangor Turf Club was converted into a new central city core comprising office towers, shopping mall international hotels, upmarket high rise residential apartments, a convention centre and a large 20-hectare recreational urban park. The KLCC Master Plan was prepared by US-based consultants Klages Carter Vail and Partners. The major landmark of the new centre was the twin Petronas Towers, completed in 1995. This development was financed by the national petroleum company Petronas and designed by the renowned US-based architect César Pelli. For years the Petronas Towers was the tallest building in the World. It immediately became the new symbol of corporate Malaysia and the main landmark of Kuala Lumpur. The Taman KLCC (the KLCC urban park) became the most popular public space in the city frequented by all ethnic groups, all social groups and local and international tourists (Stephens et al., 2016).

Another major transformation during the Mahathir era was the remake-over of the Bukit Bintang area. The Bukit Bintang area was converted from a ‘sleazy’ entertainment area to a popular shopping and entertainment precinct.

In the 1990s, the development of Putrajaya initiated by the Federal Government commenced. Putrajaya was designated as the new administrative capital of Malaysia. It was located 25 km south of Kuala Lumpur and became a part of the Multimedia Super Corridor (MSC). The MSC was designated between Kuala Lumpur International Airport and Kuala Lumpur City Centre (KLCC). The purpose of MSC was to mitigate development growth pressures in other urban areas of the Klang Valley. Putrajaya has been marked as a showplace and benchmark example of a new post-colonial Malaysian identity. It was also intended to relieve the pressure of administrative functions and activities in Kuala Lumpur (King, 2008).

Following the trend behind the development of new national capitals around the World, the urban environment of Putrajaya is completely different from a typical Malaysian city. Kuala Lumpur Central City (KLCC), planned and development as a public-private partnership project, represents an image of a ‘modern and corporate Malaysia’ that can be marketed to the outside world. Putrajaya, a purely federal government initiative illustrates an image of a strong legislative, judicial and executive powers elevating the role of the ruling political establishment (Kozlowski, 2014).

A strong emphasis on the Malay culture can be observed in the urban environment of the new administrative capital of Putrajaya. The early stages of the development of Putrajaya were characterised by Pan Malay and Pan Islamic architectural styles where the new urban environment had nothing in common with the ethnically diversified urban areas of Malaysia (King, 2008). The first buildings in Putrajaya featured a whole combination of Middle Eastern motives and design features. This trend, however, was later discontinued and the next buildings in Putrajaya display a more regional and tropical climate-responsive narration.

Majority of the residents of Putrajaya work in the public sector and federal government institutions. Kozlowski (2014) argues that any new visitor to Malaysia will notice distinctive roles for each ethnic community in the country; the Malays are in charge of administration while the Chinese and the Indians are predominant in commerce. As a result, Putrajaya being the administrative capital of Malaysia is inhabited overwhelmingly by Malays who constitute 97% of the overall population making the new city an exclusive Malay enclave (Malaysian Administrative Division, 2019).

During the Mahathir period, there was a growing trend among architects in Malaysia to re-install cultural tradition into public buildings, while at the same time incorporating modern functions into the urban areas. The rise of monumental regional architecture in forms of cultural and institutional building complexes such as the National Museum (Muzuim Negara), the National Theatre (Istana Budaya), Royale Chulan Hotel or even the Kasturi Walk shopping

arcade became the new symbols of Malay identity (Kassim et al., 2017).

The 1990s can be seen as the decade where global trends such as neoliberalism and property-led development started to surface in Malaysia. The next section of the paper discusses the notion of neoliberalism and its implication for the Kuala Lumpur Metropolitan Region.

5.1 The Notion of Neoliberalism

Neoliberalism began in the 1970s during the period of economic recession. Its leading argument was that a liberal free-market approach is more flexible and efficient in economic and physical development and allocating resources. It challenged the long tradition of state and local government intervention. Since the 1980s, neoliberal principles became dominant in all levels of economic development (international, national and local). Neoliberalism had an impact on urban policies. It paved the way for the private sector to become the leading player in urban development and in building and managing urban infrastructure and services. Instead of creating new public places and community venues, local authorities and state governments opted for the development of semi-private enclaves and catalyst projects. The main aim was to boost the image of the city to the outside world. Policies targeting decaying urban neighbourhoods, urban poverty and the provision of affordable housing were eclipsed by large scale master-planned projects (Purcell, 2011).

Davis and Monk (2009b) argue that architecture and urban design outcomes guided by neoliberal principles result in the development of exclusive fortified enclaves in form of luxury themed environments, boutique shopping malls, artificial island and waterfront suburbs and gentrified downtown districts. These new utopian environments occurring throughout the world combine three distinctive elements. Firstly, these new places are embedded in layers of security with access limited to the high-income classes and ruling elites. Secondly, the places are multifunctional combining residential, employment, leisure and entertainment and as such discourage the rich residents from mixing with the rest of the community. Thirdly these new semi-private or privatised spaces cater for a selected group of wealthy clienteles with preferences for artificial landscapes, al-fresco and formal dining, and boutique shops and utopian sceneries.

Harvey (2011) describes neoliberalism as a concentration of privileges, wealth and impunities. Smith (2011) finds the links between neoliberalism and urban regeneration. The author traces the process of gentrification in American cities and argues that new urban policies create a new frontier for restructuring urban space. As a result of gentrification, many residents are relocated and replaced by high-income earners.

The growth of neoliberalism has had an impact on urban policies and urban planning and design. As a result of neoliberal policies, urban design has been gradually shifting from a universal discipline aimed at developing urban inclusivity and creating places for all people to a master planning tool delivering new urban enclaves characterised by exclusionary qualities.

5.2 Neoliberalism in Malaysia

Since the 1990s Malaysia has adopted the main principles of neoliberalism which influenced the urban form and structure of the cities. Kuala Lumpur and its entire metropolitan region were more affected by neoliberalism than other cities in Malaysia and followed a similar pace to other capitals of Southeast Asia including Bangkok and Singapore (Marzukhi et al., 2017; Webster & Maneepong, 2011; Yuen, 2011; Rimmer & Dick, 2009). Neoliberalism began to take root during the two decades of administration under Prime Minister Mahathir Mohamad and was continued under Prime Minister Abdullah Badawi and Najib Razak (Lim, 2017).

Neoliberalism had a profound impact on the urban development of KLMR since the early 1990s. Semi-privatisation of major urban services including waste and water management's energy supply, and telecommunication services follows the trends and practices of other major cities around the World. The only urban infrastructure that was not privatised was the public transport system. The main rapid transit cities operating in KLMR including the LRT, Monorail and MRT are still fully subsidised by the government. Neoliberalism constituted a key strategy ensuring a partial government involvement in the maintenance and operation of the urban infrastructure services. As a result of neoliberalism, the private sector took the leading role in providing and managing urban infrastructure, commercial and residential development (Indah Water Konsortium, 2018; Tenaga National Berhad, 2018; DBKL, 2016; Pigeon, 2012; Lim, 2017; SPAD, 2016).

6 The Twenty-First Century: March Towards a Global City

The post-Mahathir period can be described as being influenced by global neoliberal trends resulting in property-led to fast-track development. Globalisation and neoliberal policies became the main economic driver behind the development of Kuala Lumpur and its surrounding urban conurbation. Globalisation triggered economic growth, substantial improvement of the urban infrastructure and increased the living standards of the residents. However, this global

transformation also brought negative side effects including environmental degradation, a decline of safety and security, rapidly increasing property prices and the diminishing of the traditional urban fabric. In terms of architecture, the vernacular regional styles typical for the 1980s and 1990 s were gradually replaced by universal modern design or abstract approach to regionalism which responds to new technologies, materials, conventions and the scale of buildings (Kassim et al., 2017).

The new millennium witnessed the establishment of a new urban conurbation called Greater Kuala Lumpur or the Kuala Lumpur Metropolitan Region. The area of KLMR or Greater Kuala Lumpur (also called the Klang Valley Region) is defined as an area covered by 10 municipalities surrounding Kuala Lumpur, each governed by the following local authorities; Kuala Lumpur City Hall (DBKL), Putrajaya Municipal Council (Perbadanan Putrajaya), Shah Alam City Council (MBSA), Petaling Jaya City Council (MBPJ), Klang Municipal Council (MPK), Kajang Municipal Council(MPKj), Subang Jaya Municipal Council (MPSJ), Selayang Municipal Council, Ampang Jaya Municipal Council (MPAJ) and Sepang Municipal Council (MPS). Also, the regional area is spread across two state governments; Selangor and Negri Sembilan and also contains two federal territories. The city of Kuala Lumpur and Putrajaya are designated as Federal Territories under the direct jurisdiction of the Federal Government (International Urban Development Association, 2015).

The urban structure of the KLMR is polycentric and based on a hierarchical distribution of centres connected by a network of transport corridors very similar to a typical model of an American post-industrial city. The region contains the primary centre Kuala Lumpur with its Central Business District, multi-national company headquarters, major shopping malls, and iconic building landmarks. Specialist centres include the multi-media city of Cyberjaya, Kuala Lumpur International Airport (KLIA) and Port Klang. The KLIA area has grown from an international airport to the main specialist centre comprising duty-free outlets, international hotels and specialised commercial precincts. Shah Alam, the capital city of the state of Selangor, Petaling Jaya, Kajang and Subang Jaya can be classified as principal activity centres, each having a population of a few hundred thousand. There are also several major centres such as Bangi, Serdang, Gombak and Rawang and the new townships including Setia Alam, Desa Park City, Sunsuria, Bandar Entsek and Beranang. There are prominent themes park resorts such as Sunway Lagoon and the Mines Resort and major regional mega shopping malls including Bandar Utama, Mid Valley Megamall, Sunway Pyramid and IOI. The inner-city area of Kuala Lumpur has experienced decline however, there are a few gentrified and exclusive areas in within and in the proximity of new major developments. Putrajaya, the new administrative capital of Malaysia has become a principal institutional centre.

Figure 2 shows the city of Kuala Lumpur in the context of the Kuala Lumpur metropolitan region.

As a result of political decisions taken in the early 1960s and the implementation of New Economic Policy (NEP) [1] in the 1970s the demographics of Kuala Lumpur and the surrounding urban conurbation have changed. Today the demographic figures for the city of Kuala Lumpur indicate that the Malay/Bumiputera constitute 45.9%, the Chinese 42.2%, Indians 10.3% and others 1.6%. The percentage of the Malay population in satellite cities of the KLMR is considerably higher. For example, the Malay population of Shah Alam is 65% and in the new administrative capital of Putrajaya Malays constitute an overwhelming 97% of the total population (World Population Review, 2018; Malaysia Department of Statistics, 2019).

As a result of massive fast-track development, Kuala Lumpur has experienced environmental degradation with a significant loss of green open space. The green tropical oasis of the 1960s has changed into a sprawled concrete jungle. The green space per inhabitant ratio in the city of Kuala Lumpur is 8 m^2 in 2014 a significant decrease from the figure of 13.5 in 2010 (Abu Kasim et al., 2019). The figure of 8 m^2 of green open space per inhabitant is below the minimum of 9 m^2 required by the World Health Organisation and significantly lower than that of neighbouring Singapore where every resident can enjoy 66 m^2 of green open space or European capitals such a Vienna where the ratio is

Fig. 2 Kuala Lumpur core area of investigation and the surrounding context area the Kuala Lumpur Metropolitan Region. *Source* F. Adnan and M. Kozlowski

120 m^2 (Abu Kassim et al., 2019). The situation in other cities of the metropolitan region is better. For example, 38% of Putrajaya is green open space although there is not enough residential population to take full advantage of this asset and the majority of parks remain deserted throughout the day (Kozlowski, 2014).

Similarly, to the phenomena in other world cities, some central city areas in Kuala Lumpur are experiencing gentrification. For example, the Bukit Bintang precinct developed into a popular shopping destination in the 1980s and 1990s is being slowly converted into a high-end shopping district. The former popular centre Bukit Bintang Plaza has been demolished and is currently being redeveloped for a more exclusive shopping destination (The Edge Markets, 2019).

As a result of globalisation and property-led development in the last two decades, there is a sharp increase in property prices with Kuala Lumpur, and its urban conurbation located mainly in the state of Selangor declared as areas where houses fall in a 'severely unaffordable category' (Mariadas et al., 2016). The other reason for the sharp rise in prices is; the growing demand for housing, reduction of land zoned for residential purposes, and also high foreign ownership of the housing stock which in some parts of central Kuala Lumpur is as high as 20% (Malaysia My Second Home, 2019; DBKL, 2012). According to research undertaken by Mariadas et al. (2016) population, construction costs and housing speculation are the main factors that influence the housing price in Malaysia. The authors further argue that efforts to increase the affordability should be continued by all the levels of government, policymakers, developers and other related parties to enable young people to purchase their residential property.

The rapid development of the KLMR together with the large influx of population from the Southeast Asia Region and South Asia has contributed to the rise of crime. According to the 2017 Crime Index by Numbeo, Kuala Lumpur has the highest crime index and lowest safety index among major cities in Southeast Asia. Although the number of major crimes, including murder and manslaughter, is relatively low, petty crimes such as motorbike and car theft and house brake-ins boost the figures (Numbeo, 2018).

Because of safety and security concerns, numerous small to medium size gated communities have mushroomed in the KLMR, creating a fragmented network of exclusive urban utopias. Residents living in the gated communities are sealed off and as a result not fully integrating with the rest of the urban community. The development of self-contained townships such as Desa Park City, Gamuda Cove and Setia Alam, where secluded residential areas are sealed off and the general public space is limited to shopping malls, and recreational parks only add to the rapid growth of 'secluded paradises' as described in the book by Davis and Monk (2009a). As a result of growing safety concerns, traditional residential middle-income neighbourhoods are putting up physical barriers and engaging security guards for protection. A recently conducted survey of the built environment in three gated community neighbourhoods (Symphony Hills and Setia Glades in Cyberjaya and Desa Park City in Kuala Lumpur) revealed that the application of urban design measures contributed in an enhanced and high-quality urban setting. An example of two high end gated residential neighbourhoods are shown in Fig. 3.

In the last decade, the federal, state governments and local authorities have introduced measures to mitigate the rapid uncoordinated growth, reduce the destruction of the old urban fabric, and promote new climate responsive development and regenerate streets and public spaces in central parts of Kuala Lumpur and other cities of the metropolitan region. The establishment of organisations such as Think City (an NGO sponsored by the federal agency Khazanah National) and Urbanice Malaysia (a federal government subsidiary) to conduct small scale urban regeneration projects and promote a smart city concept is a step forward in combating the negative side effects of globalisation and property-led development. The Green Building Index (GBI) introduced in 2009 addresses the tropical and sustainable design and buildings and new townships (Shari, 2015). An example of a small-scale urban regeneration project conducted by Think City is shown in Fig. 4.

Regenerating the traditional urban fabric is of vital importance to retain the character of cities such as Kuala Lumpur. Ujang (2012) argues that limited urban programs for the improvement of traditional shopping streets in KL have a detrimental impact on its sense of place and identity. An analysis conducted by Bindajam et al. (2020) of urban intervention projects in the heritage precinct of Kuala Lumpur unveiled that the projects without proper community consultation only contributed to the decline of the historic ambience and further loss of the urban character and sense of place.

DBKL has recently launched the 2040 Draft Kuala Lumpur Structure Plan. The main objectives of this plan are to create a sustainable, pedestrian-friendly, community-oriented smart city within the next 20 years (DBKL, 2020). However, this ambitious Plan is limited to the physical boundary of the city of Kuala Lumpur and does not address the entire regional context of the metropolitan area. A regional strategy for the entire urban conurbation has not yet been introduced. Lessons learned from urban agglomerations in Europe, Australia and North America indicate that regional plans and strategies are critical as they inform the local plans and overarching urban planning principles for all municipalities located in a particular region (Department of Infrastructure and Planning, Queensland Government, 2009; Priemus, 1994; Seltzer, 2008).

Majority of new mega-developments in the KLMR are all market-driven and aimed at boosting the city image on the

Fig. 3 Desa Park City, Kuala Lumpur (left) and Symphony Hills, Cyberjaya (right). Two high-end gated residential neighbourhoods. *Source* M. Kozlowski

Fig. 4 Small scale urban improvements by Think City in central Kuala Lumpur. *Source* Author

world arena. Two major projects currently under construction in central Kuala Lumpur are The River of Life Project (ROL) and the Tun Razak Exchange. The ROL is a long-term project headed by the federal, state and local government aimed to transform The Gombak and Klang Rivers into a vibrant waterfront. Tun Razak Exchange is a master-planned development aimed at creating a world financial precinct in the heart of the city. Both projects will have a profound impact on the image and urban form of Kuala Lumpur (River of Life, 2019; Tun Razak Exchange, 2019). Images showing the River of Life Project and the Tun Raazak Exchange Tower are shown in Fig. 5.

An analysis of three waterfronts located in the KLMR (KLCC Park-Symphony Lake, the River of Life Project and Lake Putrajaya) revealed that the waterfront landscapes reproduced generic international ideas in terms of their visual appearance, uses and function. The waterfront settings are influenced by global examples and have little in common with the local culture even though some are flanked by traditional Malaysian and restored colonial buildings (Stephens et al., 2016). The globally influenced KLCC Park Symphony Lake and Lake Putrajaya are shown in Fig. 6.

To become a world city, apart from conducting catalyst projects Kuala Lumpur must improve the quality of its public realm (Kozlowski, 2015). Ujang et al. (2018) demonstrate that urban design in Kuala Lumpur has been applied as a master planning instrument to creative attractive environments for the tourists and to improve the image of the city in the overall competitiveness ranking. The application of low-cost tactical urbanism practiced on a wide scale in European cities has been yet introduced in the KLMR (Webb et al., 2018). An analysis of major streets, public spaces and building complexes undertaken by Kozlowski et al. (2015) unveiled an urgent need to address the local tropical climate at all levels of intervention; the regional, city-wide district, neighbourhood and site levels. However, to undertake a comprehensive urban improvement and regeneration program targeting existing streets and public spaces in central parts of KL and other regional centres it is imperative to have financial mechanisms supporting such projects. Malaysia does not have the Tax Increment Finance (TIF) system that helped to rejuvenate degraded areas of many American cities. The existing property tax system in Malaysia is based on the gross floor area of the building and 6% of their commercial rental values

Fig. 5 River of life project (left) and the exchange 106 tower at Tun Razaak exchange (right). *Source* Author

Fig. 6 Two global waterfront settings: Lake Symphony at KLCC and lake Putrajaya in Putrajaya. *Source* Author

(Property Taxes in Malaysia, 2019; World Bank, 2019). This could be insufficient to generate funds for urban improvement projects.

7 Conclusions

Based on the data collection derived from secondary sources, Kuala Lumpur in the 1960s and 1970s was a resident and user-friendly city. It was embedded in a lush tropical landscape and inclusive to all social and ethnic groups. In the last 65 years, int has transformed from a medium-size city to a large global urban conurbation of 8.2 million inhabitants.

During the first decades of the post-independence period, political decisions became the main factor in shaping the urban form of the new urban conurbation. However, since the 1990s economic factors and globalised trends were the major drivers of urban transformation. Today KLMR has developed into a prominent globalised urban conurbation sprawled across the Klang Valley, layered by a web of highways and dotted by a fragmented network of exclusive gated communities, semi-private townships, large mega-malls, specialised centres, modern educational establishments and up-market mixed-use complexes. The fast-track development triggered by neoliberal principles is market-driven and often disentangled from local building traditions and the tropical climate. The new built form is characterised by universal design, abstract regionalism and new urban landscapes resembling generic globalised patterns.

This study demonstrates that KLMR is undergoing a massive property-led transformation dominated by catalyst projects. This transformation aims at increasing the city's competitiveness at the international scale. It is targeting specific users such as; international investors and tourists. The urban character and the old fabric of the old neighbourhoods have been destroyed to pave way for new development which neglects the local culture, climate and sense of place and identity. The social dimension of urban development has been overshadowed by market forces and global economic aspirations.

Urban design has been used as a tool for master-planned high end gated communities and flagship private/public projects. Low-cost tactical urban design has not been initiated on a wider scale. There are no financial mechanisms that can support small scale urban improvements across the city.

There is no doubt that the living standards of the residents and the quality of urban services have radically improved in the last sixty years. Nevertheless, there is a growing discontent across large sections of the community especially the low- and middle-income groups. An interview conducted with a representative of the Non-Government Organisation, Coalition to Save Kuala Lumpur (CSKL) [2] revealed that a

large portion of the community is not satisfied with the current status quo. The residents feel that basic social projects such as green open spaces, quality public areas and amenities, affordable public housing and efficient urban infrastructure have been neglected and deprioritised in favour of exclusive international development projects. The main issues of community concern include increased traffic congestions, the problem of safety and the lack of community participation in urban planning and decision making. In Malaysia, city mayors are not directly elected through popular vote. They are appointed by the state or federal government, therefore they do not feel directly responsible to the members of the community. This phenomenon only widens the gap of misunderstanding between the local authority and the urban community.

Until today planning on the regional level has not been introduced in the KLMR. A large urban conurbation needs a regional plan that coordinates and manages infrastructure services and urban development throughout the entire area. Such a plan would also inform all the local statutory and strategic documents prepared by various local authorities. The lack of this regional plan and a regional advisory committee has a detrimental impact on the future growth of the metropolitan area. The development in the KLMR is progressing in an uncoordinated and chaotic manner. The exception to this is the public transport, urban services and the road network which are managed by the Federal and Selangor State Governments. A systematic framework for consultation between the various local authorities has also not been established.

There is no long-term vision for the metropolitan area. Although various local authorities have commenced with future smart city initiatives there is no overall regional direction. Such a vision should impose smart city growth objectives. These objectives should address the provision of walkable and sustainable communities, sense of local character and identity, intensified urban form, tropical planning and design, smart rapid transit and quality infrastructure. The current KLMR piecemeal urban solutions identified by local authorities in a non-collaborative manner cannot solve the overall problem.

End Notes

[1] New Economic Policy (NEP) introduced in the early 1970s. NEP had two pillars; one was to eradicate poverty, and the other was an affirmative action policy for the Bumiputra to achieve 30% of the corporate wealth by the 1990s (Lim, 2017)

[2] Based on interview with representative of Coalition to Save Kuala Lumpur (CSKL) carried out in April 2019

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The Advance of the Concept of Sun-Breakers and Smart Solar Screens

As a Promising Input to the Design of Architectural Facades

Ahmed Mahmoud Saber Mohamed

Abstract

Breakers and solar screens in contemporary architecture no longer stands at the approved traditional norms, where they take many different forms and different and sophisticated styles, either in forms or the design style, making it a fertile ground for study, and standing on the use of these systems in the future functionally, aesthetically, environmentally and economically, especially that the traditional sun-breakers did not limit the levels and full brightness inside the buildings as well as imposing designs restrictions at the formation and design of interfaces, sometimes impeding vision, where the importance of the study is due to achieving several advantages which were not availed by typical breakers, such as the great flexibility in the design and change the form of interfaces, and control the amount of openness or closeness on the outside, as well as levels and intensity of the lighting and the reduction of the rays of the sun, where the research aims to raise the level of architectural design and outside facades using the shade systems and sun-smart breakers, and the extent of the benefit economically, environmentally and aesthetically and, where the study found that shade systems and the advanced sun-breakers will become an important factor in the overall architectural design and the design of the facades, in particular and the advance of the concept to take more sophisticated forms in the future.

Keywords

Economical sun-breakers • Solar screens • Smart facades • The outer side of buildings • Smart buildings

1 Introduction

The protection of buildings from harsh natural factors to provide the greatest comfort of the original residents that had always been the subject of research and study on the extent of different ages. There are different types used as shades to control natural lighting and ventilation to the internal vacuum, as well as protection from the strong sun rays, especially warm areas since the inhabitants of these areas were working to protect themselves in different ways and this has been reflected also on permanent attempts to reach successful ways to protect the buildings from the rays of the sun and which is affected by several factors such direction and the block and the shape of the building fixing the opaque parts, "the ceilings and the Walls" dealing with the shape and size of the slots (Al-Awadi & Mohammed, 1989). The slots are a major source of the entry of heat and light and controlling them inside the building and shading them is considered one of the most important factors and this was done through typical sun-breaker till the other kinds of protection came out adding some dimensions and other properties which increased the aesthetic and designing values as well as other environmental factors. In this study, we discuss these types as a preface to the design of the destinations which is divided into;

- Single—skin facades system
- Double—skin facades system
- Solar screens (open-works—oriels—screens)
- Smart solar screens.

1.1 Research Hypothesis

What changes now from advancement and large variety in the effective use of environmentally and aesthetically sun-breakers and the creative images given to it in external

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and internal building scene have achieved many of the features and architectural and aesthetic values as well as other gained environmental benefits where the research assumes that solar screens and the smart sun-breakers systems will become an important factor in architectural design in general and the formation and the design of the facade, in particular and the advancement of the concept to take more sophisticated forms in the future.

1.2 The Research Problem

The environmental study often take the first importance on using the sun-breakers, followed in the important by the impact on the working styles of architectural design at the formation of the facades, but at the present time, it hardly takes the same importance for the importance that will environmentally and aesthetically grow in the future, as well as the traditional breakers that are linked to certain problems such as;

- It did not limit the levels and the unwanted brightness in the building.
- It gives design restrictions conceived with the lack of flexibility in the form and design of the facade.
- It can't always reduce the sun rays for some facades, especially the eastern and western ones.
- It sometimes hinders the vision, in particular when there is a spectacular lookouts that are wanted to be viewed.

1.3 The Research Objective

The research aims to raise the level of architectural design and exterior crust destinations, using the solar screens and smart sun-breakers and the extent of the benefit of them aesthetically, environmentally and economically.

1.4 The Research Importance

The importance of research is due to achieving many positive points, covered by the study, such as;

- Controlling the levels and the brightness of the desired lighting in the building.
- The great flexibility in the form and design of the interfaces and the crust of the building.
- The possibility of reducing the Sun rays on the interfaces that traditional sun-breakers can't limit.
- Controlling the amount of openness or closeness on the outside, either for the vision or the reduction of the rays of the sun.

1.5 Research Methodology

The search adopts a scientific approach to reach the objective of the study related scientifically to the methods of the development of the concept of sun-breakers to contemporary architecture to access the methods which indicated the nature of the innovation in the environmental and aesthetical functioning in the facade.

1.6 The Research Axes

The study dealt with several axes to cover the research in an integrated style such as:

- The development of systems and fixed sun-breakers with single and dual-covering.
- The development of solar screens on contemporary facades.
- The development of movable and smart sunscreens systems.

2 Single-Skin Facades System

The front of the single cover achieves a certain level of solar energy control as well as it has fixed characteristics, for this reason, it is necessary to provide additional measures in solar control, and buildings with glass facades and buildings that are accurately regulated for air conditioning requirements, so they have been treated through setting barriers that protect from sun rays, (Eren & Ozlem, 2013) and Locorbozeia was from early architects who were interested in the subject of protecting the building holes from the rays of the sun and devised what was called the sun-breakers and the start of their implementation in the building of the Ministry of Education in Brazil, and later they were imitated by many and that was spread in most of the countries with a warm atmosphere (Zeitoun, 1995).

2.1 Sun-Breakers

They are specially established for the prevention of the rays of the sun, and usually take one of the directions; vertical or horizontal or both (Al-Awadi & Mohammed, 1989), resulting in the formation of shadows depending on the form of

the design of the breakers, and they are divided into external shading and internal, but the internal breakers are less efficient compared to the external sun-breakers.

2.1.1 Rating the External Sun-Breakers

- Horizontal Types that are successfully used in southern facades.
- Vertical Types that are successfully used in eastern and western facades that may be diagonal to the north to give full protection from the sun.
- Egg-crate Types that are used in the south-east and south-west interfaces (Abdel-Gawad, 2017) (Table 1) indicates the rating of sun-breakers according to their shape and position on the facade.

There are also some architects when dealing the climatic conditions, they deviated away from the shapes of the typical breakers to devise new shapes and styles that were icon of the building and the external facade and create interfaces with dynamic and transformation features, combining environmental characteristics and aesthetics, but in a creative way and they became distinct signs in urban surroundings (Fig. 1).

3 Double-Skin Facades System

In the 1970s, the world realized that it faces economic and environmental problems that lie in the rise of energy prices and the need to search for effective solutions to provide energy consumption in buildings, which has led to the consideration of the buildings in general and in particular interfaces represent the outer casing of the buildings, and with the development of technology and speed to save the planet, started thinking in new construction systems to develop the views of the building, The American Association (ASHRAE) has divided the cover of the building into two parts and they are designed to let the airflow in the lumen of the mediator that could be a naturally or mechanically ventilated. (Cilento, 2012).

3.1 The Definition of Dual Facade

It is known as the architectural treatment that is working as a shield that protects the building and its users from the climatic conditions, providing privacy as it was defined beforehand by Richard Rush that it is the responsible part for environmental protection of the building, and it must respond to all human values, and aesthetic factors and climatic factors on the other hand. (Rush, 1991).

3.2 Double Skin Facades System

The double cover of the building appeared for the first time in 1903 in **Steiff Giengen's** factory in Germany, (Fig. 2) where it was a priority to achieving the maximum amount of daylight, taking into account the cold weather and strong winds, with the efficient use of energy and the reduction of noise and natural ventilation, (Oesterle, 2001) where the energy crisis in 1973 has committed designers to exploit renewable energy sources for cooling and heating, lighting and ventilation, resulting in the new products to reduce thermal acquisition and to optimize the ideal use of daylight, but in the time being, there is an integration between the use of natural ventilation and solar energy, which led to the emergence of new concepts such as dual-covering façade, (Azarbayjani, 2010) It is an architectural approach that often leads to the following: (Poirazis, 2004).

- The aesthetic desire for glass facade, to increasing transparency and natural lighting.
- The practical need to improve the internal position for spaces to take advantage of the elements of the natural energies.
- The need to improve the proportions of the noise of the buildings.
- The limitation of the use of depleted energy during the presence of the occupants.

Therefore, the challenge facing the buildings of the double cover facade is to maintain the balance between aesthetics, isolation, and audiovisual benefits, from the point of view of the activation of natural energy.

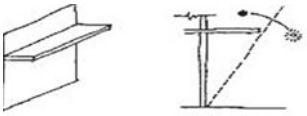
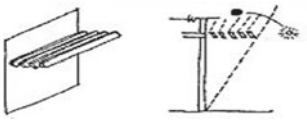
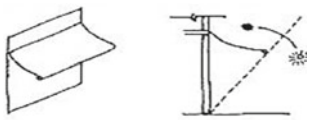
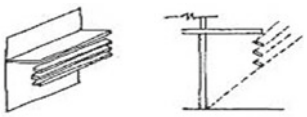
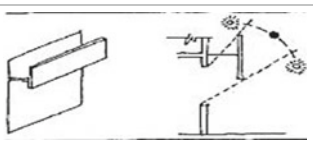
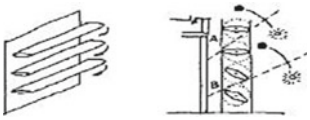
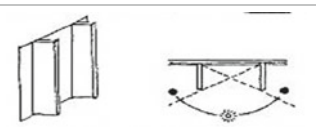
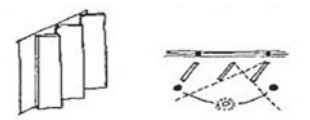
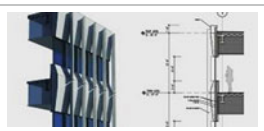
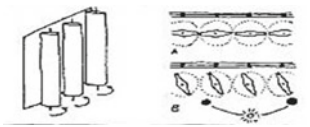
3.2.1 The Concept of Dual-Cover Facade

It is one of the elements of construction, which can organize the optical and thermal performance of the building, where an additional cover can be made to the building with the cavity between two walls (Omidiani, 2015), consisting of two parallel covers positioned in a way that allows air to flow through them in a medial cavity that works as a thermal regulator and the ventilation of this cavity may be natural by pressure or mechanical differences, whereas the internal cover is often made of a glass facade that can be opened and closed to achieve the ventilation process through the isolated area between the two layers (Meyer, 2002).

3.2.2 Rating Types of Dual Facades

There are many strategies to design a dual-cover facade, where they are classified according to the type of thermal treatment used in it:

Table 1 Shows the systems and shapes of sun breakers on the facades of buildings in contemporary architecture. "Single-skin facades system" (Researcher)

	Types of sun breakers and their effectiveness in facades	The form of sun breakers	The form breakers In contemporary architecture	Sun breakers rhythm on the facade
Horizontal sun breakers	**Horizontal overhangs**: Effective in the southern direction or what tends to the southern direction			It gives quiet, balanced rhythms on the path of the facade, both for the crushers themselves and the resulting shade
	Louvers parallel to wall Helps ventilate facade, preferably vertical			It gives balanced, but somewhat dynamic rhythms due to multiple shadow levels on the interface
	Canvas canopies: It is widely used and is the same quality as normal horizontal shading			It gives quiet, balanced rhythms on the path of the facade, both for the crushers themselves and the resulting shade
	Louvers hung form solid horizontal overhangs: Highly effective, especially at low angles			It gives balanced, but somewhat dynamic rhythms due to multiple shadow levels on the interface
	A solid screen strip parallel to wal: Long parallel walls, either solid or perforated			It gives quiet, balanced rhythms on the path of the facade, both for the crushers themselves and the resulting shade
	Movable horizontal louvers: High shielding effectiveness, therefore, used in hot climates			It gives a dynamic horizontal rhythms on the interface as a result of changing the form of slides on the façade
Vertical sun breakers	**Vertical fins**: Used in eastern and western façade or nearby it			It gives rhythms of evolution and growth on the facade path, Whether for sun breaks or the resulting shade
	Vertical fins oblique to wall: Prevents heat transfer from the inside out and vice versa			It gives deep balanced rhythms on the facade path due to the large shadow space behind the sun breakers
	Movable fins: The entire wall is shaded and can be oriented according to the direction of the sun			It gives dynamic rhythms perpendicular to the interface due to multiple shadow levels on the façade

(continued)

Table 1 (continued)

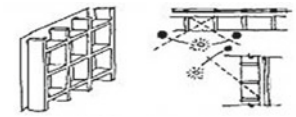
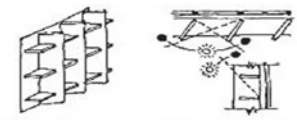
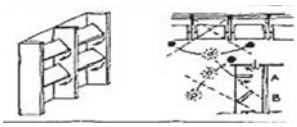
	Types of sun breakers and their effectiveness in facades	The form of sun breakers	The form breakers In contemporary architecture	Sun breakers rhythm on the facade
Composite sun breakers	**Eggcrate types**: Prevent the entry of sunlight horizontally and vertically			It gives dynamic vertical and horizontal rhythms as a result of changing sun angles on the facade
	Solid eggcrate with slanting vertical fins: Give asymmetric shades			It gives deep vertical and horizontal rhythms on the facade as the angle of the sun changes
	Eggcrate device with movable horizontal elements: High shielding effectiveness			Gives dynamic rhythms changing from the resulting shadow with the motion of the sun breakers

Fig. 1 Shows the atypical sun breakers of some buildings, which have become distinctive signs in their urban surroundings (Zeitoun, 1995; Ana & Kengo, 2014)

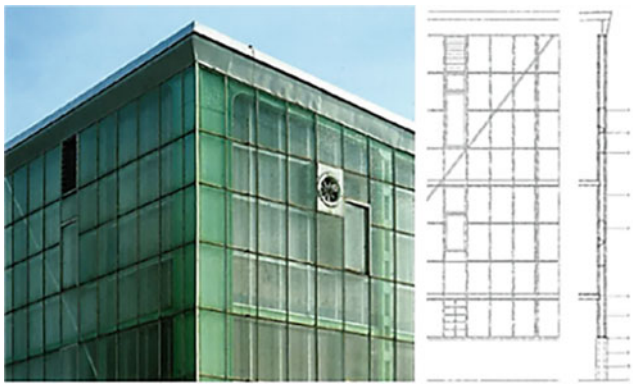


Fig. 2 Steiff Giengen's factory (Streicher, 2005)

Dual-Cover Facade Types According to the Type of the System of Ventilation

The performance of the dual facade depends greatly on the choice of means of ventilation inside the medial vacuum between the two covers; it could be natural or mechanical or both, and is due to the extent of the air temperature difference between the inside and the outside to generate negative pressure and positive areas to move the air. (Wong, 2008).

Types of Dual-Faced, According to the Division of the Façade

(a) **Box-window façade**: In this type of facades, the facade is divided into several horizontal and vertical divisions in the form of small boxes separated from each other and this model is featured by free control of the residents of the internal environment whereas this may lead to a negative impact on others (Knaack, 2007).

(b) **A shaft-box façade**: Its idea is based on the use of differential pressure and air movement, moving the air from the vertical shaft, usually several floors under pressure and high speed, as well as the difference in temperatures.

(c) **Corridor façade**: There is air intakes and outlets that may be overlapping, so vertical barriers in the groove to prevent air flow horizontally, which can lead to exposure to noise ratios between rooms, ventilation can be naturally or mechanically or mixed, and the shaft Lumen is divided horizontally at each floor vents and the entry and exit holes for air be diametric in order to prevent the air from entering the top floor (Santamouris, 2007).

(d) **Multi-storey façade**: It is based on the idea of having a non-divided air groove between the two covers and making ventilation holes in the top and bottom of the façade to allow air to pass between the two layers of the facade with the possibility of closing the groove in winter (Azarbayjani, 2010). The facades of this type are featured with super sound performances which makes this kind of widespread (Vanni, 2013).

(e) **Multi-storey Louvers façade**: It is similar to the above-mentioned type with the addition of rotary breakers between the two covers or in front of them and when closing the breakers, it can be a closed façade but in case of opening the breakers, it allows increasing in the ventilation through the shaft socket, as well as controlling the distribution of light (Daniels, 2003) (Fig. 3).

The Modes of Ventilation of the Cavity

The case of ventilation is due to the distance that air travels during its cycle inside the shaft socket, direction of entry and thermal behavior till its releases, according to that, they are classified into the following cases:

(a) **Outdoor air**: In this case, the air comes through the course of the groove of the façade, it goes vertically to return once again outside the building absorbing thermal load inside the groove in summer.

(b) **Indoor air**: In this case, the air comes through the building to pass through the course of the groove and its thermal properties change, and return once again to the inside of the building with the aim of storing thermal inventories in winter.

(c) **Air supply**: In this type, the current of air comes from outside and passes through the course of the groove and directed with fans into the rooms.

(d) **Air exhaust**: Air here comes from the building to be emptied by special air-hoods toward the space of dual facade to improve thermal properties and cool it in summer.

(e) **Buffer Zone**: The course of the groove works as a full insulator of the internal and external environment controlling the movement of air as a thermal insulator of the building (Samir, 2018) (Fig. 4).

Classification of Double Skin Facade Systems by Type

There are many differences in the construction systems, dual-atmosphere façade for it is necessary to evaluate and compare the features of different systems and environmental success. There are four basic systems that vary in the way of the ventilation and reduce energy consumption (Pollard & Brett, 2008) (Fig. 5).

(a) **Buffer System**: This system appeared in about 100 years, and is still used so far and it is two layers of glass with an air arcade between them, the **Hooker building** in New York is an example of this system, where the building inhale fresh air from the bottom and push it up during the course of the groove.

(b) **Extract Air System**: This system contains an additional layer of glass placed within the dual façade

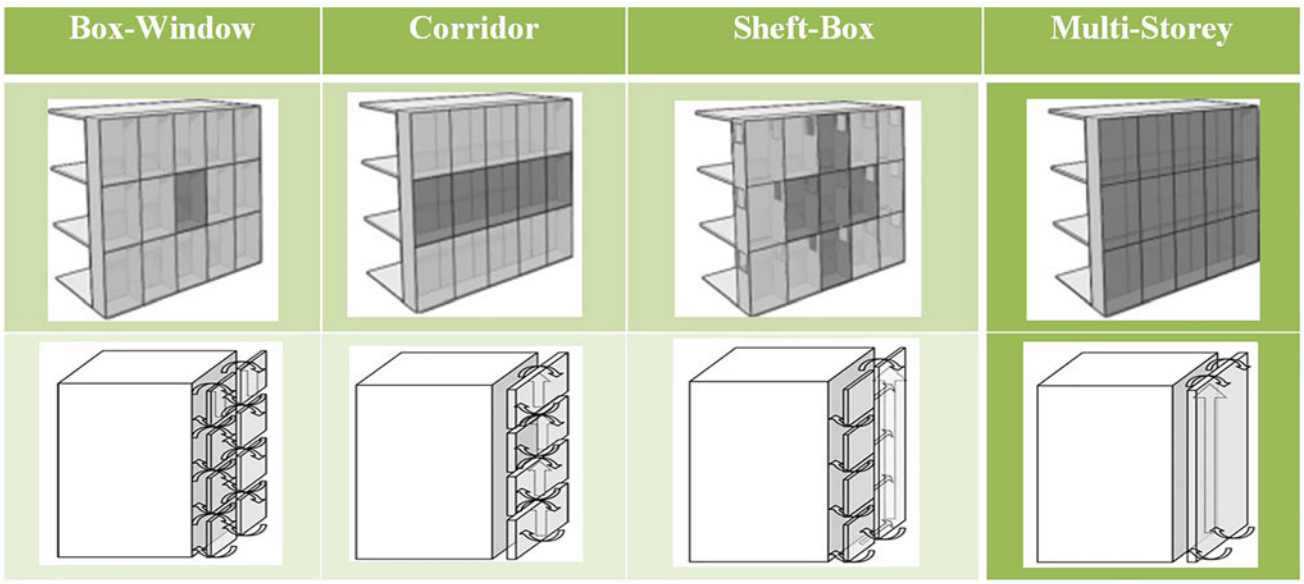


Fig. 3 Types of dual-faced according to the division of the façad (André, 2017)

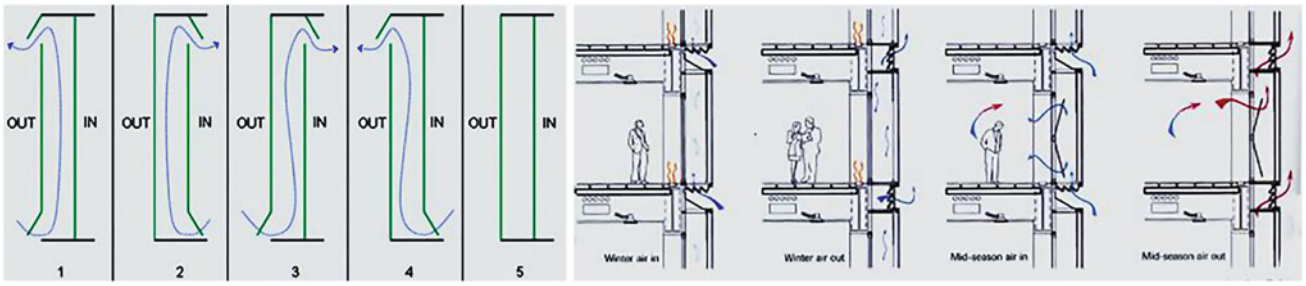


Fig. 4 The modes of ventilation of the cavity (Wordpress, 2010; Blogspot, 2016)

Fig. 5 From left in order; **Buffer System-**Hooker building, **Extract Air System-**Helicon building, **Twin-Face System**-Debis Tower and **Hybrid System-**Tjibaou Center (Boake, 2003)

between 15:90 cm depending on the possibility of maintenanceand the sizes of sun-breakers that prove that. The shaft groove works as part of a system of heating, ventilation and air conditioning (Bayram, 2003) and **Helicon Building** in London is considered a model of the system.

(c) **Twin-Face System**: This system consists of Curtain wall fixed on the original facade of the building, and it is made of insulated glass, the sun-breakers are placed between the two layers with 10 cm. Or more for maintenance, the system contains holes in the facade enabling the natural ventilation within the mild climate and the external layer of glass in protecting the sun-breakers weather from the breakers from weather factors, sound isolation and internal membrane to reduce thermal wastage and the **Debis Tower** in Berlin in 1998 is a good example of this system.

(d) **Hybrid System**: This system includes a number of different manifestations of the three basic systems, and are used to classify the building systems that can be included under one of these classifications, where it is used in those buildings layer of sensitive panels, non-glass materials whether they are inside or outside the primary environmental, (Boake, 2003) and building of the **Tjibaou Center** in California represents a good example of this system.

Integrated Systems Facades

Some designers integrated more than a system of previous systems and took advantage of the power generation systems of those facades where the building of Bligh Street, Sydney is considered a treasure of innovation and sustainable design, where it has a dual façade controlled electronically to reduce the rays of the sun and the full use of natural light and this smart façade is one of the most efficient features in the use of energy and towering buildings nowadays where an innovative tripartite system was used that depends on gas, solar

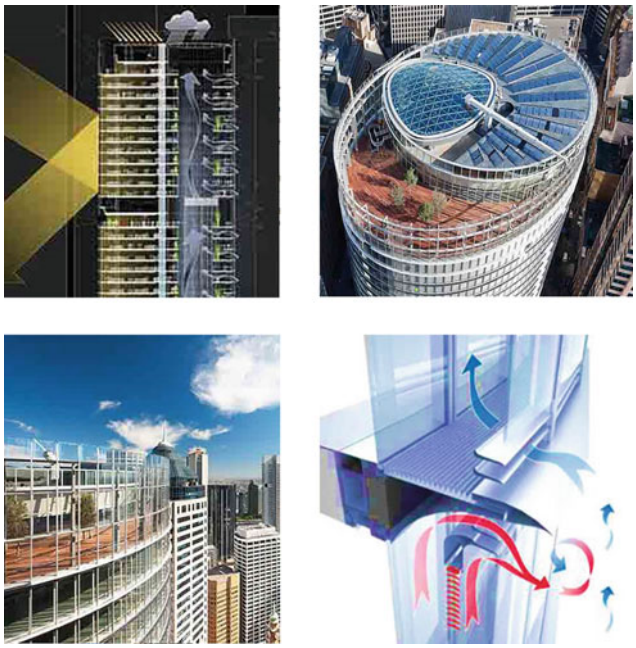


Fig. 6 Bligh Street building (Plaskoff, 2013)

power to generate cooling and heating and electricity (Plaskoff, 2013) (Fig. 6).

The Tower at PNC Plaza: The designers developed an integrated system of ventilation depending on automatic operating systems and remote sensing in the management of the building (BMS) that can help in the regulation of temperature when the facade of the building is in the negative position in summer, spreading horizontal curtains in the groove and opening the vertical holes from abroad and then chilling in the threshold to allow natural ventilation in interior spaces, and open additional sliding doors manually for ventilation, and the facade of the building which works as a thermal barrier during the winter closes walls and heat the interior negatively with radioactive system (Berg, 2016) (Fig. 7).

Daegu Green Public Library: The green design and Energy Efficiency depended on the LEED 2012 where the aim of the project was to include the importance of sustainability and energy efficiency within the minds of people through great example which is interested in culture and the future, where green technologies were strictly linked together, in accordance with an integrated approach is multifaceted and depends on the intelligent facade, designed as a dual cover as well as other techniques not consuming much energy (Vanni, 2013) (Fig. 8).

Fig. 7 The tower at PNC Plaza (Berg, 2016)

Fig. 8 Daegu public library (Wong, 2008)

4 The Protection from the Sun and the Solar Screens

The architects were interested in providing the buildings with a great amount of thermal comfort with natural before resorting to the industrial means of protection from the harmful effects arising from the strong heat of the sun and in the countries which enjoys bright sunshine most of the year as well as the Arab countries which used wooden Oriels and beautiful engineering forms, (Zeitoun, 1995) In which it is considered one of the first attempts of the idea of solar screens that provide shades and protection from the hot summer sun with to allow cool air to flow and which usually have smaller holes in the bottom and the largest in the upper parts, designed to move the air in the room to provide indirect lighting oriel at the interior space as well as aesthetics aspects as a result of the reflection of the shadows of the engineering shapes to the inside, as well as looking onto the outside with a great deal of privacy (Sabry, 1989). All these characteristics the modern architect devised many ideas including solar screens which have become an icon for some projects and distinctive signs in its urban surroundings (Fig. 9).

4.1 Solar Screens

A type of solar screen that combines some characteristics of the sun breakers and some of the features of the glass as well as their characteristics and aesthetic decorative forms and the most important of those screens in the past are oriels, gypsum open works and multi-ceilings sun-breakers and if the number of roofs increased and their sizes were small size, they could be classified as a solar screen that can be defined as it is a holed ceiling covering the hole of the window partially to allow a percentage of solar radiation to pass and block another percentage which depends on the percentage of rays usually depends on the percentage of the slots in this surface, and the angle of incidence where is design is due to the environmental and climatic conditions of the region, and the aesthetic and architectural expression required to the facades. In addition to the plastic and aesthetic potentials of the shade and shadows resulting from them and their psychological impact on the users, where they give a dynamic movement and aesthetics to the interior space responding to the events with the change of time making it vivid and exciting inside the architectural space (El-Zafarany, 2002) (Fig. 10). Its good design solar should be through the achievement of some important criteria such as:

- Providing full natural lighting and suitable for the internal spaces.
- Achieving sustainability criteria influencing climate change.
- Social requirements related to privacy and freedom of overlooking.
- Achieving the aesthetic and good architectural expression of the facades.

Fig. 9 Demonstrates some projects are using solar screens to protect against sunlight (Prodema, 2015)

Fig. 10 The aesthetic potential of the shadows resulting from the solar screens inside and outside space (Saz, 2019)

- The protection from external weather factors such as heat or harmful sun rays (Abdel-Gawad, 2017).

The design trend of facades in cold areas often used large areas of glass openings as a result of the lack of the brightness of the sun to allow views to the outside while warm environments have some problems in the design of the destinations, especially if those projects had a special nature in terms of the importance of the views where you can't use large areas of glass, so the idea of using the solar screens will be appropriate to those environments as well.

Some cases, combining the movable sun-breakers and solar screens, (Fig. 11) where they give flexibility in areas of shadow and light required during periods of the day to limit solar radiation and generally means of giving shades should be depending on the environmental and climatic conditions and the requirements of the function of the internal space.

4.2 The Solar Screens as an Input to Designing Facades

The typical model of solar screens has changed greatly as a result of the change and the development of materials and construction techniques, which they have developed from a simple component of the treatment of climate change on the facades as a whole but they went beyond that to be the basis of the philosophical idea of the project and the basic element of the architectural block and ideas varied which adopted that approach and archaeologists to show their creativity of these ideas on the facades of their buildings and their inspiring sources have differed, where we find the great diversity in the approach and design sources, some of them have borrowed forms from nature including what is engineering and raw materials have varied between metal, plastics and treated glass introducing some modern

Fig. 11 Projects, combining the movable sun–breakers and solar screens (Kalantary & Behpour, 2012)

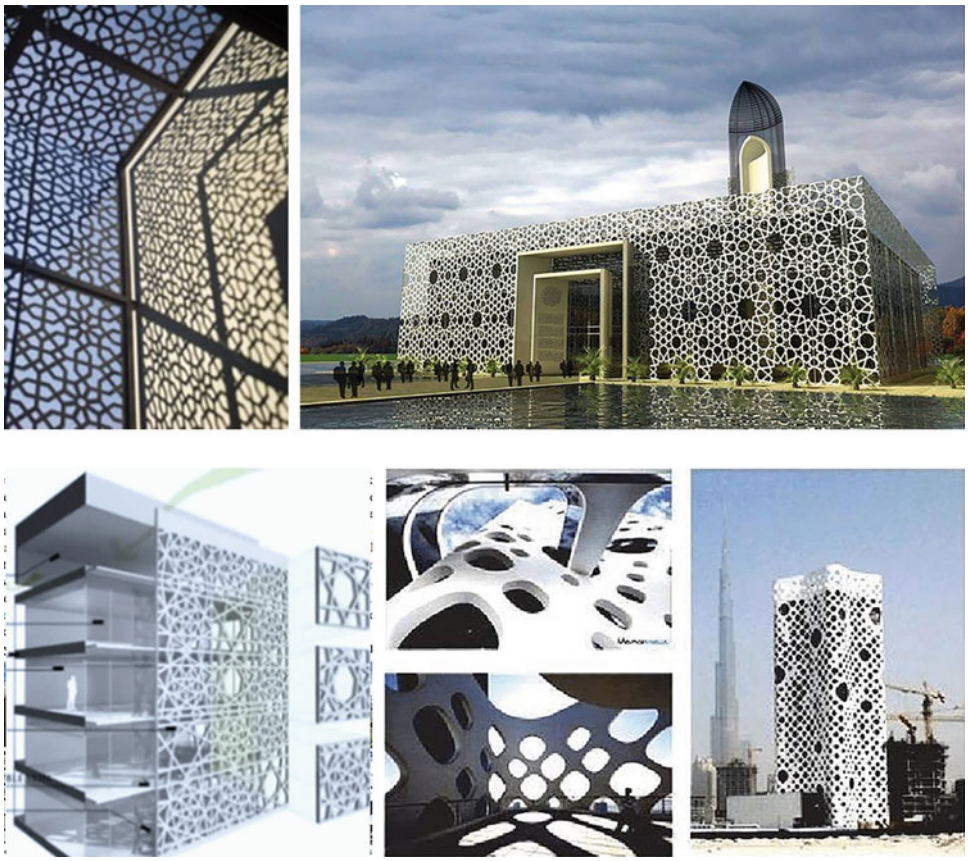


Fig. 12 The evolution of patterns of solar screens in contemporary architecture (Al-Kodmany, 2014)

technologies on them both in the ways of structure and flexible design for some of what is fixed and what is movable which varied ways and systems static or movable and the techniques used in it (Abdel-Gawad, 2017) (Fig. 12).

4.3 Smart Solar Screens

The 1990s have witnessed a great interest in the development of restrictive construction smart facades which are capable of making changes in the way the response to environmental conditions with the integration of smart technologies in designing ii to be responsive to climate change and the external environment on the one hand, and the closed places, on the other hand, to operate as an environmental dynamic filter regulating the performance of energy, thermal comfort, the quality of air and visual and audio comfort. (Samir, 2018) where the design of the facade can affect all of those factors, and therefore we should give special attention to the design of the facade and its components and operating it (Giselbrecht, 2018). As a result, the design system of the facade should take advantage of all the surrounding circumstances and possibilities, to achieve the effective performance of the outer space of the building and the mutual response between the internal and external environments (Samir, 2018).

4.3.1 Dynamic Façade

Not long ago, buildings particularly the administrative were with a clear structure in the design and arrangement of windows, this choice in design imposed itself by the stability of the building and the location and arrangement of internal spaces and organization according to the priorities of its functions in the direction of the lovely sun, wind, or pool view or others to conciliate between the desire to comfort, and fun for everyone in the building and the actual needs and logical in the arrangement of these elements on the facade according to the importance of each of the elements of the former and the ability of the architect crystallized form of facades (Giselbrecht, 2018). Climate is considered a major specification in the formation of the facades which restricts the architectural creativity of the building as he wishes. For these reasons, some of the architects thought of a different pattern in their vision of the architecture of the future to surpass those constraints for we believed till a short time ago that we are dealing with dynamic facades that can be adapted to changing circumstances within the limits of the technology available in that period, but that perception has changed

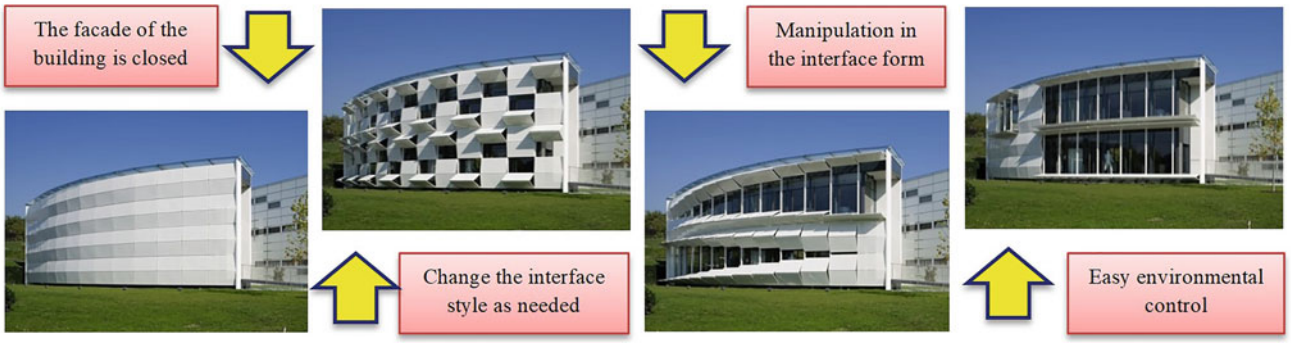


Fig. 13 "Kiefer showroom" Dynamic façade change as desired, depending on the circumstances of the external environment (Giselbrecht, 2018)

with the advent of high technologies and advanced technology (Abou Seada, 2010). This gave way to some of the architects to form dynamic facades which change throughout the day, depending on the circumstances of climate change and what the imagination of the designer creates of the facade configurations which are designed with high precision, working electronically with sustainable features aiming at fun and pleasure for everyone and the biggest example is the building of "**Kiefer showroom**" Austria-2008, "Giselbrecht + Partner" Architecture, where the work of the exhibition facade so that external changes are designed with more than a pattern partly or totally of the facade to give the dynamic façade change as desired depending on the circumstances of the external environment and the corners of the diagonal angles of the sun, and a desire for openness to the outside which improves the performance and the warming of the building where it is electronically controlled in harmony (Giselbrecht, 2018) (Fig. 13).

In the past two decades, the idea of "intelligent building" had developed where this term was used in the 1980s. Smart facade has been defined as an facade combining between the changing technology which can adjust itself to give a state of satisfaction inside the building whatever the outer circumstances, smart and fast facades interacting with the surrounding environment by integrating technology rapid response interfaces interact with the environment through the integration of technology to meet the natural needs of establishments and these systems have changed from the stereotypical image of the design and format of the facades from fixed module to dynamic facades, (Civil, 2012) and "smart" facade differs from the conventional in that it includes changing tools that can provide the building control in the exclusion of negative energy from the external environment or to attract the positive energy required to find acceptable internal conditions. On the other hand, these facilities serve as environmental frameworks and are relatively complex requiring the programs to give control of environmental harmony and energy efficiency. It also takes multiple forms of mobility, either on the Axes or vertical or horizontal structures or takes the forms of decorative modules, dynamic smart facades are also used as an intermediary in the dynamic environmental control of four key variables:

- Solar thermal control "gain or loss of thermal"
- Control the use of the light of day of interior spaces.
- Control of natural ventilation in temperate climates.
- Effective power generation "thermal and hydroelectric"

Operating means of shading" Louver systems" can control the value of the entry into force of solar radiation and the desirable, for summer or winter, (Givoni, 1994) which can improve the conditions of the internal environment and thus increase the satisfaction of users, for Examples include:

The Institute of the Arab world: It is one of the first buildings that used mechanical interaction of environmental conditions surrounding sensitive since 1987 where an electronic control is done in 25000 photoelectric cells such as the camera lens to guide light levels on the southern façade that is similar to the Arab orie,l where is formed of technically advanced tools, where those lenses to organize and control the volume of light and vision of the interior depending on the circumstances of the external environment as well as the technologically advanced tools which gave great importance to the building that was not known in this period (Dezeen, 2013) (Fig. 14).

Q1 building in Essen, Germany: It is covered with 3150 dynamic columns that are controlled electronically through a facade responding to external changes. There are about 400,000 of the steel plates that enable redirecting light without impeding vision, moving based on the orders of the control unit and the closure of mechanical components to make the interface fully fenced or fully open to allow the vision or take advantage of the sun at certain times which reduces the requirements for ventilation and cooling and coordinate lighting internal spaces which reduces the requirements of industrial lighting besides the environmental advantages constituting the facade components of distinctive forms similar to fisheries some time, (Soleil, 2012) which

Fig. 14 The institute of the Arab world (Dezeen, 2013)

Fig. 15 Q1 building in Essen, Germany (Soleil, 2012)

makes an integration between each of the external dynamic composition of facade and the environmental amenities of the internal spaces (Fig. 15).

Sea Towers: They require glass buildings in hot regions more air conditioning and thus increase the cost of energy but this change if building glass towers in a smart and sophisticated style the Sea Towers (Abdou et al., 2017). Through a quick glance at the climate of Abu Dhabi, the architects in charge of design of faced major challenges. The large heat and glare can make the internal environment impossible, where the structural architects of Aedas formed a responsive façade similarity to "Al-mashrabia" where the coverage of the outer surface of the structure is a 2000 shield of solar umbrella that opens and closes automatically in accordance with the severity of the rays of the sun, located 2 meters from the external structure, this smart engineering design provides both shade and privacy and at the same time it allowed outer view all the time, At night, umbrellas remain folded to allow the emergence of the glass facade of the building. When the sun moves, umbrellas follow it (Radhia, 2015). This smart oriel reduces the percentage of solar radiation entering the building to half, the control movement of an asterisk on the flexible units forming the interface and coordination of internal light, with visions of better and less need for manufactured lighting, a new way of interacting with the external environment electronically, "and the World Council of the towering buildings of urban housing CTB H", the project was chosen to be the best design in terms of innovation and compliance with environmental standards (Alittihad, 2013) (Fig. 16).

Thematic Pavilion: is one of the main buildings in the EXPO 2012, Design: Prof.-Ing Jan Cremers, aiming at the establishment of a permanent landmark which is consistent with the urban and environmental and ongoing transformations characterize the outer appearance, where the topographic lines of ceilings with sheets of the kinetic media facade, which aims to create memorable experiences through the dynamics of the facade for the entry of light and the design of the wave-like dances along the building, and after sunset, it enhances visual impact on unlock movements through LED lights installed inside the sheets, in this way, the electronic principle creates firm impact integrating into the engineering and characteristics of materials and the angle openness and light with each other smoothly, where a mobile facade combines between technical innovation and outcoming of sudden emotional manner and the dynamic facade sheets control the solar energy inputs where the solar panels found on the roof provides capacity for the operation of the establishments of service (Lima, 2012) (Fig. 17).

Campus Kolding: for architects, Henning Larsen is considered a milestone in the Grønborg, the facade is an integral part of the building which together create a unique and varied expression, as a result of there was change in the light of day during the day and year, and equipped with umbrellas and dynamic solar, adapted to the climatic conditions and patterns used with creating comfortable indoor

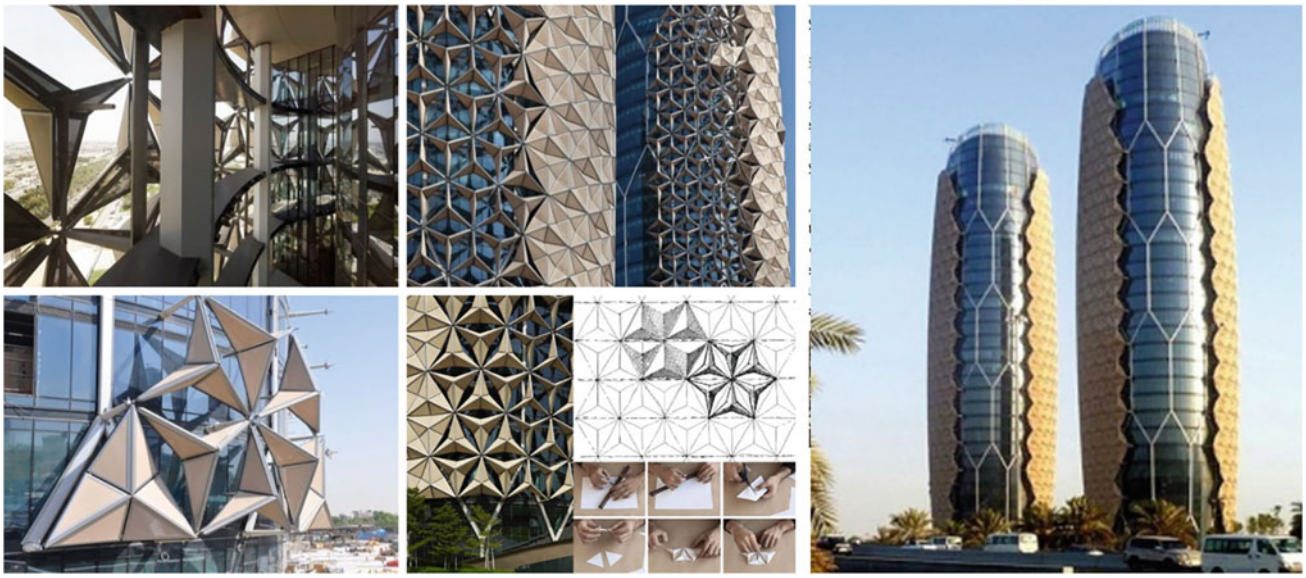


Fig. 16 Abu Dhabi's sea towers is a smart design that follows the movement of the sun (Radhia, 2015)

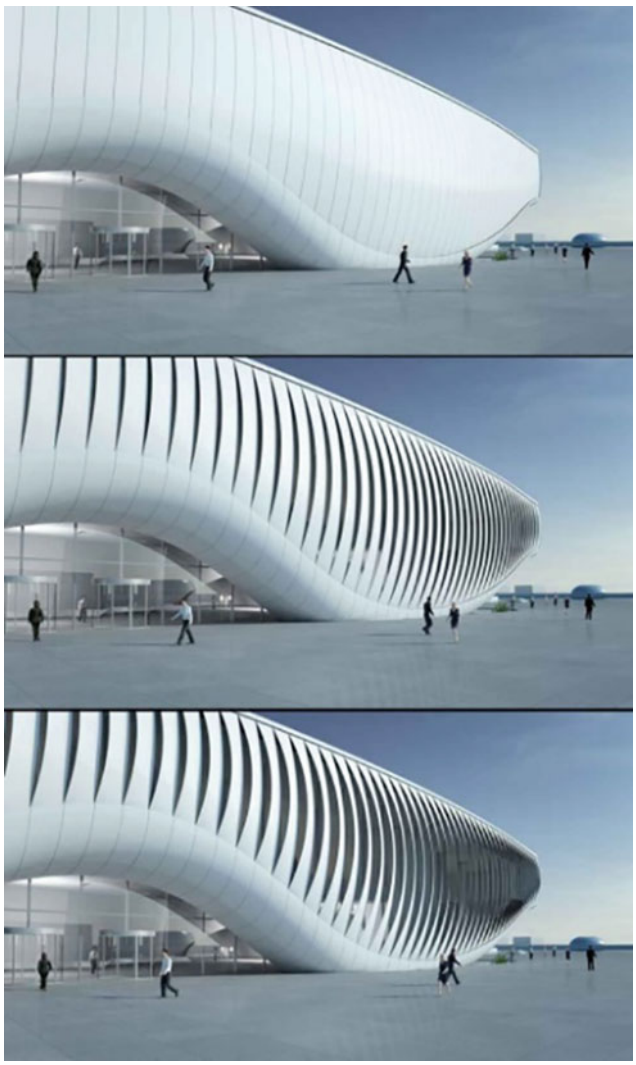


Fig. 17 Thematic Pavilion (Lima, 2012)

climate areas along the waterfront, through a sun shading system consists of 1,600 tripartite shutter of steel drill and fixed on the facade in a dynamic way providing adaptation to the Daylight Changing with opening or closing as desired and the climatic requirements, it is also a dynamics means of formation that provides the building with expressive and attractive appearance expressed and the shading system is equipped with sensors that measure the levels of light, heat and organizes the mechanism of its openness to the outside (Crawford, 2011) (Fig. 18).

Singapore arts center-1997: is one of the examples of smart facades built to provide thermal comfort, in terms of the inter-dependence of the facades and the ceilings in one covering consisting of Griad shell with the presence of an interior glass cover behind them that constitutes self-shading outer surfaces and arched shells with the glass cover working to allow a certain proportion of the rays of the sun and shells are modified on the facade by using the computer to treat high sun angles which cause a big flow of heat, this idea helped to get rid of the trapped air between the surfaces of the glass, creating a shaded area with low pressure under the shells moving freely beneath the air around the building that arises natural cooling system through which air flows, to allow the smart cover, internal and comfortable environment (Hassan, 2008) (Fig. 19).

From the foregoing, it is clear that the sun breakers and the systems of shades in contemporary architecture no longer stand at the acknowledged traditional norms, where it takes various and developed forms and styles either in its forms or style of design moving to the stages of creativity, making it a fertile ground for study and analysis, and standing on the use of these systems in the future, functionally, aesthetically, environmentally and economically for their importance will

Fig. 18 Campus Kolding (Crawford, 2011)

Fig. 19 Singapore arts center (Hassan, 2008)

grow in the future. The traditional sun breakers did not limit different environmental problems fully within the buildings as well as to impose restrictions manufactured at the formation and design of facades, with the obstruction of vision, sometimes the other.

Results:

The facades pass a new phase coexisting with all design solutions available side by side, plastic arts or functional or environmental adopted by architects according to their views due to the technical revolution that allowed the architects to achieve all the design ideas, whether at the level of the operating systems or construction materials. There are facades with sophisticated and traditional breakers in forms, materials and facades with solar screens or mobile dynamic facades which created the possibility of achieving the facades of a large number of jobs in one time which is in itself a successful economic orientation, such as:

- **The protection from surrounding environmental negatives**: This includes thermal and sound insulation, the wind and rain different contaminations.
- **The linkage or separation between home and abroad**: It includes the provision of natural lighting and ventilation and the outlook on the outside and living in the natural environment and communication. It can provide visual and acoustic privacy.
- **The expression of the function of the building**: The buildings facades were similar despite different functions but architects were aware of this problem and facades started to reflect the functions of the building and the evolution of this trend so that today has become an essential requirement in the design.
- **Achieving the attraction factor**: There were buildings that need to appear in a good way or constructions that attract the public to formations such as commercial buildings or recreational or cultural, such as the facades that are completely transparent to allow the identification of what was inside of the commercial or amusement Stores or could be public libraries facades or museums that aim to attract the passers-by and the cognitive and cultural level of the population, taking into account environmental factors and their impact on the building.
- **Building distinction**: There are buildings with supreme or important posts such as the religious buildings or with national posts or that the need to distinguish themselves in the region where they are located or that is characterized by the surrounding buildings.
- **Economic demand**: Despite the high cost for those facades especially the mobile ones, but the provision of energy consumption in the long term, and provide the value of requirements that limit the thermal effects on the building in summer or winter, and aesthetic values of experience making use of these facades economically demand in many environments, especially characterized by harsh climate.
- Developed Solar screens and sun systems and breakers will become an important factor in the overall architectural design in general and the design of the facades in

particular and the evolution of the concept to take more sophisticated forms in the future.

- "A smart facade" differs from a conventional one in that it includes changing tools that can provide the building with control the exclusion of negative energy from the external environment, or to attract the positive energy required to find acceptable internal conditions, on the other hand, these facilities serve as a relatively complex environmental frameworks, where control requires a program to give the required harmony.

Recommendations:

Activating using the system of smart cover to the building for the environment, aesthetic and economic benefits as well as the availability of domestic environmental comfort to users.

The definition in ways and methods of interactive and effective designs of the building and external interfaces to reach the best solutions and economic efficiency and environmental and aesthetic, the level of architectural education and scientific research, and integrate that into educational curricula as part of keeping pace with the evolution in this direction.

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From Teaching to Entrepreneurial Pedagogy: Preservation of Territorial Heritage Through Design Thinking

Hejer Barbouch Ben Fradj

Abstract

The new paradigm of design combines pedagogical teaching with entrepreneurial pedagogy seeking innovation. In this context, this research is centred on the teaching methods and the students' projects as a part of the methodology interactive workshops of the Master's degree project of "Design for the Sustainable Development of Local Craft Productions". This program raises many questions about the transmission and conservation of tangible as well as intangible heritage. This article focuses on the discussion of learning from the social design. It also stimulates the creation of new approaches and needs necessary for the teaching of design. The following paper is based on a research developed on the teaching activities at the University of Fine Arts in Sousse in Tunisia.

Keywords

Territorial heritage • Design thinking • Entrepreneurial project

1 Introduction

In a context of social change, teaching is becoming a growing challenge for aspiring young professionals. Indeed, as society is changing and family dynamics are evolving, the Tunisian educational community and institutions, from schools to universities, find themselves more and more subjected to and even pressurized by some external influences. Therefore, Teaching is evolving its function and role in what relates to knowledge. The question, among others, is the type of training to be given to students in order to guarantee them a real professional and social integration, on the one hand, and a healthy and fruitful education on the other. Knowledge, skills and techniques must serve young people, not enslave them, if they are to be able to face "the new global culture of the 21st century" (Buchanan, 2004). It is for these reasons that teaching, and the teacher in particular, is expected to play a delicate and primordial role at the same time.

According to Santi, "the pedagogy of entrepreneurship feeds on a constant back and forth overlap between the field and the research, for four key reasons: Identifying and selecting favourable opportunities, developing innovative entrepreneurial strategies, teaching students to seize opportunities for real projects, and allowing them to build a successful team by using new information and communication technologies" (Santi, 1994). Teaching is no longer confined to transmitting knowledge. It must rather ensure that students learn notions and concepts that would allow them to develop their life skills. An effective teaching not only results in the application of what is taught, but ends up helping with the acquisition of new knowledge.

One must bear in mind that the know-how to teach is more important than the content to be taught and the knowledge we do not enrich every day regresses forever. The teaching of Design is therefore undergoing a considerable evolution. It is a pedagogical "practice-action-transposition", a constructive and evolutionary process of knowledge transmission.

The introduction of new ways of thinking such as "design strategy" or "entrepreneurial pedagogy" for example, opens up new doors to "design thinking" on the pedagogical and methodological level and subsequently refreshes the teaching devices and methods of a "discipline" in constant search of originality and innovation. This was the main idea behind the addition of a new degree to our educational program, a multidisciplinary master's degree that is especially conceived to suit the reality of our society, allowing talented youth to innovate in the most promising fields and offering

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them more opportunities for growth. This marks the birth of the "Design for the Sustainable Development of Artisanal Productions" master's degree. This article explores a new pedagogical practice in a classical institutional setting, upon the implementation of this new master's degree "Design for the Sustainable Development of Local Craft Productions", created within the European Tempus 3D project "Design for the Sustainable Development of Craft Productions". This project involves European partners such as the University of Florence, the University of Barcelona and the Escola Superior Gallaecia in Portugal, all in cooperation with the Tunisian University.

Through this article, our aim is to study the different constraints that the teaching staff of this master's degree has been facing during the last four years they spent managing this program, requiring the introduction of a new innovative pedagogical approach inside the traditional educational setting. The main issue tackled in this article is the following: How can a design strategy enhance the value of our tangible and intangible heritage?

Our results demonstrate how strategic thinking through design can be beneficial for the scientific community as well as for society, and how it can work for the good of our heritage. This article is presented as follows: First, we start with an overview of the master's degree and its objectives, we then develop our methodological choices before we finally lay out our results.

2 A Master's Degree in Design for the Sustainable Development of Artisanal Productions

This professional master's degree extends the linear methodology of design by integrating a design whose goal is to preserve ancestral techniques through innovation, making use of local identity and both tangible and intangible heritage. All this is done with a special focus on the social value of production. This approach attempts to create connections that leave room for creative research. For us, the "real" case studies are projects that revolve around participatory workshops developed with local partners and that present students with relevant and concrete content in accordance with field work.

Students experience the development of an item, a service, a product or an innovative communication mechanism while putting into practice the tools and skills acquired during theoretical and empirical courses. Through the training provided by this master's degree, each student is led to identify a specific problem before starting to develop a solution.

From that point, the student can start an exhaustive research conducted in the field resorting to the different design tools and methods to do it properly. Each single student is responsible for proving his ability to anticipate an iterative planning. This trains our future professionals to use strategic thinking instead of focusing all of their energy on the final product.

Many students have ideas, but only a few dare to take the plunge. The main objective of this master's degree is to make an "entrepreneur" out of each student and to promote the entrepreneurial spirit among all learners by using entrepreneurship as a tool. This project provides the necessary support for students who have already thought of the first version of their social enterprise project and are able to think of a needed solution to a specific problem while calculating its estimated potential.

Students are supported by teachers from different backgrounds, working in various disciplines. These teachers dig deep into students' ideas and help them see and seize the opportunities at their disposal. Their approach is based on the observation, analysis and appropriation of a given situation. Overall, this project contributes to improving the quality of life and the collective wealth, be it economic, cultural, humanitarian or ecological, by cultivating and harnessing innovative ideas from our youth. And while some people generate ideas as they breathe and are always inspired to carry out new projects and seize every "chance" they get, others may need a little push to do the same.

Therefore, this section provides some incentives to foster reluctant learners 'creativity' and to consider it as a distinctive element of their personality, distinguishing them from others. The syllabus of this master's degree is based on putting into practice strategic design tools and methodologies in a concrete situation of business competitiveness. The theme will involve the analysis of territory, identity, and cultural heritage. It will also investigate the analysis of companies' competitiveness, strategic design contribution, intervention areas and its contribution to modernity. Thus, students' hypotheses and assumptions will be verified through an empirical experience of design strategies in the context of business competitiveness.

2.1 Pedagogical Objectives

This master's degree curriculum aims to provide students with the experience of an integrated innovation process in an interdisciplinary context. Its ultimate goal is to develop an highly innovative training program within the framework of the Tunisian higher education system involving the most notorious educational institutions, a training program that combines tradition and innovation, i.e. cultural identity

re-appropriation and openness to modernity, or heritage conservation and sustainable development. This master's degree highlights the essential role of design in the evolution of territorial projects, on a social, economic and ecological scale. To achieve this goal, concrete actions are planned:

- Intensive on-going training course for trainers, i.e. professors in universities;
- Design, in terms of training and organizational technical aspects,
- The adoption of a consolidated scientific methodology including a multidisciplinary approach, suitable for training activities and in accordance with the participatory approach involving the local artisans and producers

2.2 Pedagogical Expectations

As Glickman states: "Effective teaching is not a set of generic practices, but a series of teaching decisions made in a given context. An effective teacher does not apply the same set of practices in each lesson… He rather constantly reflects on his work, observes students to see whether or not they are learning, and adjusts the teaching practice accordingly" (Glickman, 1991). The choice of pedagogical approaches is a personal action that the professor adopts models and sometimes improvises.

Today, Tunisian design teaching schools focus their teaching strategies on thinking of new pedagogical approaches centred on peoples' projects. Training courses on innovative pedagogies are beginning to take place in the university, aiming at training professors to scientifically lead these design approaches. Being a teacher also requires the use of reliable methods in relation to given situations. I know from my experience that the teacher chooses, and then adapts his approaches according to the form of interaction with his students. He plans his lesson to be able to effectively transmit knowledge to learners.

As mentioned by Allaire S, "the class in which the teacher plays the role of an actor, added to the teacher's belief in communication, these are the essence of pedagogy to me…" (Allaire, 1993). The choice of adopting such an educational approach is essential for the instructor to ultimately fulfill his aspired objectives. From my perspective, I believe that pedagogy is intimately linked to a teacher's personal practice. There is no ultimate rule and no one-size-fits-all model when it comes to pedagogical approaches.

On the contrary, any teacher can temporarily bend the rules and mold the didactic situation to fit his students' specific needs. In fact, this strategy helps the instructor have a better teaching experience. Our mission is to properly train students to be independent entrepreneurs, help them maximize their chances of launching their own start-ups and provide them with the necessary assistance, supervision and support so that their projects can thrive and grow into successful businesses.

3 Project Method: The Situation-Based Approach

The project workshops' strategy calls for a methodological multidisciplinarity based firstly on a combination of survey methods applied to social and anthropological sciences, and second on methods used in product, architecture and digital design. The choice of this specific approach is not random, it's rather fundamental to deliver optimal results. To better understand the rationale behind this choice, a short presentation of the "Project Methodology" workshops and their objectives is necessary.

One of the particularities of teaching design lies essentially in the form of its workshops. It is a place where theory meets practice and where students are expected to learn how to design. (Kekhia Meddeb, 2017). Project Methodology is a basic workshop with one main mission: setting up a process of both analytical and practical reflection on palpable cases. It also gives room for group initiation and sharing, allowing students to continuously check their theoretical knowledge. Not only do they get to see how their inventive approaches can serve as professional strengths, they also learn a lot about the requirements of their future professions. These workshop classes aim to increase students' awareness of the variety of professional practices related to design. They also help them to find the links that connect these different practices. For us teachers, some of the most important questions are: what pedagogical approaches can effectively awaken the entrepreneurial spirit of our young students? And how can we help them succeed in their entrepreneurial projects? The use of active pedagogy seems to be particularly suitable for teaching entrepreneurship. The problematic situation itself becomes a tool that allows the teacher to organize his entrepreneurship training by activating two complementary approaches, the first being procedural and the second emotional. In this workshop, I chose the problematic situation approach method which is based on a fact, an observable phenomenon, drawn from a specific situation that allows the student to be engaged in a learning process.

Indeed, I chose this method because it engages students and allows them to work together on problem-solving. As far as I am concerned, I found this approach to be the most suitable for this workshop's objectives. According to Raucent, Benoît and Bourret, Bernard, "Problem-based learning is above all 'a pedagogical formula' set up to help students to have a participatory attitude towards teaching in the teaching process learning".

The project development phase is based on a reflective approach that begins with the completion of some analytical work. This is essential because it acts as a starting point from which the whole project's construction will then derive. In a way, it is like needing to gather clues and collect some information before you get to capture that special photograph of a unique situation at exactly the right time. This practice therefore consists in making an inventory during which students describe a fact or an operation then use this data to generate knowledge (Fig. 7). This approach specifically seeks to identify the strengths and weaknesses of the observed system, although at this stage, the elements at hand do not yet allow for an accurate assessment of that system and do not give us any final conclusion as to whether or not it can be satisfactory. An instant solution to the problem may sometimes be impossible because it requires a conceptual knowledge that has yet to be introduced.

The aim of the training provided through this master's degree is to learn that collected information must be analysed and verified before being channelled. Information should never be taken for granted. One should follow the track of things starting from their genesis, leading up to their development before coming to an end. When collecting information, students are encouraged to prepare their own reports, observe situations and identify the real problems. They go out into the field with a problem that has already been identified and try to enrich their assumptions by observing the reality of things (Figs. 2 and 5). In this phase, we invite each student to define the line of business in which he intends to work, the location of his project, the target market, the segmentation of this market (territory, statistics and target clientele), the possible competition, and the evaluation of possible revenues. Their output could be defined as a fundamental starting point for meta-projects design, using this feedback to create new products, services and systems based on context and needs.

At every step of the process, and regardless of the object and the level of analysis required, students have to observe reality as it is before being asked to put it freely into words, figures, numbers and graphs. They have to include and take into account everything deemed necessary to survey the phenomenon being studied. Once they elaborate their strategy, they must prove how it specifically answers to the needs of their territorial sector. Students are placed in real work environments. This way, they are more likely to feel committed to their projects and can therefore learn a lot from it. Each phase of each project is a step forward towards discovering new innovative solutions that are truly sustainable both environmentally and socially (Fig. 8). In our particular case, it is about a contextual analysis done on the Tunisian territory with the aim of developing the first set of concepts needed to preserve tangible as well as intangible heritage.

At the end of each project, an evaluation phase is required. It is during this phase that we get to track and measure the achievement of the initial goal and see to which extent the objectives set beforehand are being met.

Two evaluation models are used for each student project: a normative assessment by the end of each milestone and summative evaluation when reaching the realization and prototyping phase. We chose this combination of assessment methods in order to ensure that students progressively develop the set of skills needed to bring their projects to life, to confirm that all students are involved in solving the problem and to effectively check the progress of each group. As for summative evaluation, we chose to keep alive the tradition of organizing a jury to assess the sum of work done by each student.

This project-based teaching is radically different from the so-called "traditional" teaching because it focuses on the student and his project. One of the best proven ways to promote professional integration of young graduates is getting them involved, from the training phase, in real projects rooted in their territorial reality.

3.1 The Approach's Outcome for Teachers

Teaching methods should not be dealt with as skills dictated by teachers and executed by students. I think that there must be a real reconciliation and interaction between the teacher, the student and the pedagogical situation. The application of the situation-based pedagogy is indeed a step in that direction. Among other things, it allows the teacher to go beyond the role of the information transmitter to that of the vision generator. The student will certainly acquire new technical skills, but will also develop others within the process such as the critical thinking and the problem-solving.

The use of the "Entrepreneurial Pedagogy" should no longer be thought of as a teaching for the end, crowning a university course sanctioned by the rite of the end of study project. On the contrary, this learning should be designed as a go-between step, preparing students for professional life. Indeed, we must think more of this approach as a generator that will push students to seek information to analyse situations to learn to be autonomous, confident, critical, and to think about successes and failures.

Using this teaching approach helps with students' social, cultural and professional integration into society by bringing out their potential, developing their autonomous thinking, and engaging them in collective practices related to the professional environment. As a teacher, I believe that this has been one of the most valuable experiences of my teaching career, compared to what I have experienced using more traditional methods. I must say that thanks to this new master's degree, all members of the teaching staff have had

the chance, the pleasure and the honour to learn more about entrepreneurship and start-ups.

Hence, setting up a workshop based on entrepreneurial pedagogy assumes that the teacher takes on many roles that are sometimes way too different from those attributed to formal teaching. As a teacher, I have to play the role of a motivator who fosters the student's engagement, a guide throughout the process of learning and a mediator who does not only provide the student with a direct access to knowledge, but also ensures him autonomy to help him carry out his independent learning. These roles require the teacher to develop his leadership and management skills as a creator of significant learning environments and situations for his students.

3.2 The Approach's Outcome for the Students

As a member of the team responsible for this master's degree, I focused on teaching the student to be eloquent and to know how to speak in front of an audience because as a designer, one is expected to master public speaking in order to be able to fluently communicate one's project to any audience.

Personally, I share the same point of view as Tardif (1996) who believes that "competence is a declarative system (the what) as well as conditional (the when and the why) and procedural (the how) organized in operational diagrams which allow, within a multitude of situations, not only the identification of the problem, but also its resolution by an effective action."

This way of seeking proficiency enables students to work more independently while enriching their knowledge and developing their abilities and skills. It also provides them with a recognized empirical and professional training that would guarantee them a smooth integration into business. More importantly, this approach does not only enable students to get the qualifications that meet the current needs of local and international markets, but it also aims to make them experience a process of innovation, resulting in an increase of leadership in their future entrepreneurial practice.

4 Case Studies

Case 1: "An abandoned place turned into an entertainment space"

Student: Emna Mili—Study project 2018

"Jemmal" is a rural area with no tourist attractions. It is surrounded by several small villages that lack leisure facilities. There are no protected recreational spaces for families. Mothers and daughters suffer the most from this serious lack of entertainment centres, as it is more socially acceptable for men in this region to indulge in outdoor activities. There is also a considerable distance separating "Jemmal" from neighbouring governorates Fig. 3.

How to solve these problems and pump some energy into the "Jemmal" village? After a thorough study of the area, addressing the lack of leisure facilities seemed to be a good place to start. This led us to the necessity of finding a space that meets some specific criteria: large porch area for everyone. And there it was, the former brick factory, a place that outsiders at some point were about to transform into a housing estate if not for the inhabitants who intervened to stop the massacre of a great heritage. This neglected space is impressive both in terms of size and history. It is also quite heterogeneous. How can it be fully restored while preserving its identity? What are the conditions for setting up an entertainment area that meets the real needs of the city?

Taking all of this into consideration, the objective of this project consists in developing and managing this space by promoting the ecological landscape and providing entertainment. This notably improves the living environment of the inhabitants while preserving our heritage. However, the restoration of an abandoned space is a complex issue. Profiles are very distinct and there are multiple ways in which different parts of it can be perceived. This made their management complicated. The challenge of reviving this neglected heritage can only be faced with well thought-out strategies and with special regard to this space (Fig. 1).

Through design thinking, the student had the will to suggest a new reflection at the crossroads of sustainable development and heritage in order to revive this factory. His project idea consists of an ecological and heritage enhancement of the entire abandoned space while keeping the identity imprint of the brick factory. The design strategy

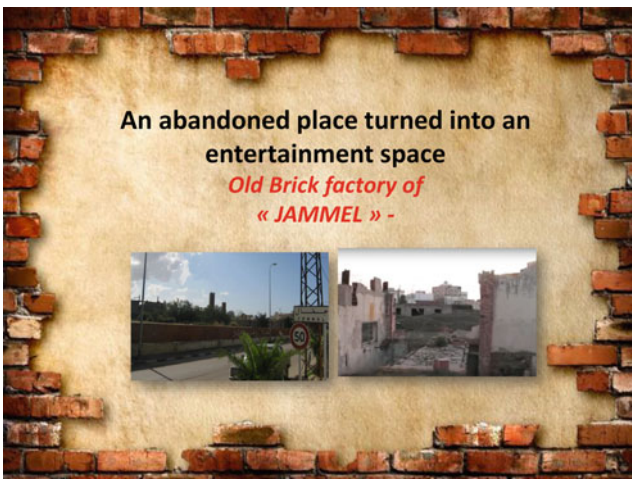

Fig. 1 An abandoned place turned into an entertainment space

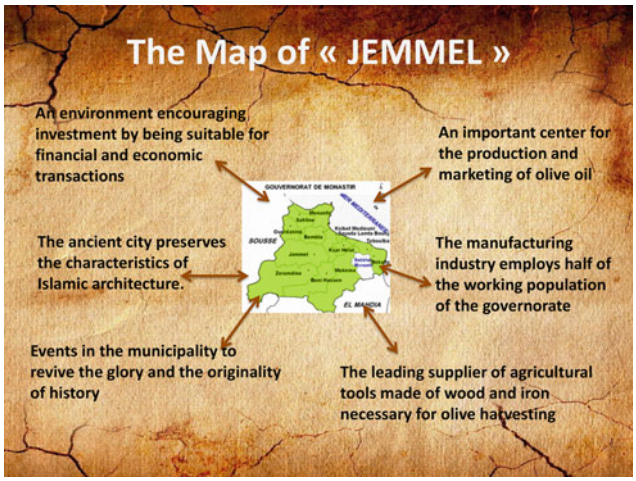

Fig. 2 Jemmel cartography

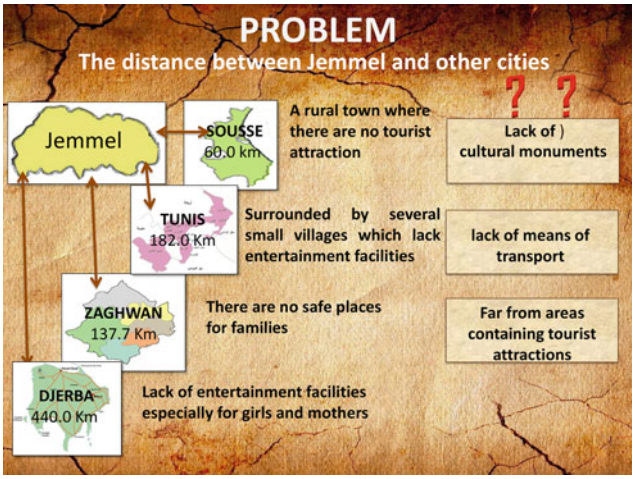

Fig. 3 The distance between JEMMEL and other cities

process developed by the student is to explain the necessary steps for the creation of this new entertainment facility. It is a varied space with different activities. It includes an entertainment space and a cultural area. My interest was to suggest a new approach to the environment combining the concepts of ecology and heritage preservation with particular attention to the social value of production (Figs. 2 and 3).

This research aims to combine, through design-oriented actions, the tangible and intangible heritage of "Jemmal". The research is divided into two phases: An initial phase of "multidisciplinary" analysis of the territory aimed at building innovative scenarios opening up new avenues-specific actions, and a second practical phase which concretizes the idea and suggests a material and immaterial identity for the territory with potential contents to develop concepts. With a vision for the future of new generations, the idea for this project is based on social and cultural sustainability.

The student's project consists in the creation of a museum retracing the history of the brick, its role and its trade in

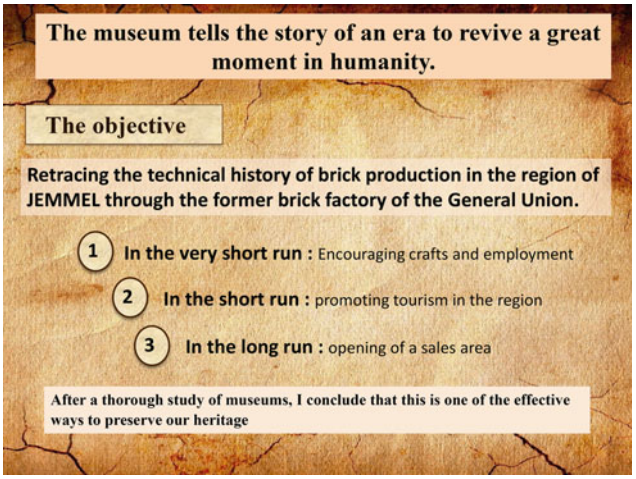

Fig. 4 The museum tells the story of an era to revive a great moment in humanity

Tunisia. A viable project that preserves heritage, promotes sustainable social and economic development and empowers communities Fig. 4. Indeed, the creation of a brick museum has the potential to rebuild a sense of collective identity among the inhabitants of this territory. It can help establish sustainable development by focusing on heritage resources. This museum can further promote the conservation of heritage resources and community growth. Still, its construction is not only designed for the conservation and preservation of heritage, but it is also meant to attain a more ambitious goal of creating a collective space for courses, workshops, exhibitions and even tourist visits. This museum introduces Jemmal to the exhibition theme. It is a brilliant combination of architecture, product design and anthropology on one hand, and a powerful tribute to the history of Jemmal's former brick factory on the other.

Case 2: Autonomous mobile sanitary cubicles

Rania.zaghmi—Study project 2017

Improving people's life quality and preserving their environment are inarguably some of the most humane and noble goals. And if these two goals can be achieved simultaneously, we can say that we hit the jackpot. Offering both benefits is exactly the value proposition behind self-contained toilets.

Relieving oneself when necessary is something most people don't give much thought to. Yet, everyone has, at least once, gone through the trouble of finding a public toilet. Like many cities, Sousse has a busy center with a large mix of residents, workers, students, tourists and passers-by. Thus, access to sanitary facilities in public places can be a real struggle and even a recurring problem for many.

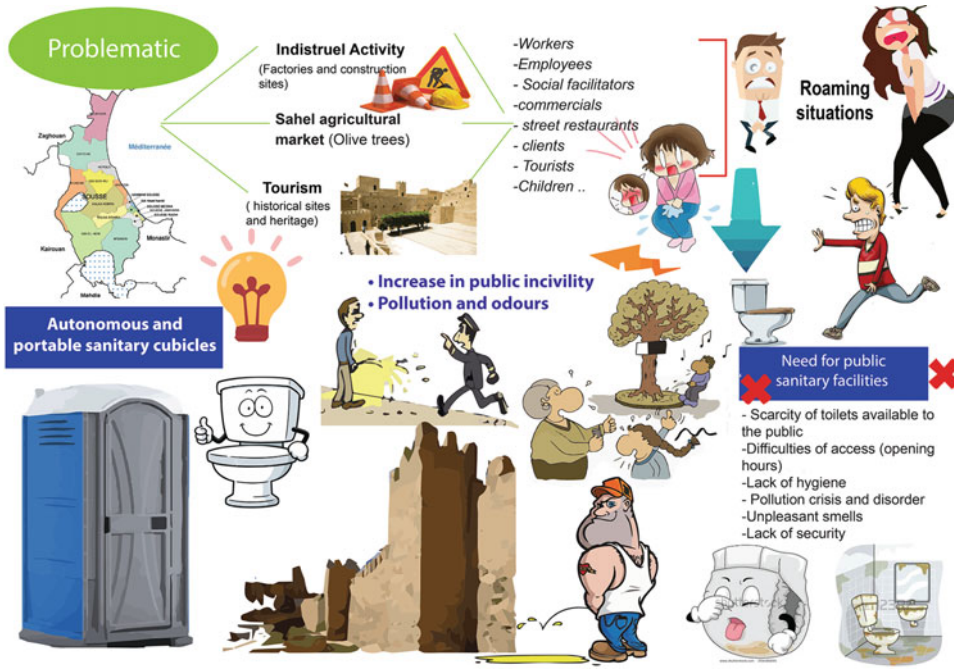

Fig. 5 Industrial activity

Moreover, the incivilities resulting from the lack of access to public toilets create tensions on the city's territory and amplify cohabitation issues among its different population groups (Fig. 5).

Among the problems identified by the student:

- Difficulties of access (opening hours/signage)
- Small number of toilets available to the public
- Lack of hygiene in public sanitary facilities
- Absence of public health culture.
- Pollution and disorder crisis especially after the revolution
- Lack of satisfaction with urgent needs other than health care.
- Apprehensive attitude towards public restrooms (Only 4.36% of Tunisians are using public or shared toilets).

The student sought to identify ways to explicitly consider everyday practices by taking into account sociological, anthropological and ecological factors. In this perspective, our contribution as design teachers was to orient the student's thinking towards multidisciplinary perspectives through design thinking. The idea behind this project was to design ideal public mobile toilets that meet high hygiene standards to tackle the current restroom issue in Tunisia (Fig. 6). These mobile sanitary cubicles are independent units for individual use, easily transportable and with a waste water tank that is not connected to the sewerage system. They are economical and well-equipped allowing absolute comfort, hygiene and odour control (Figs. 7 and 8).

These are some of the project's short-term objectives

- Providing equitable access to basic sanitary facilities in different places in Sousse
- Improving the quality of public health services.

Medium-term objectives:

- Reduction incivility on the public highway.
- Increasing cleanliness and reduced risk of infection and virus spread
- Increasing ridership of parks and commercial areas.
- Increasing individuals' mobility on the territory.
- Facilitating cohabitation among merchants and marginalized people.

Long-term objectives:

- Improving the coexistence between traders and marginalized people.
- Significantly improving the tourist experience throughout Tunisia (enhancing our country's image).
- Improving consumers' well-being with a sustainable approach.

It is important to highlight the role of our design approach in this project. In fact, design in this case is not only about manufacturing a product to meet a need using a design strategy. It rather consists in developing a whole social, ecological and anthropological system where design acts as a stimulator of other contributions. It is about merging service, product and communication to reflect upon the identity of our territory.

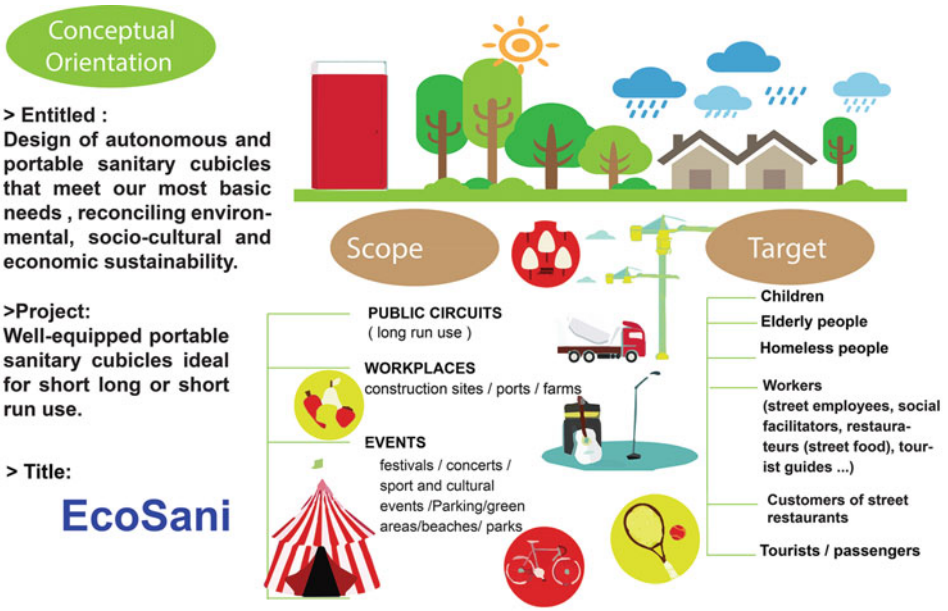

Fig. 6 Conceptual orientation

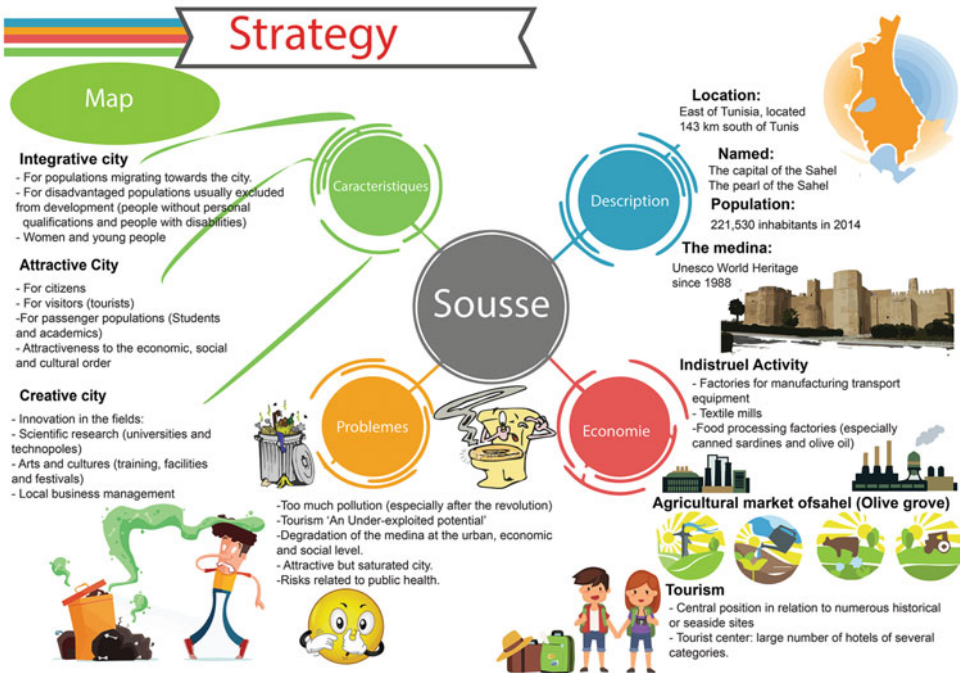

Fig. 7 Cartography strategy 1

This project aims to improve the user experience with a single object and space. The student's ultimate goal is to design a cubicle where every parameter can be perfectly controlled: light, cleaning, odour, etc. The cabins are also designed and fully equipped to meet the requirements of PRMs (People with Reduced Mobility). These mobile restrooms are in great demand by several communities (camping, leisure, sites, etc.) and represent a quick solution to have standard sanitary facilities on a budget.

The primary goal of teaching entrepreneurship is to act on students' thoughts and attitudes. It is almost considered as a «pedagogical revolution», a new experience in design teaching, allowing for the birth of innovative projects that promote local and global growth.

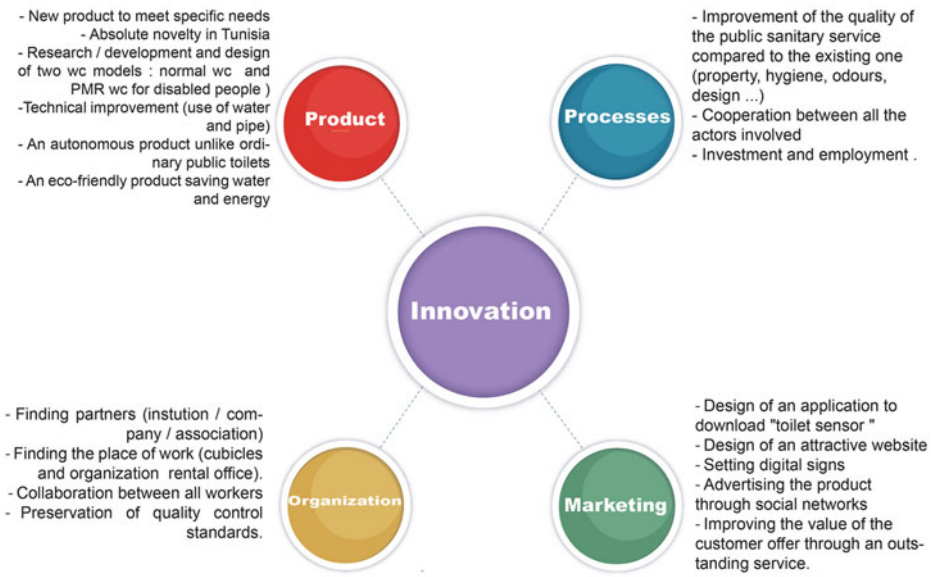

Fig. 8 Cartography strategy 2

5 Discussion and Conclusion

The experience of this master's degree was beneficial for teachers, students and for Tunisian territorial heritage. Our students oriented their reflective thoughts to observe real-life situations arising from their territories. Their thinking strategies were not based on inert artefacts but rather on interactive experiences, putting to use both knowledge and life skills. Their design approach evolved to meet the criteria of sustainable development. Our Tunisian identity was their primary source of inspiration. Each one of their projects puts a strong emphasis on territorial identity, heritage and culture. However, the most important thing for my students was the chance they had to discover the real values behind their identity, each one of them digging deep inside his/her own territory. By the end of this experience, they were also able to appreciate the tremendous value of their tangible and intangible heritage. Comparing to students from other professional master's degrees, students from the "Design for the Sustainable Development of Local Craft Productions" program evolved considerably thanks to the innovative design strategy.

They finally managed to develop their projects with the collaboration of all teaching teams who did their best to help bring these ideas to life. This new design pedagogy pushes teachers out of their comfort zone to venture into a new approach. It stimulates them to open up and reflect on their own teaching strategy. Nowadays, we are moving from a "traditional" pedagogy to an innovative pedagogical experience centred on humans and their heritage. This master's curriculum was a great opportunity for teachers to learn how to transmit their knowledge through more effective and methodical tools.

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Housing Development in the Town of Mansoura Northern Badia of Jordan

Majd Al-Homoud and Salem Al-Oun

Abstract

Cultural values and living needs are encounters that motivate constructs of the current study. The present work examined the likelihood of providing low-income housing for a socio-cultural group from Al-Noaim clan who still inhabit traditional tents (*Bayt Ash-sha'r*) et al.-Mansoura town. The total community size is 350–400 members. Most of them receive financial support from the Ministry of Social Development. The suggestion here is to consider the cultural attributes of the tribe with special attention to such socio-cultural group. Al-Mansoura town is in the North Badia, located 12 km Northwest of the city of Mafraq close to the villages of Al-Serhan. The design proposal was projected from the field work: survey and interviews with 27 households. Results of the study recommended to build in two-phased project over 15 years lifecycle, 100 residential units to be distributed to 27 families. The design development was centered around two aspects: (1) Site selection and (2) Identification of areas and patterns for the housing units.

Keywords

Housing • Jordan • Bedouins • Urbanism • Nomadic • Culture • Determinants • Urban • Planning • Architecture • Design • Sustianable • Development

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1 Introduction

Cultural values, living needs, services, in addition to income generation are encounters of the present study. Most of the population of Al-Mansoura town get financial support from the Ministry of Social Development. Al-Mansoura town is in the North Badia of Jordan, 12 km Northwest of Mafraq city. The clan of Al-Noaim usually locate themselves to Irbid city area throughout the periods of graze. However, their linkage to their kinship in Ruweished area made them move around and stay in Al-Mansoura town when livestock deteriorated after the latest drought. Possession of a house is a facet of ritual. In addition to providing a shelter, a house reflects social status and prestige. A field survey determined three house typologies in the area: (1) old mud houses, (2) modern houses, and (3) traditional house (*Bayt Ash-sha'r)*. The main study objective is to provide houses for members of the clan who live in *Bayt Ash-sha'r*. Such improvization should be based on understanding norms and cultural practices in addition to considerations of the material needs.

Although population growth rate in Jordan proposes a continuous demand for housing, the supply mismatch the demand (Al-Homoud & Al-Oun, 2021). For decades housing production in Jordan was a priority of the government, in the form of apartments simply to satisfy rapid population demand (World Bank, 2018). Such housing product increased dramatically after the influx of the Gulf War in 1990 (Al-Homoud et al., 2009). An influx of wealthy Iraqis in 2003 following the attack on Iraq transformed the housing demand and supply dynamics (Al-Homoud & Al-Oun, 2021). Later, "Jordan hosted by 2013 about 1.4 million registered Syrian refugees, 85% of whom lived in different cities" (Al-Homoud & Al-Oun, 2021, p. 570). At municipalities, refugees outnumbered residents (Al-Homoud & Ghanem, 2019). The new household demand pressured the supply side. It affected quality and quantity undesirably; it increased construction, land, and overall housing cost Al-Homoud & Al-Oun, 2021).

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Jordan is in the heart of the Middle East with an area of "88,780 km^2 with a population of 10.18 million and a natural growth rate of 1.37%—year 2019. Urban population makes about 91.5% of the total population. Amman, the capital city, population is 1.28 million, which makes 12.5% of the total population of Jordan. Further, 25.96% of the total population of Jordan dwells in three major cities: Amman, Irbid, Zarqa, and Russeifa (about 2,644,239)" (Al-Homoud & Al-Oun, 2021, p. 573).

2 Literature Background

Housing design attempts are a representation to the image of the needed perfect environment (Rapoport, 1977). Designers concentrate on the product and withdraw from the follow up after users' occupation. Housing should consider users' participation (Marcus & Sarkissian, 1986). Developer's priority is costs and architects focus on image with rare synchronization between them and end users (Marcus & Sarkissian, 1986; Michelson, 1977; Rian & Sassone, 2012; Wentling, 1990). The built form is hardly ever assessed based on users' preferences and needs. Developer's emphasis is on profit. Immediate buyers are usually public or private agents not end users (Al-Oun et al., 2010; Lang, 1987; Michelson, 1977; Rian & Sassone, 2012; World Bank, 2018).

Developers and users think about residential units as an investment. Therefore, production becomes oriented toward material than quality (material). To match fitness of users' choices within housing markets and to cope with social and economic pressures, there should be an assessment of users' preferences (Al-Oun et al., 2010; Lang, 1987; Michelson, 1977; World Bank, 2018). Choices may not reflect users' preferences or needs as some studies indicated that they were limited to include: location of doors, modification of spaces to adjust to the needs, additional space that include balconies, separation of the living room from the entrance using screens, modification of color and patterns of tiles (Al-Homoud et al., 2009; Rian & Sassone, 2012).

Multi-family housing continues to be a prototype that is needed to reduce development costs. This typology requires more compromises than other housing typologies. Producing quality multi-family housing can be through better design process that focuses on quality. Issues of quality include: shared walls, privacy, noise, parking, access, square-footage, floor plan, and shared services (Marcus & Sarkissian, 1986; Michelson, 1977; Rian & Sassone, 2012; Wentling, 1990). For multi-family housing developers are recommended to invest in the following: location selection, quality of buildings entrance, flexible units' layout, variable housing types, personalization of buildings image, and open space provision (Al-Oun et al., 2010; Sweis et al., 2013).

Social responsibility toward multi-family housing development focuses on how buildings fulfill daily living needs. The next step is to learn from the experiences multi-family housing inhabitants (Marcus & Sarkissian, 1986; Sweis et al., 2013; Wentling, 1990). The following procedures can be considered when producing multi-family housing developments (Al-Oun et al., 2010):

- To establish a formal policy for participation that includes design and management.
- To seek participation of end users, if known, as they may decide on the size and layout of the units.
- To select and modify needs and preferences if end users are known.

2.1 Cultural Framework

Culture influences ways of living that reflect shared notions such as routines and communication skills that transmit over generations throughout language or other tools. It consists of the following: (1) Customs that govern behavior in definite circumstances. (2) Legends that explain fundamental norms of a society. (3) Icons and indices that are approved by the community as shared meanings. (4) Rituals that are repeated periodically to designate cultural principles and symbols. (5) ownership gives meaning. On the other hand, sub-culture is formed within the larger culture and reflects shared values, beliefs, and conduct of its members. Therefore, we find that the sub-cultural values of different cultures vary within its general framework (Al-Beejawi, 1997; Kellett, 1999).

Cultural ideals are divided into tangible and intangible. Tangible includes property that is acquired by people use or daily consume. It is an outcome of the interaction between local communities, and architecture is one of those outcomes. Therefore, a house is the most important entity that depicts social life with reference to the past and present of a society. Intangible values include social and religious viewpoints, shared customs, goals and inspirations, and activities. Intangible values are rich constitution that illustrates association between the physical world and lifestyle (Al-Beejawi, 1997; Rapoport, 1969; Richardson, 1989). In general, cultural values in different societies are noticed through house designs and way of living. House is considered a tangible value that determines cultural changes and evolution. Accordingly, culture and its components impact house external and internal layouts. Meanwhile, in traditional societies intangible values offer variations in the built environment that are less connected to the tangible values. Physical modifications and shifts are slowly trying to fit with the intangible values to be accepted. Viewpoints and customs allow those slow changes (Rapoport, 1969, 1985).

In Jordan in general, there are different psychological and socio-cultural values and factors that affect behaviors and increase housing cost such as: "(1) Wasted guest area: users assign 25–33% of the area for the reception room. (2) Large number of rooms: three bedrooms or more. (3) Replicate spaces for gender domains: privacy demands separation in the living, dining, guest spaces, entrances, and bathrooms. (4) Ownership: detached single-family home that satisfies socio-spatial needs is a priority. (5) A housing for lifetime: spending lifetime savings on housing purchase regardless of the real household needs. (6) Negative attitudes toward borrowing from financial institutions: people refuse to deal with bank loans for religious reasons; rather, they borrow from their relatives, which does not match the needed cost" (Al-Homoud & Al-Oun, 2021, p. 571). As an outcome, the money re**source**s stay below the cost of a housing unit they want, which affects the demand in the housing market.

The clan of the present study stems from a profound understanding of Bedouin (Bedu) subculture. It stems from the fact that Bedouins form "10% of Jordan's population and reside in the Badia, which composes 81.3% of Jordan" (Al-Homoud & Al-Oun, 2021, p. 569). Geographically, "Jordan is divided to four regions: the highlands, Jordan Valley, Aqaba Gulf, and arid lands of Badia" (Al-Homoud & Al-Oun, 2021, p. 569). Further, "Badia covers 72,600 km^2, which is administratively divided to three Badia areas: northern, central, and southern Badia" (Al-Homoud & Al-Oun, 2021, p. 569). The study area is in Mafraq governorate in the northern Badia.

Bedu in Jordan were affected by urbanization. They shifted from a traditional to a modern lifestyle. This was reflected on their homes: they lived in permanent homes with culturally dominated internal layouts reflecting the physical and spatial comfort of *Bayt Ash-sha'r*. The modern residential typology met some of the Bedu needs, yet *Bayt Ash-sha'r* sustained as part of the layout in different sizes. The traditional typology of *Bayt Ash-sha'r* was functionally used in the old times, while the typology was symbolically used as ceremonial space in modern times. The transitional third typology used *Bayt Ash-sha'r* as an addition to the home depending on the available number of rooms and family size. This suggests that *Bayt Ash-sha'r* is constant in Bedu minds regardless of the development in their way of living (Al-Homoud & Al-Oun, 2021; Al-Homoud et al., 2008; Bickerton et al., 2020).

2.2 Socio-Cultural Framework

Bedu society is a tribal collective and viciously loyal to family, clan, and tribe. Their formation stems from "*asheirah*, which is subdivided into clan (*hamoulah*) and main families (*fakhdh*)" (Al-Homoud & Al-Oun, 2021, p. 572). Jordanian "*asheirah* of the northeast Badia include *Bani Khaled*, *As-Sirhan*, *Al-'Isa*, *Ahl Al-Jabal*, and *As-Sardiyyah*" (Al-Homoud & Al-Oun, 2021, p. 572). Bedu society is patriarchal; members of a tribe affirm they are descended from a known male ancestor. The commander is the *sheikh* who originates from a dignified family characterized by generosity and bravery. When he dies, his role may not pass to his eldest son; rather to any fit member of the family who attains the support of the elders. The *sheikh* has a capacity controlled by customs, primacy, and advice of the council of elderly (*majlis*). He rules by virtue of his character and the respect it gains, by negotiation, consensus, and arbitration (*shoura*) rather than by order. Bedu controls life matters by the customary law, which is viewed as a strict code of honor. Customs ancestors focus on tribal obedience and honor, and defend it against others through shrewdness and retaliation (Al-Mousa, 1996; Al-Ozaizat, 1980; Jabbor, 1988; Weir, 1990).

Bedu life depends on four elements: the Badia which is the Bedu environment; the camel as means of transportation; the Bedu individual who grew up and lived all his life in the Badia; and *Bayt Ash-sha'r* where Bedu reside, see Fig. 1. These elements are linked to nomadic pastoral life, although Bedu have been changing gradually to semi-nomadic and settled life. Though Bedu settled life, they have a combined traditional and modern values. The traditional Bedu economy largely rely on livestock and its products with other additional sources of income (Abu-Jaber et al., 1987; Al-Mousa, 1996; Al-Oun, 1997; Bickerton et al., 2020; Jabbor, 1988).

Bedu settlement was for the following reasons: lifestyle change; governmental policies; economic thrive; transport and communication services; influence by urban communities; independence from livestock and land cultivation; education and job opportunities; and use of built homes while keeping *Bayt Ash-sha'r* (Al-Homoud & Al-Oun, 2021). As an outcome, "these factors reduced the average number of nomadic Bedu as a proportion of the total Arab population from 10% in 1960 to 1% in the late twentieth century" (Al-Homoud & Al-Oun, 2021, p. 572).

2.3 Spatial Framework

Moreover, Bedu lifestyle is notable by tribal and clan loyalty, customs, collectivist society, and identity. Bedu were changed from a nomadic pastoral to a settled life (Abed, 2001; Al-Homoud et al., 2010; Al-Mousa, 1996). Lifestyle was a combination of the following: occupation, education, family origin, income, social status, gender, life cycle, ethnicity, role, hobby, aesthetic taste, cultural customs, identity, consumption behavior, and family type and size (Erwin, 1994; Rapoport, 1985, 1991; Strauss, 1976; Weisner & Weibel, 1981).

Fig. 1 A view of the traditional house type (*Bayt Ash-sha'r*). *Source* Authors

It is important to realize that "collective and individual home identity is reflected spatially and sociospatially" (Al-Homoud & Al-Oun, 2021, p. 572). Therefore, "Bedu lifestyles are geared toward using the internal spaces, which is affected by traditional male and female household occupations. Householding is considered the traditional female occupation. A housewife usually spends most of her time inside to perform the daily work such as baking, cooking, spinning, and weaving. Diversity of a housewife's work made it difficult to assign one space for each activity; overlapping of such activities became essential. Mobility dictates the overlapped use of one space for more than one activity" (Al-Homoud & Al-Oun, 2021, p. 572).

Space crucially overlaps such activities. This overlapping appears clearly in the functional space of *Bayt Ash-sha'r* called the (*haderah*), the female domain where she cooks, stores food, and washes clothes. Moreover, the traditional mobility of Bedu dictated the interrelated use of one space for more than one activity (non-specialized space) (Abed, 2001; Al-Homoud & Al-Oun, 2021). Traditionally, livestock ownership was the common household occupation, involving traveling to search for grazing and water. This required mobile, light, and simple and quick assembled homes, such as *Bayt Ash-sha'r* (Weir, 1990). Job affects income; such occupation offers a seasonal income that depends on climatic circumstances, and, therefore, fluctuates from year to year depending on the rainfall. *Bayt Ash-sha'r* suits oscillations in livelihood, because it is produced from livestock skin and wool, which is woven and sewn by women (Jabbor, 1988; Weir, 1990). Income instability influences savings to escape droughts; therefore, they allocate money to food, drinks, clothing, and finally for the house. It is discussed that occupation and income affect social role and status; rich Bedu have larger *Bayt Ash-sha'r* size as an emphasis of their hospitality. This readily accommodates expansion or enlargement in home size according to guest numbers (Abed, 2001; Kellett, 1999).

Privacy is controlled through Bedu cultural values, beliefs, and ideas (Al-Homoud & Al-Oun, 2021). As an example, "Bedu women can participate in the family discussion; if the guest is a stranger, women will participate from behind the scenes; otherwise, they can join the males of the family in the discussion. Women, within the Bedu code of honor, are allowed to receive male guests in the *Madheif*, if the male householder is not available" (Al-Homoud & Al-Oun, 2021, p. 572). Bedu use cultural beliefs for privacy regulation; "Bedu uses distances that separate *Bayt Esh-Sha'r* from all sides and from the front side as physical expression for privacy. Another reflection of privacy is on the location of the entrance, which is situated at the corner of *Bayt Esh-Sha'r*" (Al-Homoud & Al-Oun, 2021, p. 572). In addition, "privacy is achieved through hierarchical zones in *Bayt Esh-Sha'r*" (Al-Homoud & Al-Oun, 2021, p. 572), and through haram *Bayt Ash-sha'r* (Transitional space around *Bayt Ash-sha'r* from all directions). Collectively, "Bedu uses outdoor *haram Bayt Esh-Sha'r* for privacy, territory, children playing, and for animals" (Al-Homoud & Al-Oun, 2021, p. 572). Horses are placed at the front, donkeys are

tied at the back, and goats are delimited within a space, called *seyrah*, that is situated at a distance from *Bayt Ash-sha'r*. Its external space (*haram Bayt Ash-sha'r*) where the Bedu keep their livestock (Abed, 2001; Al-Mousa, 1996; Al-Ozaizat, 1980).

Meaning is important, therefore, "*Bayt Esh-Sha'r* was considered a basic necessity for Bedu identity, such as hospitality, psychological comfort, openness, mobility, durability, occasions, flexibility, lightness, simplicity and beauty, authenticity, continuity, social communication, heritage, identity, assurance, external work, and climatic suitability. It is also considered an effective shelter that provides privacy, and it is handy for the construction and deconstruction that is required by continuous traveling" (Al-Homoud & Al-Oun, 2021, p. 572). *Bayt Ash-sha'r* is basic and original home because it suits the traditional lifestyle of constant moving. It is an effective shelter that offers privacy, and it can be easily constructed and deconstructed to suit the continuous traveling. *Bayt Ash-sha'r* has two major internal spaces: *madheif* and *mharam* (Abed, 2001; Al-Mousa, 1996). The *madheif* is the large quarter of the internal space that expresses the symbol of Bedu hospitality. Further, as a communal act, Bedu prepare *nezalah*, a dinner meal to their new neighbors for more acquaintance. *Bayt Ash-sha'r* sizes include *kharboosh*, *gatbah*, *shawa*, *mthoulath*, *mrouba'*, *mkhoumas*, *msoudas*, *msouba'*, and *mthouman*, dependent on *wassit's* number (post in the center). Figure 2 shows the *wassit* inside the traditional house. The cover of the house is made out of different materials that include goat and camel hair, cotton, and *kheish* (Abed, 2001; Al-Homoud et al., 2003).

2.4 Research Setting—Al-Mansoura Town

This emerging town is in Mafraq Governorate which "has a population of 593,900" (Al-Homoud & Al-Oun, 2021, p. 573). Also "the town is located on the major highway between Mafraq and Irbid cities, 12 km Northwest of Mafraq city", see Fig. 3. Statistics indicated "it has a population of 5675, which makes 1068 households" (Al-Homoud & Al-Oun, 2021, p. 573). Provided services include water, electricity, health center, primary school, post office, and two mosques (Al-Homoud & Al-Oun, 2021).

3 Field Interviews

The study was based on a field survey through face-to-face interviews with 27 families from Al-Mansoura town. Data was collected from head of households. Outcomes proposed that the housing project should be built in two stages every 15 years. This projection was based on the family stage in life that was explored through the interviews. Forecasts recommended 100 residential units to be allocated over 27 families. We examined the demographic and the spatial dynamics in the study area. About one-third of the population had recurring marriage, an average of nine family members, and 25 years marriage age. This implies that the family lifecycle is 25 years. The field work indicated that "only 19% of men have polygamy and ability to work, and 63% women have the desire and ability to work" (Al-Homoud & Al-Oun, 2021, p. 573). Also "*Bayt Esh-Sha'r* was dominant house typology with *Mthoulath* and *Qatbah* sizes, and some live in *Kharboush*" (Al-Homoud & Al-Oun, 2021, p. 573) (poorest type of *Bayt Ash-sha'r*). Figure 4 shows the research team with some of the interviewees.

Most of the sample hinted a "need for flat open land when selecting a site for the project. About 55% of the sample indicated the need for a school, 82% indicated a need for a mosque, 29% indicated the need for health center 29%, and 60% indicated a need for a post office" (Al-Homoud & Al-Oun, 2021, p. 573). Regarding external spaces almost, "77% have stressed the need to establish boundaries between neighboring houses" (Al-Homoud & Al-Oun, 2021, p. 573). For internal spaces "82% indicated a need for a yard or garden, 85% focused on need for a fence, 82% focused on the need for back yard for livestock breeding, and 93% of the sample suggested housing unit layout toward the east. *Bayt Esh-Sha'r* was dominant house typology with *Mthoulath* and *Qatbah* sizes, and some live in *Kharboush*" (Al-Homoud & Al-Oun, 2021, p. 573).

4 Discussion and Conclusions—Design Challenges and Outcomes

Cultural constraints for housing delivery of the present households included the examination of demographics and spatial dynamics and how it reflects on dwelling and its adjacent space extensions and characteristics. Results showed the demand for the formation of a housing development in two phases every 15 years. The project will be housing a total number of 100 residential units for 27 nuclear families. The proposed cost reduction investigated in the field work included the following procedures:

- Housing Unit Design: Identifying and confining variation in areas and patterns of housing units.
- Site Selection and Planning: Selection of the most appropriate location to reduce the total cost, which was affected by: (1) the cost of infrastructure as it relates to landform and topography, (2) price of land, and (3) ease of access to public transportation. Thereafter, the development of the site layout and design. Figure 5 shows

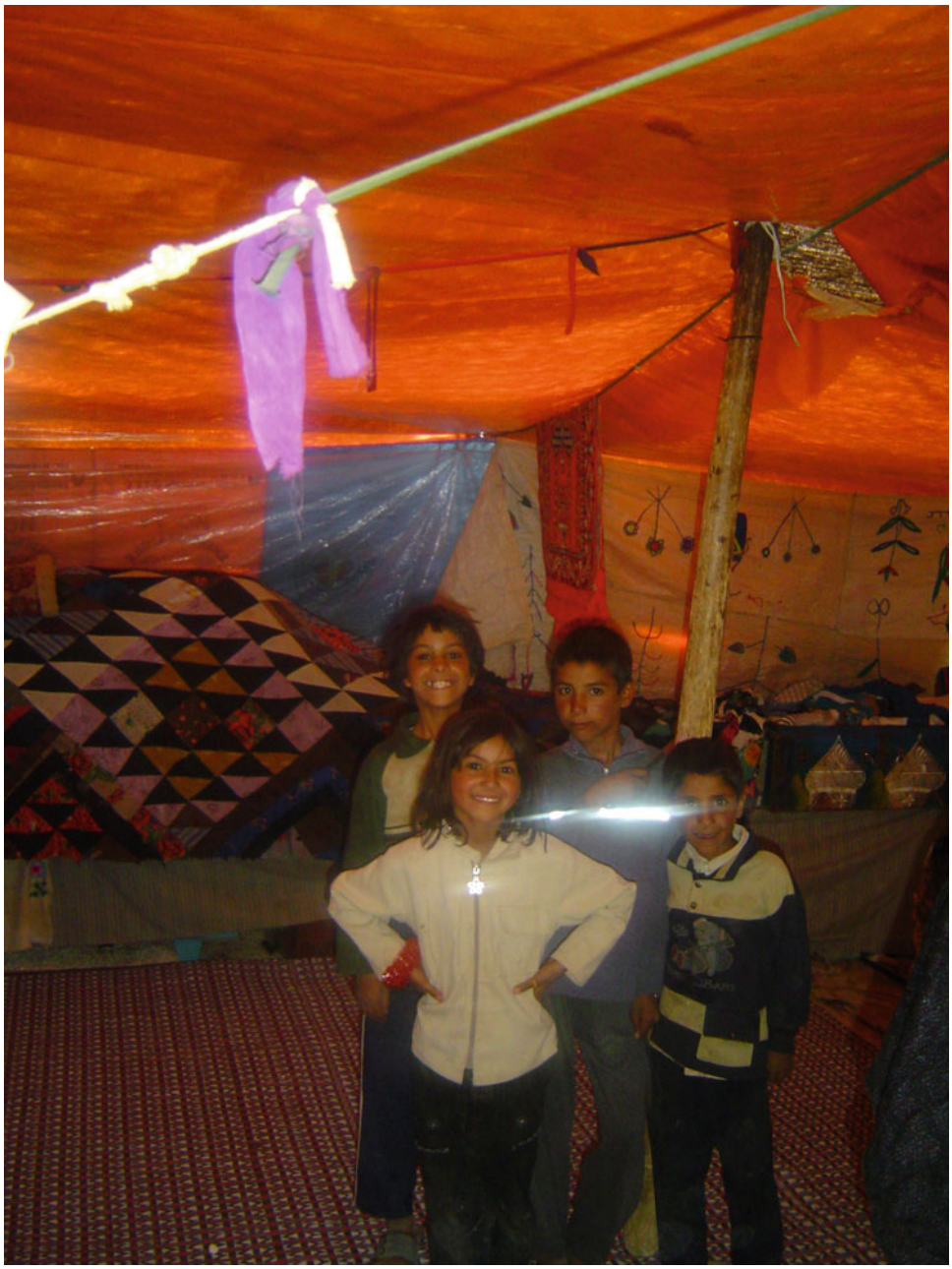

Fig. 2 A view inside a traditional *Bayt Ash-sha'r* showing the central column. *Source* Authors

view of the selected site that matches the needed criteria for a cost cut in the total project cost.

Design challenges included cultural determinants that were realized from the field work and the literature. Design approach was based on understanding the way of living and its connected meanings to Bedouin culture that was elicited from field work and interviews with Al-Noaim tribe and families. This understanding showed interrelations of internal and external spatial layout and connection to family and clan ties.

In addition, environmental projections included the following aspects as design strategies:

- Orientation of Buildings: All buildings were oriented to the east in correspondence to the traditional layout of *Bayt Ash-sha'r*.
- Water Harvesting: Responded to water demands for the household by injecting water harvesting concept to the landscape design.

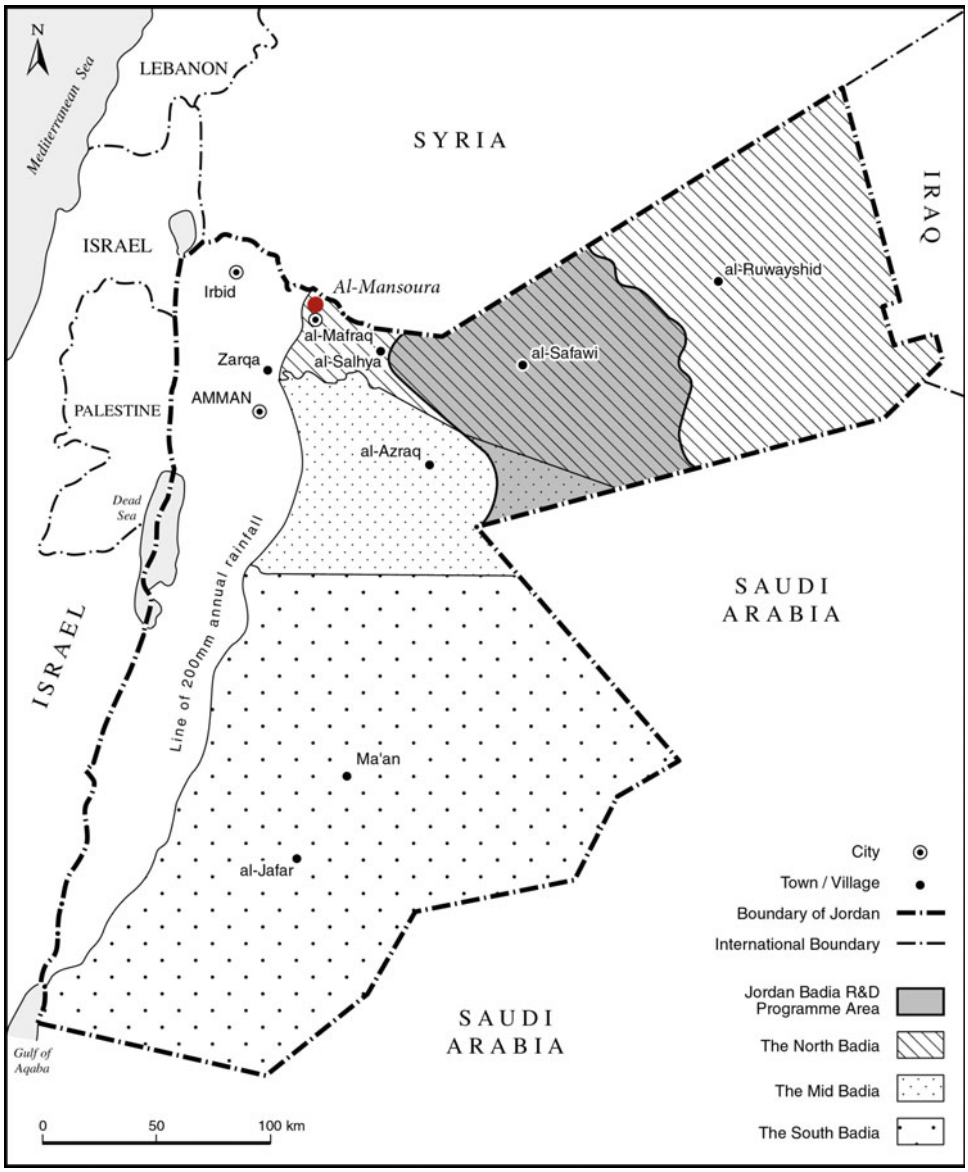

Fig. 3 Location of Al-Mansoura town. *Source* Al-Oun (1997)

- Soft Landscaping: Vegetation was infused in the front yards as a climate moderator and provider for visual comfort with intensified use of native plants.
- Mass and Space: Mass and space was combined to develop the housing units design to gain passive energy and to reflect cultural domains.
- Construction Material: Selected appropriate construction material environmentally, economically, and culturally.

4.1 Housing Unit Design

Based on field interviews and literature review the following aspects influenced design strategies: (a) evolution and growth of the site plan; (b) adjacent space as home extensions; (c) house space and domains; (d) socio-economic characteristics and its impact on elements of design; and (e) alternatives and modules for future expansion. Additionally, there were two major cultural entities that influenced the design outcomes: (1) site development: integration of farming activities to increase productivity and belonging of individuals. (2) Housing unit development: provision of two *madheif* spaces that will provide seasonal migration inside the house while adapting to cultural gender separation. Also housing unit design responded to the requirements of cultural rituals of hospitality and privacy that showed an impact on internal and external space as the traditional layout of *Bayt Ash-sha'r*. It also considered the proportions and number of r*ebaat* (spatial module) of *Bayt Ash-sha'r*. The module reflected the number of central posts (*wasit*). It is the space that reflects cultural symbolism and identity.

Fig. 4 The research team with families from the local community inside *Bayt Ash-sha'r*. *Source* Authors

Fig. 5 View of the selected site. *Source* Authors

Based on Al-Homoud and Al-Oun (2021) housing units' modules and patterns included typologies as follows: two-bedroom housing unit represented (*qatbah*) traditional typology, three bedrooms represented (*shawa* or *mthoulath*), and four bedrooms represented (*mroubaa*). These typologies provided a modular base for the housing units' plans in reflection to the family size. The interior space has two major domains displaying cultural privacy: reception (*madheif*) domain and private domain (*mharam*). In addition, spatial and privacy hierarchies of the traditional layout were

reflected in the design to define visual, auditory, and physical interactions. Figure 6 shows the proposed design prototypes of the housing units. The projected designs considered proportions of the traditional typology and the East orientation, as well as environmental issues.

Figures 7 and 8 show three-dimensional images that reflect the design strategies used for developing the housing unit design and are summarized in the following:

- Cultural Space: We combined the house with the semi-public space in front of it as spatial hierarchies. This concept provided a hierarchy of privacy: (public (street), semi-public (next to the house), and private (within the house)).
- Accessibility and Orientation: We provided access to the entrances of the housing units from the street side. Whilst we provided hierarchical zones as open spaces around the house to attain private functions (behaviors) around the yard.
- Environmental consideration: We developed a compact spatial pattern for the housing units. We provided optional sleeping area on the roof to reflect seasonal needs.
- Form and Identity: We proposed the house typology to be as one floor as much as possible to in congruence with the adjacent towns' skyline and as responsive image of *Bayt Ash-sha'r*, which is a horizontal form.
- External Privacy e provided acoustic insulation in front of the house using soft landscape. A green fence enclosed a central space, which groups the houses and blocks the noises from the street side.

4.2 Site Planning

Based on the study by (Al-Homoud & Al-Oun, 2021), the projected spatial layout reflected the collective socio-cultural space and the need for family growth based on a 15-year family lifecycle. It also included a provision of pastoral areas in close distance, and the provision of water through water harvesting promoted by topography of the site.

4.2.1 Site Selection

The site was selected where the tribe is currently localized and based on evaluation of land cost. It also considered social connectivity with the clan. It also considered the no-slope concept of land selection as much as possible to reduce the cost of restructuring the landform and the needed infrastructure, and yet to generate water harvesting system. Therefore, the site selection was affected by the concept of future water harvesting plan as it impacts vegetation and livestock (Al-Homoud & Al-Oun, 2021).

4.2.2 Site Development and Design Strategies

Site development and design strategies included the following issues:

- Land Ownership: To resolve the issues of land ownership by purchasing shared land.
- Topography: To select a slightly sloped land to limit cost of development and land use, see Fig. 9.
- Additional Local Facilities: To propose a provision of funding for their construction, see Fig. 10.

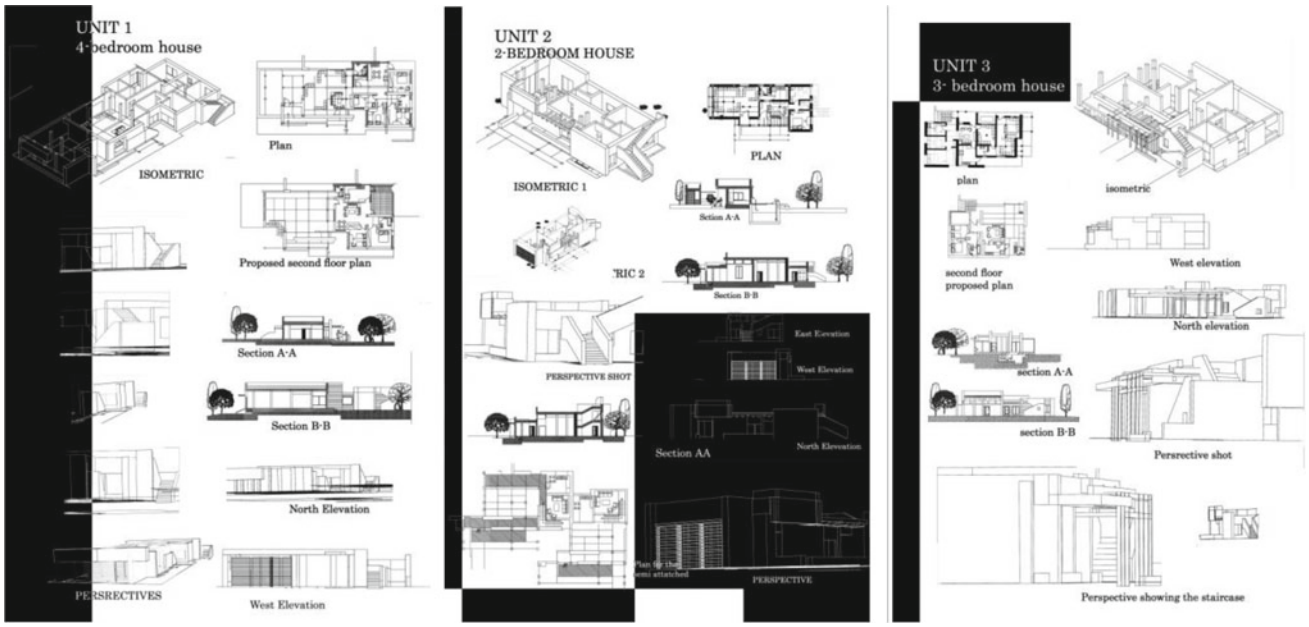

Fig. 6 Proposed design for housing units' prototypes. *Source* Authors

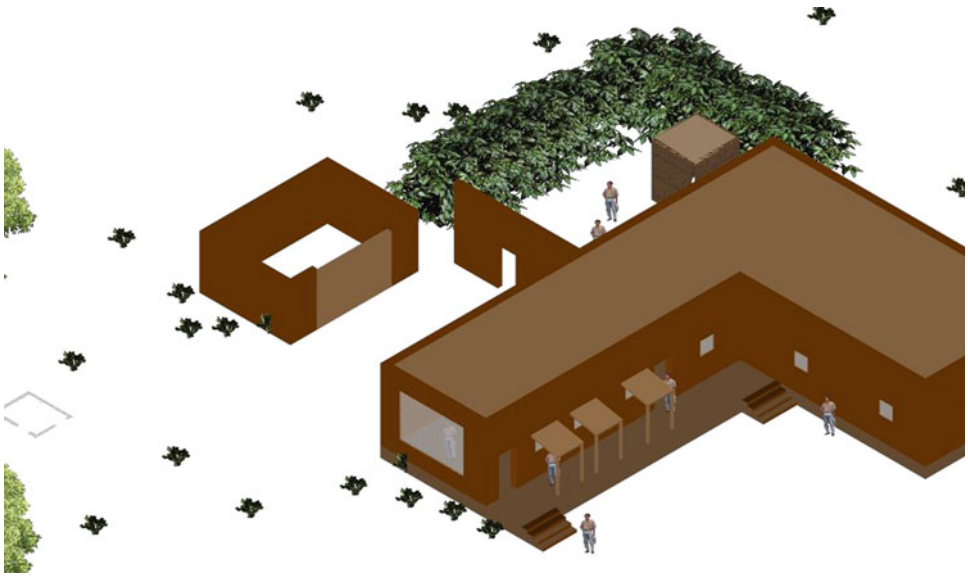

Fig. 7 A three-dimensional image for one of the proposed housing units designs showing outdoor enclosures. *Source* Authors

Fig. 8 A three-dimensional image showing another housing unit proposal. *Source* Authors

- Commercial Services: To propose a provision of funding for their construction.
- Productive Agriculture: To providing limited farming and livestock farming activities within the site and the yards.

4.2.3 Layout and Site Design

The study by Al-homoud and Al-Oun (2021) guided the following design issues as follows: (1) the layout was composed of different clusters based on family territorial extensions, see Fig. 11. (2) Clusters were designed based on grouping of father and sons to maintain a semi-public space to host *Bayt Ash-sha'r* in addition to increase in housing unit size based on the stage in life. (3) The layout was based on future expansion that will house new units, spatial hierarchy, and privacy. It allotted zones for livestock and local farming. (4) The defined area was 100 *dunums*, the proposal is to house 100 units and a growth of 33 housing units to reflect patterns of life cycle and cultural domains. Figures 12 and 13 present two proposals for the site layout and the housing unit design.

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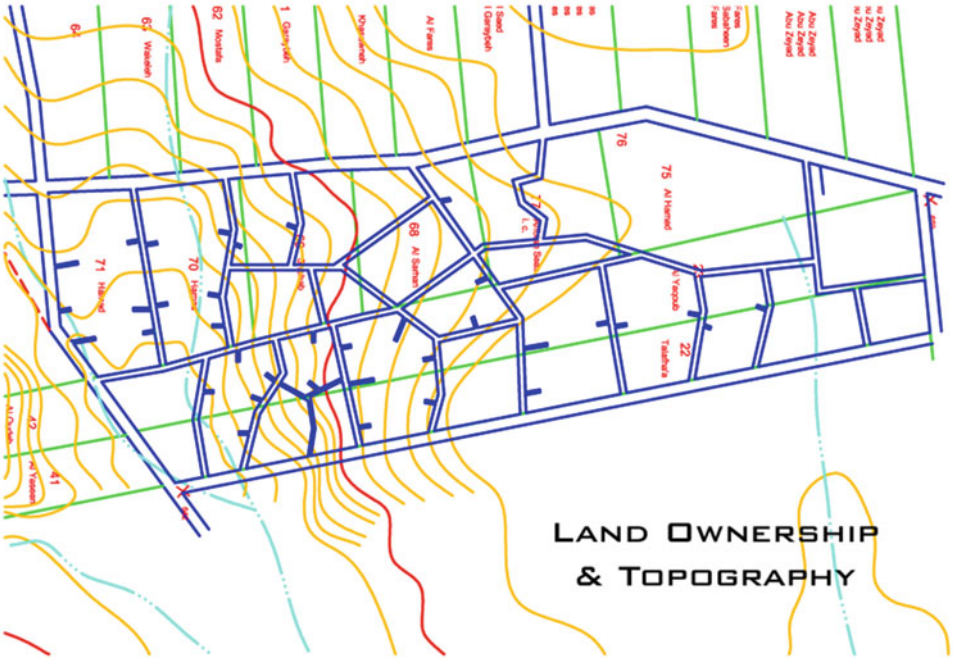

Fig. 9 One of the proposed site layouts projected on a slightly sloped land. *Source* Authors

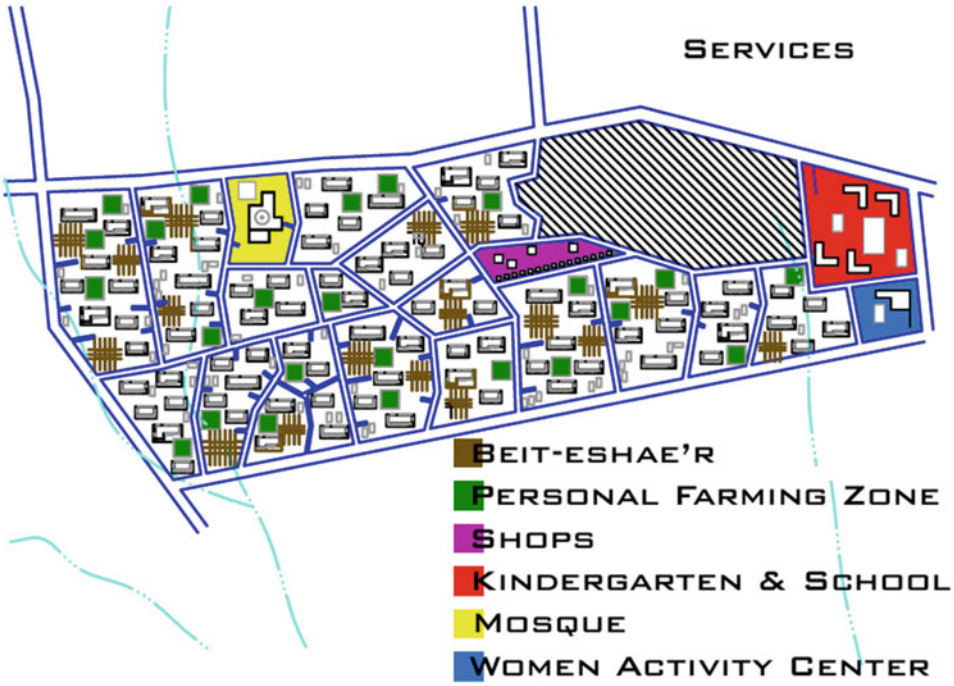

Fig. 10 The proposed site showing additional local facilities and services. *Source* Authors

Fig. 11 The proposed layers included synthesis of territoriality and landscaping. *Source* Authors

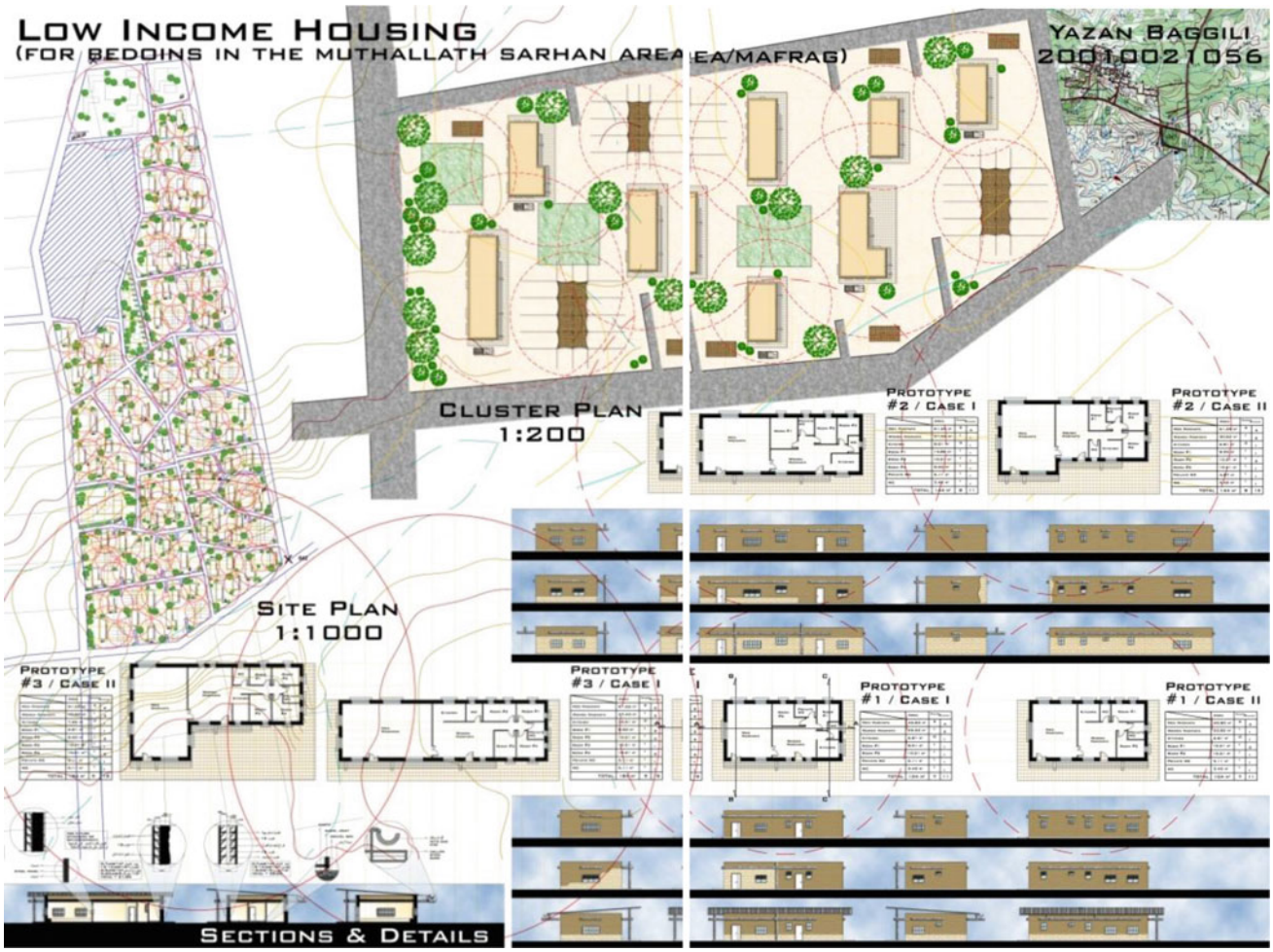

Fig. 12 Proposal for the housing project design and development. *Source* Authors

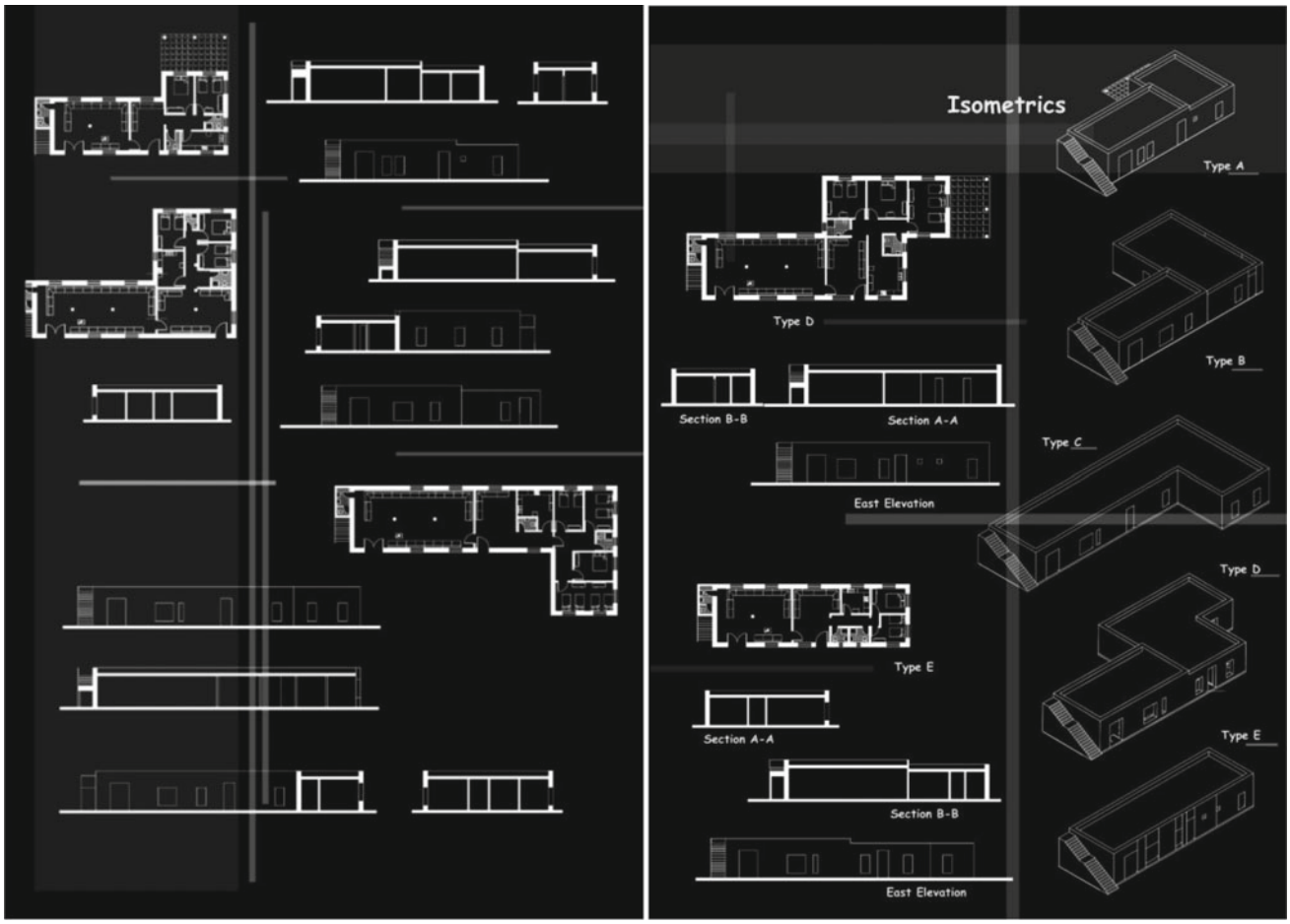

Fig. 13 Additional proposal showing housing unit design typologies. *Source* Authors

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Home-Based Enterprises: The Case of Powerlooms in Bhiwandi, India

Farozan Ansari

Abstract

Home-based Enterprises are small-scale enterprises with low capital investment and labour-intensive. These activities are executed within residential premises with the home as a base and family members as employers and managers. These home-based establishments are an effective mechanism for the city to develop into Industrial City, generating employment opportunities for weaker sections of society. Bhiwandi, located in Maharashtra State, is rightly known as 'Manchester of India,' with a significant number of powerlooms. Due to the influx of powerloom activity in a short time, the city has been escorted to growing in an unplanned and congested manner. The study focuses on understanding the linkages of home-based activity to their residential premises—at settlement level, cluster level and dwelling unit level. It also deals with analysing the impact of industries on housing, health and the environment. An attempt has been made to develop the strategy and furnish recommendations acknowledging the potentials and overcoming the issues.

Keywords

Home-based • Small scale enterprises • Powerlooms • MSME's • Bhiwandi

1 Introduction

The Textile Industry is the third-largest employment generator in India, with over 35 million employed under the sector contributing 13% to export earnings with 4% GDP. Textile Industry ranks second for generating informal employment in India (NCEUS, 2012). Organised Mills, Decentralised Powerlooms and Traditional Handlooms are three segments of the Fabric Production, and Powerloom leads the segment with 60% of production. Thus, powerlooms play a pivotal role to fulfil the clothing demand.

Out of 1.9 million powerlooms in India, 33% are based in Bhiwandi. The decentralised powerloom sector in Bhiwandi produces 24,000 metric tonnes of grey fabric used for suiting, shirting and sarees (Sherfani, 2014). These enterprises are disorganised, scattered and interwoven within the residential premises with the advantage of work and live settings.

1.1 Bhiwandi—Manchester of India

Bhiwandi is located in Thane District, Maharashtra, and lies towards North in Mumbai Metropolitan Region (MMR). It is the fastest industrialised city and recognised as the 'Urban Growth Center'. The city is connected with two National Highway—NH8 and NH3, which enhances its Inter and Intra State accessibility. The linkage of the city is facilitated through Railways (Bhiwandi Station-2 km), Airport (International Airport-37 km) and Dockyards (Mazgaon Dock-46 km, Jawaharlal Nehru Port-54 km).

Bhiwandi Nizampur City Municipal Corporation (BNCMC) has an area of 26.36 km^2. The passing of the Tansa pipeline acts as a physical barrier in the growth direction. The scenic attraction of the city is Varala Lake which is the second largest lake in MMR stretching over an area of 2.56 acres. There are 12 zones in BNCMC—Bhiwandi, Nizampur, Chavindra, Pogaon Nagaon, Kaneri, Gauripada, Narpoli, Fene, Kamatghar, Temghar and Bhadvad which were merged to form new Bhiwandi Nizampur City Municipal Corporation boundary (Fig. 1).

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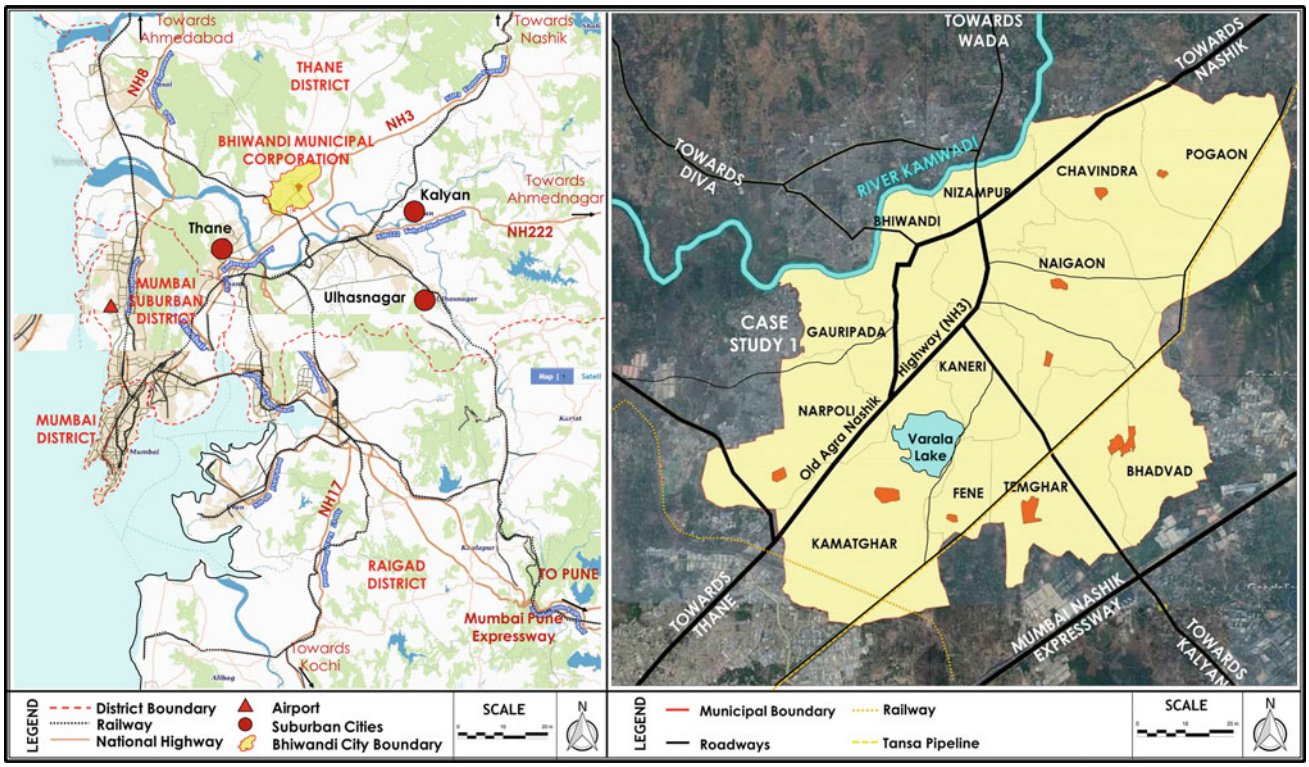

Fig. 1 Location of Bhiwandi in Mumbai Metropolitan Region and Bhiwandi Nizampur City Municipal Corporation limit and zones. *Source* (Planning, draft regional plan for Mumbai Metropolitan Region, 2018) (Planning, development plan for Bhiwandi-Nizampur City Municipal Corporation, 2003–2023, 2003)

2 Objectives

The objective is to study the evolution of the powerloom industry in Bhiwandi, the policies concerning the powerloom sector, the socio-economic profile of the population involved in the powerloom industry and its impact on residential areas in Bhiwandi. Based on the study, recommendations and guidelines are furnished with possible government and private interventions for both existing residential areas and future development.

3 Research Methodology

Background study, Literature study and relevant data collection concerning the situation of enterprises were conducted to understand the city's profile and growth of the powerloom sector in Bhiwandi. Primary surveys were conducted in selected case study areas to understand the correlation of economic activity with living conditions, work environment and skill requirement. Case studies helped evaluate the exact ground conditions, identification of issues and potentials which contributed to the drawing of strategies and recommendations.

4 Scope and Limitation

The study is confined to the Bhiwandi Nizampur City Municipal Corporation (BNCMC) limit. The focus was on residential areas with a maximum concentration of powerlooms with a detailed study at settlement level, cluster level and dwelling unit level. Due to the limitation of secondary data for the activity, the study is extensively based on primary surveys conducted.

5 Powerloom as Home-based Enterprises

Home-based Enterprises are income-generating activities undertaken by residents using the home as a base. Residents take up these tedious and labour-intensive ventures to boost their financial position with compromise on their residential and work setting for the virtue of a better future (Aziz, 2010). The Home-based Enterprise/industry is classified by various organisations in terms of Mode of Operation, Characteristics and Monetary Investments.

Census of India: Home-based Industry is defined as 'an industry conducted by the members of the house within the rural areas or within the precincts of the house in urban

Table 1 Represents category of Enterprises as per MSME Act, 2006. *Source* (Development Commissioner, 19933 and 2001

Type of enterprises	Investment in plant and machinery
Micro scale enterprises	$\leq$ Rs. 25 lakhs
Small scale enterprises	>Rs. 25 lakh and $\leq$ 5 crore
Medium scale enterprises	>5 crore and $\geq$ 10 crore

areas.' The industry should be qualified or registered under the Indian Factories Act (Industry, 1951).

Planning Committee: The powerlooms industry is defined as the handloom industry with applied mechanical devices to remove tedious and unproductive operations.

Micro, Small and Medium Enterprises (MSME)Act, 2006: As per the MSME Act, Enterprises are categorised into three category (Table 1).

5.1 Powerloom as Intermediate Technology of Weaving

The essence of powerloom and handloom are indivisible as both are the system of weaving with the relatively same technology where the former is hand-operated and the other is a mechanised loom. The powerloom performs the middle level of work in the textile sector by acquiring raw material in the form of yarn fibre from spinning mills and producing fabric that is passed for further processing. A comparative understanding has been developed for Handlooms, Powerlooms & Mills by Working Group on Textile Technology to figure out similarities and differences in terms of Setting up the Industry, Workers' requirements, Machinery, Capital cost, Production (Table 2).

The study reflects that the powerlooms with an investment of Rs.10,000 produces more quantity in a single shift compared to handlooms. Powerloom needs thrice the number of labourers and 1/3rd of the expense on a single metre of fabric production than in Mills. Furthermore, Powerloom workers are hired on a meagre pay scale, so it is easier to hire labour in bulk. Thus, powerlooms exhibit to be more profitable with low capital investment and accelerated mass production over Mills and Handlooms.

Powerlooms can be operated in a variety of setups from tiny households with a couple of units to relatively large sheds with over a hundred looms. Setting up of powerlooms was smooth and effortless and assembling of a couple of powerloom units required Rs. 7.5–9 lakhs, so newer powerloom clusters came up along with handloom shifting to powerlooms.

5.2 Events in Growth of Powerlooms

India's first powerloom unit was installed at Ichhalkaranji, Maharashtra in 1904 and the first powerloom unit in Bhiwandi was installed in 1927 by Abdus Samad Seth. During the World War-II, production under handlooms decreased as most yarn fibres were consumed by mills and powerlooms to accomplish the demand.

In 1980, the Greater Bombay Mill Strike led to the closure of 80 mills in Bombay (now Mumbai). So, the discarded looms from these Mills were available at a discounted price. Due to locational benefits, Bhiwandi managed to support the shift of powerlooms from Mumbai. This shift created massive employment opportunities for low-income groups, uneducated, unemployed persons which led to a wave of migration from Intra- and Inter-state.

6 Manufacturing and Production Process in Powerloom

Let us see the process of manufacturing required to achieve the final product. In fabric, the longitudinal thread is called the Warping yarn, and the transverse thread is called the Wefting yarn. The process is divided into four parts.

Step 1: Yarn fibre acquired from spinning mills is rolled on bobbins according to the required width and length of fabric and the process is called Sizing. These rolls are passed through a starch solution (starching) for strengthening fibre (Fig. 2: 1–3).

Table 2 Represents comparable aspects of Handlooms, Powerlooms and Mills. *Source* Little et al. (1987)

Aspects of productivity	Handloom	Powerloom	Mills
Output per loom shift (in metres)	11 m	27 m	34 m
Number of shifts in a day	1	1.5	2.5
Number of workers per loom	2.02	1.60	0.8
Total Output per day in metre	11 m	40.5 m	76.5 m
Capital cost per loom			
(Machinery) + (Land, Building and Working Capital) = Total Cost	321 + 4918 = 5239	3,358 + 7044 = 10,402	13,435 + 43,565 = 57,000

Fig. 2 Represents the process in the manufacturing of fabric. *Source* Primary survey, Authors'

Step 2: Post starching, bobbins are used for Bheem Bharai or Weaving Preparatory work which involves arranging of warping yarn from Bobbins as per the needed texture or pattern on fabric (Fig. 2: 4). Simultaneously, yarn fibre is also coiled on Kandi-Reels, which are used as Wefting Yarn (Fig. 2: 5).

Step 3: Bobbin rolls and Kandi-Reels (Step 2) are loaded on the powerloom, and through a mechanical process yarn is weaved into the fabric and rolled on empty bobbins attached to powerloom (Fig. 2: 6).

Step 4: Folding of weaved fabric is called 'Calendaring' which is the last step and the fabric produced is called 'Grey fabric' as it requires finishing touch- dyeing, colouring and embroidery (Fig. 2: 7).

7 Acts and Policy

Over the years, the powerloom sector was dwarfed by technological obsolescence, fragmented structure, low productivity and low-end quality products. Thus, Acts and Policies have been established to enhance machinery's technological advancement, support the workers through schemes and initiatives, upgrade machinery with financial support, quality capturing and maintaining through introducing new technologies, and much more.

Technological Upgradation Fund Scheme, 1999–2007 and Restructured Technological Upgradation Fund Scheme 2011–2017, was introduced to replace old machinery with new advanced machines. 15% of the total cost of new machinery was given as Capital subsidy at an interest rate of 6% with a reimbursement period of 7 years. The scheme was revised with an interest rate of 2%. Under Powerloom Service and Testing Centre, 2000 Scheme, Service and Testing Centre were established in clusters with the responsibility to conduct sessions to guide manufacturers for quality standards. Powerloom Worker Insurance Scheme, 2002 was introduced, which could be availed only by registered workers. The scheme was revised several times to increase the amount of premium paid to families. In-situ Upgradation of Plain Powerlooms, Yarn Bank Scheme, Common Facility Centre, Group Workshed Scheme, Solar Energy Scheme for Powerlooms, Facilitation, IT, Awareness, Market Development and Publicity and many more schemes were introduced in 2018 (Textile, 1998–2018).

Enforcement of Indian Factory Act, 1948 and Minimum Wage Act, 1948 have been overlooked which are the vital policy providing healthy and safe working practice, formal wage system, workers safety and risk management, and other facilities for workers. Poor implementation of policies and acts at ground level, absence of coordination among authorities, lack of awareness and an unwillingness among workers and stakeholders are hindrances of the powerloom sector.

8 Growth of Bhiwandi

Around 1872, large settlements of weavers arrived in Bhiwandi due to drought and famine conditions in Uttar Pradesh districts. These troop of weavers had travelled in various States and colonised in the city like Surat, Burhanpur, Ichhalkaranji, Malegaon and Bhiwandi, which have emerged into weaving clusters. In 1918, Bhiwandi and Nizampur town were merged as Bhiwandi- Nizampur City. Abdus Samad Seth, a resident of Bhiwandi, installed the first powerloom in Bhiwandi in 1927 and initiated the shift from handlooms to powerlooms.

The First Development Plan for Bhiwandi Nizampur Municipal Council was prepared in 1963 and sanctioned in 1964. As numbers of powerlooms increased, the city proliferated, and thus the Revised Development Plan was proposed in 1971 and came into effect in 1976. Meanwhile, few Town Planning Schemes were submitted in 1965 and sanctioned and implemented in 1986. In 1982, Bhiwandi Nizampur Municipal Council Boundary was extended by the merging of 12 surrounding villages. As the Municipal limits were extended, the Revised Development Plan for City was prepared for 1993–2013, but it was sanctioned in 2003. Between this magnificent gap for approval and implementation, the city took refuge in unauthorised colonies and slums to render the want of a larger low-income group population (Planning, Development Plan for Bhiwandi-Nizampur City Municipal Corporation, 2003–2023, 2003) (Fig. 3).

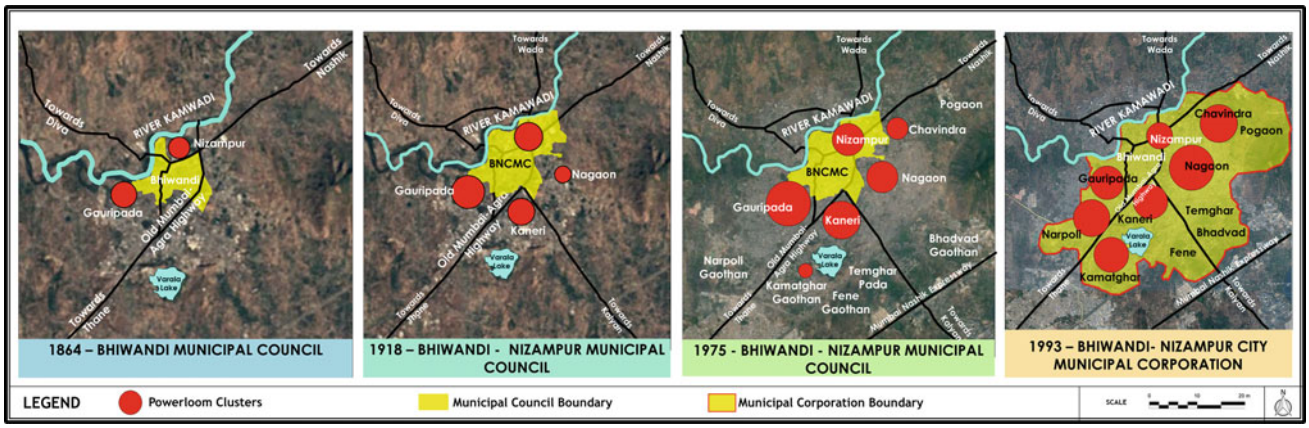

Fig. 3 Represent timeline and growth of Bhiwandi and its powerlooms cluster. *Source* Primary Survey, (Planning, development plan for Bhiwandi-Nizampur City Municipal Corporation, 2003–2023, 2003)

9 Demographic and Industrial Profile

In 2011, the population of Bhiwandi was 7.09 lakhs with a density of 26,284 persons per sq. km. The population of the city has increased tremendously from 1971 to 2011, prominently due to Bombay Mills Strike. Out of the total worker's population of 2.89 lakh, 98.4% fall under household industry workers, workers in manufacturing, services, and trade and commerce sector (Employment, 1948). Bhiwandi ranks first for its Textile Manufacturing Sector in Mumbai Metropolitan Region (Planning, Draft Regional Plan for Mumbai Metropolitan Region, 2018). 48.5% of the establishment is employing 1.28 lakhs under the Manufacturing Sector in Bhiwandi City. The statistics reflect that the Textile Manufacturing Sector is the dominant sector with the highest employment generated through Powerloom Industry (Planning, Regional Plan for Mumbai Metropolitan Region, 1996–2016, 1996).

10 Development Plan (DP) and Development Control and Regulations (DCR)

Bhiwandi Nizampur City is Municipal Corporation with two towns—Bhiwandi, Nizampur and ten villages—Gauripada, Narpoli, Kamatghar, Temghar, Bhadwad, Nagaon, Chavindra, Pogaon, Fene and Kaneri. The city is divided into two areas where the former Municipal boundary is referred to as Inner City and declared as 'Congested Area' and the rest of the area as Outer City Area—'Non-Congested Area' (Planning, Development Plan for Bhiwandi-Nizampur City Municipal Corporation, 2003–2023, 2003).

10.1 Development Plan

In the proposed development plan, Residential Use was increased from 33.29 to 57.47%, and Industrial Use drastically reduced from 38.43 to 9.18% and Mixed-Use reduced to 2.86% from 5.36%. These reductions reflect that the planning is insensitive and unresponsive to the manufacturing sector's need. The provided area is inadequate to hold the ongoing industrial activity with spill-over of activity into other land use areas. The Development Plan has failed enormously to support the balanced ratio of Open and Green Spaces and Public and Semi-Public Area. Though these areas have been increased, but are deficient. The Revised Development Plan was proposed for 1993–2013 (Fig. 4) but was sanctioned in 2003. By the time the Proposed Development Plan could be implemented, the city had grown unauthorised as per the need and growth of the powerloom sector. Thus, the current DP is abortive and the city needs a Development Plan with a fresh approach to fulfil the goal of 'well-integrated landuse with healthy city development.'

10.2 Development Control Rules and Regulation

The Development Control Rules and Regulation are established for a healthy built-environment with suitable development. According to the existing landuse, the Outer City has an average density of 2100–2700 persons per hectare (pph) and Narpoli is a thickly populated zone with 5321 pph. In contrast, the Inner City has density 1200–1600 persons per hectare, which states that the demarcated 'Congested Area' is less congested than the Outer City. As per the proposed DP, the overall density proposed is 16,000 per

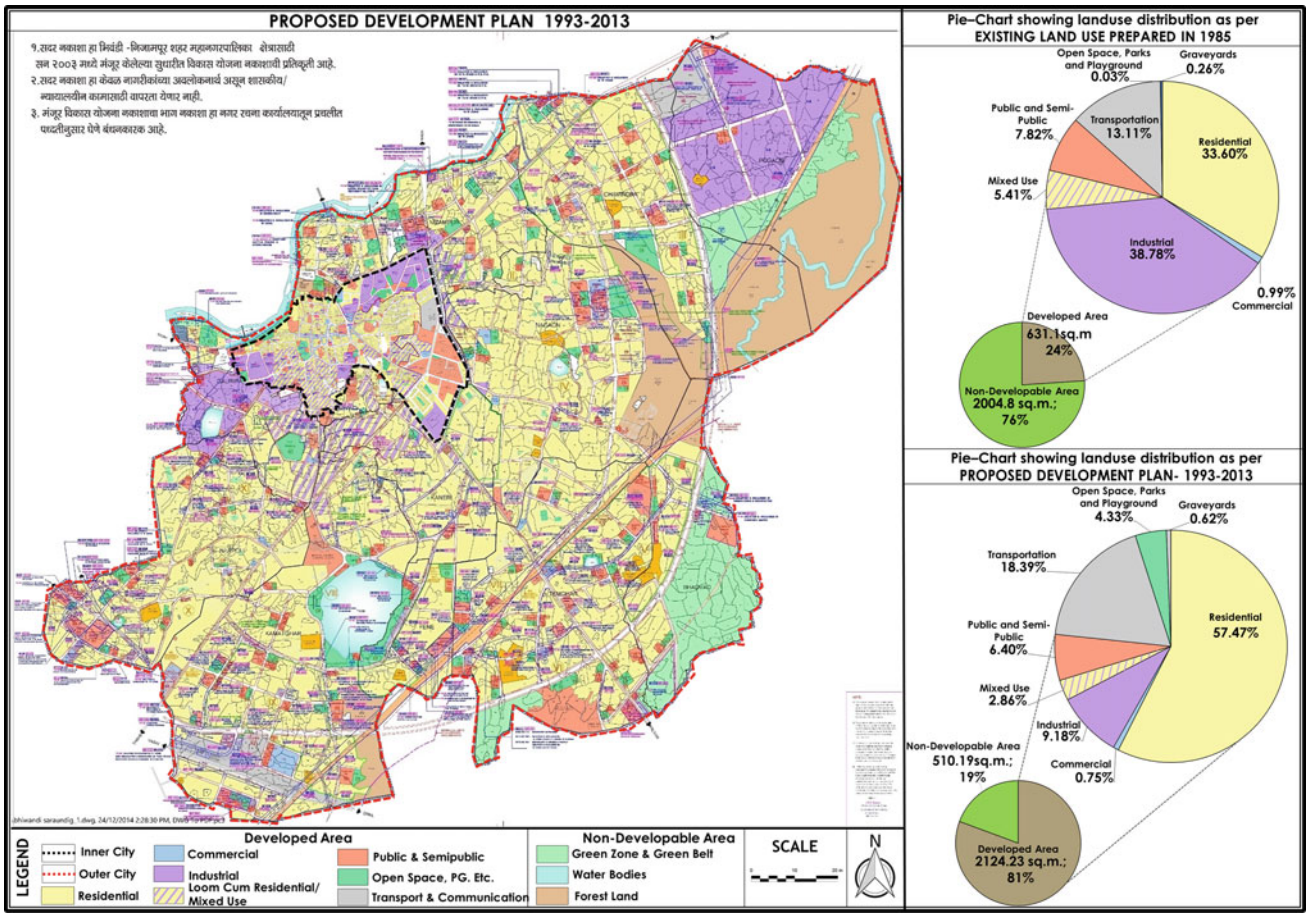

Fig. 4 Represent the development plan for Bhiwandi Nizampur City Municipal Corporation (1993–2003). *Source* (Planning, development plan for Bhiwandi-Nizampur City Municipal Corporation, 2003–2023, 2003)

square kilometre, and the prescribed density for both Congested and Non-Congested Area is 350 persons per hectare.

Residential Zone and Mixed-Use Zone: Residential Zone is categorised into two zones—Purely Residential Zone (R1) and Residential Zone with shop line (R2). Mixed-Use Zone is also referred to as Loom cum Residential Zone. Powerlooms are permitted on the ground floor in the residential building of R2 and Mixed-Use Zone. The setback is defined by the height of the building, which 1/3rd of building Height. However, an exception has been made for narrow plots; plots with a width less than 6 m can have a minimum setback of 0.6 m, which causes poor ventilation with reduced distance between buildings of adjacent plots (Table 4).

However, road width for powerloom in the R2 zone is prescribed but due to non-adherence, powerlooms are operated on narrow plots causing congestion and traffic due to loading and unloading, parking issues. The provision of open space for the recreational purpose has been focused on plots above 1000 m^2. in area. The extensive sub-division of plots has reduced the chances of recreational spaces provision at the plot level.

11 Housing Situation, Infrastructure, Environment and Health

The quality of life is governed by qualitative family-work life balance, adequate infrastructure, accessible facilities and services. Bhiwandi is the most congested non-metropolitan city with an acute housing problem (HSMI, 2017).

11.1 Housing Situation in Bhiwandi

Population, number of households and household size: The tremendous increase in population in 1981 reflects the influx of population due to migration as employment generated with an increase in powerlooms (Tables 3 and 5). The number of Households and Population has not increased

Table 3 Represents increase in number of powerlooms and population in Bhiwandi. *Source* (Planning, Development Plan for Bhiwandi-Nizampur City Municipal Corporation, 2003–2023, 2003)

Year	1960	1972	1982	1991	2011
Number of powerlooms	16,500	36,000	120,000	250,000	627,000
Year	1971	1981	1991	2001	2011
Population	79,576	210,712	378,546	598,741	709,665
Gross Density	4006	7978	14,353	22,671	26,871

Table 4 List the detail of permitted activity in residential and mixed-use zone. *Source* (Planning, development plan for Bhiwandi-Nizampur City Municipal Corporation, 2003–2023, 2003)

Category	No. of looms/Power requirement	Plot area	FSI
Residential zone (R2)	8 looms/10HP	Plot area not less than 300 m^2. Road width not less than 15 m	2 (0.5 + 1.5)
Mixed use zone (Loom cum residential)	16 looms/20 HP	Not less than 250 m^2	1.33

Table 5 Represents the increase in population, households and average household size over the decades. *Source* (Registrar & Commissioner, 1971, 1981, 1991, 2001 and 2011)

Year	1971	1981	1991	2001	2011
Population	79,576	210,712	378,546	598,741	709,665
Household	–	–	70,068	110,408	140,035
Household size	6.27	5.67	5.41	5.42	5.07

rationally as the culture of the joint family system is prominent and sharing of a single room by migrant workers.

Households and Type of Dwelling Unit: 59% of households reside in One Room house and 11% in No Exclusive rooms. With the average household size of 5, there is no sufficient space for all family members and the case of congestion is very high.

Households size and Number of dwelling rooms: 79,000 households out of 1.40 lakh stay in congestion. 53,155 households face acute congestion with 4–9 or more members sharing a single room house (Table 6). Therefore, the housing situation in Bhiwandi needs immediate attention as the congestion is at an alarming level.

11.2 Infrastructure and Facilities

Water Supply and Drainage: 86% of households have access to treated water and rest use untreated water through handpumps and borewells. 75% of households have closed drainage system whereas 24% of households do not have a drainage system.

Sanitation: 80% of houses are dependent on the Septic tank and other facilities which causes contamination and degradation of groundwater resources as they are not maintained, whereas only 20% have a connection with the Municipal Sewer line. 58% of households use community toilet and 37% of households have access to sanitation facilities within their premises; the rest 5% defecate in the open. 77% of households have access to the bathing facility where 23% use community facility or take bath in open near well. The dependency of a larger population on community sanitation systems can lead to the spread of disease and other health problems at the community level.

11.3 Environmental and Health Issues

Environmental Issues: The Central Pollution Control Board of India categorises Powerloom Weaving Industry under the 'GREEN' Category. As per categorisation, the hazardous waste generated is land disposable and does not require treatment and stabilisation before disposal. The minor emissions released from the processing can be contained within premises through conventional methods (Sultana, 2016).

Health Problems: Closed working environment, long continuous working hours in contact with fibre dust, and heat from machinery add to the lungs' vulnerability to the respiratory ailment like Tuberculosis, Bronchitis. 60% of workers have the asthmatic tendency and 25% have symptoms of chronic bronchitis (Kolgiri, 2017) and most of the workers have deteriorating eye-sight. They also face problems like deafness, insomnia, stomach ache, muscle and body pain due to poor or non-food consumption, extensive working hours, deafining sound from machinery (Prof. Dr. Sultana & Nisa, 2017).

Table 6 Represents the comparative analysis of Number of Dwelling Room with Household Size (Red = Households in Congestion, Yellow = Livable Condition, Green = Lavish Condition). *Source* (Registrar & Commissioner, 1971, 1981, 1991, 2001 and 2011)

Household Size	Number of Dwelling Rooms						
	No Exclusive Room	1	2	3	4	5	6 & above
1	1,072	4,666	417	78	24	1	34
2	1,854	8,835	1,400	371	71	19	67
3	2,159	11,451	2,665	781	182	21	78
4	2,688	15,395	5,259	1,692	464	66	112
5	2,390	13,720	4,949	1,531	455	71	126
6-8	3,395	19,246	8,119	2,525	840	168	277
9+	978	4,794	3,191	1,614	731	241	353

12 Case Studies

Case studies were conducted in localities of different density and housing typologies with interviewing powerloom workers, managers and owners. Through Case studies following findings were established on the comparative development study (existing and proposed) in the area, the socio-economic character of workers and owners, entrepreneurial activity and housing characteristics—settlement level, cluster level and dwelling unit level with evaluation of physical and social infrastructure, environmental and health issues.

12.1 Development Plan and Land Use

By comparing the proposed development plan with the existing scenario, it is visible that the existing situation is miserable with the extensive conversion of land, no consideration of development control rules and regulation for development. Over the decades, the land use has changed from residential to mixed-use and industrial use. Large chunks of the mixed-use zone in the local street (Fig. 5: Case Study 1) and the conversion of the residential zone into a full-fledge industrial zone (Fig. 5: Case Study 2) are the shortcomings of the development.

The residential colonies developed surrounding the powerloom sheds with an advantage of work-cum-reside scenario (Fig. 6). Over time, the residential colonies have developed in such a compact and condensed manner that upgradation of infrastructure would be impractical. In case of fire hazards, the damage would be vast and uncontrollable. Therefore, a well-integrated development plan keeping intact the essence of work-cum-reside would be crucial.

12.2 Socio-Economic Status of Workers and Owners

The findings from primary survey reflect the following problems and issues of workers, managers and owners. 89% of workers are hired on a daily wage basis, and rest on monthly payroll which includes managers and caretakers appointed by owners. 78% of workers are single migrants living alone in the city, and rest reside with their families. The age of workers varies from 12–65 years, with 68% of workers fall in the age group of 18–45 years. Skilled workers are preferred for operating powerloom. In contrast, Semi-skilled and Unskilled workers are involved in Bheem bharai, calendaring, kandi machine operators, and these workers learn the skills on the job. While being paid on a piece-rate basis, workers manage to gather monthly income of Rs. 9000–12,000 with an investment of 16–20 h of work per day. Workers tend to save 70–80% of their income for their family and use rest for rent, food and medicine. Due to the informal nature of the industry, the workers face job security issues, they remain unorganised with no awareness about their rights and no representative to raise their concerns and problems.

72% of owners manage to set up their enterprises on self-finance; they do not concern themselves with bank loans or government schemes and 28% of managers either work in partnership or arrange for loans from relatives. Even if an owner is aware of the scheme, he finds it painful and

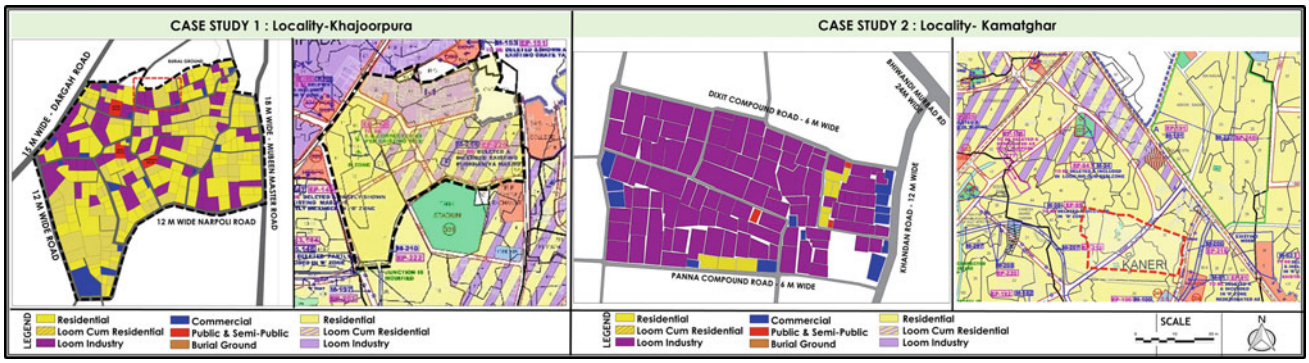

Fig. 5 Case Study 1 and Case Study 3 with existing land use (2018) and proposed development plan of Bhiwandi City. *Source* Primary survey, Authors' (Planning, development plan for Bhiwandi-Nizampur City Municipal Corporation, 2003–2023, 2003)

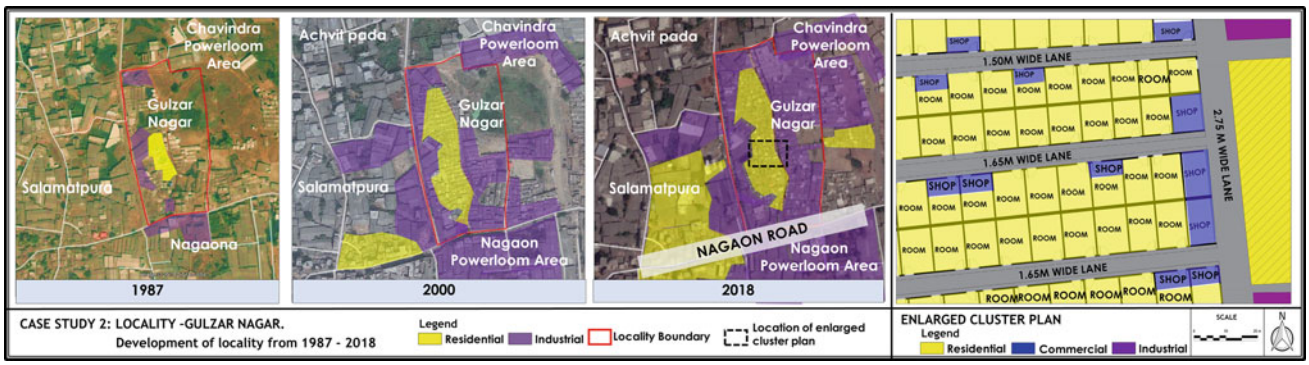

Fig. 6 Case Study 2—existing and proposed development plan and enlarged cluster plan. *Source* Primary survey, Authors'

complicated, as the process of availing scheme is time-consuming. There is a lack of awareness and unwillingness to enrol in the scheme as they are interest-rate-based, lengthier process of approval, and multiple trips to Regional Office in State.

12.3 Entrepreneurial Activity and Housing Characteristics

Settlement Level: With the third and fourth generations running the business, there is extensive sub-division and conversion of plots. Drastic conversion from Residential to Mixed Use in inner City and Residential to Industrial Use in Outer City has led to manifold increase in density, stress on physical infrastructure and social infrastructure with blocked traffic movement.

Cluster Level: Over the period, the building has transformed from a ground structure to a multistoried building with powerloom on the ground floor and residential use on the upper floors. There are severe violations of DCR in terms of no setback and open space, exceeding the permissible built-up area limit hampering ventilation and breathing distance between buildings. Parking and loading–unloading of heavy vehicles on internal streets create traffic congestion. The microscopic job of weaving preparatory work is conducted along the street under the sky for clarity of vision; thus, they occupy streets and parking spaces. Due to the continuous movement of workers in residential premises, women and children do not feel safe and avoid moving out after sunset. Thus, the presence of industrial activity in residential areas hampers the privacy and free movement of children, women and elderly persons.

Dwelling Unit Level: Two residential typologies have evolved in areas with powerloom. Multi-storied building with ground floor operating powerloom and the upper floor for residential use. These residential units have 1 Room with Mori (Washing and Bathing Area) (Fig. 7). Residential Cluster developed along large powerloom shed. These clusters have residential units with 1 Room connected with narrow alley and a community toilet and bath facility. Commercialisation on the ground floor with inappropriate access to the upper unit, cramped floor height are few characteristic of these clusters. Floors are increased in phases with flexibility and availability of money with the owner (Fig. 8). As most workers are single migrants, 15–18 workers share a single room and as they work in shifts, 7–9 members share a room at a time. In Industrial Zone, the

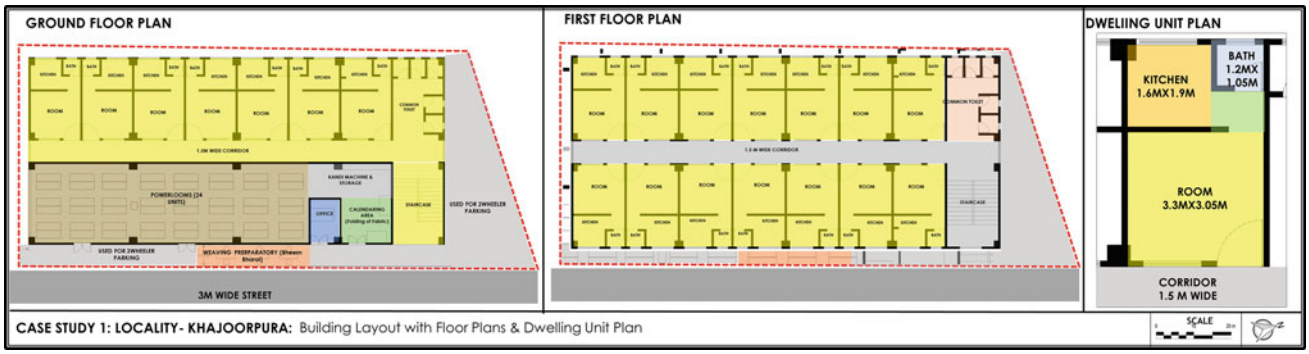

Fig. 7 Building layout and dwelling unit plan from Case Study 1. *Source* Primary survey, Authors'

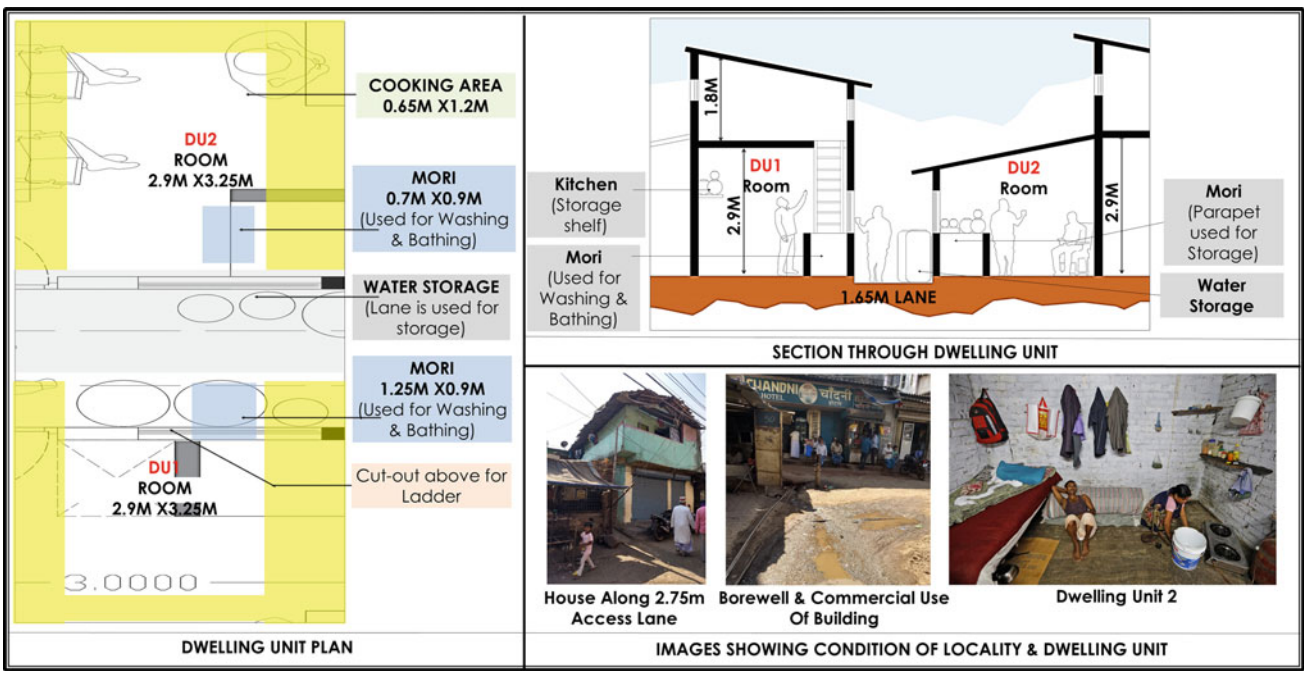

Fig. 8 Dwelling unit details and images from Case Study 2. *Source* Primary survey, Authors'

workers use the loft area or terrace as a residence. Workers depend on community bathing and toilet facility.

The area of units is 15–18 m^2. shared by 7–9 members with minimal usable area per person falling in the range of 2.35–0.75 m^2. As living space is inadequate, the common passage is used for storage, and in summers, male members resort to sleeping in the corridor. Lack of cross ventilation and insufficient exposure to daylight increases the chance of physical stress and psychological issues.

12.4 Physical and Social Infrastructure

Water is available for few hours in a day and as buildings do not have an underground or overhead tank, residents have to store water. People are extensively dependent on community toilets, and 25–38 persons share a single WC. Garbage Collection and Solid Waste disposal are also not administered regularly in areas due to the narrow lanes making door-to-door collection laborious. Thus, residents dispose of waste in open areas. Most of the public and semi-public facilities as demarcated under DP have not been acquired to be developed. Insufficient provision of educational, health clinics and recreational facilities both at community and neighbourhood level (Fig. 9).

12.5 Pollution and Health Issues

Workers are highly exposed to fibre dust for 16–20 h per day, which weakens their respiratory tract causing bronchitis, tuberculosis and other respiratory ailments. With

Fig. 9 Images showing living condition of workers from Case Study 3. *Source* Primary Survey, Authors'

microscopic work and extended working hours in poor lighting conditions, there is increased stress on the eye leading to swelling of the eye and early cataract. The continuous deafening sound of powerloom hampers mental equilibrium, and workers experience fatigue and lethargy. The vibration produced from machinery is felt throughout the structure and is a threat to structural safety. The diposed fibre dust in open and settled fibre dust on walls and roof increases the chance of residents in vicinity to respiratory disease. These factors have physical and psychological effects leading to deteriorating health with continuous distress for workers and residents (Fig. 9D).

13 Recommendations

Powerloom Industry is capable of assisting and encouraging an entrepreneur to establish their enterprises, generate employment and strength the city's economy. Bhiwandi City with its strategic location, offers efficient connectivity helping backward-forward linkages of activity essential for the powerloom sector. For a healthy and qualitative living environment for residents and workers with the efficient working of industrial activity, unified and inclusive steps should be taken. Thus, the recommendations are proposed considering the existing scenario and future development in Bhiwandi.

13.1 Upgradation for Existing Settlement

Upgradation Strategy can be implemented in the powerloom cluster at various levels for rectification and alteration. The strategies can be framed and executed to improve productivity and health.

A. Policy Level Intervention

1. Capacity Building Programme, Skill Upgradation and Financial and Technological Support
   - The government should aid skill upgradation and capacity building through Powerloom Facilitation and Service Centre (PSC). As with technological upgradation, plain powerlooms would be discarded with advanced technology; workers should be trained to operate to all types of looms to secure their income source. Workers should be given benefits for attending training programmes and workshops. All categories of workers should be trained to learn the complete process and shift from one job to another, thus reducing the physical stress.
   - Increasing the numbers of Facilitation and Service Centre (FSC) and locating them within the powerloom cluster, so that accessing them becomes easier for workers and manufacturers.
   - Registration and Training of Workers should be conducted at FSC, so the workers can easily register for training programmes and assistance provided under schemes.
   - Standard Guidelines for area requirements of all types of looms and associated activities should be provided to support a mature understanding of appreciable working standards and risk and safety management in work premises.
   - Interest-free loan scheme should be formulated for Small Scale Enterprises to promote Entrepreneurship.
   - Compulsory Mask and Gloves provision would reduce health risks. Intervention at the policy level for mandatory Dormitory provision for workers at clusters level.
   - Electricity is the basic need of powerloom industry and it should be provided on subsidised rate.
2. District Industries Centre (DIC) and Labour Welfare Organisation
   - Manufacturers should strictly adhere to workspace standards, premises maintenance and various requirement as per Indian Factory Act. They should be implemented and regular inspections should be conducted for the same.

- Wage on per piece-rate basis should be abolished, and Formal Wage System as per the Minimum Wage Act should be followed. New License and Renewal of License to the manufacturer should be given on the Wage System's implementation.

3. Powerloom Weavers Manufacturers Association (PWMA) and Other Organisations.
   - These organisations should be strengthened and activated to guide the Powerloom Sector. It should work cohesively for workers and manufacturers. Manufacturers should be made aware of the MSME Act and motivated to register with District Industries Centre.
   - PWMA should conduct various Awareness Programmes to transform from Unorganised and Informal System to Formal System with the insight into the benefits of Policy with the welfare of workers and manufacturers, providing financial assistance and technological upgradation.

B. Planning Level Interventions

- Identifying Powerloom Cluster, preparing Cluster Map with location, number of powerlooms and details of units.
- Registered and Licensed Manufacturers under DIC should be permitted to continue with the activity.
- Strict adherence to Building Bye-Laws and structures violating rules should be notified for alteration or demolition.
- Flatted Industries should be promoted and powerloom activity within the residential building should be banned.
- Incentives should be provided for Industries shifting from Electricity to Green Energy consumption. Installing Solar Power and Air Filtration Machine should be promoted to control and reduce pollution.

C. Settlement Upgradation

- Physical and Social Infrastructure should be upgraded. Road Widening as per Development Plan should be implemented to provide adequate infrastructure facilities considering the future density. Vacant plots should be acquired for making provision of recreational spaces and owners can be awarded TDR.

13.2 Redevelopment Strategy for Existing Settlement

Redevelopment Strategy should be implemented in clusters where the plots are fully developed to their capacity and minor modifications will not suffice. Public–Private Partnership (PPP) Model should be promoted for redevelopment in the congested area where developers will provide group housing for existing residents. Developers can be awarded incentives for consolidating land and promoting redevelopment. Permission to Built-Up Sale Component should be given after completion of Rehab and EWS Components.

13.3 Future Development Strategy

Integrated Development Schemes should be framed for Community Development with quality Housing, Social and Physical Infrastructure promoting Work cum Reside environment for efficiency, productivity and resourcefulness. Following Space Standards and Building Regulation should be followed in Redevelopment and Future development.

1. Settlement and Cluster Level Interventions
   - Powerloom Facilitation and Service Centre to be established at the Settlement Level.
   - Flatted Industries to be promoted. Instead of Blanket FAR, Land Use specific FAR should be provided. Strict adherence to Development Control Rules and Regulations. Combination of Stilt and Basement Parking can be made to suffice parking requirements. Separate Loading—Unloading bays should be planned at Cluster Level.
   - Promotion of Green Technology like Solar Power, Rainwater Harvesting, Solid Waste Management, etc.
   - Air Filtration and Exhaust Fan should be mandatory to maintain Indoor Air Quality and reduce air pollution from Industries. Use of Sound-absorbing material in industries and planting trees along roads to act as a buffer for controlling noise and air pollution.
   - Compulsory Dormitory provision for workers at Cluster Level. The facility for toilets and drinking water should be provided within Industrial Premises.
2. Dwelling Unit Level Intervention
   - Unit Size should vary between 40 and 80 m^2 for creating a better living space standard. For redeveloped areas, unit size should be provided considering the number of family members. Units should compulsorily have attached bath and toilet.

Thus, the Strategies proposed shall be fruitful in uplifting the city's potentials and capabilities, promoting 'Green Powerloom City' with reduced pollution and well-integrated and inclusive city with qualitative living conditions, infrastructure and services. Bhiwandi can lead the path of sustainable, secure and economy-knowledge-based industrial development for many industrial towns, as it has been leading the Powerloom Sector since its genesis.

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Pandemic Spread in Metropolitan Cities of India—Spatial Planning Factors

Sridharan Namperumal, Natraj Kranthi, and Madhukar Kuchavaram

Abstract

India has seen pandemic disasters several years in the past. The recent coronavirus disease of 2019 (COVID-19) is similar to severe acute respiratory syndrome (SARS) and other viruses earlier, except in its spatial spread and concentration within the city. This paper is an attempt to identify the risk spatial planning factors responsible for the pandemic spread in the metropolitan cities of the four worst affected states of India: Mumbai, Ahmedabad, New Delhi, and Chennai, and how the spread is getting concentrated in these cities among the low-income housing areas such as slums and squatter settlements. Based on COVID-19 spread in these areas, a total number of 14 spatial factors that induce spatial environment were identified. These factors were divided into three categories based on their spread. Further, a combination of geospatial overlay techniques was employed to assess the link between built-up density and the pandemic spread. This was done through geospatial overlay of slums over the risk zone maps obtained from the open sourced geospatial portals targeting hotspots in the study areas. The results revealed that higher built-up density areas such as slums are instrumental in steering a higher number of positive cases. Based on these parameters, a four-pronged planning approach is suggested to tackle the pandemic spread and hence to transform the future planning interventions in India.

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Keywords

Built-up density • COVID-19 spread • Informal settlements • Slums • Spatial planning factors

1 Introduction

1.1 Brief Account of COVID-19 Pandemic Spread in India

First cases of the most recently discovered highly infectious disease COVID-19 were identified in Wuhan, China in December 2019. Subsequently, it turned into a pandemic and affected many countries across the globe (WHO, 2020). Positive cases increased in substantial number globally generating public health crisis. The situation is no different in India. By March 2021, more than 11.2 million cases and 157,584 deaths were registered, taking India to second place in the most affected nations of the world (MoHFW, 2021; Worldometer, 2021).

A nationwide pandemic lockdown since 25 March 2020 was ordered in India as a preventive measure to contain the virus spread. Prior to the total lockdown, a 14-hour public voluntary curfew 'Janata Curfew' was ordered on 22 March 2020. The lockdown was imposed in four phases to slow the growth rate of the pandemic. The first phase of the lockdown was during 25 March and 14 April. With the increase in the number of confirmed cases, the lockdown was extended to the second phase till 3 May with conditional relaxation. Thereafter, the lockdown was extended by two more weeks as the third phase. During this phase, the districts in the entire country were divided into three zones: red (with high cases), orange (with fewer cases), and green zones (with no confirmed cases in the past three weeks) based on the number of positive COVID-19 cases (Business Insider India, 2020). Further, the lockdown was extended by two more weeks till the end of May as the fourth phase with some

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relaxation. During this phase, to have greater control over the spread of the virus, the red zones were sub-divided into containment and buffer zones (The Hindu, 2020a, b). After the fourth phase of lockdown, six phases of reopening 'Unlock' were implemented by phase-wise lifting of the lockdown restrictions outside the containment zones (The Indian Express, 2020).

1.2 Pandemic Spread in the Metropolitan Cities of India

Susceptibility to pandemic spread is high in India (Patranabis et al., 2020). The COVID-19 (Corona Virus) pandemic spread has affected all the states in India claiming a number of lives in the recent past months in the year 2020. Among them, first four worst affected states are Maharashtra, Gujarat, Delhi, and Tamil Nadu (Government of India, 2020). The metropolitan cities of these four worst affected states in India: Mumbai, Ahmadabad, New Delhi, and Chennai have accounted for a major proportion of the total cases in the country. Crowding in markets is considered to be one of the major reasons for the rapid spread of the virus in these cities (india.com, 2020). Hence, these four cities have been identified as study areas in this paper (Fig. 1).

It has been reported that a majority of the positive cases from the metropolitan cities are from low-income informal housing areas such as slums and squatter settlements, having highly dense built-up areas and act as fertile ground for outbreak. The latest data on housing and sanitation by National Sample Survey Office (NSSO) is a reconfirmation for the high vulnerabilities to spread in slums and squatter settlements.

As per the NSS 76th Round Report, the average ratio of a room to a person in urban slums is 1:1.41, indicating congestion in the built areas i.e., more than one person per room (Deka & Das, 2020; Government of India, 2018). Due to this, the COVID-19 spread in India is anticipated to be faster in slums than in non-slum areas (Chatterji & Zeeshan, 2020). Heavy loss of life is likely due to dense living conditions and a weak public healthcare system, leading to the rapid spread of the current pandemic. Crowded and poorer areas are more vulnerable to infection as it is difficult for the inhabitants of these areas to safeguard themselves against getting infected (Patranabis et al., 2020). The average per capita built-up space in slums of Indian cities is only 42 square feet (Biswas, 2020). Besides, a high morbidity pattern has also been noted in these characteristically congested areas (Sharma et al., 2020), indicating the need for identifying the risk spatial planning factors for the spread. While a number of socio-economic factors have been attributed to the pandemic spread of COVID-19 in India, spatial factors of the physical environment, particularly in slums, cannot be ignored. Therefore, there is a need to identify and understand the risk spatial planning factors that are directly or indirectly instrumental in the spread of positive cases of COVID-19 and further assess the link between built-up density and the pandemic spread.

2 Material and Methods

In order to identify the spatial planning factors, various spatial planning factors responsible for the pandemic spread in the low-income housing settlements, particularly in slums of the identified metropolitan cities in India were reviewed. Further, open source geospatial data available in the public domain from the *sociometrik* online portal was procured. This portal has a dashboard that displays the risk zone maps, which are likely areas for the COVID-19 spread in the near future. It identifies micro-zones within the select metropolitan cities and each map is divided into 1.0 km^2 grid. The risk zone maps displayed on sociometrik portal were prepared based on a risk score, which was built using granular spatial data, location database and demographic database. The risk scores on this portal were calculated and assigned to each of the micro-zones based on density of human settlements, density of congregation spots, and density of road networks and transport hubs (sociometrik, 2020).

Each map on this portal is classified into five types of risk zones: very low, low, moderate, high, and very high. The COVID-19 risk maps were overlayed with the municipal corporation boundaries in ArcGIS Desktop 10.3 version. The area of each risk zone within the city for all the four cities was calculated by adding all the grids of 1.0 km^2 each of the same risk zone. Further, slums in each city were superimposed with the risk zone maps. A grid-based locational analysis of these high dense slums was carried out to with respect to the COVID-19 risk zones. Through a geoprocessing intersection of these two layers of spatial information, i.e., risk zones and slums, area of the slums falling in each risk zone was calculated. Based on these areas, the percentage of slum areas falling within each of the risk zones was assessed. The methodology adopted is shown in Fig. 2.

The city-wise details of the geospatial analysis are presented here.

2.1 Study Area: City-Wise Spread Details

2.1.1 Mumbai

Mumbai is one of the largest and the most important metropolitan cities of India, it is considered to be the financial capital of the country. The Brihanmumbai Municipal Corporation (BMC) has a population of 12,442,373 as

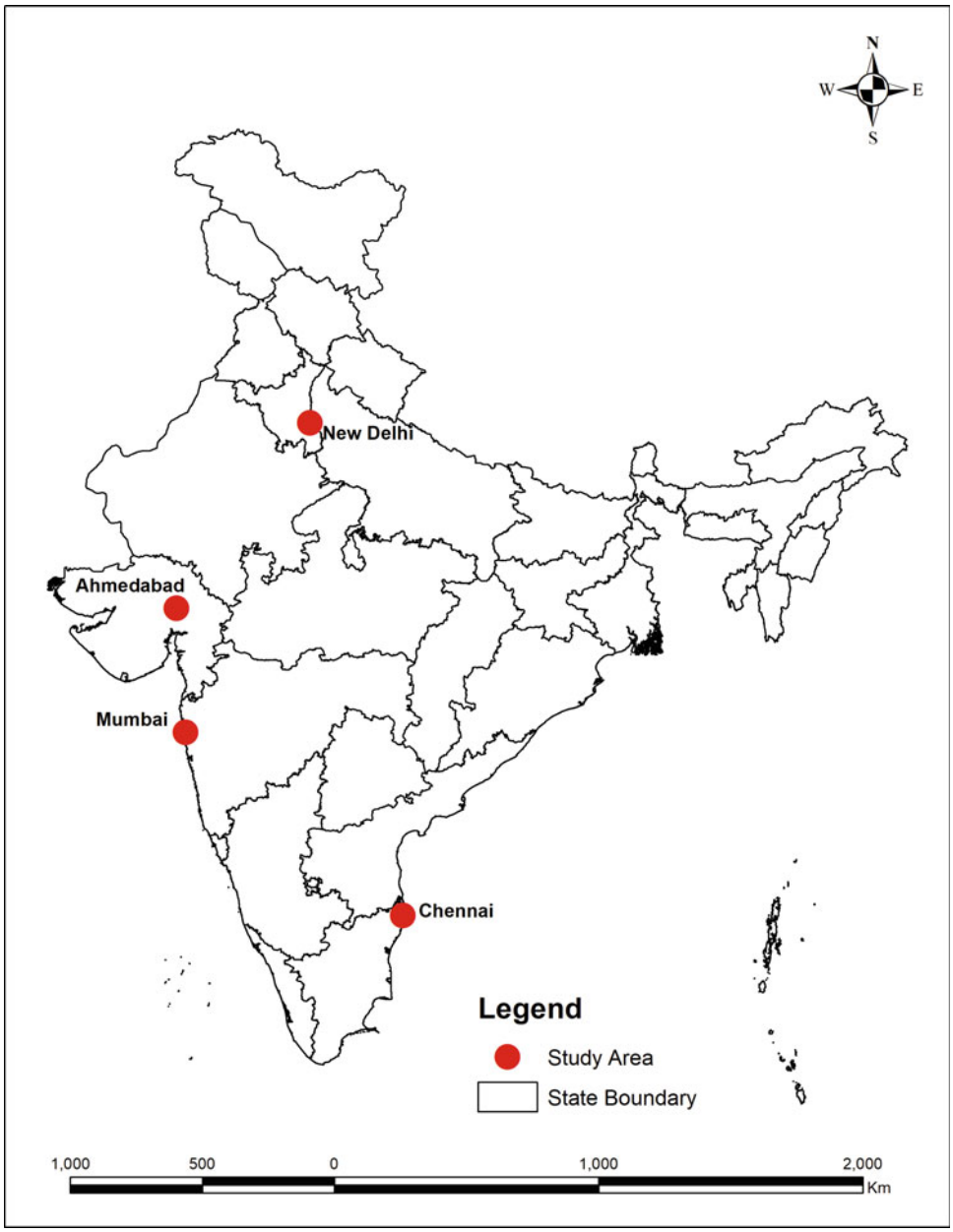

Fig. 1 Map showing the identified study areas. *Source* Map based on the Political map of India (Survey of India, 2020)

per the Census of India 2011. It is on the list of the most COVID-19 affected cities in India. Slums are considered to be one of the main reasons for this phenomenon. The slum area in the city is around 42.1 km^2, which accounts for around 9.6% of the city area. Nearly 80% of the marked containment zones are in congested areas like slums or *chawls* (local word for slum). According to a survey conducted by Brihanmumbai Municipal Corporation, it was found that 60% of the deaths in the city were from slums or slum-like areas. Of these slum pockets, Dharavi is the worst hit with a majority of Covid-19 cases. One of the main reasons was attributed to the nearby wholesale vegetable markets, from where the infection chances were higher. Besides, community toilets are also considered to be one of the biggest sources of the spread of infection (The Times of India, 2020).

Slums in Mumbai are extremely crowded constituting 42% of the households, with a majority of them staying in a single room without having access to basic amenities like toilets, clean water, etc., making them highly vulnerable to the spread of infection (Patranabis et al., 2020). The ratio of room to the person in slums is 1.67 in the state of Maharashtra (Government of India, 2018). Most of such rooms are not more than 100 square feet in area with around 8–10 people living in such cramped spaces, making the containment of virus even more challenging (Shelar & Mahale,

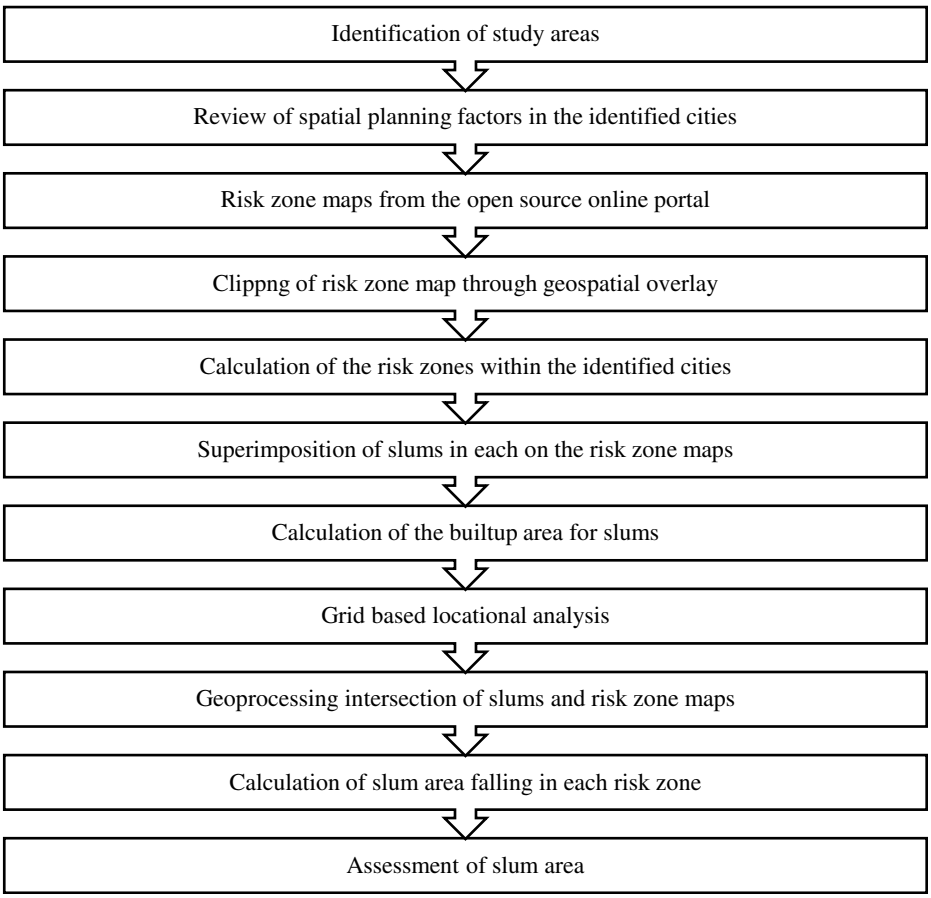

Fig. 2 Flow chart showing the methodology adopted

2020). Infrastructure deficits, lack of sanitation, poorly maintained community toilets, shared water taps, severe water shortages, and poor ventilation promote the spread of the virus in these densely packed poor neighborhoods or informal settlements (Randolph & Gandhi, 2020).

More than half the city area, i.e., 255 km^2 falls under either the high-risk or very high-risk zones indicating the vulnerability to the pandemic spread (Fig. 3). Nearly 85 km^2 falls under a very high-risk zone, while the high-risk zone area is twice the very high-risk zone with 170 km^2. It was found that over 60% of the slum area, i.e., 25.6 km^2 falls under moderate to very high-risk zones. This shows that high dense built-up slum areas, particularly located in the high or very high-risk zones are the hotbeds for the spread. Therefore, there is a need to urgently address the built-up density-related spatial factors through effective spatial and integrated planning intervention.

2.1.2 Ahmedabad

Ahmedabad Municipal Corporation, the largest city in Gujarat extends to an area of 449 km^2 with a population of 5,633,927 as per the Census of India 2011. The city has an area of 26.22 km^2 covered by slums, constituting around 3.7% of the city area. The city has more than half of the total positive cases of the Gujarat state. It is the worst-hit city in the state with more than 95% of cases emerging from slums and congested pockets (The Hindu, 2020a, b). The average ratio of room to the person in Gujarat is 1.7, indicating that more than one person lives in one room in its slums (Government of India, 2018).

New cases are being detected mostly from the congested slums of the old city area in Ahmedabad (Yadavar, 2020). Anticipating that the increased number of positive cases is due to the nearby shops, Ahmedabad Municipal Corporation ordered the closing of all shops except the milk and medicines (News 18 India, 2020). The high concentration of a majority of the virus infections in small, narrow, and congested areas like slums is an indicator for disastrous proportions of transmission in the city. A number of positive cases emerged from slums located in Gulbai Tekra (Hollywood street), Vadaj (Ramapit no Tekro) Shahibaug, and Asarwa (Patel, 2020). Large-scale testing for Covid infections is carried out in Rampir Tekra, the state's largest suspected slum in Ahmedabad, which is considered as a hub for Covid spread in the city (India Today, 2020).

As per the Census of India 2011, there are a total of 375 slums in the city with a population of 242,050 living in these areas. The slums in the city were interpolated over the

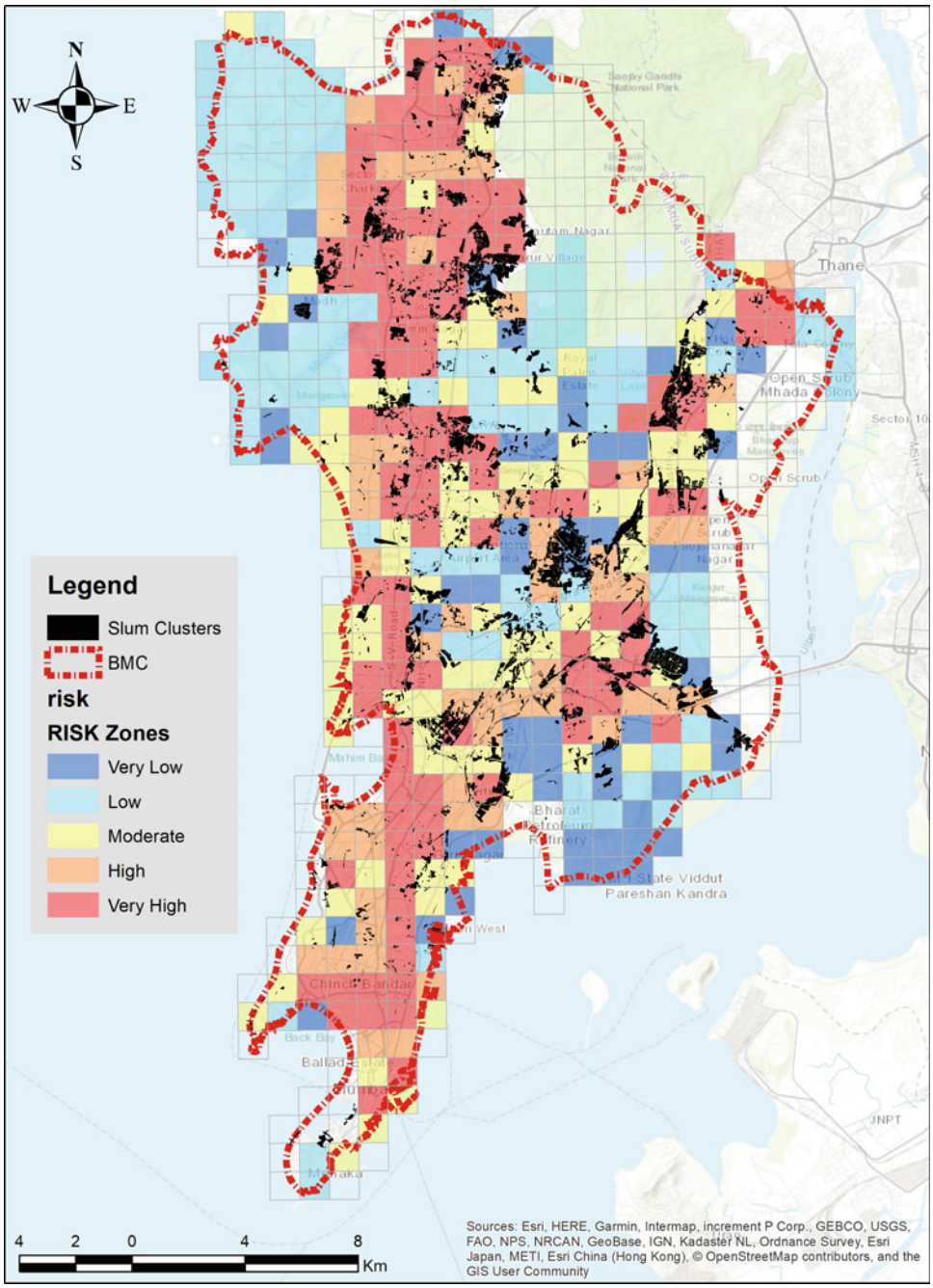

Fig. 3 Map showing COVID-19 risk zones and location of slums in Brihanmumbai Municipal Corporation. *Source* sociometrik, 2020; Zhang, 2018

COVID-19 risk zone maps to assess the concentration of slums in various risk zones. An analysis of these risk zone maps revealed that over 42% of AMC comes under very high and high-risk zones. Further, it was found that 62.4% of the slum area is located in the moderate to very high-risk zones (Fig. 4), indicating that these densely packed neighborhoods are the sources for the virus spread. Therefore, there is a need to address the issue of dense neighborhoods through effective zoning.

2.1.3 New Delhi

It is one of the largest cities in the world. In the year 2012, the erstwhile Municipal Corporation Delhi (MCD) was replaced by three corporations: the North Delhi Municipal Corporation, the South Delhi Municipal Corporation, and the East Delhi Municipal Corporation (Department of Law, Justice & Legislative Affairs, 2012). As per the Census of India 2011, the erstwhile MCD area covered 1397.3 km^2 with a total population of 11,007,835 and a slum population of 1,708,398.

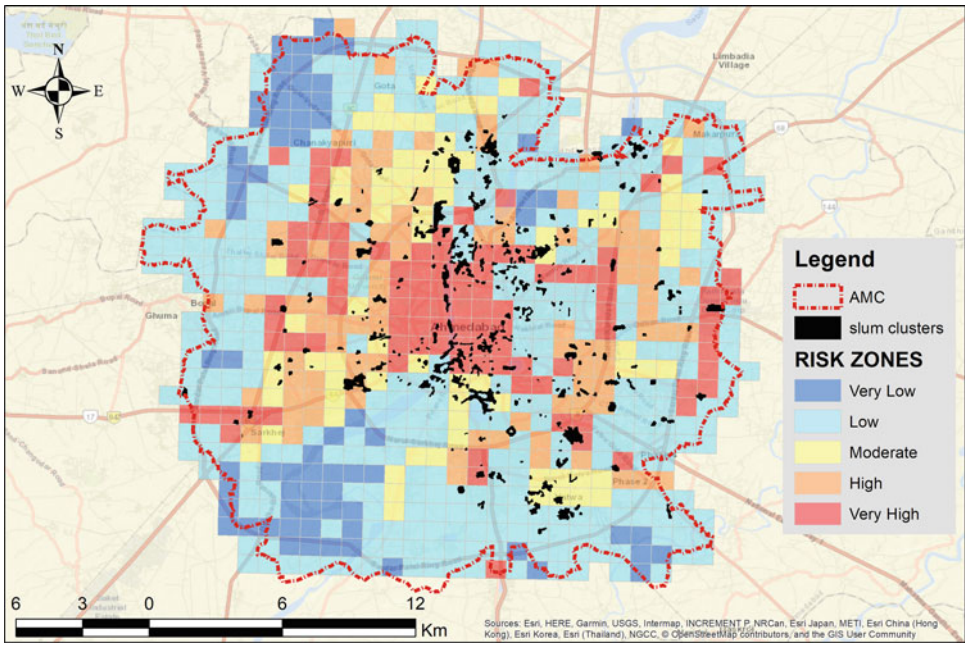

Fig. 4 Map showing COVID-19 risk zones and location of slums in Ahmedabad Municipal Corporation. *Source* sociometrik, 2020; CEPT University, 2014

The spread of COVID-19 is indicated to be of high speed in all the slums of Delhi. The main reasons for this are lacking living spaces with high dense built-up spaces where the inhabitants have only a few square meters, inadequate social security, poor access to sanitation with more than 70% of households in the slums of Delhi having no access to improved sanitation. Also, around one-fifth of the inhabitants of the slums do not have access to clean water (Chatterji & Zeeshan, 2020). Influenza infection rates in slums are higher by 44% than non-slum areas in Delhi (Adiga, et al., 2018). Crowding is one of the important reasons for these increased infections in slums (Riley et al., 2020). Besides, Bhalswa slum is a potential hotspot of coronavirus spread due to its unorganized urban housing, open drainage, runoff water from garbage, contaminated drinking water, unclean single toilets facilities, and single room sharing by a majority of the inhabitants (Mujibi, 2020). The ratio of room to the person in the slums of Delhi is 1.52 (Government of India, 2018).

More than half of the city i.e., 52.5% falls under either the very high or high-risk zones. Geospatial overlay analysis of the COVID-19 risk zones with slum areas, revealed more than 92% of the slums in the city are located in moderate to very high-risk zones (Fig. 5). What is appalling is that almost all the slums are vulnerable to the virus spread. Therefore there is a need to reduce the vulnerability through local area planning.

2.1.4 Chennai

Chennai, the capital city of Tamil Nadu is one of the most affected and vulnerable cities to COVID-19 in India. Chennai Municipal Corporation (CMC) has a population of 4,646,732, as per the Census of India 2011. Nearly one-fifth of the city is covered by slum areas. The rapid spread in Chennai is attributed to the narrow streets, high dense, and congested houses constructed too close to each other (Subramani, 2020). The ratio of room to person in slums as per the NSS report in Tamil Nadu is 1.08 (Government of India, 2018). Koyambedu, a fruit and vegetable market, located in the city center is one of the main sources of Covid-19 spread in Tamil Nadu. The number of positive cases in the Nochikuppam slum has been reportedly increasing every day (Mujibi, 2020). Royapuram, Thiru Vi Ka Nagar, and Kodambakkam are the three zones in Chennai that account for more than 3000 cases out of a total of 9364 cases in the city. Nearly 1000 cases are from each of these three zones (Lopez, 2020).

Half of the city area is either under very high or high-risk zones. The geospatial overlay analysis showed that 61.3% of the slum areas come under the moderate to very high-risk zones in the city (Fig. 6). Vegetable marketplace along with spatial factors related to built-up density has been found to be the hotbeds for the virus spread.

3 Discussion and Results

A majority of the deaths in the study areas were found to be from the slums or slum-like areas, indicating their vulnerability to the virus spread. Particularly, densely packed poor settlements along with common market spaces located in the very high or high-risk zone were found to be the hotbeds acting as the sources for the virus spread. Addressing issues of vulnerability and virus spread through an integrated

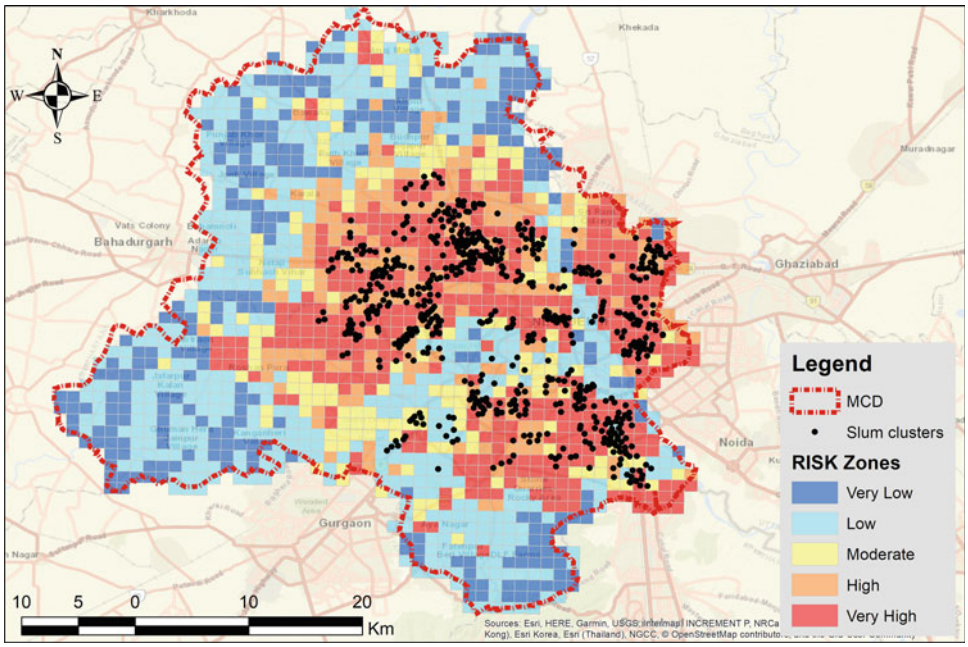

Fig. 5 Map showing COVID-19 risk zones and location of slums in the corporation area of Delhi. *Source* sociometrik, 2020; Kapoor & Thakur, 2020

planning approach across various levels of planning hierarchy is the need of the hour.

3.1 Identification of Spatial Planning Factors

In order to identify the critical spatial factors in the slums, a comparative analysis of the city-wise information of the above-mentioned four cities is done. A total of 14 spatial planning factors were identified. These include wholesale vegetable markets, overcrowded spaces, densely packed neighborhoods, narrow streets, congested single-room houses, poorly ventilated cramped/unorganized spaces, community toilets, shared water taps, severe water shortages, lack of sanitation, open drainage, nearby shops, inadequate social security spaces, and runoff water from the garbage. These factors were divided into three following categories based on their influence in the study areas:

Category-1: Out of identified 14 factors, four spatial factors have been found to cast their influence in all four cities. Therefore, these are the most critical factors and are related to high built density, congestion, and overcrowding.

Category-2: Seven spatial factors related to shared facilities or services and unorganized spaces have contributed to the pandemic spread in two of the four cities.

Category-3: The remaining three other spatial factors related to maintenance and proximity to shops have affected only one of the four cities.

The spatial planning factors along with their categories are presented in Table 1.

From the above analysis, it was found that the built-up density-related spatial factors of slums identified under category-1 have casted their influence in all the four cities. Built-up density in detail was therefore geospatially assessed in each of the cities, in order to understand its link to the COVID-19 spread. The geospatial overlay analysis revealed that in all the metropolitan cities, slums have significantly contributed to the pandemic spread of the COVID-19. A minimum of 60% of the slum areas is located in the moderate to the very high-risk zones, indicating a direct link between the built-up density to the pandemic spread. It can therefore be concluded that higher built-up density areas such as slums are instrumental in steering a higher number of positive cases.

4 Suggestions

To avoid any pandemic spread such as COVID-19 in future, the following planning policy measures are suggested that can transform the future city planning in India:

1. Built-up density-related critical spatial planning factors such as overcrowded spaces, densely packed neighborhoods, narrow streets, and congested single-room houses identified under the category-1 need to be urgently addressed and improved on high priority basis. To achieve this, voluntary neighborhood groups like the Advanced Locality Management groups (ALMs) in Mumbai, which usually work with the local government on environmental, security, and upgradation issues can be created or introduced and engaged actively (Baud & Nainan, 2008).

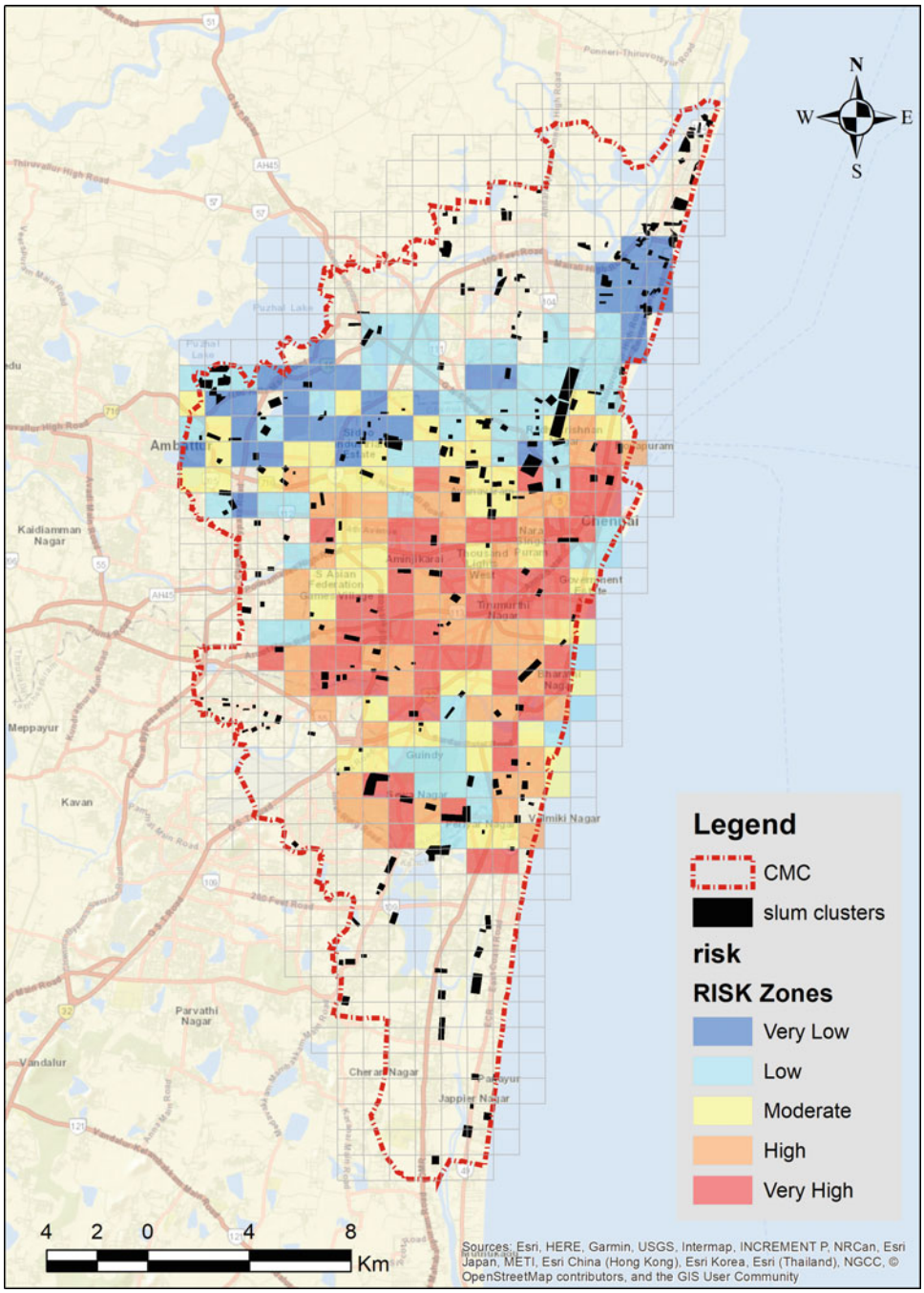

Fig. 6 Map showing COVID-19 risk zones and location of slums in Chennai Municipal Corporation. *Source* sociometrik, 2020; Rajiv Awas Yojana, 2014

2. Strict compliance with the minimum spatial or planning standards by adhering to the applicable building bye-laws and National Building Code is the need of the hour for improving the average built-up density, particularly in the low-income housing areas and the densely packed neighborhoods such as slums and squatter settlements.
3. The ratio of room to the person in the dense built-up areas needs to be improved by increasing the supply of more affordable housing units, so as to avoid sharing of single rooms by many individuals. This is because the economically weaker sections and the low-income groups are the most affected by the urban housing shortage (Housing.com, 2019). This will minimize the risks associated with the pandemic spread.
4. The common open spaces need to be critically evaluated and improved as per the space standards given in the Urban and Regional Development Plan Formulation and Implementation guidelines. As per these guidelines, the recommended number of open spaces is 2–3 parks

Table 1 Identified spatial factors in slums and their influence in each of the metropolitan cities

	S. no	Spatial planning factors	Mumbai	Ahmedabad	New Delhi	Chennai
Category-1	1	Overcrowded spaces	✓	✓	✓	✓
	2	Densely packed neighborhoods	✓	✓	✓	✓
	3	Narrow streets	✓	✓	✓	✓
	4	Congested single-room houses	✓	✓	✓	✓
Category-2	5	Whole sale vegetable markets	✓			✓
	6	Poorly ventilated cramped/ unorganized spaces	✓		✓	
	7	Community toilets	✓		✓	
	8	Shared water taps	✓			
	9	Severe water shortages	✓		✓	
	10	Lack of Sanitation	✓		✓	
	11	Open drainage	✓		✓	
Category-3	12	Nearby shops		✓		
	13	Inadequate social security spaces			✓	
	14	Run-off water from garbage			✓	

Note: ✓ mark indicates the contribution of the spatial factor of the slum to COVID-19 spread in the city

per community (Ministry of Urban Development, GoI, 2015). This will in turn curtail overcrowding of common spaces in the low-income housing neighborhoods.

5. Shared facilities or services related spatial factors identified under category-2: wholesale vegetable markets, poorly ventilated cramped/ unorganized spaces, community toilets, shared water taps, severe water shortages, lack of sanitation, and open drainage; need to be improved by prioritizing the needs in the poor settlements.
6. Shared community facilities such as wholesale vegetable markets were found to be the sources of virus spaces. Such common social facilities need to be carefully addressed by considering necessary relocations to the peripheral areas of the cities, wherever feasible.
7. A shift from shared common services such as community toilets, water taps, etc., in the low-income housing areas to individual services is the need of the hour, to reduce the spread. Individual toilet facilities and individual water taps through piped water connections need to be taken up on a large-scale basis. Such interventions enable reducing the vulnerability to pandemic spread to a large extent in the future.
8. Improving the common physical infrastructure, particularly uncovered sanitation and drainage infrastructural facilities, need to be covered by improving the underground networks.
9. Improvement and maintenance of the spatial planning factors identified under category-3 are important. The security of the social spaces by increasing necessary monitoring is critical to avoid unnecessary social gatherings. Further, the proximity to convenient shopping/other spaces of essential commodities from the neighborhoods need to be carefully planned so as to avoid unnecessary physical contact spaces.
10. Presently there is no official mechanism for either data collection or assessment or evaluation of built-up density areas in India. Considering its importance, it is necessary to collect built-up density-related data through census by including it as one of the key parameters.

5 Conclusion

A four-pronged planning intervention suggested as follows to address the pandemic spread related issues:

(i). Regional level planning: Effective hierarchy and physical linkages or connectivity among various settlements to facilitate better mobility and services.
(ii). Zonal level planning: Provision of infrastructure combined with network connectivity for better access to services, particularly to health infrastructure for effective crisis management. Presently, the planning guidelines such as URDPFI (Urban and Regional Development Plans Formulation and Implementation) do not have specific provisions or standards to cater to the needs of the pandemic situation. Therefore, it is suggested to evolve necessary standards for essential

physical and social infrastructure clubbed with associated services. Mixed infrastructure could be a suitable solution to cater to such specific needs without causing delays in the facilitation of emergency / medical needs.

(iii). City level planning: Mixed land use planning with an emphasis on integrated city and regional planning approach can act as a coherent bridge between various levels of planning hierarchy levels. Spatial distribution of core health infrastructure with respect to the population and built densities to enable better crisis management.

(iv). Local area level planning: Ward (A ward is an administrative unit within the urban local body typically used for electoral purposes) level planning clubbed with social distancing guidelines within the framework of the master plan to achieve vertical integration with higher levels. In-situ redevelopment/ upgradation of informal spaces along with adequate common open spaces to reduce the virus spread. In order to achieve this, there is a need to allocate such spaces with a comprehensive assessment of the requirements of the urban poor after ascertaining the ground realities for in-situ redevelopment/upgradation (Ministry of Urban Development, GoI, 2015). Such requirements are to be considered against the backdrop of the pandemic spread. Local data rather than regional level data are essential for informed decision-making to tackle the pandemic at the local level.

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Compact Cities and Land Reform; The Case of South African Cities

Sushma Patel

Abstract

South African cities would benefit from compaction of suburbia and development nodes close to inner city centres. While the inner cities are fairly dense and black townships and informal settlements are dense in pockets on the peripheries, some of the developed old white suburbs close to the inner cities are less compact. The paper explores urban land reform strategies close to inner South African cities as a way to address low density and diversity through a variety of models of land tenure and housing in order to address the complexities of development. Very high unemployment levels, dire social inequality as well as wealth and asset ownership by a few of the population, leads South African cities to the brink of social unsustainability, even pre-corona. Land reform is crucial to increasing people's life chances. How land is made accessible to more people and where it is located and the model and nature of land near the centres is paramount. The study looks at Johannesburg, Cape Town and Durban as case studies to identify spaces of potential for densification and compaction.

1 Introduction

Within the context of high unemployment (expanded version of 37%) and high youth unemployment (55%), dire social inequality (Gini coefficient of 0.6%) as well as wealth and asset ownership by a few (0.95%) of the population,[1] South African cities are at the brink of social unsustainability, even pre-corona. Housing development has been taking place since 1994, mostly at the periphery of the city and housing models have been limited. Access to the city, the location of housing and a variety of living options is what is lacking. The suburbs close to inner cities have not significantly transformed to accommodate higher densities of people nor offering for diverse living needs. People of colour and mostly working class people who were already living close to Cape Town, for example, have been driven out due to gentrification and increased land values. While economic and building development have improved at Johannesburg and Durban's northern suburbs close to the centre, actual land configurations and densities have not significantly been improved. The objective of the study is to illustrate the need for increased density and diversity at suburbs close to inner cities in order to address structural inequality. The methodology adopted for the study draws on 'the right to the city'[2] as central to the discussion, takes into account many visual studies undertaken by civic and rights organisations and includes visual graphic representation of race maps, travel distances by race, density studies and spatial unemployment rates by race.

2 Background

The permanence of South Africa's spatially fragmented city configurations—the separation of cultural groupings—is obstinate, entrenched and physically resilient to change. The physicality of this fragmentation perpetuates the social and economic inequality of people. The unequal access to land and location extends back as early as the mid-1600s to the landing of the Dutch at the Cape. Both resident Bushmen as well as arriving slaves from various colonies were deprived

[1] Ben Cousins discusses the land issues in South Africa.

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[2] Henri Lefebvre (2014) and David Harvey (2008) refer to the right to the city as a demand for access to urban life, not just for the individual but for the collective good.

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of holding land title.[3] Later, land dispossession through the Natives Land Act of 1913 ensured blacks did not receive access to security of land tenure. There were many other legislations preventing the ownership of land and access to jobs and urban opportunities. The Group Areas Act of 1950, essentially prescribed separate areas for different race groups. All of these legislations ensured a sustained denial to the right to access to land and by implication the denial of the right to the city and improved life chances. People of colour were denied this access over centuries and generations and the cumulative effect is the permanent physical and spatial entrenchment of the separation. Black people have been denied the front door, they have been relegated to the underground and invisible spaces, and they have been forced into the underbelly of our urban centres and are living in the outskirts and peripheries of urban activity. Due to architecture's permanent built form, the relegation of black people to back spaces requires strategic and invasive intervention, without displacement and disruption. Land reform could produce the desired earth shift to address the cultural and spatial inequality and hegemony.[4] If land was manipulated as a political tool to alter the production of space[5] during apartheid, there exists the possibility that legislating land desegregation and disaggregation,[6] increasing densities in South Africa's low-density suburbs and promoting city compaction could lead to a meaningful restitution to the past social and economic injustices.

3 The Context

3.1 South African Cities and Cities of the Global South

Cities of the Global South (in developing countries) including South African cities, have developed and are being developed in particular ways: people are moving to cities in droves known as rapid urbanisation (particular to sub-Saharan Africa), the poor are living at the urban periphery and there are deep spatial divides between rich and poor. Walls, gates, barriers, booms—exclusionist practices all driven by fear and capital, resist change that is vital for equitable cities. South Africa is slow on the uptake of retrofitting old buildings, building upward instead of sideward and building and infilling in existing built-up areas rather than on new green field sites. Dense informality often occurs in isolated areas, with people who require the most access receiving the least. Infrastructural transit modes are limited and the motorcar and minibus taxi dominate transportation options. Our cities in both wealthy and poor areas neglect our natural resources. And all of this is sprawling.

Old suburbs flanking inner city areas are established and entrenched. The old suburbs characteristically are large plots of land; have housing on them that often have acquired historical, read often colonial, heritage significance. Due to high property values as well as their large urban footprints and heritage aspects, they are resistant to the required disaggregation strategies including infill and increasing densities. While some suburbs have altered in diversity of race and user groups, many of the urban built forms have not evolved into housing more people per square metre.

3.2 Suburbia, Urban Sprawl and Polycentric Cities

Suburbia and sprawl is an American and Modernist concept and practice that Apartheids' planners adopted. This is culturally the most lasting practice of most South African city inhabitants and architects. Many new developments emulate the madness of suburbia. Sprawl is detrimental for any city; it intensifies infrastructural needs and maintenance and makes our cities highly inefficient. Some of the oldest and wealthiest suburbs are located close to the inner cities of South African metropolises. The old suburbs of Oranjezicht in Cape Town, Morningside in Durban and Parktown in Johannesburg, for example, are located in close proximity to the city's centre. In Muckleneuk in Pretoria, for example, these range from 1000 to 2000 m^2. Suburbia, sprawl and space overconsumption could be countered by insertions of built infill, subdivision of land and a disaggregation of spaces through land reform.

Apartheid townships still exist on peripheries of cities in a sprawled manner. New RDP houses are being built even further away than old townships. These are mostly single storey dwellings on single plots. New high-density residential developments are being built, but mainly on green field sites, often away from employment opportunities. This new increase in sprawl is exacerbating spatial patterns and problems rather than solving housing and city spaces challenges simultaneously and holistically. Informal settlements, other than in inner city high rise 'high-jacked' buildings, continue to locate on the margins of city space, further adding to sprawl.

Since 1994, South Africa has embraced neoliberal economic policies that have had a significant impact on the

[3] Krotoa (Penguin films, 2013), a documentary dramatising the plight of the Bushmen and slavery in the Cape through Jan van Riebeecks' slave girl Krotoa.

[4] From Antonio Gramsci and Marxist philosophy wherein there is a cultural domination of the culture of the ruling class over a diverse culture of people.

[5] Henri Lefebvre's theory of the production of space as influenced by politics.

[6] One of Charles Correa's seven cardinal principles for housing in the third world is a 'disaggregation ' of people and space in order to unlock the potential for development.

creation of polycentric cities. More shopping malls located at more highway off-ramps as well as the insertion of more malls into suburbs that have begun an erasure of strip developments and independent stores. The aggregation of built forms such as malls as well as their employment creation nodes, has led to multiple polycentric nodes within the cities. Gauteng, including Johannesburg and Pretoria, as well as Durban have experienced white 'flight' from inner cities since 1994 and many citizens locate themselves at polycentric nodes. Cape Town remains an anomaly to inner city race demographics but has also subscribed to a polycentric development.

3.3 Compaction, Density and Diversity

Jane Jacobs and Jan Gehl, from different urban generations of thinkers, allude to the need to create higher densities of people and urban form while simultaneously increasing diversity.[7]

More people living closer to each other and living closer to the centre of the city have better chances to access work opportunities, education and health. A compact city implies a higher density of people per hectare. Higher densities of people in cities is healthy for the functioning of cities. With rapid in-migration into our cities still expected, an irreversible trend, our suburban sprawl could well benefit from the new arriving population to aid in densification. Spatial segregation encourages a lack of social diversity in the areas in which we live. Mixed use (living, working, schooling in close proximity), mixed-income housing (a range of housing typologies; single houses, flats, social housing, informal housing), intergenerational spaces (children, the middle-aged and the elderly) living in close proximity, racial diversity, all add to a rich cultural and social environment. What we are seeing in South Africa is a fortressing of super wealthy space overconsumption and a compaction of space consumption of the poor. Space overconsumption fuels inequality, alienation, isolation and mental ill-health. Homogenous built forms and neighbourhoods do not benefit the urban environment. The simultaneously dense and diverse a neighbourhood, the more equitable and rich the new culture and old heritage.

South African cities continue to be racially separate (Fig. 1). The higher density pockets of residential developments lack the diversity that is required for creating healthy, thriving urban spaces of opportunity.

3.4 Sustainable Cities and Buildings

South African cities are characterised by spatial polarisation, where black and white, wealthy and poor, live spatially divergent existences. South Africa is now the most unequal country in the world and the city configurations reflect the stark contrasts; distinct impoverished neighbourhoods and excessive urban geographies[8] (Fig. 2). Social justice is about the just and fair access to and equitable distribution of opportunities, resources, privileges and burdens of a society. It is about the equal enjoyment of rights and freedoms by all regardless of differences and histories. It is the remedy that is required through an economic redistribution. Spatial justice refers to the spatial opportunities created to all that live in the city. The fair distribution, access and opportunities necessarily deals with the spatial distribution of densities, housing, amenities, etc. Spatial justice is paramount to social sustainability. Social and economic sustainability does not preclude environmental sustainability. All forms of sustainability could be achieved. This could be beneficial to all.

3.5 Neoliberalism and the Aggregation of Space

Capitalism's free market, deregulation and consolidation of land and built form aids in spatial fragmentation. Monolithic tracts of land is the aggregation of space which gives less people less living and working opportunities. With the onset of late capitalism, however, land reform and social sustainability are going to be global concerns and not only challenges for the Global South. South Africa could be a pioneer of land reform trends worldwide. Neoliberalism can be linked to the establishment of the polycentric nature of development. This form of development does not aid in providing better and equal opportunities for black and working class people. It drives out informality and one-man entrepreneurship. In any event, post-corona has already raised red flags to how countries achieve economic growth. Focus on disaggregated spaces could raise opportunities for more people. This could directly address social inequalities and unsustainability.

[7] Jane Jacobs' (1961) 'The death and life of great American cities and Jan Gehl's 'Soft city' (Sim, 2019), both old and new references to the need for simultaneous density and diversity of neighbourhoods.

[8] Time Magazine featured a photo by Johnny Miller and cover piece "The World's Most Unequal Country", South Africa in May 2019 which exemplifies the spatial segregation and contrast.

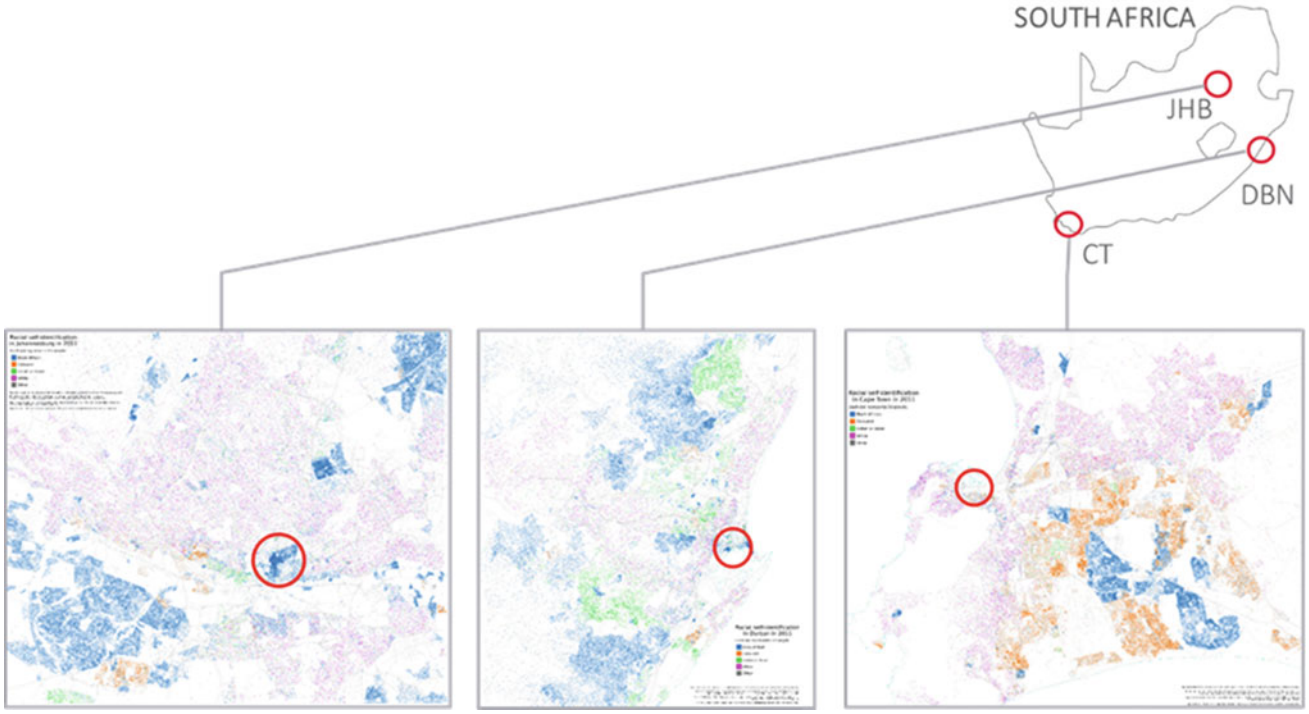

Fig. 1 Adapted maps from Census 2011 and racial density dot maps adapted from Adrian Frith https://adrian.frith.dev/images/dotmaps/Durban-2011.png

Fig. 2 Photo by Johnny Miller on cover of Time magazine capturing unequal city spaces https://time.com/5581483/time-cover-south-africa/

3.6 Displacement and Forced Removals

Forcibly removing people from their neighbourhoods through eviction and displacement is part of our violent and destructive past[9] and present. Gentrification or regeneration has a similar effect of benefiting the rich and driving out the marginalised. Removal and displacement of people could mean devastation of livelihoods.

3.7 Development Policies

South Africa is not short on national as well as local policies on development in the built environment. The Spatial Planning and Land Use Management Act 16 of 2013 (SPLUMA) lists 'to address past spatial and regulatory imbalances' as one of its key objectives. Perhaps in time this instrument could be employed to address density and diversity close to inner cities. Other instruments like the Spatial Development Frameworks (SDFs) and Integrated Development Plans (IDPs) as well as new policies like the Johannesburg's Nodal Review 2020 will be important tools to assist in spatial restructuring.

[9] The Group Areas Act of 1950 forced many people of colour away from their homes. Their dwellings were destroyed.

3.8 The Constitution and Rights

Section 25.5 of the Constitution of the Republic of South Africa does not directly give citizens access to land and land redistribution. Section 26 of the Constitution gives people the right to adequate housing, yet housing would need to be built on land. People are not accessing housing and land equitably. Even though the government has provided a considerable number of houses since 1994, there is a dire backlog and informal settlements are growing exponentially.

3.9 Case Study of Johannesburg, Durban and Cape Town

For the purposes of this study, where the relationship between compact cities and land reform is explored, three South African cities have been selected as case studies.

Johannesburg is the economic hub of the country in the northern interior and is situated within a larger city region including the capital city of Pretoria. This city region is home to the largest concentration of people in terms of land area in the country.

Durban is situated on the east coast of the country. It is an industrialised city and is important to people from many rural areas as the commercial hub of the province.

Cape Town is a global city with commercial enterprises and tourism as its largest revenue generator.

These three cities, while having similarities in terms of colonial and apartheid planning histories, are different in their urban challenges. The aim will be to demonstrate some urban land reform and built typology solutions.

4 Three Major Urban Centres in South Africa

4.1 Johannesburg and Pretoria, The Gauteng Conurbation

The inner city of Johannesburg has grown in population density mainly within existing buildings. Limited inner city new developments have been built. A large number of inner city buildings have been refurbished, but not nearly at the scale of development as in the polycentric centre of Sandton to the north. Higher densities in the inner city is positive from both a compact city as well as a land reform view. There are a number of derelict inner city buildings where landlords have abandoned their caretaker responsibilities and where the homeless, informal traders and entrepreneurs have taken refuge. These brown field buildings continue to be a safety hazard for the people living in them and local authorities continue to harass and threaten people with eviction orders. More could be done by cities to upgrade these brown field[10] buildings and offer safe and affordable housing for people. Homelessness is measurable and finite and could be eliminated over time. More can be done in terms of management of public rental housing. Management and maintenance by national government as well as local authorities are lacking (SIM, 2019).

Townships are higher in residential use than commercial and other zoning. The restrictive and prescriptive land use zoning prohibits the growth of trading and job creation within townships (SIM, 2019). Cumbersome zoning regulations in this case impacts diverse and mixed use of land sites, limits job prospects for those who can work locally. Policies tailored for townships would assist in addressing township specific land-use, land value, growth as well as employment.

Informal settlements in Johannesburg, like in the rest of South Africa mostly occur on peripheral and disused land, often in low-lying areas near water sources. The quality of self-build housing here is further compromised by adverse ground conditions, flooding and fires. These mostly dense and compact settlements require state intervention through upgrading of structures thereby unlocking potential land value.

Suburbs are mostly established and new developments tend to be walled estates sprawled further away from the city. Old white suburbs are located in good proximity to the inner cities. Land values are very high, for example, Parktown, just north of the centre of Johannesburg. Infill and subdivision of large plots of land could help densify and compact the city. The state has a role to play in densification strategies here. New policies like the Nodal Review have a role to play, particularly in established suburbs around transportation and development nodes. However, there are limitations of the Nodal Review in that the policy addresses density ratios and not the mix and diversity required in increasing the densities. The potential result is that land values will remain high, and income groups in these areas will remain homogenous.

Gauteng's spatial structure differs from most other major metropolises (Bertaud, 2009). Gauteng's spatial footprint to population density ratio is vast. It covers a very large land area for 9 million people (Fig. 3). There is a disconnection between high-density residential areas and distant places of employment. Employment areas are clustered through the region.

The Edged Out report conducted by SERI (Socio-Economic Rights Institute of South Africa), confirms the relationship between extreme distances from jobs with the unemployment rates in those residential areas. Living far

[10] UN-Habitat's planning of sustainable human settlements called for development on brown field rather than green field sites.

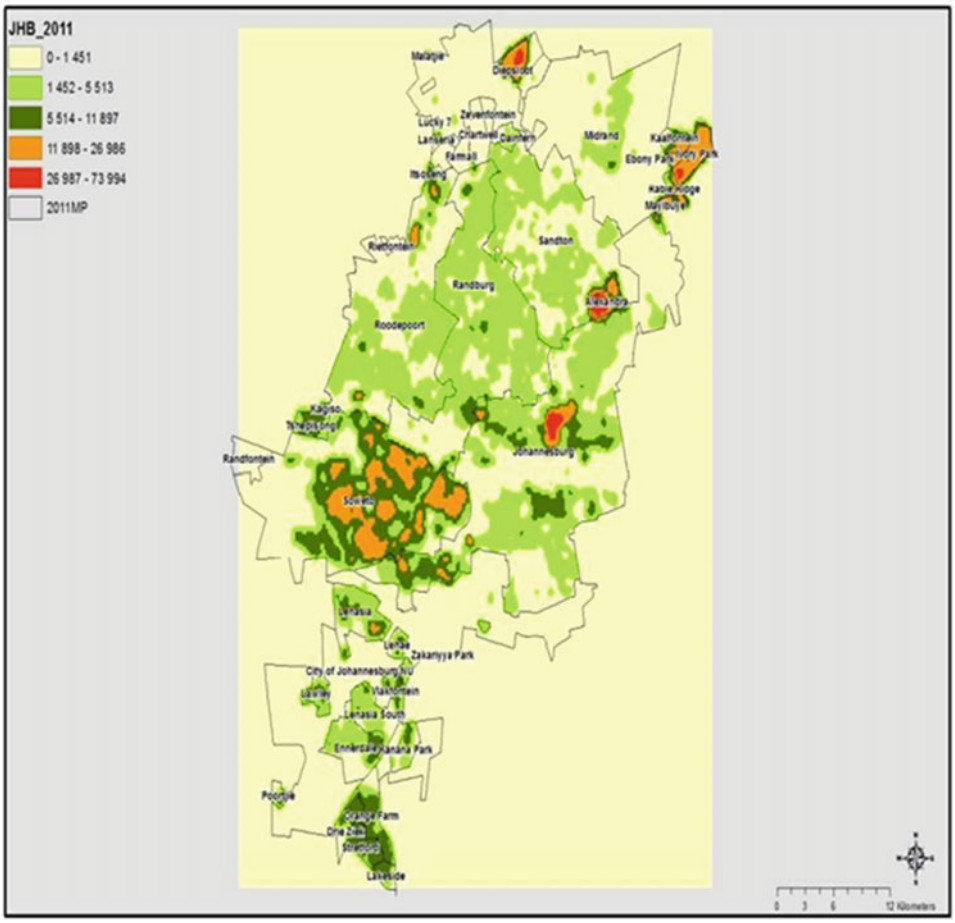

Fig. 3 Urban population density in Johannesburg from Census 2011 http://www.statssa.gov.za/publications/Report-03-18-06/Report-03-18-062014.pdf

away from work reduces people's employment prospects (SIM, 2019). (Fig. 4) illustrates Gauteng in relation to movement patterns from places of residence to work by race indicates that there is a lot of travelling between home and work and that black people have to travel longer and further. A good example is Soshanguve north of Pretoria. The result is unemployment, not due only to national economic difficulties, but due simply to prohibitive transportation time and cost to find and work jobs.

4.2 Durban

The Durban harbour and the inner city of Durban is a major employment magnet. However, due to the topography of Durban, with many hills and valleys, fragmented settlements occur which exacerbates apartheid spatial planning. Durban's jobs corridors are focused mainly around the harbour and centre as well as along the coastline. Old townships as well as informal settlements are peripheral. Housing in the inner city is comparative to the conditions of parts of Johannesburg's inner city. Due to the beachfront being in close proximity to the city centre, parts of the beachfront attracts higher relative land values than the inner city of Johannesburg. For this reason, more people working in the inner city live outside the city when compared to Johannesburg.

Townships like Umlazi and KwaMashu exist on the periphery of the jobs corridor. These townships are high in density compared to most suburbs, yet lack economic vibrancy. Unemployment rates are high, land values low, they have good densities but little growth prospects (Fig. 5).

Informal settlements tend to be on the outskirts of opportunity. Tongaat and Mpumalanga are high in density but have little to no spatial relationship with the major activity nodes.

Old suburbs such as Berea, Morningside and Greyville and others to the north of the city inhibit the growth and compaction of the city. Old heritage buildings could be conserved simultaneously with subdivision, new developments and more dense affordable housing.

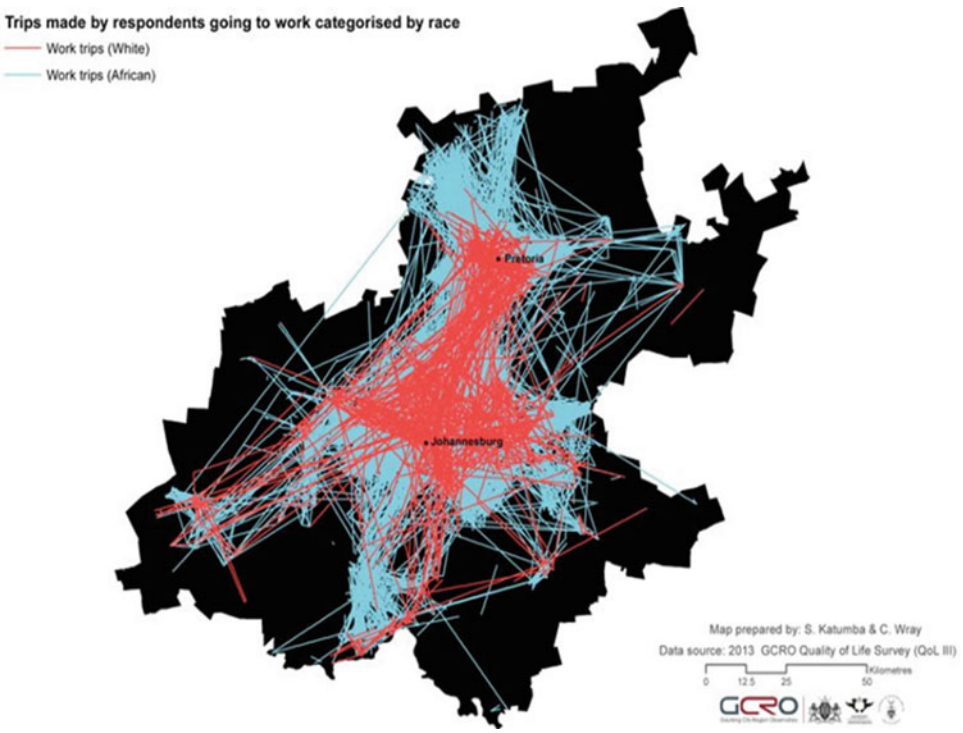

Fig. 4 Travel between home and work by race in Gauteng https://www.gcro.ac.za/outputs/map-of-the-month/detail/getting-to-work-in-the-gcr-trips-to-work-by-race/

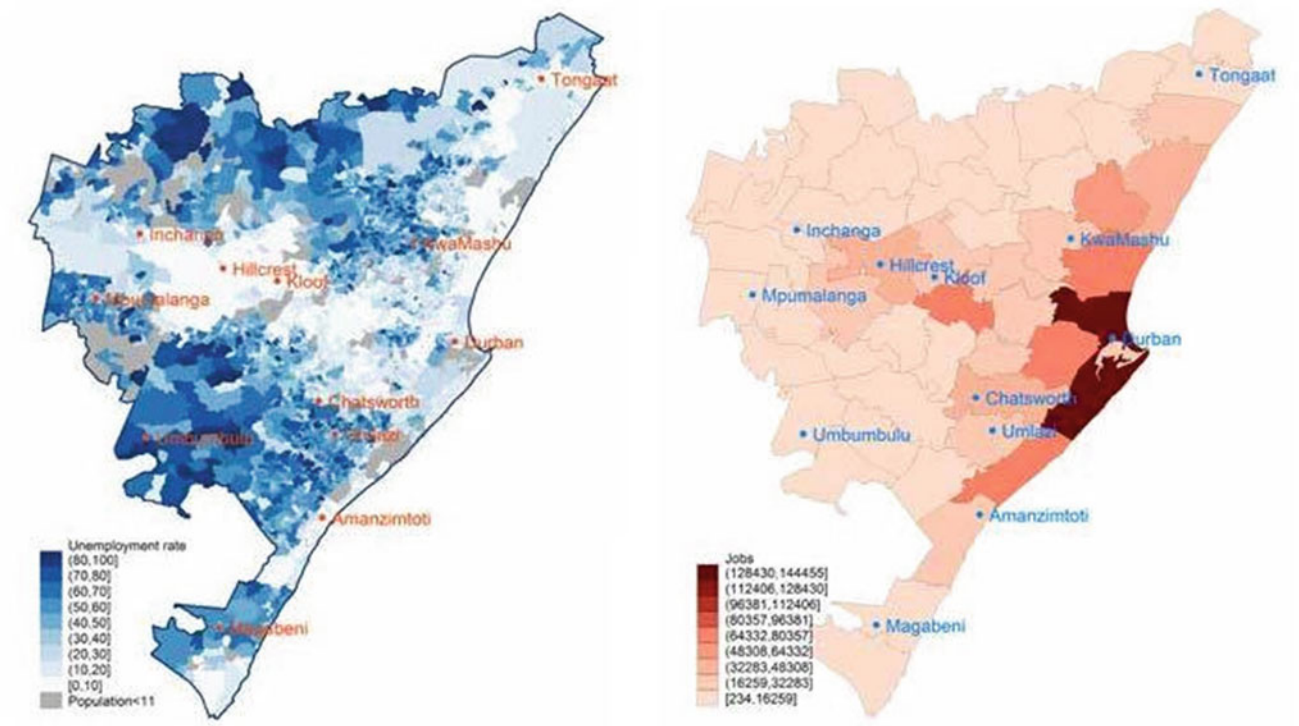

Fig. 5 Unemployment rate (left) and jobs (right) in Durban mapped by SERI in Edged Out, pg 34–35 http://www.seri-sa.org/images/images/SERI_Edged_out_report_Final_high_res.pdf

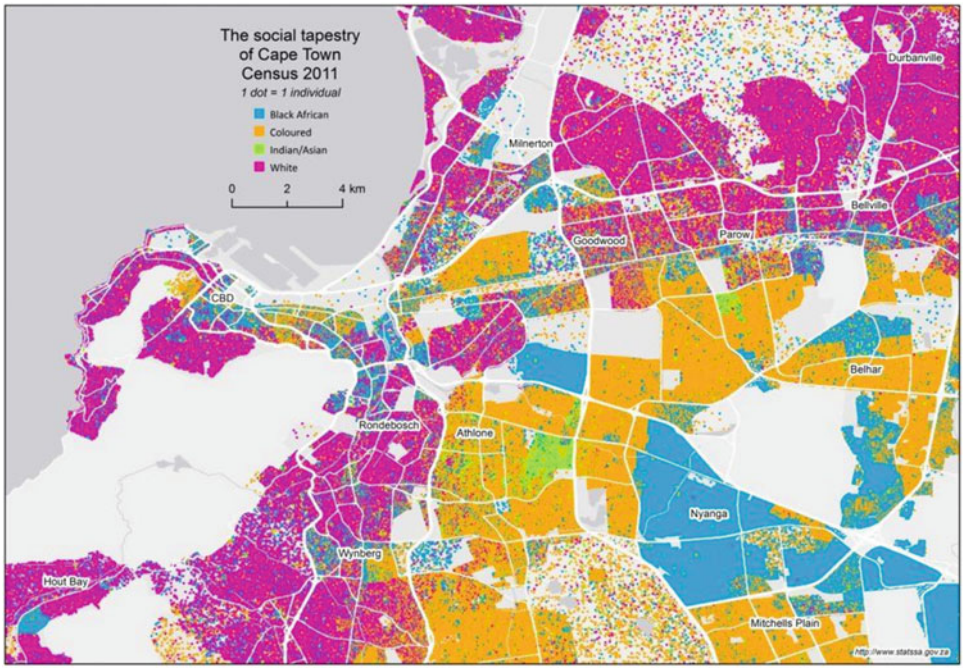

Fig. 6 Racial density mapping of Cape Town from Census 2011 http://www.statssa.gov.za/?p=7678

4.3 Cape Town

Cape Town remains an anomaly to other South African cities. The civic and activist group *Reclaim the City* focuses on well-located land and buildings for affordable housing in and around the city. Other organisations like the Community Organisation Resource Centre (CORC), Development Action Group (DAG) Lawyers for Human Rights (LHR), Legal Resources Centre (LRC), Ndifuna Ukwazi are also active in the call for well-located land affordable housing. Cape Town's inner city, unlike Johannesburg and Durban, has remained wealthy and white (Fig. 6). Almost all inner city housing is unaffordable to most city dwellers. Few people of colour who remain in the inner city, in the Bo-Kaap and in neighbourhoods like Woodstock do so in fear of losing their generational homes to gentrification. The geography of the city with mountains and sea defining much of its layout, isolates some parts and makes commuting particularly difficult in and out of the city. The centre is a major economic hub, drawing people to the centre for employment. The population density of the city centre is relatively low when compared to Johannesburg and Durban. At face value, the city is compact, but living quarters in the inner city is largely low density.

High unemployment exists mainly in the Cape Flats. There are limited employment opportunities within the Cape Flats. The densities are higher and the land values are significantly lower than inner city and coastal developments.

Old Southern Suburbs land parcels are smaller in plot size when compared to Johannesburg and Pretoria suburbs. Some inner city suburbs like Oranjezicht could increase in diversity.

The city council has attempted to increase densities in Cape Town; in 2009 wanting to densify the inner city from 55,000 to an additional 100,000 people within a 10-year period (Turok, 2013). There is no clear understanding by the city as to what the demographic and income group will be and 'who' will live in the inner city to help densify the city. The city has still not been able to densify and diversify the inner city in any significant way.

5 Discussion

5.1 Compact Cities and Land Reform

Historically the inner cities were reserved for the preserve of white workers and residents. Today, the inner cities are dense yet not diverse. Johannesburg and Durban have become dense and black; and Cape Town has remained largely white. Diversity in unequal cities will remain elusive unless inclusivity is measured and transformed. South African cities may achieve the required densities, however, if not diverse in its makeup will play a little part in making cities socially, economically and environmentally sustainable. Simultaneous density and diversity in the South African context continues to evade planning and development. In addition to more social and financial opportunities, major land reform is required to break the impasse of spatial inequality. And the corollary, spatial apartheid contributes

directly to Johannesburg's chronic unemployment, is true too. Those who have had access to land for centuries and generations are complicit in driving spatial polarisation. The vitality of good quality living environments is equality. Equitable cities are often messy, inclusive, progressive and accommodating to change and not sanitised of informality and the poor.

With weaponised forms of architecture and the dominating forms of politics, there is a need to consider land as an instrument for change. Three key political peripheralisation techniques were adopted by the Apartheid government: pass laws, black townships on outskirts and black homelands. History is being repeated.

All of the three cities above indicate the potential for densification of old white suburbs close to the inner cities. This will require more than policies like the Nodal Review, where densities will be increased at developments nodes. The old white suburbs in themselves are not current development nodes as such, but rather suburbs where the wealthy have been living for generations. To increase density and diversity in the suburbs close to the inner cities will require strategic intervention, particularly around issues of land value. Incentives for the disaggregating of these large freeholds would have to be developed. In some instances, land expropriation could be considered in order to unlock the potential for affordable and mixed income urban rather than suburban housing. The problem is not so much that wealthy people occupy homes here, it is that the settlements inhibit density and city growth and disallow for closer home–work commutes. The wealthy could be rehoused within the actual developments but in a much more urban situation. Alternatively the mansions could remain and infill and sub-division of land could increase density. Diversity of people as well as income groups could be catered for in new developments. Inclusive and affordable housing needs specific direction within these contexts. The incision of diversity will be vital to the vitality also through a legislated multigenerational living, family units, single units, short-term accommodation, etc.

The scales of density could vary within these suburbs. There could be high streets with higher densities, lower scale densities within the general areas where heritage buildings will restrict development. Urban typologies of compact living such as apartments, semi-detached housing, courtyard housing, row housing, tenement housing, 2–3-storey walk ups and mixed development buildings could be developed. Diversity of living spaces and forms is equally important to diversity of people.

To merely increase density is not good enough, targeting income groups and diversity simultaneously is important. The Nodal Review however, does not specify income groups for inclusionary housing. The densification strategy adopted may well lack the desired diversity of cultural, racial and income groups potentially leading to a homogenous neighbourhood, literally more of the same.

Housing models and land reform for the poor require multiple, complex and diverse formal and informal solutions.[11] These should ideally be incrementally integrated within the existing developed suburbs in a meaningful way.

5.2 Contextual Issues

With rapid urbanisation likely to increase intensively in the next few years in sub-Saharan Africa, densities of the major cities will grow. Harnessing these new densities in a sustainable manner will be key. Drawing a limit to the city development zone to avoid sprawl as well as allowing for infill within existing built up areas will in turn promote vertical development.

The racially segregated areas and exclusionist practices reinforcing inequality and entrenching spatial fragmentation, and a lack of integration will need to be addressed as an ideological as well as a national and regional priority.

Retrofitting old buildings, building upward instead of sideward, infilling between existing structures and building on brownfield sites will need to be prioritised. Vacant land and empty buildings could be put to good use. So too can golf courses and racecourses that are well located in proximity to city centres. These can be converted to affordable and diverse housing.

Transportation costs and commuting time to work opportunities remains a key prohibitive factor in increasing employment. Well-located housing close to work opportunities will be essential for economic growth.

Reducing the need for transportation and living close to work will considerably decrease air pollution, the need for fast food and overconsumption of convenience living. Locating housing well will lead to a better and conscious use of natural resources.

Old suburbs and sprawled developments could benefit from densification. A disaggregation[12] of city space would mean the repackaging of smaller parcels of land and property through various densification strategies for the benefit of more people, unlocking the potential for economic vibrancy and access to better social amenities.

A sustained long period of incremental disaggregation of city space will over time foster cohesion between different cultural, race and income groups. Old buildings and buildings with heritage status could exist side by side with new

[11] Ben Cousins implores us to seek non-simplistic solutions for housing the poor.

[12] Charles Correa's disaggregation principle, one of the seven key principles for developing cities.

developments. Infilling and the sub-division of land in the old suburbs is necessary.

With the onset of late capitalism, the polycentric city is not sustainable. Unless the South African city grows rapidly in population and growth and development keep pace with rapid urbanisation, the polycentric city will not be feasible. Choosing to allow cities to grow in multi-central ways, means that cities choose to continue being exclusionist, segregated and inequitable. This choice ultimately leads to social unsustainability, social unrest and will destroy our cities and communities.

Townships and informal settlements as well as new RDP housing in new areas do need to be supported in the short and medium terms. Upgrading and relaxing of land-use will assist areas to uplift themselves. However, not simultaneously creating attractions and incentives of affordable housing for working-class people near work opportunities will continue on the trend of inequality and social unsustainability. Upgrading of marginal spaces alone, without disaggregating suburbia reinforces the polarisation and inequality of space. A voluntary move to the suburbs by marginalised people through a conscious relocation is not the same as displacement of communities.

Displacement, forced removals, eviction and gentrification has been part of our history for generations. The weaponised ways in which development has historically disadvantaged the marginalised, cannot continue. New ways of integration must be sought. It is our constitutional obligation as city makers to place the subaltern at the centre of our urban decisions.

The old suburbs were planned in some of most beautiful natural settings. Johannesburg's Park suburbs, as the name suggests, has several green parks, the Johannesburg Zoo as well as one of the world's largest urban forests. Cape Town's old suburbs are located on the slopes of Table Mountain overlooking the city and the waterfront. Durban's Berea too is lush and green overlooking the city and harbour. The environmental and ecological contexts are also part of the heritage of the place. Careful consideration will have to be given to biodiversity while simultaneously increasing human habitation. The Scottish town planner Patrick Geddes central themes in his town plans in India in the 1800s were respect for nature; respect for democracy; and respect for tradition (Guha, 2020). Introducing density and diversity within the settings of the old suburbs calls for this Geddes's spirit of harmony.

5.3 Disaggregation and a Variety of Housing Typologies

Disaggregation of space is the breakdown of monolithic tracts of land and built forms. It is a counter strategy to space overconsumption and capitalist extra-largeness. It is the practice of space economy in order to provide a foot in the front door and a foothold in the city. Shopping centres, business parks, gated communities can be disaggregated and complemented by small shops and traders, small businesses and informal housing. Subdivision offers a spatial compromise where no homeowner need vacate their home; only a partial offering of space is required. Erven could be subdivided to accommodate more units. Houses could be co-owned. Upper floors could be sectional-titled. Large flats could be split in two. Water sucking elitist spaces like golf courses, racecourses and white elephant stadia could be expropriated for development of diverse and dense neighbourhoods, especially those located close to city centres. Well-located government owned land could be developed for social housing and social amenities.

By introducing a variety of housing models and mixed-use developments, a process of disaggregation of our cities will begin. Infill between structures and adjusting property lines to suit the aim of density and diversity will need to be negotiated between landowners and landowners and the City. Landowners will need to be incentivised to sell or share parts of their unused spaces. The subdivision of properties in old suburbs where stands are large should be legislated to be a maximum in area, beyond the density calculations of some of the Cities. Neighbourhoods in consultation with local authorities will need to come up with original models of disaggregation. The altering of offices into residential zones and the retrofitting of these should be encouraged.

There should be a de-emphasis on new build. New buildings are the most expensive form of development, it incurs land production costs, i.e., land acquisition and infrastructure, requires regulatory approval and carries finance costs. Building smaller units and redeveloping existing lower density stock by adding to vertical floors, stimulates the economy and is viable. The old suburbs have development rights usually in place and increases the value per square metre of smaller units.

6 Conclusion

Developing smaller units in the old suburbs close to the inner cities of South African cities will foster better racial integration and diversity, increase density and with inclusionary housing, provide city dwellers with more work opportunities as well as a better quality of life. For the city, this will mean less infrastructural and maintenance costs and a more viable management of the city.

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Civic Design to Make Cities More Sustainable and Resilient

Francesco Alberti

Abstract

In scientific literature, as well as technical reports by national and international organizations on urban sustainability and resilience, there is broad agreement on the need for a paradigm shift in spatial planning and design based on cross-disciplinary knowledge, an inter-scalar approach, and integrated planning tools. In this vein, the contribution takes up the concepts found in literature of capital web (Crane, J Am Inst Plan 4:280–292, 1960) and civic design (Scott Brown, Arch Des 60:21–30, 1990), which identify two different levels of "direction" in the field of urban transformations, both the preserve of public administrations, revisiting them in light of present-day challenges and emergencies concerning urban sustainability and climate adaptation. Some good practices of integrated urban planning and design refer to this interpretation, which is emblematic of how a positive approach to the issues raised by sustainability and environmental and risk protection can lead to the creation of new types of public space and multifunctional infrastructure, with strong social and symbolic significance.

Keywords

Urban planning • Urban design • Sustainable city • Urban resilience • Large-scale plans and projects • Open spaces

1 Holistic Land Management: Challenge or Chimera?

Efforts to fight or adapt to global warming, as well as problems relating to the hydrogeological instability of territories and all other sustainability issues, focus attention on the importance of public policies and actions aimed at preventing, mitigating and neutralizing the impact of human activities on ecosystems, which can still be reversed, as well as metabolizing ones that are now irreversible. On the other hand, they require a profound rethinking of spatial planning and design methods and tools, with special regard for urban contexts where the main causes and effects of the disasters that threaten the planet are concentrated, along with the highest rate of exposed population.

A large number of international studies have addressed this issue, starting with a list of requirements that characterize a human settlement as "sustainable", "green", "ecological" (Gaffron et al., 2005; Lehmann, 2010) (Fig. 1), and "resilient", the latter becoming more and more important over time. The term "resilience" usually refers to adaptive capacity to climate change, but it can also be extended to include the transformations required to break the dependence of cities on fossil-based energy sources, which are responsible for the emissions that lead to climate change: a transition made otherwise inevitable by the depletion of fossil resources in the face of the increasing global demand for energy (Newman et al., 2009).

The performances and requirements identified by such research, largely overlapping although aggregated differently depending on the assumed perspective and particular objectives of each of them, show how land use choices, traditionally regulated by urban planning, must now be derived from an overall land protection strategy. This applies both quantitatively (which means promoting the reuse of abandoned or underused lots for redevelopment as an alternative to new land consumption) and qualitatively (that is preserving or restoring the ecological and hydrological

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Fig. 1 The features of an ecological city, according to the EU-funded project "Ecocity—Urban development towards appropriate structures for sustainable transport" (Gaffron et al., 2005)

functions of soil), by making efficient use of all resources—which calls into question the relationship of all urban functions with the surrounding physical environment.

The keyword—a true leitmotiv in scientific literature, often echoed in recommendations issued by national and international institutions on urban sustainability, global warming, and risk prevention (Bizikova et al., 2008; European Environment Agency, 2012, 2016; United Nations Human Settlements Programme, 2009; United Nations Office for Disaster Risk Reduction, 2017; Intergovernmental Panel on Climate Change, 2014), is "integration". In the culture of architecture and the city, this concept has always interpreted the need to rediscover interactions between the parts and the whole. Examples of this can be found in Lynch's (1960) and Cullen's (1961) studies on the construction and perception of the urban landscape, or in Alexander's attempt to define syntactic rules for harmonizing architectural projects to the genius loci (Alexander et al., 1977); or in McHarg's call (1969) for the need to reconcile anthropic intervention and natural laws: different perspectives, which all converge in opposition to the mainstream model based on the clear separation between urban functions, assembled by type in zoning plans regardless of actual differences in the urban morphology, environment, and landscape, and on the specialization of public policies, works, and spending.

The insistence with which international reports call for a paradigm shift in territory management according to a holistic vision of problems—which implies overcoming disciplinary barriers as a prerequisite for the exploration of integrated place-based solutions—accounts for the persistence of the functionalist matrix of urban planning, despite its clear inadequacy when faced with the current challenges. Moreover, it accounts for the risk of responding to the inefficiency of traditional planning methods with the proliferation of sectoral approaches and plans, in addition to or even in conflict with them, but paradoxically informed by a similar reductionist view: that is the attempt to provide standard solutions to any type of problem—in the form of constraints or monofunctional interventions—by applying technical rationalities that are, once again, extraneous to the peculiarity of places.[1]

Instead, sectoral approaches, which are essential for understanding the different aspects and evolutionary

[1] Some recurring examples: retention basins, canals, and embankments conceived solely as hydraulic devices; impact mitigation works provided as mere shields to standard infrastructures, without any attempt to integrate them into the surrounding landscape according to different project parameters; impact compensation measures, defined exclusively on a quantitative basis, etc.

dynamics of territories, should help to form the knowledge base on which to establish a new project culture, accompanied by necessary adjustments to the regulations, technical apparatus, and financing mechanisms, applicable with appropriate instruments at the various scales. First and foremost, this means acknowledging the prominent role of large environmental systems in guiding regional planning towards forms of territorial organization, which are at the same time efficient, adaptive, and safe for the population. Consequently, it also means recognizing any spatial transformation consistent with such objectives as an opportunity to affirm, through the project, its civil significance beyond utility: its being an expression, always and in any case, of a general attitude to the improvement of the human habitat, whose main lever is the improvement of open space, in any of its forms.

The need to make the territory more resilient and safer can thus become, with the strength and legitimacy resulting from its recognized urgency, an opportunity for the systematic intervention of urban and environmental regeneration, fruitfully combining the protection of territorial resources and adaptation measures with the creation of socially and culturally significant places, landscapes, and architecture.

This approach to the project is diametrically opposed to the instrumental use of greenwashing gimmicks in market-driven operations for self-promotional purposes or mitigating new environmental impacts produced by the same.

Taking into account the different "contexts" (Carmona et al., 2010), against which spatial plans and projects have to measure themselves, it seems appropriate–and this is the aim of this contribution—to define unambiguously in disciplinary terms a field of project research focused on sustainability—that is the "global context", according to Carmona's definition (p. 51)—different from the most widespread practices of urban design.

To do this, the discussion will develop in the next two paragraphs using a twofold method:

- deductively, by referring to two of the main authors who in the past dealt specifically with the topic of public interest in large-scale physical planning and urban design, highlighting how the very notion of public interest carries an intrinsic symbolic value that projects should be able to make explicit; the validity of this theoretical approach is put to the test by the assumption, developed more recently through the studies mentioned above, that public interest in the management and transformation of physical space is to be sought primarily in the (re)constitution of a healthy and safe urban habitat, in harmony with natural processes;
- inductively, by referring to some international best practices of integrated urban planning and design, which are particularly significant for the role played by public actors and the ability to turn environmental and climate challenges into opportunities for territorial and urban regeneration.

2 Physical Planning and Urban Design as Tools for Sustainable Adaptation and Mitigation

Two concepts from literature seem particularly suitable to be taken up, updated and integrated in order to redefine the domain of public city designing, aimed at providing blended spatial responses to instances of sustainability and urban resilience:

- "Capital designing"—an approach to metropolitan or regional planning proposed in 1960 by David Crane, at that time Assistant Professor at the University of Pennsylvania. The term "capital" refers to the main pattern of the spatial organization of the territory—the capital web—which is for the most part under the jurisdiction of public administration. "[…] Capital designing is a process for making more creative use […] of urban structure which the public sooner or later pays for but does not design. Capital designing should become the primary tool of local physical planning, backed up by time-zoning and other methods of rationing new development and urban renewal" (Crane, 1960, p. 285).
- "Civic design"—that is the application of urban design to the components of the public city, according to the definition proposed in a famous essay by Denise Scott Brown, published in 1990 in the *Architectural Design* magazine. Unlike urban design, which potentially concerns the city as a whole as well as different actors and interests, civic design is what shapes the *public realm*, that is "the public sector seen in physical terms." "Civic design projects are typically designed for, built by, and maintained by the public sector, civic groups or a combination of both." Their domain is made up of the same components as the capital web—a notion that Scott Brown takes from Crane: "simple-mindedly […] everything on the city transportation plan and everything that is blue or green on the city land use plan" (i.e., urban facilities and public space) (Scott Brown, 1990, pp. 21–22).

Capital design, in particular, shifts the emphasis from the quantitative regulation of private intervention, which is the pivot of functional planning, to the qualitative definition of

the capital web, the territorial structure formed by the essential elements of the environmental system, and public infrastructure and equipment, from which it deduces the rules of compatibility for private transformation. This approach implies that the project is informed by a vision of the future—"A large-scale design philosophy must begin with objectives, not with techniques or shapes" (Crane, 1960, pp. 284–285)—to be made explicit and shared through public debate. It was Crane himself, 60 years ago, who recognized objectives that reflect "environmental morality and man's long-run interdependence with nature; organized change capacity and permanence of structure" (p. 284) as priorities. That is, in other words, what we now mean by sustainable development and resilience, whose implications on the built environment are topical in the above-mentioned international studies and reports. Sustainability can no doubt be assumed as a large-scale design philosophy which now informs, by means of adequate techniques and shapes, regional, and urban planning in terms of capital designing.

Susceptible to incremental development over time, "The capital web must become to individual city builders or dwellers what a river or canal is to desert farmer" (p. 285).

In an ideal path that, starting with the concept of capital design, continues along the lines of *Design with nature*, the seminal book published 9 years later by Crane's most famous colleague at the University of Pennsylvania Ian McHarg (1969), and arrives at current studies on sustainable adaptation and mitigation (Cohen & Waddel, 2009; Brown & Eriksen, 2011). The evocative image of the river is even more significant outside of the metaphor, if we consider what a prominent role river basins and coastal systems, as well as all other features affecting the geomorphological balance of territories, can play in large-scale landscape and urban projects.

In this framework, new symbolic places acquire relevance by greatly expanding the operational field and semantic range of civic design, which affirms itself as an indispensable driver of the change towards a different urban model and landscape, including among other things new infrastructure developed (or redeveloped) for sustainable mobility, "hybrid" parks and public spaces, where collective use is combined with ecosystem services, such as flood protection, prevention of the heat island effect, production of clean energy (Fig. 2), etc.; brownfields and abandoned buildings turned into community places and facilities, innovative technological plants conceived as "monuments" of the sustainable city, etc.

As a whole, the project activities referred to in the two concepts cover all scales of urban planning and design (from the region to the site), from which they distinguish themselves due to the greater centrality that themes concerning the public city and interest are acknowledged to have compared with the objectives of optimal organization of urban functions based on socio-economic criteria and the interests of real estate.

3 Resilience as an Opportunity for Integrated Urban Planning and Design

3.1 The Interpretation of the Emscher Park Regeneration Project as Capital Design

A well-known example of physical planning at regional scale where this type of approach can be seen is the regeneration program of the Emscher River valley, which over the last 30 years has transformed the heart of the ancient mining district of the Ruhr, in Germany, into a landscape park system (Fig. 3), starting with the reclamation and naturalization of the hydrographic network from a former condition of extreme degradation.

In this program, we can find all the salient features of capital design, that is:

- the preliminary construction of a well-defined vision, resulting from broad consultation with local stakeholders;
- implementation in stages, in all of which the public sector acted as the leader and driver of the change;
- the assumption of a territorial framework, consisting of three main layers. The first one is the environmental system, a green continuum comprising the Emscher River valley and seven transversal green corridors, wedged between the urban areas along its 75 km length; the second one is the transport infrastructure network, including not only the canals, railways, and road network inherited from the region's industrial past but also, and no less important, the new walking and cycling routes that link and cross in and around the parks; and finally, the major urban facilities and landmarks, most of which are industrial heritage sites turned into educational and sociocultural facilities, which together form the third layer.

The process, sponsored by the Land Nordrhein-Westfalen, was initiated with the IBA-Emscher Park initiative, thanks to which the consortium of the 17 municipalities of the region—responsible for the ecological regeneration plan of the main valley and the framework plans for the green corridors—was supported over 10 years (1989–1999) by an ad hoc agency with a consulting and coordination role, tasked with soliciting, evaluating, and selecting projects, consistent with the goals of the rehabilitation and de-construction (*Rückbau*) of the industrial landscape, as a premise for the socio-economic revitalization of the area (Marchigiani, 2005).

In the next decade, the design of the capital web, expanded by an increasingly dense and branched network of ecological connections between the seven main green corridors, was finally institutionalized as a tool of integrated management of the territory through the adoption of two master plans, respectively, referring to the whole region

Fig. 2 The Energy Hill in Hamburg (Germany). Within the framework of the IBA Hamburg initiative (International Building Exposition), in 2009–2013 a former toxic waste dump was turned into a park with a belvedere on the city harbor, which supplies electricity and heat to the surrounding neighborhood of Georgswerder using wind power, solar energy and landfill gas (IBA Hamburg GmbH/www.luftbilder.de)

Fig. 3 Aerial view of the Emscher Valley at Oberhausen (Photo by Raimond Spekking/CC BY-SA 4.0 via Wikimedia Commons)

(Projekt Ruhr GmbH, 2005) (Fig. 4) and the Emscher River corridor (Emscher Genossenshaft, 2006). Notably, in the latter one, design guidelines for flooding and water-retention areas are provided, in which the issue of hydraulic safety is assumed as a part of the multifunctional "hybrid park" character of riverbanks, reconciling the risk protection objective with those of environmental regeneration and the creation of freely enjoyable public space.

More recently (2013), the design of hybrid parks has once again become the focus of the Emscher Landshaftspark 2020 + action plan, promoted by the Land Nordrhein-Westfalen within the framework of the EU programme

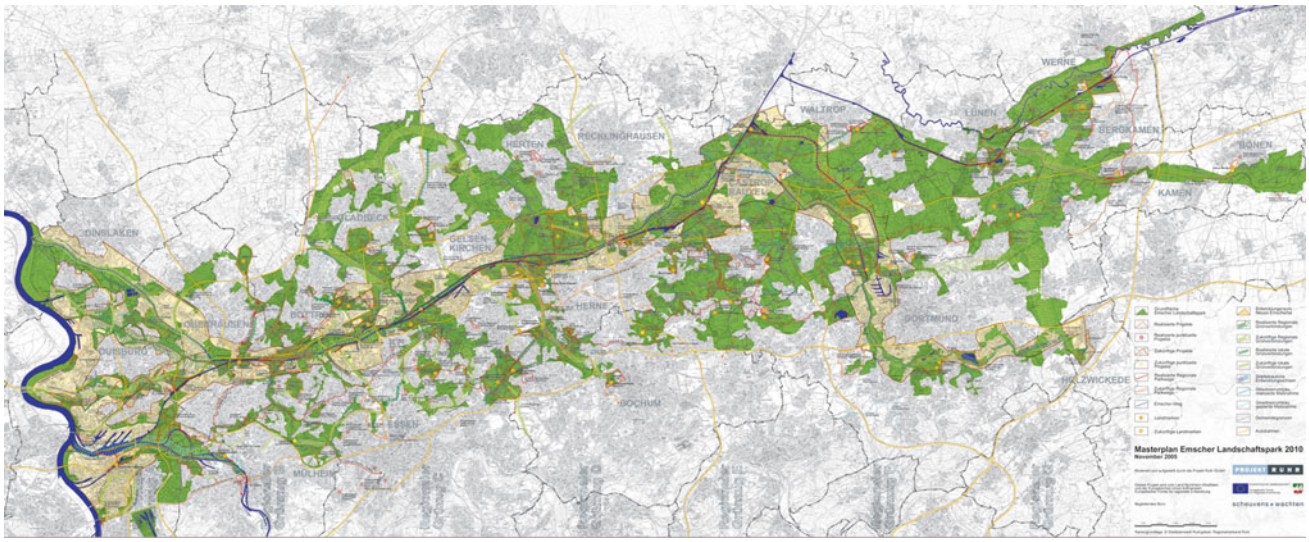

Fig. 4 Masterplan Emscher Landshaftspark 2010, elaborated by Land Nordrhein-Westfalen in 2005 (Projekt Ruhr GmbH, 2005)

INTERREG IVC, specifically dedicated to them, as a tool for responding to climate change: this challenge has provided a new input to the regreening projects in the Emscher Valley, now underway (Meltzer, 2014).[2]

3.2 Rethinking Urban Space for Climate Resilience: The New Frontier of Civic Design

It is therefore through civic design interventions at intermediate or local scale that so many different needs can find a common answer in spatial terms, producing representative places of what we can define as a new "responsible urbanity": a perspective that paves the way for unprecedented experimentations, which can completely renew the forms, uses, meanings and design techniques of public space.

Rethinking traditional urban spaces like public parks and squares as blue-green infrastructures fits with this perspective. This is the case of water-squares and water-gardens, obtained by integrating specific nature-based solutions, gravitational drainage systems or a combination of both in the design of urban ground surfaces—what Italian spatial planner and academic Bernardo Secchi (1989) used to define as the "project of soil" ("progetto di suolo"), understood as the quintessence of urban design.[3]

Two early applications of this multi-sectoral approach to urban infrastructure are the celebrated Water Square Benthemplein in Rotterdam (Fig. 5), and the Vuores Central Park in Tampere (Finland), respectively, designed by the firms De Urbanisten (2011–2013) and Atelier Dreiseitl (2012–2014), where the shaping of the ground surface—completely paved in the former, mainly green in the latter—in the event of extreme rainfall, allows the ground to retain a large amount of water which is channeled by pipes from the surrounding roofs and streets.

In recent years, the idea to use capital and civic design, in terms of large-scale landscape planning and water-sensitive urban design, as a tool to adapt the urban environment to climate emergencies has informed many important renovation programs, such as the plans to redevelop the New York City waterfront as a sequence of parks, resilient to sea level rise, coastal storms, and catastrophic flooding (McPhearson

[2] The Emscher model was later extended to the whole region thanks to the establishment of programmes ("Regionalen"), with which, since 2000, the Land Nordrhein-Westfalen has assigned with priority, through competitive selections initially called every 2 years, and more recently, every 3, the available resources to strategic projects proposed by associate municipalities for large territories (Ministerium für Heimat, Kommunales, Bau und Gleichstellung des Landes Nordrhein-Westfalen, n.d.). In many of these programs—including the latest, the Regionale 2025, referred to the territory of the Bergische RheinLand—the dominant theme, which links the various projects, is the environmental regeneration of a river corridor following the logic of capital design.

[3] "A 'project of soil' must be placed at the center of every urban plan and project, at any scale; this is what the urban plan first draws […]. A 'project of soil' concretely and precisely defines the technical, functional and formal features of the open space, possibly classifying them by type; it defines the variability of the open space, interprets its relationships with the activities and functions that take place or can take place within the surrounding built space, integrates the different open spaces, mutually and with covered areas: streets, avenues, squares, gardens, orchards, parks, churchyards, street enlargments, parking lots, but also courtyards, hallways, loggias, etc.; it assembles them in sequences and paths, according to systems of significant associations and oppositions; it defines the elements that rule their articulation, organizes the mediation between one and the other" (Secchi, 1986, pp. 272–274). Translation from Italian by the author.

Fig. 5 The Water Square Benthemplein in Rotterdam (2011–2013). Project by De Urbanisten, (Roel Dijkstra Fotografie-Vlaardingen/Photo by Joep van der Pal)

et al., 2014; New York State Department of State, 2016) (Fig. 6) or, at national level, China's "Sponge City Initiative", which since its launch in December 2014 has involved 30 pilot cities, with the goal of retaining, absorbing or reusing onsite 70–90% of average annual rainwater by means of blue-green infrastructures (Li et al., 2017; Zevenbergen et al., 2018).

The most innovative plans focused on climate adaptation recently carried out in Europe include the Cloudburst Masterplan, developed by Rambøll Group on behalf of the City of Copenhagen, whose application is bringing about radical change in the design of the space "between buildings" (Gehl, 2011), conceived as the matrix of urban regeneration, aimed at making the city at the same time waterproof and more liveable (Fig. 7).

The plan is in continuity with the Climate Adaptation Plan (City of Copenhagen, 2011), and with the innovative Cloudburst Management Plan of the following year (City of Copenhagen, 2012), which decided to combine nature-based solutions for local rainfall storage, resulting in the redesign of parks, sports grounds, open spaces, and similar, with measures where the water is led out to sea via new flow routes, including canals, urban waterways, subterranean tunnels, and the city road system, after dividing the city into "catchment areas".

The solutions proposed in the masterplan, which are currently being tested in the Saint Klejd neighborhood (City of Copenhagen, 2016) (Fig. 8), are new types of roads and boulevards, which can work when necessary, without danger to people, as a drainage system that retains or conveys excess water to Copenhagen's harbor or, whenever possible, towards large basins with adequate capacity, built for this purpose in public green areas.

Hence, the protection of the city acquires the character of a large-scale renewal operation, intended to significantly modify the urban landscape in a dynamic way, making it sensitive to meteorological changes.

4 Conclusions

The few best practices mentioned seem to confirm the assumption stated by the Committee of Regions of the European Union (2014) that towns and cities are "bodies with great potential for environmental efficiency." Strong public leadership and a cross-disciplinary approach, able to strategically integrate the aim of environmental efficiency with the other social, cultural, and economic objectives inherent to the urban model, are the two essential conditions for these potentials to be fully expressed.

In this sense, the concepts of capital and civic design can be used both as a key to understanding successful plans and projects and as a design paradigm to make the human habitat more sustainable and resilient, based on the following principles:

- trans-scalar continuity between regional planning and urban design, reflected in the broad scalability of interventions;
- public control of transformations, focused on the redevelopment of the capital web, as a lever for ecological

Fig. 6 Hunter's Point South Waterfront Park in New York (2018). Project by SWA/Balsley + Weiss/Manfredi (www.weissmanfredi.com)

Fig. 7 City of Copenhagen, Cloudburst concretization masterplan (2013). Project views for a "green and retention road" and a central "retention space" (Rambøll Group n.d.)

transition and climate adaptation of settlements as well as increased urban liveability;
- the project as a tool to give shape, meaning and imageability (Lynch, 1960) to the urban environment, while meeting a wide range of various needs.

From a semantic point of view, the adjective *civic* refers simultaneously to the sense of collective responsibility that inspires sustainable spatial planning and design, social cohesion which is one of its pillars, and communities as the recipients and beneficiaries of environmental improvements and adaptation measures.

Looking for a single definition that encompasses all scales, we can then extend the notion of civic design to large area planning referred to by capital design (an expression which can be misunderstood), while maintaining the definition of capital web to mean the network effect of the actions on the public realm.

Despite the scientific and academic world and international institutions being aware of the need for such an integrated approach to spatial planning to face the challenges of sustainable development and catastrophic risk protection, an increasing number of good practices and experimentations around the world, which combine urban regeneration

Fig. 8 The new arrangement of Tåsinge Square in the neighborhood of Saint Klejd, Copenhagen (2013–2015). Project by Malmos, GHB Landskabsarkitekter, Orbicon, VIA Trafik, Feld Studio for Digital Crafts (GHB/Photo by Steven Achiam)

with environmental improvement, climate adaptation, and mitigation, and the ever greater mobilisation of civic organizations—witnessed by Greta Thunberg's "Friday for future"—calling for action against the threats of Anthropocene, which implies a radical change in terms of urban ecology and metabolism (Kennedy et al., 2010), there are still obstacles to the widespread diffusion of physical planning and urban design inspired by a holistic approach, the principle ones being:

- the structural weakness, in many countries—especially in the Global South—of public institutions, resulting in the absence or inadequacy of territory management and urban development strategies and policies; indeed, strong "accountable and inclusive institutions," as declared by Goal no. 16 of UN Agenda 2030 for Sustainable Development (United Nations [UN] n.d),[4] are a fundamental discriminant for the achievement of all other goals concerning the human habitat, starting with Goal no. 11—"Make cities and human settlements inclusive, safe, resilient and sustainable";
- the priority usually given at all levels by politics, beyond statements, to objectives linked to economic growth, which favors land uses and infrastructures according to a logic of mere mitigation of impacts. In times of crisis, such as that currently generated by the Coronavirus pandemic, this attitude easily relegates to the background the request for effective public control over land transformations, to the advantage of free enterprise.
- resistance to change in the systems of professions and bureaucratic apparatus, traditionally organized according to sectoral criteria which are reflected in technical regulations, administrative procedures, and financing mechanisms, which often need to be reformed just to make innovative interventions feasible—as indeed occurred in Denmark, where amendments to the national Planning and Water Sector Acts passed in 2012 made it possible for municipalities to include mandatory, locally specific regulations for climate adaptation in the local development plans, and for wastewater companies to co-fund municipal projects.

A form of rhetoric, intrinsic to spatial disciplines, which leads to a clear separation between means and ends (and finally confuses them) can be traced back to this closed-minded attitude. Way back in 1960, David Crane stigmatized it as "the City Procedural", "[…] the culmination of a growing preoccupation with the concept of 'planning' per se, an increasing interest in the means and the process rather than with the product being planned." This preoccupation, even when opposing old-fashioned functionalism in words, ends up, in turn, superimposing a virtual model on the real world, where "the chief goal […] is acceptance of planned decisions rather than the decisions themselves" (Crane, 1960, p. 283).

Unless they are used as meaningless labels, "sustainability", "resilience", and "territory safety" must be assumed as the keywords for a radically different approach.

[4] The full phrase describing Goal no. 16 is: "Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels" (UN, n.d.).

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