Social Balance and Economic Effectiveness in Historic Centers Rehabilitation

Carmelo Maria Torre[1,2] (✉), Pierluigi Morano[1,2], and Francesco Taiani[1,2]

[1] MITO Labs, DICAR, Polytechnic of Bari, Bari, Italy
carmelomaria.torre@poliba.it
[2] Dipartimento Di Architettura, University Federico II Naples, Naples, Italy

Abstract. The growing need to support financially the processes of urban regeneration of city centers clashes with the limited availability of public resources. Administrations are therefore forced to evaluate the priority areas of intervention, on the one hand trying to pursue goals of social equity, other actions to promote efficient financial plan. Consequently the reference institutional policy of intervention is based on regulatory frameworks that require a closer integration of programming needs of the allocation of resources, and social needs. The chapter shows an example of conciliation among the seek for efficiency and for social equality in choosing priority of intervention in the urban make up of historic centers.

Keywords: Multicriteria evaluation · Cost effectiveness · Equity · Gis

1 Accountability, Social Equity, Effectiveness in Rehabilitation plans

Development plans require a serious monitoring of policies through a consistent evaluations of results. Local governments, in order to increase governance, should set some decision points on the ability to preview the search for coherence by the new program tools. An useful example of preview method is the definition of appropriate indicators, describing the condition of social disease and environmental degradation, for a valuation method that support both land use or property plans and territorial programming, al a sort of "planology process" [1] [2], finding opportunity of land-use but looking at efficiency.

The evaluation of alternantives and choices should be made on a concept of accountability and transparency, based on principles of efficiency and equity, that can accompany not only the ex ante phases, but also the on-going and ex post evaluation of the implementation of policies [3]

In brief, we require tools to monitor and forecast results, in the light of the resources allocation; therefore, in order to check the consistency of the results a set objectives of transparency, fairness and economic sustainability should be set [4]

This search implies, in the case of the redevelopment of historic fabrics degraded, to look for methods based on cost-effectiveness, which makes visible spent efforts,

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achieved effects and measures in the light of the reduction of frequent imbalances in the nucleus of our ancient cities [5][6].

2 The Case of Study

The case study regards the assessment of intervention in the case of the urban renewal in a middle size historic center in Apulia.

The center of Monopoli is a medium-size city (about 45000 inhabitants), on the eastern coast of Bari, Apulia, and has an old town affected by various forms of degradation. Significant parts of the public and private architectural historic heritage need works, unbalanced with a significant scarcity of resources that the City Council may make available to any incentive.

If we look at the old town centre of Monopoli we can recognize the condition defined by the notation of the Italian Ministry of Public Works (dated 22/10/1997), that foster the concepts and establishes the issues of some development plans defined "Contracts for Neighbourhoods": " Neighbourhoods are often marked by widespread degradation of the built and the urban environment and by lack of services in a context of limited social cohesion and of clear criticality of housing ".

The evaluation of projects to submit for funding is based on criteria defined by several national calls, to which usually are integrated by criteria provided by Regions.

The comparison among cost and effectiveness supported the decision making and provided indications about which actions, in front of equal financial resources deployed, can pursue better targets for the reduction of the physical and social degradation in urban contexts. This information is useful not only when the public bodies have to operate with their own funds, but also when they have the need to motivate to higher-level institutions (and generally speaking all superior sources of funding) the effectiveness of the measures for which the financial support is requested.

An assessment of sustainability must somehow make consistent objectives of efficiency and social equity. In the case of the requalification on urban architectural heritage, you get trying to bring together the results in reducing the substantial deterioration in the physical environment and in the social context [7] [8].

A preliminary analysis becomes a crucial point, when it is aiming at identifying

- the dimension of the resources to be used,
- the conditions of the relevant social questions,
- the conditions of the relevant physical degradation,

The relevant aspects for the physical and social degradation generate a set of evaluation criteria for a multi-dimensional assessment giving as result an index of physical degradation and an index of social deprivation.

The priority is to act where the indexes assume their relevant values.

For the purposes of the construction of the evaluation framework (Figure 1), the phases of were the following:

- developing a survey methodology to identify and quantify the changes and situations of degradation of the historical heritage;
- determining the costs of recovery, as measure of the cost effectiveness;

- developing a method to identify priorities for interventions supporting decisions in the light of social equity and transparency.

Create a balance between cost, and effectiveness firstly in terms in term of physical rehabilitation against decay and secondly in favour of social revitalisation.

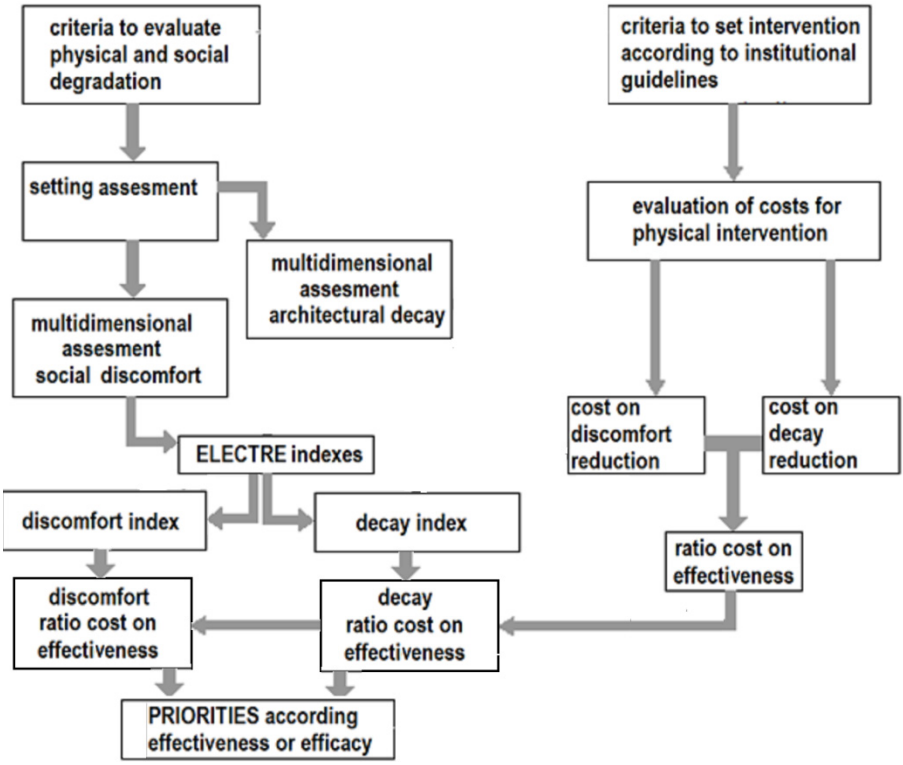

Fig. 1. The logic framework at the basis of the assessment of intervention priority

2.1 Geography of Physical and Social Criticalities

In order to organize data, a Geographic Information System has been set, containing a database of the historical Center [9].

In such database, photographic references, attributes collected inside schedules of "architectural components", and inside schedules of the "improper changes", are merged, as well as links with the stock image.

As regards details of the degradation, two sets were built.

The first set, that is the more detailed, collect data at two levels: the first refers to the small unit of cadastral parcels, the second, broader, refers to the minimum urban block, coincident with the geographic section of the Italian Population Census.

The second set, that is the broader, collect data at the level of the geographic section of the Italian Population Census.

The physical degradation and the social discomfort conditions at the end were mapped by the use of ArcMap. The geographical unit was the population census areas. Inside the urban fringe, the area was covered by census section numbered from 89 to 107.

As regards the physical cost of degradation each one of the section the absolute cost per category of refurbishment was considered as attribute, As regards the social discomfort the attribute was defined by the set of indexes of social discomfort.

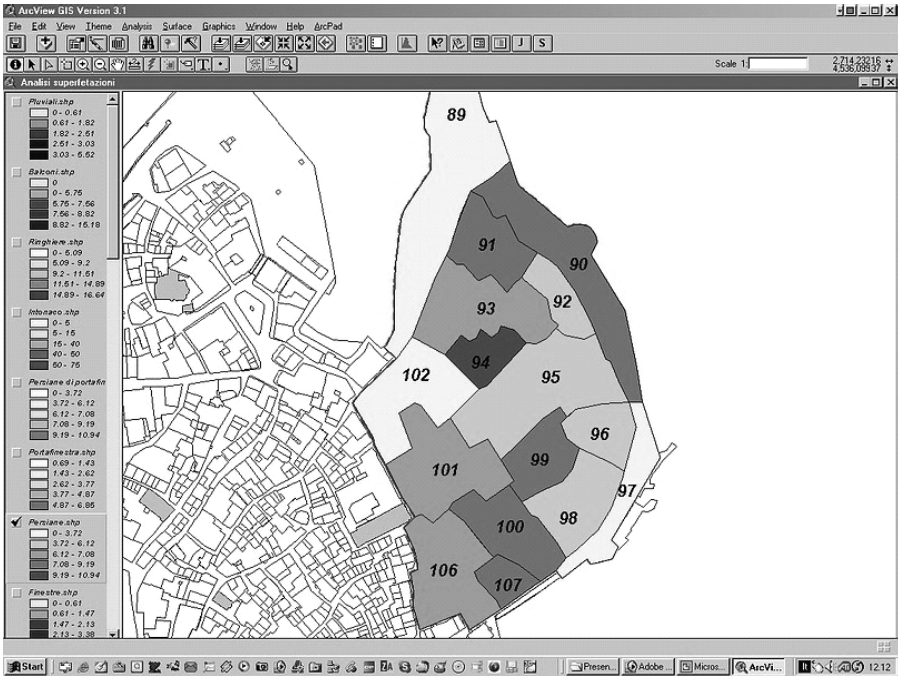

Fig. 2. The geographic context of the historic center of the town subdivided for census sections (from 89 to 107)

2.2 Cost of Urban Refurbishment and Social Disconfort

In this regard, reference was represented by the "morphological Quality" that Guidelines of District Contracts trial in the case of the "preservation and enhancement of historic fabrics."

According to such objective the preservation of the significant architectural organism, in its aspects of historical development, "guaranteeing the permanence of the figurative and material consistency is the main task. The interventions in the historic centre must comply with the following design criteria:

- elimination of superfluous degradation; modification of the adjunctions, conservation of the original plasters, the paintworks and existing decoration (e.g. frescoes);

- preservation of the original external openings, according to their shape and position;
- construction of new windows made on the basis of schedules, featuring scores and configurations consistent with the original pre-existing typologies.

In order to identify the average cost of intervention an investigation about the typology of alteration of the built heritage has been provided. Abacuses of architectural components and their types of alterations in the built environment have been the basis of classificatory attributes of cost in each geographical units.

The obtained data were structured in a base of knowledge collecting 196 elements of cost, corresponding to the different type of intervention, and 1120 fabrics laying on parcels inside the old town.

The old town has no relevant problems of static consolidation. The urban landscape instead highlights several alterations in architectural facades, due to the insertion of improper handling, or inadequate maintenance of the buildings.

With regard especially to the architectural heritage of the private property, the restoration urban, represents a significant part of the intervention overall rehabilitation of the historic center.

The survey is divided into the following phases:

– photographic survey of the prospects of the buildings;
– construction of an "Abacus of architectural components";
– construction of an "Abacus of alterations";
– calculation of the area of land parcels and elevation of buildings affected by degradation;
– creating a database about the degradation of the external surfaces.

Thanks to the versatility offered by the used support, it was possible to recombine and aggregate data, so that they were suitable for use in relation to the goals. By queries we could examine any context through spatial relationships between intervention for each fabric.

Inside the schedule architectural elements are collected: some types of doors, windows, railings and architectural elements, to be used as models for public and private interventions to follow.

In addition to census of the valuable elements, you must also identify the factors that lead to the disqualification of the historic centre. This classification is helpful to assess the costs in the subsequent removal.

Similarly to what was done for the architectural components, were prepared then an archive called "Abacus of alterations": used non-traditional materials, colors unsuitable environment, elements of modern fashion and all those transformations that have altered the architecture of the buildings.

3 Indexing Physical Impacts and Social Impacts on Expenditure

The matrices of concordance show the results of the pairwise comparisons. They are two (reported below).

The concordance is obtained according to what Roy suggests [10], by the use of the concordance index for each alternative (ie each section enumeration).

The matrix in formula (1) is a performance table according m criteria (from A1 to Am) referring to n options. In our case criteria are related with value of the intervention, and values of the intensity of social discomfort in the area.

$$\begin{array}{c} \\ X_1 \\ X_2 \\ \\ \\ X_n \end{array} \begin{array}{c} A1 \\ \left[\begin{array}{c} U_{X_1}(A1) \\ U_{X_2}(A1) \\ \\ \\ U_{X_n}(A1) \end{array}\right. \end{array} \begin{array}{c} Am \\ \begin{array}{c} U_{X_1}(Am) \\ U_{X_2}(Am) \\ \\ \\ U_{X_n}(Am) \end{array}\left.\right] \end{array} \tag{1}$$

The Concordance index is the average of the pairwise comparison between the n options for each one of the m criteria (divided for n-1 pairwise comparison), where we assign the weight W of the k criterion to the winning pairwise comparison for the options Xi (i=1 to n).

$$C_+ = \frac{\sum_{k \in I_{ij}^{+} \cup I_{ij}^{=}} Wk \quad k=1....m}{n-1} \tag{2}$$

In our case the Intersections represent the prevalence of generic section of the census on generic section of census j, by weighed relating according to a chosen set of different criteria. The final index Ii is the concordance index obtained as the average of the heads of each section, or as the average of partial intersections reported in each row (corresponding to the value determined in the formula given above).

We have calculated two different concordance index:

- the first shows the priority according the seek for a best result in terms of physical refurbishment;
- the second shows the priority according of support looking to the most difficult social conditions, that could be in contrast with the need of refurbish of the weakest households living in the historic centre of the town.

If we privilege the first index, we can obtain a better result in terms of amount of decay that is retired (table 3).

Table 1. The table of effects in terms of incidence of costs for each intervention (economic criterion) for each sections (alternative)

criteria	% cost winters	% wooden winters	% internal doors	% external doors	% structured facade	% structured doors	% steel works	% paint works	% plaster works	% balconies	% roofs	% pvc/plastic works
weights	0,087	0,087	0,087	0,087	0,043	0,043	0,130	0,087	0,130	0,087	0,043	0,087
Sections												
89	0,00	3,26	1,43	4,89	4,89	0,61	5,09	0,00	381,13	5,30	0,82	0,61
90	3,38	8,11	3,04	7,10	13,86	3,72	13,18	5,07	402,30	8,11	4,39	0,00
91	1,47	9,19	4,78	8,46	6,25	1,84	12,87	1,47	469,89	6,62	1,84	0,00
92	2,09	5,23	2,62	6,80	3,14	2,09	11,51	2,09	521,47	5,75	6,80	2,62
93	1,11	7,08	4,87	10,40	0,66	1,55	10,40	0,22	493,37	4,65	2,66	1,77
94	0,61	10,94	1,82	12,76	0,61	3,04	16,41	0,61	726,64	7,29	6,08	1,82
95	2,84	5,52	3,01	11,04	10,21	1,51	9,20	3,18	414,17	8,20	1,00	2,51
96	4,71	6,12	3,77	16,49	3,30	0,00	10,36	1,41	630,33	6,59	16,96	1,41
97	0,00	0,00	2,29	0,00	10,30	3,43	4,58	0,00	600,69	0,00	0,00	0,00
98	5,03	5,82	4,24	7,41	3,44	0,26	7,94	2,12	502,84	7,41	5,03	2,91
99	1,18	7,87	3,54	8,65	0,39	3,93	14,16	3,54	716,53	7,08	1,97	2,75
100	2,02	8,41	3,03	8,41	2,35	2,69	9,08	4,37	687,73	4,37	3,70	2,35
101	1,26	6,55	6,05	11,60	4,54	4,03	16,64	2,02	572,90	8,82	1,51	3,03
102	4,29	3,72	2,86	4,86	2,29	1,43	10,59	0,29	642,49	3,72	1,14	2,29
106	2,13	6,62	6,85	10,16	4,96	2,60	14,89	2,13	630,37	7,56	4,02	2,13

It was analysed the uncomfortable condition of the inhabitants to privilege, in identifying priorities for action, socially weaker families.

The disease conditions were investigated by evaluating the way some situations deemed unfavourable are distributed in the area. Then they were taken into accounting the following structural characteristics of the population:

- people over 65 years and under 14;
- people looking for their first job and unemployed;
- number of entrepreneurs and professionals;
- number of employees, employers and self-employed workers;
- the number of families in relation to the size of the household;
- housing in relation to the property deed;
- territorial density (overcrowding).

Table 2. The table of effects in terms of incidence of costs for each social condition of households (social criterion) for each sections (alternative)

criteria	weak people (young elderly)	unemployed	middleclass	low income	renters households	overcrowd households
weights	0,27	0,09	0,09	0,09	0,27	0,19
Sections						
89	0,258	0,146	0,112	0,258	0,429	0,103
90	0,375	0,125	0,067	0,250	0,438	0,370
91	0,385	0,154	0,044	0,187	0,300	0,222
92	0,292	0,111	0,125	0,194	0,179	0,333
93	0,298	0,094	0,070	0,275	0,215	0,164
94	0,406	0,125	0,125	0,234	0,438	0,083
95	0,437	0,111	0,044	0,252	0,362	0,119
96	0,275	0,157	0,059	0,196	0,321	0,118
97	0,429	0,143	0,000	0,286	0,083	0,000
98	0,404	0,101	0,061	0,162	0,192	0,081
99	0,349	0,120	0,084	0,229	0,385	0,280
100	0,336	0,175	0,073	0,299	0,400	0,282
101	0,372	0,115	0,071	0,218	0,362	0,289
102	0,265	0,163	0,082	0,245	0,588	0,286
106	0,347	0,150	0,048	0,177	0,235	0,245
107	0,355	0,097	0,065	0,258	0,200	0,273

Table 3. The Concordance index on term of costs effectiveness according the ration between expenditure and decay restored for each section (alternative)

	89	90	91	92	93	94	95	96	97	98	99	100	101	102	106	107	Li
89	0,000	0,725	0,725	0,362	1,087	0,362	0,000	0,725	4,348	0,725	0,362	1,087	0,362	1,812	0,000	1,087	**0,14**
90	7,609	0,000	4,348	6,159	5,072	3,623	5,072	3,986	6,522	3,986	3,623	5,072	2,899	5,797	3,986	3,261	**0,71**
91	7,609	3,261	0,000	4,348	4,710	2,536	4,348	4,710	5,797	3,986	2,536	4,348	2,174	5,797	1,087	2,899	**0,60**
92	7,971	2,174	3,986	0,000	6,159	3,623	3,623	2,899	6,522	2,899	1,449	3,986	1,812	5,797	1,087	2,174	**0,56**
93	7,246	3,261	3,623	2,174	0,000	1,812	4,348	3,623	6,522	3,623	2,174	3,261	1,087	3,623	1,449	2,536	**0,50**
94	7,971	4,710	5,797	4,710	6,522	0,000	4,348	4,710	6,884	4,348	5,072	5,072	2,899	5,797	4,348	4,710	**0,78**
95	8,333	3,261	3,986	4,710	3,986	3,986	0,000	2,899	6,522	3,986	2,536	4,348	1,812	5,072	3,986	2,536	**0,62**
96	7,609	4,348	3,623	5,435	4,710	3,623	5,435	0,000	7,609	3,986	2,899	4,710	2,899	5,072	1,812	3,986	**0,68**
97	2,536	1,087	1,812	1,812	1,812	1,449	1,812	0,725	0,000	1,812	0,362	0,725	1,449	0,725	0,725	1,449	**0,20**
98	7,609	4,348	4,348	5,435	4,710	3,986	4,348	4,348	6,522	0,000	3,623	3,623	1,812	5,797	1,812	1,812	**0,64**
99	7,971	4,710	5,797	6,884	6,159	3,261	5,797	5,435	7,971	4,710	0,000	5,435	2,899	7,246	3,623	3,261	**0,81**
100	7,246	3,261	3,986	4,348	5,072	3,261	3,986	3,623	7,609	4,710	2,899	0,000	3,623	6,522	3,623	1,812	**0,66**
101	7,971	5,435	6,159	6,522	7,246	5,435	6,522	5,435	6,884	6,522	5,435	4,710	0,000	6,522	3,623	3,261	**0,88**
102	6,522	2,536	2,536	2,536	4,710	2,536	3,261	3,261	7,609	2,536	1,087	1,812	1,812	0,000	2,536	2,899	**0,48**
106	8,333	4,348	7,246	7,246	6,884	3,986	4,348	6,522	7,609	6,522	4,710	4,710	4,710	5,797	0,000	2,174	**0,85**
107	7,246	5,072	5,435	6,159	5,797	3,623	5,797	4,348	6,884	6,522	5,072	6,522	5,072	5,435	6,159	0,000	**0,85**

Table 4. The Concordance index on term of costs effectiveness according the ration between expenditure and weak social conditions supported for each section (alternative)

	89	90	91	92	93	94	95	96	97	98	99	100	101	102	106	107	*Ii*
89	0,00	1,07	2,14	3,21	2,14	2,67	2,67	2,14	3,21	3,74	2,67	1,60	2,67	0,53	2,14	2,67	**0,35**
90	4,81	0,00	3,21	5,88	5,35	2,14	3,21	4,81	2,67	3,74	5,88	4,81	5,88	3,74	4,81	4,81	**0,66**
91	3,74	2,67	0,00	4,28	5,35	2,14	2,14	3,21	3,21	4,28	2,67	2,14	2,67	2,14	4,81	4,28	**0,50**
92	2,67	0,00	1,60	0,00	1,60	1,07	1,07	2,67	2,67	2,14	1,07	1,07	1,07	2,67	1,60	1,60	**0,25**
93	3,74	0,53	0,53	4,28	0,00	2,14	1,60	3,21	2,67	3,21	1,07	0,53	1,07	2,67	0,53	2,14	**0,30**
94	3,21	1,60	3,74	4,28	3,74	0,00	2,14	3,74	2,67	5,35	4,28	3,21	4,28	1,60	3,74	3,74	**0,51**
95	3,21	2,67	3,74	4,28	4,28	3,74	0,00	5,35	4,28	5,88	2,67	2,14	2,67	2,67	4,28	4,28	**0,56**
96	3,74	1,07	2,67	3,21	2,67	2,14	0,53	0,00	3,21	4,28	1,07	0,53	1,07	2,14	2,67	2,67	**0,34**
97	2,67	3,21	2,67	3,21	3,21	3,21	1,60	2,67	0,00	3,21	3,21	2,14	3,21	2,67	2,67	3,21	**0,43**
98	3,21	0,00	3,21	4,81	4,81	1,60	3,21	4,81	2,67	3,74	0,00	1,60	2,67	1,60	4,81	3,21	**0,46**
99	2,14	2,14	1,60	3,74	2,67	0,53	0,00	1,60	2,67	0,00	2,14	2,14	2,14	2,14	1,60	2,67	**0,30**
100	4,28	1,07	3,74	4,81	5,35	2,67	3,74	5,35	3,74	3,74	4,28	0,00	2,67	3,21	3,74	3,74	**0,56**
101	3,21	0,00	3,21	4,81	4,81	1,60	1,60	4,81	2,67	3,74	3,21	3,21	0,00	3,21	4,81	4,81	**0,50**
102	5,35	2,14	3,74	3,21	3,21	4,28	3,21	3,74	3,21	3,74	4,28	2,67	2,67	0,00	3,74	3,21	**0,52**
106	3,74	1,07	1,07	4,28	5,35	2,14	1,60	3,21	3,21	4,28	1,07	2,14	1,07	2,14	0,00	2,67	**0,39**
107	3,21	1,07	1,60	4,28	3,74	2,14	1,60	3,21	2,67	3,21	2,67	2,14	1,07	2,67	3,21	0,00	**0,39**

If we privilege the second, (table 4) we support with public funding firstly the social class that are less able to act by themselves in refurbish their own heritage.

4 Efficacy Effectiveness and Social Justice

The key to choose at this time it will be represented by equity, defined as the rule that enlarge spatially and geographically the effect in terms of social justice.

If we observe the table 5, we can see how the indexes and the costs re defined for each section. We consider most effective the solution that shares the available public fund (about 550.000 euros) in the widest part of the centre.

The first graph (figure 3) represents a classification of areas as a function of the indices of physical degradation and social distress.

A priority for action based on that classification is broadly consistent with a choice of efficacy.

This approach to the choice is desirable in the absence of constraints imposed by the need to allocate scarce resources to priority.

In fact in this case it must be remembered that each field is characterized, even in situations of not high value of the indices of degradation and discomfort from situations however deserving of intervention.

The assessment, in fact, the need to determine the list of priorities in the light of emergencies resulting from the analysis of the context.

The problem of priorities in scarcity of resources is then addressed from the evaluation of efficiency and equity of interventions.

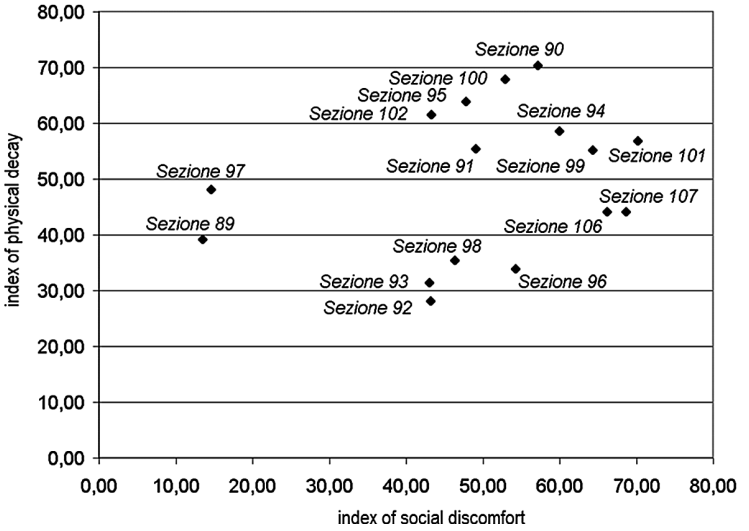

Fig. 3. Priority: the highest discomfort (horizontal axis) on the highest decay (vertical axis)

If we look at the following table, we can see the relationship between cost on physical decay and cost on social discomfort.

The first table lists the sections that have both indices of degradation and discomfort levels (visible at the farthest from the origin of the axes in the diagram degradation physical and social distress), for which the costs of intervention summed amount to approximately EUR 550,000.

The efficiency ratio measures the reduction of the rate of decay per unit monetary spending, while the "index of justice" measures the relationship between social disadvantage and financial implementation features such discomfort.

Table 5. Expenditure of more-less 550.000 euros according to the best couple (highest decay-highest social weakness) in figure 3

Sections	**Intervention Costs**	**Rehabilitation Decay Index**	**Social weakness Index**	**Cost Effectiveness**	**justice index**
90	€ 79.112	57,2	75,0	0,72	0,95
94	€ 58.702	60,0	58,0	1,02	0,99
99	€ 80.419	64,3	52,0	0,80	0,65
101	€ 134.001	70,2	56,0	0,52	0,42
106	€ 138.931	66,2	44,0	0,48	0,32
107	€ 51.056	68,7	44,0	1,34	0,86
Total expenditure	€ 542.221,00				
Average		*average* 64,43	*average* 54,83	*Average* 0,81	*average* 0,7

5 Sharing Effects in the Light of Equalisation

The construction of the indices of efficiency and fairness is therefore equivalent to a standard correlation between costs and results of multicriteria analysis in the light of some indication from literature, acrossing in new ways the break even point analysis [8].

The bands in figure 4 identified in the diagrams take into account the trade-off, and then indifference to choose between situations of greater physical degradation and situations of the greatest social problems in equal financial resources used, in which the indifference is given by the ratio of value of each one the other with the purpose of the expenditure of financial resources.

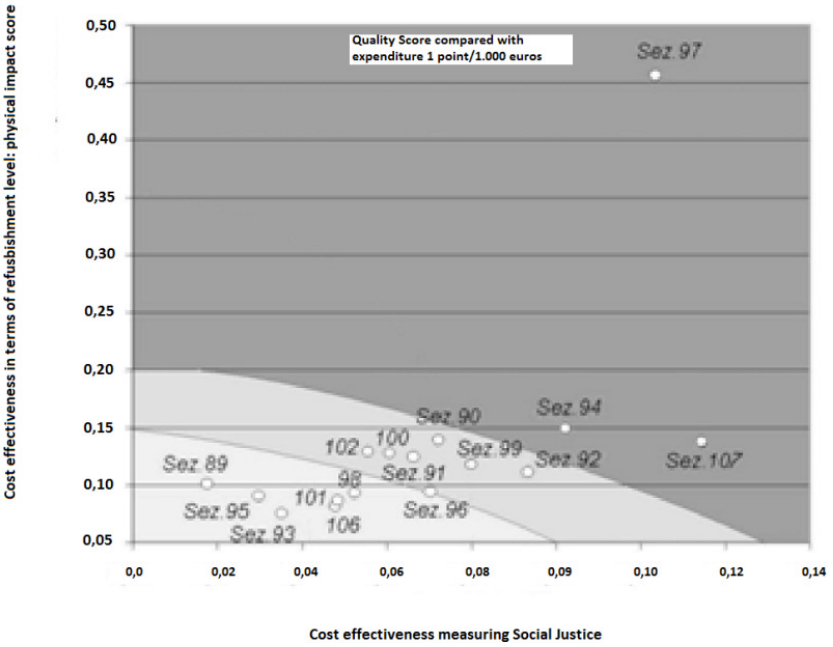

Fig. 4. Values expressing the ratio between score in figure 3, and quantity of expenditure

The second table shows instead the sections that have simultaneously high values of the efficiency index and the index of fairness (equity-efficiency in the diagram are identified by the points belonging to the first and second band of the graph), for which the amount interventions is still estimated at around 550,000 euro.

Table 6. Expenditure of more-less 550.000 euros according to the best couples (lowest ratio of cost on decay- lowest ratio of cost on social weakness) in figure 4

Sections	Intervention Costs	Rehabilitation Decay Index	Social weakness Index	Cost Effectiveness	justice index
90	€ 79.112	57,2	75,0	0,72	0,95
91	€ 46.212	49,1	56,0	1,06	1,21
92	€ 74.194	43,2	28,0	0,58	0,38
94	€ 58.702	60,0	58,0	1,02	0,99
97	€ 11.858	14,7	48,0	1,24	4,05
99	€ 80.419	64,3	52,0	0,80	0,65
100	€ 87.094	52,9	64,0	0,61	0,73
102	€ 77.776	43,3	59,0	0,56	0,76
107	€ 51.056	68,7	44,0	1,34	0,86
Total expenditure	€ 566.423,00				
Average		*average* 50,38	*average* 53,78	*average* 0,88	*average* 1,18

The choice made on the basis of the second priority list allows you to intervene with the same resources employed in a greater number of areas than those related to the first priority list, getting best distribute effects and consequently not only looking at efficiency, but also at fairness and justice.

The final evaluation is based on the definition of an "efficiency index" and a index of justice.

A further comparison between the two approaches can be inferred from the comparison between the mean values of the index of two types of intervention.

Again, note that the first mode of decision favours mainly effectiveness, being the index of physical degradation the only one to take in the first hypothesis value higher than that assumed in the second (64/100 versus 50/100) .

The changes in the index of social disadvantage not seem relevant in the transition from one approach to another (reaching its 54/100).

In the second approach ultimately mean values of the indexes of efficiency and equity related to the areas affected by the intervention are higher than those assumed in the first approach (respectively: 0.88 versus 0.81 and 1.18 against 0.7).

6 Final Remarks

The paper starts with a methodological approach

In conclusion, the study shows how the opportunity to explain the rationale based on the principles of effectiveness, efficiency and equity helpful for improving the character of the decision context. The context reminds to two different economic dilemmas:

Even without ambitious impossible hope of compensatory approaches [11], it is clear the positive contribution of integrated assessment approaches to decision making in providing an advantage in terms of accountability for choice [12][13].

They are in fact comparing two priorities that respond both to paintings of legitimacy, but prefer different principles. In this situation the transparency is fundamental to support the comparison between political views.

It promises a dimension "ethics" in institutional assessment, as well consider in a general perspective of sustainability of choice.

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