BDC

Università degli Studi di Napoli Federico II

17

numero 2 anno 2017

BDC

Università degli Studi di Napoli Federico II

17

numero 2 anno 2017

Circular Models for Systemic Adaptive Reuse of Cultural Heritage and Landscape

BDC

Università degli Studi di Napoli Federico II

Via Toledo, 402
80134 Napoli
tel. + 39 081 2538659
fax + 39 081 2538649
e-mail info.bdc@unina.it
www.bdc.unina.it

Direttore responsabile: Luigi Fusco Girard
BDC - Bollettino del Centro Calza Bini - Università degli Studi di Napoli Federico II
Registrazione: Cancelleria del Tribunale di Napoli, n. 5144, 06.09.2000
BDC è pubblicato da FedOAPress (Federico II Open Access Press) e realizzato con Open Journal System

Print ISSN 1121-2918, electronic ISSN 2284-4732

Indice/Index

.

MULTIDIMENSIONAL ASSESSMENT FOR URBAN REGENERATION: THE CASE STUDY OF POZZUOLI (ITALY)

Pasquale De Toro, Francesca Nocca

Abstract

Cities are home to a growing percentage of the world's population. As the world continues to urbanize, sustainable development challenges will be increasingly concentrated in cities. For this reason, the city's organizational structure is being increasingly questioned. The multidimensional perspective of sustainable development implies a systemic and integrated approach that requires new assessment tools able to capture the multidimensional impacts of cities transformation/regeneration. This paper aims to contribute to the international debate about the role of cities in the achievement of sustainable development and to make operational concepts in the evaluation field driving transformations of cities and territories. The case study of Pozzuoli (Italy) represents a concrete implementation of a proposed methodology for assessing the multidimensional impacts of city regeneration projects using multicriteria evaluation methods.

Keywords: multidimensional indicators, NAIADE method, MacBeth method

VALUTAZIONE MULTIDIMENSIONALE PER LA RIGENERAZIONE URBANA: IL CASO STUDIO DI POZZUOLI

Sommario

Nelle città vive una percentuale sempre più crescente della popolazione mondiale. Poiché il mondo risulta sempre più urbanizzato, le sfide dello sviluppo sostenibile saranno maggiormente concentrate nelle città. Per tale motivo, la struttura organizzativa della città è costantemente messa in discussione. La prospettiva multidimensionale dello sviluppo sostenibile implica un approccio sistemico e integrato che richiede nuovi strumenti di valutazione in grado di identificare gli impatti multidimensionali della trasformazione/rigenerazione delle città. Il presente paper intende contribuire al dibattito internazionale sul ruolo delle città nel raggiungimento dello sviluppo sostenibile e rendere operativi, nel campo della valutazione, i concetti che guidano le trasformazioni delle città e dei territori. Il caso studio di Pozzuoli (Italia) rappresenta una sperimentazione della metodologia proposta per la valutazione degli impatti multidimensionali dei progetti di rigenerazione della città utilizzando metodi di valutazione multicriterio.

Parole chiave: indicatori multidimensionali, NAIADE method, MacBeth method

1. Introduction

Cities are home to a growing percentage of the world's population. Today just over half of the global population is urban and this trend is expected to continue: more than 70% of the world population will be located in urban areas by 2050 (United Nations, 2015a).

This rapid and growing urbanization implies having to face important challenges, from the increasing demand for affordable housing to efficient transport systems, infrastructures and services supply, the opportunities for employment, etc.

As the world continues to urbanize, sustainable development challenges will be increasingly concentrated in cities. For this reason, the city's organizational structure is being increasingly questioned. It produces economic wealth but, at the same time, consumes ecological and social wealth.

Habitat III Conference represented a great opportunity to discuss the role of cities in sustainable development, that is how they need to be planned and managed for becoming drivers in this process and to become more "inclusive, safe, resilient, and sustainable" (United Nations, 2016). The New Urban Agenda, the outcome document of the Habitat III Conference, represents an "extension" of the 2030 Agenda principles (United Nations, 2015b) in the space of the city.

In the New Urban Agenda the shift to a new paradigm has been recalled more than once (NUA, foreword, §15, §24). This new paradigm on which the international debate is today focused (Hosagrahar *et al.*, 2016) will define sustainable development policies and programmes: it moves the concept of development towards a more humanistic and ecological point of view. The necessity to change towards this more humanistic (suggested in the 2030 Agenda of United Nations) and more ecological (Paris Cop21 and Agenda 2030) paradigm is deeply felt. It is characterized by the human scale of development and is inspired by the wisdom of nature (Fusco Girard and Nocca, 2018). It is based on three dimensions: economic, environmental and social dimensions. Each of them is based on the cultural dimension that assumes a key role in this paradigm shift.

2. The need for new evaluation tools

In this framework, the evaluation tools are fundamental to move from theory to practice, that is to make the above mentioned principles operational. Adequate evaluation tools are required.

The 2030 Agenda dwells on this necessity. In fact, it highlights (in particular §§ 80, 94, 104, 115, 136, 138, 147, 158, 159, 161, 172 paragraphs) the central role of evaluation processes in order to achieve all goals. The above mentioned paragraphs of the 2030 Agenda highlight the importance of medium-long term impact evaluation (2030 Agenda, §80) and stress the importance of improving the transparency of data (2030 Agenda, §§104, 136, 138) to ensure equity and spatial integration.

In the New Urban Agenda the importance of evaluation tools is underlined, too. In particular, in the Means of Implementation section (NUA, points 126-160) the necessity of a variety of actors and means to implement the complex agenda is recognized. It is required a wide range of financial, planning and evaluation tools. Capacity development and mobilization of financial resources (NUA, point 126), the necessity to generate evidence-based and practical guidance for implementation (NUA, point 128), property value assessment promoting best practices to capture the increase in land and property value due to urban development processes and investments (NUA, point 137), impact assessment of

investments and projects (NUA, point 138), the capacity to formulate, implement, enhance, manage, monitor and evaluate public policies for sustainable urban development (NUA, point 147) are part of the main means.

Participatory practices play a key role in the implementation of the NUA. The "bottom-up" approaches can trigger positive change and their success lies in the participatory and inclusive urban development. Furthermore, the section about Means of Implementation highlights the need of digital platforms and tools, including geospatial information systems, geospatial information systems, data collection, mapping, analysis and dissemination to promote evidence-based evaluation and governance. It is important to monitor progress achieved through urban policies and strategies and to inform decision-making about the results achieved.

Current research on urban development is characterized by a lot of studies aiming at providing an overview about the assessment of the sustainable development (Dalmas *et al*., 2015). In particular, the studies about indicators able to capture the multidimensionality of sustainability are an open field of research.

The above highlighted multidimensional perspective of cities transformation/regeneration implies a systemic and integrated approach that requires new assessment tools able to capture the multidimensional impacts.

Economic approach is necessary, but it is not sufficient. It needs an integrated evaluation tool, in which quantitative economic matrix is enriched with qualitative indicators, expressed by social component (social matrix) and environmental component (ecological matrix).

This paper aims to contribute to the international debate about the role of cities in the achievement of sustainable development and to make operational concepts in the evaluation field driving sustainable transformations of cities and territories. Its purpose is to put into operational terms concepts and categories identified by international organizations, otherwise at risk of being confined to a purely abstract reflections.

Starting from the previous study (Nocca, 2017a; Nocca, 2017b; Fusco Girard and Nocca, 2018) about the identification of a matrix of multidimensional indicators able to evaluate city transformation/regeneration (with particular reference to the Historic Urban Landscape), this paper wants to represent a first application of this matrix.

The following paragraphs are a part of the first application of the proposed methodological approach (Nocca, 2017b). The multidimensional indicators matrix is applied in the present case study in order to include multiple dimensions in the evaluation process, supporting the identification of sustainable development strategies. This evaluation approach takes into account the above highlighted multidimensionality, also including both expert and community knowledge.

The case study of Pozzuoli (Italy), and in particular the "ex Sofer" area (an area of 17 hectares occupied by an abandoned industrial plant), represents an implementation of the proposed methodology, demonstrating its application potentialities. This study is part of an ongoing process. In fact, "a dialogue" between the municipality of Pozzuoli and the Waterfront Flegreo Spa (the owner of the area on which the research is focused) is currently underway to reach an agreement about the future development of the Sofer site. It represents a methodological application without administrative implications, but it aims to support the municipality during the decision process.

In the 3 paragraph an overview of the case study is presented. The proposed methodology to identify the most appropriate functions that are able to trigger synergistic relationships between port and city and to increase city productivity is described in the paragraph 4. The next paragraphs (no. 5, 6, 7) deal with the analysis of the participatory processes and multicriteria analyses and thus their integration in decision-making process. Finally, after the elaboration of data, the results are discussed (paragraph 8) and a possible path for further research is highlighted (paragraph 9).

3. Case study: the city of Pozzuoli, Italy

The city of Pozzuoli is an Italian city of 81,661 inhabitants, a municipality part of the Metropolitan City of Naples. It is located in the volcanic area of Campi Flegrei in the gulf of Naples. It is characterized by a valuable cultural and natural landscape and a complex city-port system.

This study analyses the development plan for the port area of the city, currently occupied by the abandoned plants of ex "Sofer", an industrial plant dates back to the 1800s (closed in 2003, after more than 100 years of activity), an area of 17 hectares representing a physical barrier between the city and the sea, a "concrete wall" of abandoned industries.

This area is included in the "Historic Urban Landscape" of Pozzuoli and the Gulf of Naples, defined by UNESCO as "the urban area understood as the result of a historic layering of cultural and natural values and attributes, extending beyond the notion of "historic centre" or "ensemble" to include the broader urban context and its geographical setting" (UNESCO, 2011, art. 8). This port area can represent the entry point for the entire city regeneration (Fusco Girard, 2013; Fusco Girard and Nocca, 2016).

The ex Sofer Area, under regulations related to the protection of natural and archaeological resources, is included in the Masterplan of Pozzuoli Coastline (designed by Eisenman Architects, Interplan Seconda Srl, AZ Studio) aiming at the development/revitalization of the coastline through the enhancement and valorization of the archaeological heritage, the disposal of industrial areas and the re-development of the waterfront (through the introduction of new facilities and the conversion of the port for tourism).

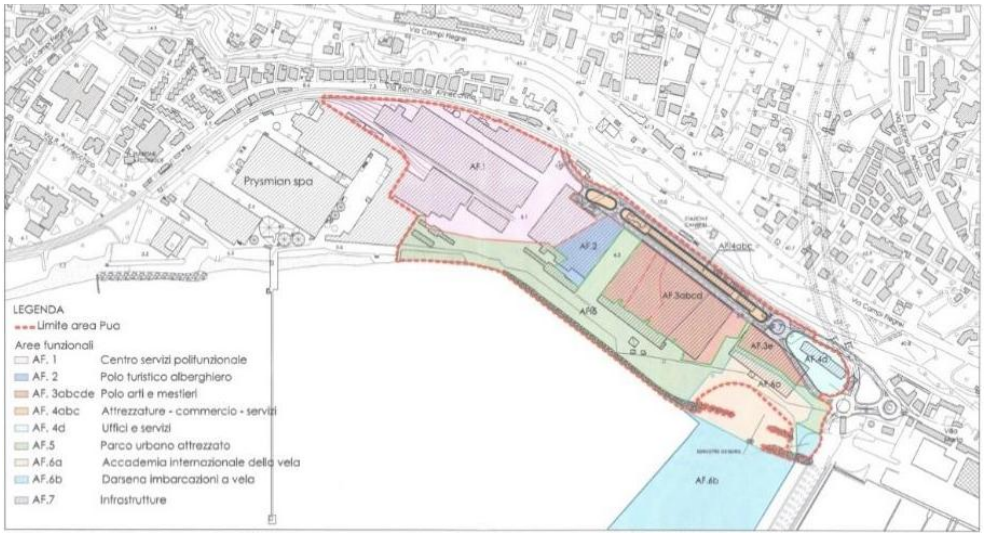
Planning the city with the port requires necessarily critical considerations: port and city have different interests and priorities. The reconstruction of inter-dependencies between different city areas suggests the identification of functions capable of triggering synergistic relationships between port and city (Fusco Girard and Nocca, 2016).The port-city relationship should be approached beyond the planning of waterfront leisure areas. It is necessary to increase port-city connectivity, regenerating cultural and natural heritage and providing port areas with new functions able to create connections with the city life, in order to attract people from the city and to make the port area a connection "hub" to the whole city/territory. The objective is thus to "give back the sea to the city" transforming, in a circular perspective, the port area in a focal point of the city.

The aim of this study is to identify a set of suitable functions to be localized in the ex Sofer area and able to increase the multidimensional city productivity. These functions are those that can mainly contribute to link the port with the city and the broader territory, considering these entities to be linked in a synergic relationship.

The approved Urban Implementation Plan (in Italian PUA) (2009) and the "Proposal for a revision of the approved PUA" (2015) define a primary set of functions. The goal of the

PUA is to create a hub of activities able to promote the strengthening and development of sectors such as tourism, trade, leisure, wellbeing and sport (Fig. 1; Tab.1).

Fig. 1 – PUA masterplan with functional areas



Source: Gnosis Architectural firm and Municipality of Pozzuoli

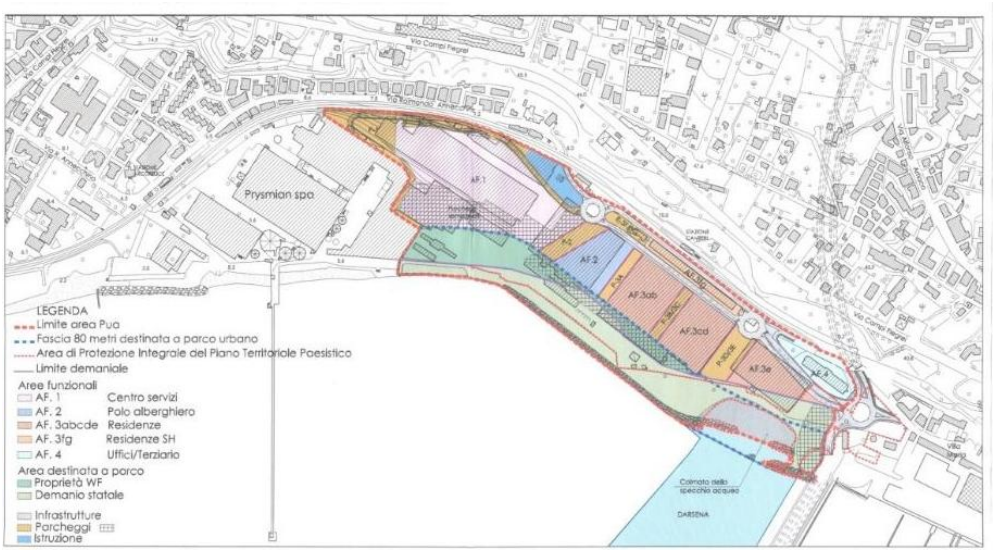
Tab. 1 – Functional areas included in the PUA

	Functional area
AF.1	Polyfunctional complex
AF.2	Accommodation complex
AF.3abcde	Arts and crafts centre
AF.4abc	Trade and services
AF.4d	Offices and services
AF.5d	Urban Equipped Park
AF.6a	International sail Academy
AF.6b	Sail boat dock
AF.7	Infrastructures

The "proposal for a revision of the approved PUA" (Fig. 2; Tab. 2) presented from the owner of the area (the private company Flegreo Waterfront Spa) points out to the gravity of the economic situation that has reset every entrepreneurial expectation at startup, and provides for the partial change of the intended uses of the approved PUA, converting a part of the activities relating to the technology and craft production and office activities into

residential assets (including Social Housing units, in reference to the Regional Law 19/2009 – Piano Casa).

Fig. 2 – Proposal for a revision of the approved PUA masterplan



Source: Gnosis Architectural firm and Municipality of Pozzuoli

Tab. 2 – Functional areas included in revision of the approved PUA

	Functional area
AF.1	Services center
AF.2	Accommodation complex
AF.3abcde	Residential complex
AF.3fg	Social housing
AF.4	Offices and tertiary

The City Council, following the submission of the review proposal of the PUA, stated its admissibility and the willingness to consider more different revision hypotheses, always in accordance with the requirements of current legislation. This study has been developed in the frame of the municipal intention of revising the port area development plan.

4. Methodology

In order to identify the most appropriate functions that are able to trigger synergistic relationships between port and city and to increase city productivity, the following phases are carried out:

- knowledge phase: analysis of the context, of the existing regulatory instruments and the existing proposals for new functions/area regeneration;
- participative phase: identification of stakeholders for conducting interviews and focus groups to support the identification of development strategies;
- evaluation phase: multi-group and multi-criteria analysis for the identification of the community preferences (NAIADE method preferences) and the most appropriate combination of functions to valorize the area and the resources of the territory (MacBeth method).

The proposed methodological approach aims to include multiple dimensions in the evaluation process supporting the identification of sustainable development strategies, including both expert and community knowledge.

Participatory, multi-group and multi-criteria tools (UNESCO 2016; Smit, 2011) have been integrated in a multidimensional perspective and processed to evaluate the more appropriate combination of functions to valorize the area and the resources of the territory; in other words, to identify functions to increase city productivity, creating synergies between port and city, as also highlighted also in the Opinion of European Committee (European Committee of the Regions, 2017).

The first phase of this study (knowledge phase) took place in close contact with the Municipality of Pozzuoli, allowing to know in depth the current and ongoing dynamics related to the ex-Sofer area.

The history of the area (and the city of Pozzuoli in general), the project context, the existing regulatory instruments and the existing proposals for new functions/area regeneration have been analysed during this phase starting from the existing literature, municipality official documents and surveys on site.

The participatory process has allowed acquiring local information, analyzing possible conflicting behaviours, producing more preferable and shared alternatives. In this phase three groups of stakeholders have been identified (Tab. 3).

Tab. 3 - List of stakeholders involved in the participatory process

Institutions	Campania Region Metropolitan city Municipality Superintendence Basin Authority Port Authority Port Captaincy
Technical-professional organizations	Professional Association of Geologists Professional Association of Architects Professional Association of Engineers ACEN (Association of Builders Construction of Naples) Industrial Union, Trade Union
Community	Residents Representatives of associations

A questionnaire has been administered to the community and representatives of association; focus groups with representatives of institutions and technical-professional organizations have been carried out (it was not possible to interview all those identified).
The questionnaire has been administrated through an on line survey by Google Form. Forty-one questionnaires have been filled (Nocca, 2017). It was divided into four sections. The first section of the questionnaire has aimed at understanding the level of community satisfaction about some issues related to the city of Pozzuoli.
In particular, the interviewees have expressed their level of satisfaction (then evaluated by NAIADE software), according to a linguistic scale (low / medium-low / medium / medium-high / high), related to the following issues:

- state of conservation of cultural heritage;
- usability of cultural heritage;
- urban landscape quality;
- transport efficiency;
- equipment and public spaces supply;
- usability of equipment and public spaces;
- economic activities and services supply;
- level of seismic and bradiseismic risk perception (safety);
- level of security perception related to the use of public spaces;
- sea-city relationship - visual relationship;
- sea-city relationship – physical connection.

The second section of the questionnaire has been focused on the understanding of the priorities of intervention of the above mentioned issues. The interviewees have assigned a value from 1 to 10 to the identified issues, thus placing them from the most priority issue (1) to the least one (10).
The third section of the questionnaire is specifically focused on the ex-Sofer area. The aim has been to understand the preferences of the community about the possible functions to be set up. Each interviewee has expressed his satisfaction through a linguistic scale (low, medium-low, medium, medium-high, high level) on the proposed functions (in relation to the PUA and the revision plan of the PUA):

- Residential units;
- Production industry;
- Accommodation complex;
- Trade/shopping;
- Business district;
- Scientific-technological center;
- Urban Equipped Park;
- Sports complex;
- Park areas.

In the fourth section, the interviewees have had the possibility to propose other functions (not specified in the questionnaire).
The face to face focus groups have been organized with each institution and technical-professional organization identified as stakeholder during the knowledge phase.
The focus group process is characterized by dynamic nature and synergetic effects, resulting in the generation of more information.
These focus groups have been divided in three main phases:

1. first phase: during the first phase the overview of the topic has been introduced by the moderator. It has been supported by a Dossier (supportive material) designed to introduce the issue. It describes the area of project and its context, with reference to spatial features and current legislations and highlighting the open-issues related to the strategic proposal for the socio-economic development of Pozzuoli.
   In particular, the open issues guiding the meetings have been the following:
   - Adequacy of the area's boundary;
   - Identification of problems and potentialities of the area;
   - Development and valorization objectives and strategies;
   - Actions and proposals (new functions to be set up).
2. second phase: during this phase the interaction among the interviewees has taken place. A set of different views/opinions is gathered, representing the reactions of participants involved in issues arisen.
3. third phase: during this phase the information and reactions gathered during the previous phase have been elaborated and a final report has been produced with the collaboration of all participants.

Data resulting from the participative phase have been processed through multi-group and multi-criteria analyses, including both community and experts opinions/knowledge.
A combination of a participatory process (questionnaires and focus groups) and multi-criteria analysis tools has been employed to collect and process information on the stakeholders' opinions and expert knowledge and integrate them through multicriteria evaluation.
In particular, two software have been used:

- NAIADE (Novel Approach to Imprecise Assessment and Decision Environments) method (Munda, 1995; 2006; NAIADE, 2006) to process the results from the administrated questionnaire;
- MacBeth (Measuring Attractiveness by a Categorical Based Evaluation Technique) method (Bana e Costa and Vansnick, 1999; Bana e Costa *et al*., 2002) to evaluate multidimensional impacts that different functional choices (resulting from the knowledge and participative phases) can have on the overall objective, that is to increase city multidimensional productivity.

5. Survey and focus groups

Useful observations and considerations have emerged during this participative process. They allow understanding the points of view of the different identified stakeholders in relation to the Urban Implementation Plan (PUA) and its proposed revision and, more in generally, to understand more deeply potentialities and problems of the study area (ex-Sofer) and Pozzuoli.
A set of possible functions and strategic recommendations for the development of the port area has been identified through the open-ended parts of the questionnaire and through the debate during the focus groups.
The fourth section of the survey, in which the interviewees have had the possibility to indicate further other functions, have highlighted a demand for more public spaces. In particular, the functions identified are:

- artistic and handicraft laboratories;
- spaces for associations;

- spaces for creative laboratories;
- the so-called "contenitori culturali".

A shared vision arisen from all focus groups is the potentiality of Pozzuoli lying in its cultural and natural resources and thus the necessity to create a network of cultural/natural heritage for the recovery of the city. The project needs to be revised in more touristic terms and, in this perspective, a shipping station is necessary, considering also that 3 million passengers pass through every year.

Furthermore, proposals for new functions (compared with that identified in the PUA and its revision) are arisen during the focus groups. They are:

- shipping station;
- on-site command for the Archaelogical Park of the Flegrea Area;
- museum Center (related to cultural and natural heritage);
- educational tourstic pole;
- tourist service point and park areas for tourist terminal.

These functions have been taken into account as possible functions to be localized in the ex-Sofer area and thus added to the functions proposed in the PUA and its revision in the evaluation process.

6. NAIADE method

As said before, the NAIADE method is used to process data arisen from the participatory phase. NAIADE (Novel Approach to Imprecise Assessment and Decision Environments) method is a discrete multicriteria method able to manage quantitative and qualitative data (Munda, 1995; 2006). It performs the comparison of alternatives on the basis of a set of criteria.

The values assigned to the criteria for each alternative may be expressed in the form of either crisp, stochastic, fuzzy numbers or linguistic expressions. This method uses the conflict analysis procedures. It can be used to understand both information about the distance of the positions of different stakeholders (possibilities of convergence of interests or coalition formations) and a ranking of the alternatives according to actors' preferences (social compromise solution).

On the basis of this method, two types of analysis can be conducted (Munda, 1995; 2006; JRC, 1996):

- a multi-criteria analysis which, based on the impact matrix, leads to the prioritization of alternative scenarios as to certain decision criteria;
- equity analysis (analysis conducted in this case study) which, based on the equity matrix, explores possible "alliances" or "conflicts" among different interests as to the scenarios at hand.

The equity analysis, based on equity matrix, analyses possible "alliances" or "conflicts" between different interests in relation to different scenarios. Such information are important to choice the alternatives characterized by a high level of consensus among stakeholders.

To this end, the equity matrix is constructed. Its elements show, in a qualitative way (linguistic expressions), the opinions of stakeholder groups in reference to the alternative scenarios (different functions or issues in this study).

The processing of these data leads to the calculation of a similarity matrix, in which the similarity level of the opinions of each pair of stakeholder groups is presented. These

calculations are based on "semantic distance" among the opinions of each stakeholder in relation to the different alternatives.
There are three main steps:

- the construction of the equity matrix, based on the participative processes (questionnaire);
- the elaboration of the similarity matrix;
- the structuring of a "dendrogram", graphically representing the "alliances" or the "conflicts" among stakeholders.

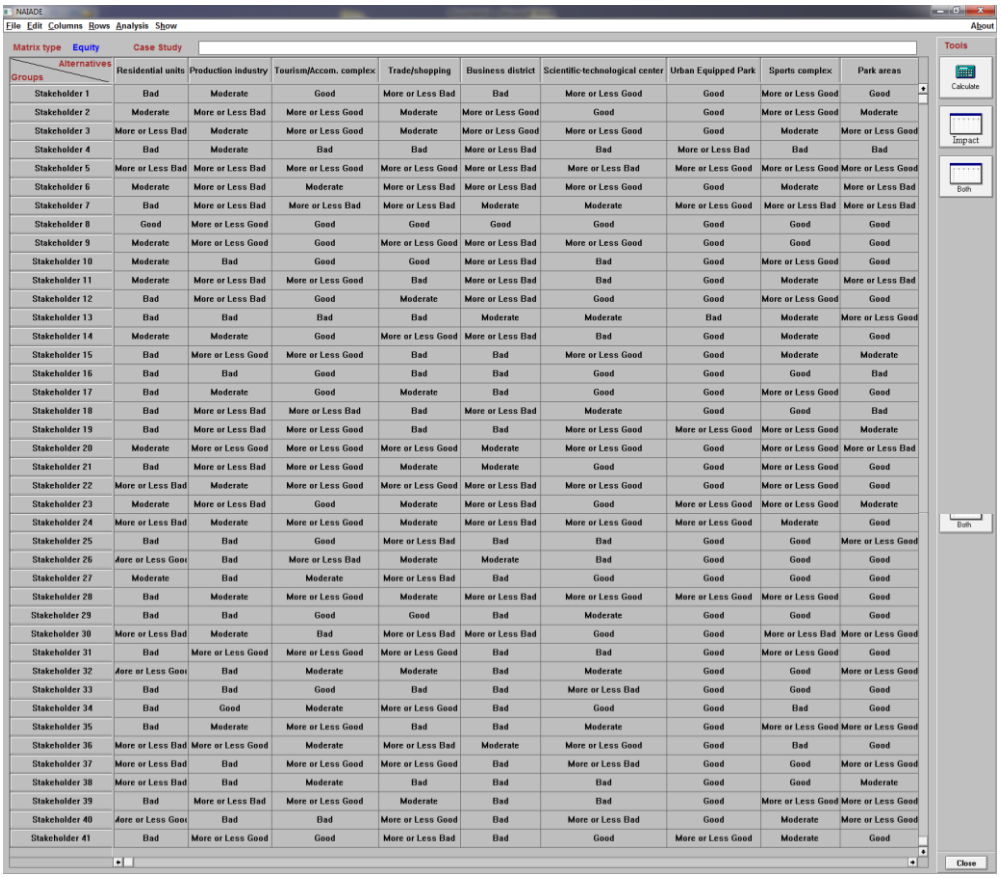
The dendrogram provides useful information about the consensus reached for each alternative and about divergences in opinion: a great divergence can lead to restructuring the alternatives.
The NAIADE output is related both to the affinity of perception among different stakeholders and to a final ranking of preferences.
This method is used twice in this study (Nocca, 2017):

- to understand community satisfaction in relation to some proposed issues in order to identify priority of intervention (state of conservation of cultural heritage, usability of cultural heritage, urban landscape quality, transport efficiency, equipment and public spaces supply, usability of equipment and public spaces, economic activities and services supply, level of seismic and bradiseismic risk perception - safety, level of security perception related to the use of public spaces, sea-city relationship - visual relationship, sea-city relationship – physical connection);
- to understand community opinion about the localization of different functions in order to identify the most appropriate combination of them for the regeneration of the study area.

In this paper the second elaboration is presented and analysed. It is elaborated to understand community preferences about the different possible functions to localize in ex-Sofer area in order to know the demand for functions and supporting, in the following step (by MacBeth method), the identification of the most appropriate combination of them for the regeneration of the study area.
The equity matrix has been constructed on the base of the information coming from the participative phase (the NAIADE inputs are data coming from the administrated questionnaire) (Fig. 3). Its elements show, in a qualitative way (linguistic expressions), the opinions of stakeholder groups in reference to the alternative scenarios, that is to different functions for ex Sofer area re-functionalization. The processing of these data leads to the calculation of a similarity matrix, in which the similarity level of the opinions of each pair of stakeholder groups is presented. Each interviewee has expressed a ranking of preferences about the following functions (proposed in the PUA and revised PUA):

1. Residential units;
2. Production industry;
3. Accommodation complex;
4. Trade/shopping;
5. Business district;
6. Scientific-technological center;
7. Urban Equipped Park;
8. Sports complex;
9. Park areas.

Fig. 3 - Equity matrix - alternative functions

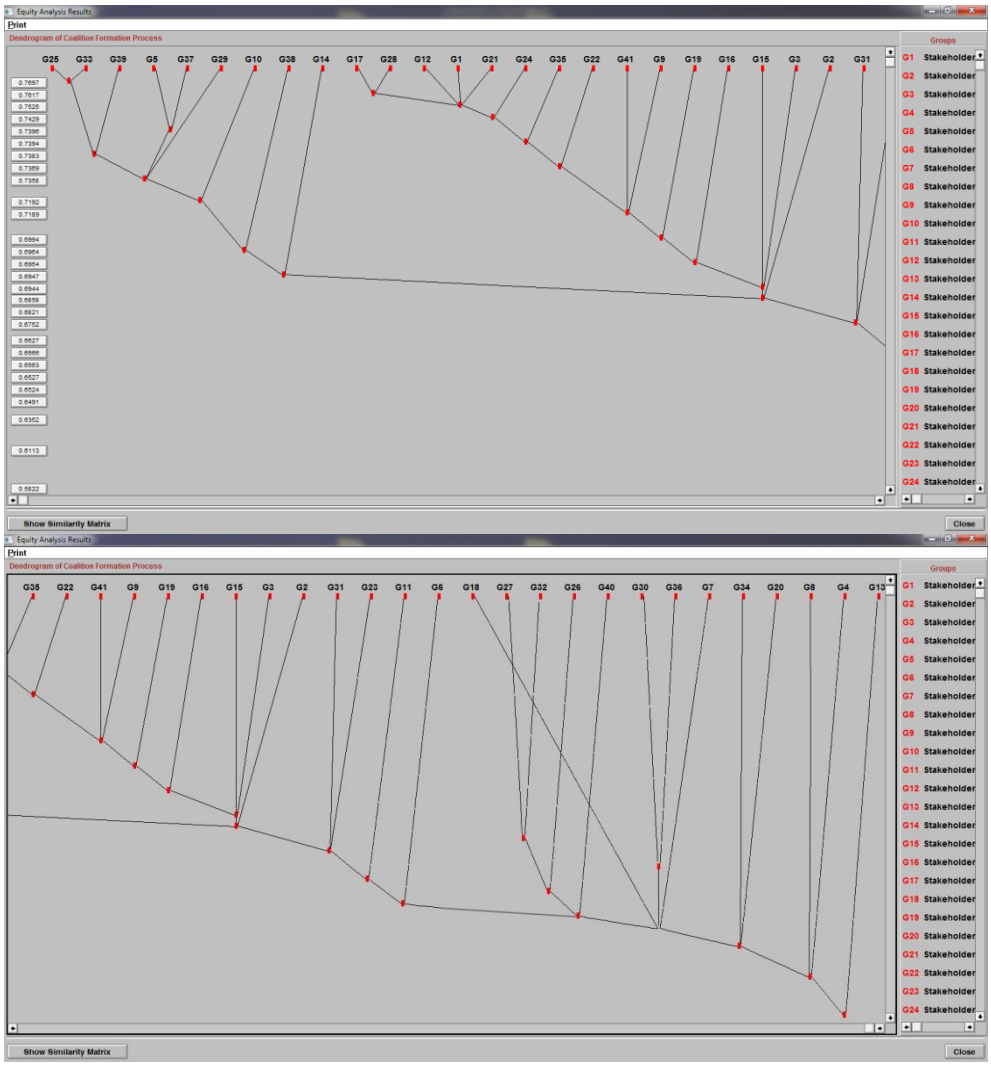


Groups \ Alternatives	Residential units	Production industry	Tourism/Accom. complex	Trade/shopping	Business district	Scientific-technological center	Urban Equipped Park	Sports complex	Park areas
Stakeholder 1	Bad	Moderate	Good	More or Less Bad	Bad	More or Less Good	Good	More or Less Good	Good
Stakeholder 2	Moderate	More or Less Bad	More or Less Good	Moderate	More or Less Good	Good	Good	More or Less Good	Moderate
Stakeholder 3	More or Less Bad	Moderate	More or Less Good	Moderate	More or Less Good	More or Less Good	Good	Moderate	More or Less Good
Stakeholder 4	Bad	Moderate	Bad	Bad	More or Less Bad	Bad	More or Less Bad	Bad	Bad
Stakeholder 5	More or Less Bad	More or Less Bad	More or Less Good	More or Less Good	More or Less Bad	More or Less Bad	More or Less Good	More or Less Good	More or Less Good
Stakeholder 6	Moderate	More or Less Bad	Moderate	More or Less Bad	More or Less Bad	More or Less Good	Good	Moderate	More or Less Bad
Stakeholder 7	Bad	More or Less Bad	More or Less Bad	More or Less Bad	Moderate	Moderate	More or Less Good	More or Less Bad	More or Less Bad
Stakeholder 8	Good	More or Less Good	Good	Good	Good	Good	Good	Good	Good
Stakeholder 9	Moderate	More or Less Good	Good	More or Less Good	More or Less Bad	More or Less Good	Good	Good	Good
Stakeholder 10	Moderate	Bad	Good	Good	More or Less Bad	Bad	Good	More or Less Good	Good
Stakeholder 11	Moderate	More or Less Bad	More or Less Good	Bad	More or Less Bad	Bad	Good	Moderate	More or Less Bad
Stakeholder 12	Bad	More or Less Bad	Good	Moderate	More or Less Bad	Good	Good	More or Less Good	Good
Stakeholder 13	Bad	Bad	Bad	Bad	Moderate	Moderate	Bad	Moderate	More or Less Good
Stakeholder 14	Moderate	Moderate	Good	More or Less Good	More or Less Bad	Bad	Good	Moderate	Good
Stakeholder 15	Bad	More or Less Good	More or Less Good	Bad	Bad	More or Less Good	Good	Moderate	Moderate
Stakeholder 16	Bad	Bad	Good	Bad	Bad	Good	Good	Good	Bad
Stakeholder 17	Bad	Moderate	Good	Moderate	Bad	Good	Good	More or Less Good	Good
Stakeholder 18	Bad	More or Less Bad	More or Less Bad	Bad	More or Less Bad	Moderate	Good	Good	Bad
Stakeholder 19	Bad	More or Less Bad	More or Less Good	Bad	Bad	More or Less Good	More or Less Good	More or Less Good	Moderate
Stakeholder 20	Moderate	More or Less Good	More or Less Good	More or Less Good	Moderate	More or Less Good	Good	More or Less Good	More or Less Bad
Stakeholder 21	Bad	More or Less Bad	More or Less Good	Moderate	Moderate	Good	Good	More or Less Good	Good
Stakeholder 22	More or Less Bad	Moderate	More or Less Good	More or Less Good	More or Less Bad	More or Less Good	Good	More or Less Good	Good
Stakeholder 23	Moderate	More or Less Bad	Good	Moderate	More or Less Bad	Good	More or Less Good	More or Less Good	Moderate
Stakeholder 24	More or Less Bad	Moderate	More or Less Good	Moderate	More or Less Bad	More or Less Good	More or Less Good	Moderate	Good
Stakeholder 25	Bad	Bad	Good	More or Less Bad	Bad	Bad	Good	Good	More or Less Good
Stakeholder 26	More or Less Good	Bad	More or Less Bad	Moderate	Moderate	Bad	Good	Good	Good
Stakeholder 27	Moderate	Bad	Moderate	More or Less Bad	Bad	Good	Good	Good	Good
Stakeholder 28	Bad	Moderate	More or Less Good	Moderate	More or Less Bad	More or Less Good	More or Less Good	More or Less Good	Good
Stakeholder 29	Bad	Bad	Good	Good	Bad	Moderate	Good	Good	Good
Stakeholder 30	More or Less Bad	Moderate	Bad	More or Less Bad	More or Less Bad	Good	Good	More or Less Bad	More or Less Good
Stakeholder 31	Bad	More or Less Good	More or Less Good	More or Less Good	Bad	Bad	Good	More or Less Good	Good
Stakeholder 32	More or Less Good	Bad	Moderate	Moderate	Bad	Moderate	Good	Good	More or Less Good
Stakeholder 33	Bad	Bad	Good	Bad	Bad	More or Less Bad	Good	Good	Good
Stakeholder 34	Bad	Good	Moderate	More or Less Good	Bad	Good	Good	Bad	Good
Stakeholder 35	Bad	Moderate	More or Less Good	Bad	Bad	Moderate	Good	More or Less Good	More or Less Good
Stakeholder 36	More or Less Bad	More or Less Good	Moderate	More or Less Bad	Moderate	More or Less Good	Good	Bad	Good
Stakeholder 37	More or Less Bad	Bad	More or Less Good	More or Less Good	Bad	More or Less Bad	Good	Good	More or Less Good
Stakeholder 38	More or Less Bad	Bad	Moderate	Bad	Bad	Bad	Good	Good	Moderate
Stakeholder 39	Bad	More or Less Bad	More or Less Good	Moderate	Bad	Bad	Good	More or Less Good	More or Less Good
Stakeholder 40	More or Less Good	Bad	Bad	More or Less Good	Bad	More or Less Bad	Good	Moderate	More or Less Good
Stakeholder 41	Bad	More or Less Good	Good	More or Less Bad	Bad	Good	More or Less Good	Moderate	Good

The stakeholders' opinions have been included in the equity matrix. Starting from the equity matrix, the dendrogram, that graphically expresses the relation among different stakeholders' preferences, has been analysed (Fig. 4). The dendrogram provides useful information about the consensus reached for each alternative and about divergences in opinion: a great divergence can lead to restructuring the alternatives.

The final output returns the ranking of stakeholders' preferences about the functions to be located in the study area. It is elaborated through subsequent aggregations and it lies in correspondence with the level of consensus equal to 0.5822, the lower red dot in the dendrogram that combines all stakeholders' opinions.

Fig. 4 - Dendrogram of coalitions



Analysing the final red point of the dendogram, that is the final ranking. The result has been shown in Tab. 4.

The different functions are not alternative: the method shows a preferability ranking. The goal is to identify the functions characterized by the higher level of consensus among community's members. This output has been useful also for identifying the weights to be assigned to alternative functions in the following step of the evaluation process (Macbeth method).

Tab. 4 - Final ranking of functions

	Function	Ranking
G	Urban Equipped Park	0.77
H	Sports complex	1.51
I	Park areas	1.55
C	Accommodation complex	1.61
F	Scientific-technological center	2.13
D	Trade/shopping	2.49
B	Production industry	2.77
A	Residential units	3.06
E	Business district	3.17

7. MacBeth method

Once identified community preferences and other possible functions, the following step has been carried out in order to understand the combination of functions resulting more appropriate and having more impacts on the city multidimensional productivity, creating relationships between "ex Sofer" area and the broader territorial resources (landscape and the natural and cultural heritage).

To this end, a multi-criteria decision support system has been used: the MacBeth (Measuring Attractiveness by a Categorical Based Evaluation Technique) method (Bana e Costa and Vansnick, 1999). It is an interactive approach that quantifies the attractiveness of options (functions) starting only from qualitative judgements about differences in reference to a global goal. It is based on pairwise comparisons and adopts an interval scale (Ishizaka and Nemery, 2013).

The MacBeth method consists of two main phases:

- a partial evaluation phase (referred to each fundamental criteria/sub-criteria);
- an aggregation phase (referred to the global attractiveness of functions).

This method has been chosen because it requires only qualitative judgements about differences of attractiveness to quantify the impacts of each function on each criterion.

The functions' list has been deduced from the combination of Urban Implementation Plan (and its revision) and the results of the questionnaire and of the focus groups (Tab. 5).

The first step of this evaluation process has been the structuring of the evaluation problem, that is the identification of the criteria for evaluating impacts addressing the issue in a cross-cutting and multidimensional way. Each function is compared to the others considering simultaneously fundamental criteria (and sub-criteria).

The aim has been to understand the impacts of each function in relation to each of these 9 criteria, and then to the overall objective (to increase city productivity in a multidimensional perspective).

For each criterion, some sub-criteria have been identified. They represent the key indicators deduced (through consultation tables with expert knowledge) from the general indicators matrix coming from the research that Fusco Girard and Nocca conducted about the impacts that Historic Urban Landscape conservation/regeneration projects produce on city

productivity (Nocca 2017a; 2017b; Fusco Girard and Nocca 2018; Fusco Girard *et al.*, 2015).

Tab. 5 – Functions list deduced from PUA and participatory process

F1	Urban Equipped Park (beach resort, equipped seaside, heliotherapy, thalassotherapy, kiosks and bars, place of worship, green public area)
F2	Park areas
F3	On-site command for the Archaelogical Park of the Flegrea Area
F4	Shipping station (porter service; information point, taxi and car rental service, shuttle service to the city center; small refreshment bar; finance and police; harbour master's office; artistic events)
F5	Educational tourstic pole
F6	Tourist service point (info point, other tourist services) and park areas for tourist terminal (tourist bus, guided visits to the sea – submerged park)
F7	Accommodation complex (hotel, residence, spa/baths, seaside resort, meeting hall, garages)
F8	Polyfunctional complex (retail, leisure time, catering, sport, garages and parking area)
F9	Sports complex
F10	Scientific-technological center
F11	Sailing center (with sailing technological center for temporary junior and athlete residence)
F12	Sail Accademy(accademy, Savoia Club, park areas)
F13	Museum Center (related to cultural and natural heritage)
F14	Sail boat dock (a dock with a small service building and a connected park area; a sheet of water for docking, dock services, parking)
F15	Production industry (industries, handicrafts, etc.)
F16	Residential units
F17	Business district (Banking, insurance, private offices, professional offices, etc.).

The indicators are not only referred to the limited area of ex-Sofer, but they have taken into account the impacts (economic, environmental, social and cultural) on the surrounding, in accordance to the perspective of the Historic Urban Landscape approach. The selected key indicators are listed in the following table (Tab. 6). All of them have been used in the evaluation process.

In order to make each identified criterion (and thus sub-criterion) operational, according to the MacBeth method, a "descriptor" of impacts has been associated with it to produce a comprehensive qualitative description of performance. A descriptor is "an ordered set of (quantitative or qualitative) plausible impact levels" (Bana e Costa *et al.*, 2002). It has been produced by the association of performance levels to the project. Two reference levels (good and natural) have been then identified in order to create a value function to evaluate the attractiveness of each criterion in the model. The two reference levels respectively represent a "good function" and a "neutral function" (that is neither attractive nor repulsive). They help to better understand the criteria, making the reference levels more explicit.

Tab. 6 – List of key indicators

Tourism and recreation
Tourists in hotels and non-hotel accommodations
Number of visitors
Passengers to the port (unloading and loading)
Number of employees in local active units (tourism sector)
Creative, cultural and innovative activities
Number of active enterprises by type of activity
Number of employees in local active units number (typical and local production)
Percentage of employees by sector on the total number of employees
Typical local productions
Number of farms
Number of educational farms
Number of wine-firm
Environment and natural capital
Amount of cars
Amount of bus
Municipal waste production per capita
Community and social cohesion
Number of non-profit active units
Number of volunteers in non-profit units
Index of propensity to cooperation
Real estate
Market value of residential buildings - good state of conservation
Number of active businesses in real estate sector
Index of residential attractiveness
Financial return
Increasing in earnings due to tickets selling
Increasing in incomes due to construction permits
Increasing in taxes related to real estate asset
Avoided expenditure for management and maintenance of cultural heritage due to increasing in private investments
Welfare/wellbeing
Average income per capita
Employment rate
Unemployment rate
Cultural value of properties/landscape
Incidence of buildings in good state of conservation
Incidence of buildings in poor state of conservation
Potential for residential use in residential areas

An aggregation is firstly applied for each sub-criterion sharing the same parent criterion. A judgement matrix is elaborated making pairwise comparisons among the different functions

with respect to each indicator (sub-criterion). As judgements are entered into the software, it automatically verifies their consistency.
The comparison in attractiveness is elaborated using the MacBeth semantic categories:
- no difference;
- very weak;
- weak;
- moderate;
- strong;
- very strong;
- extreme.

A numerical scale is generated; it is entirely consistent with all judgements (then through a similar process weights will be generated for criteria). The functions are classified in a value "thermometer" on a scale from 100 value (good preference) to 0 value (neutral preference). The 100 value corresponds to the good solution, the 0 value to the neutral one.

Tab. 7 – Final ranking and relative scale

Ranking	Function	MacBeth scale
F1	Urban Equipped Park	104,62
F7	Accommodation complex	92,98
F8	Polyfunctional complex	92,98
F6	Tourist service point and park areas for tourist terminal	92,35
F13	Museum Center	92,23
F5	Educational tourstic pole	82,42
F3	On-site command for the Archaelogical Park of the Flegrea Area	65,86
F4	Shipping station	59,31
F9	Sports complex	54,47
F2	Park areas	52,95
F17	Business district	49,76
F10	Scientific-technological center	49,56
F11	Sailing center	48,21
F12	Sail Academy	42,44
F15	Production industry	42,34
F16	Residential units	42,34
F14	Sail boat dock	33,92

This MacBeth scale represents the impacts that each option/function has on the individual criteria and sub-criteria. It is a partial evaluation phase.

Then, these partial values are aggregated in order to calculate the overall attractiveness of the functions. So, after this first ranking, the program allows having a final ranking of functions in reference to the overall criterion. To this end, it is necessary to give weights to individual functions.
The weight of individual function has been deduced from the integration of participatory process (above analysed) and expert knowledge. The functions have been gathered into three groups, from the group characterized by a major weight to the group characterized by a lower weight:

- first group: cultural value of properties/landscape, tourism and recreation;
- second group: creative, cultural and innovative activities, community and social cohesion, welfare/wellbeing, typical local productions;
- third group: environment and natural capital, real estate, financial return.

To evaluate weights through MacBeth approach, qualitative judgements have been given. The judgements have been expressed by using the MacBeth semantic categories (very weak, weak, moderate, strong, very strong, or extreme difference of attractiveness). Each judgement reflects a view of difference in attractiveness. They have been grouped in a matrix. If two criteria have the same weight, they are anyway introduced in the matrix under the category "no".
So, after determining the impacts of each function on each criterion and sub-criterion, the final aggregation phase has been elaborated. A final ranking of preferences referred to the overall goal has been processed (Tab. 7).

8. Discussion of results

The administration of the questionnaire and the elaboration of its results by NAIADE method have been fundamental to include the preferences of the community in the evaluation process. The knowledge of landscape, expressed through the experience of those who live and transform it every day, is a fundamental aspect of the evaluation process.
The additional functions arisen from the questionnaire have highlighted a demand for more public spaces. These spaces are linked to the regeneration of human capital that is fundamental in city regeneration processes: regeneration processes are not only related to regeneration of spaces, but firstly to the regeneration of human landscape.
"The conversion of at least part of the revitalised area into public spaces which are accessible both to permanent residents and tourists" is one of the key factors to the success of this kind of project (art. 58 of the Opinion on Regeneration of Port Cities and Port Areas of European Commission) (European Committee of the Regions, 2017).
Furthermore, the final ranking from the assessment by NAIADE method has highlighted that the members of the interviewed community agree that the function G (urban equipped park) is the most appropriate for the redevelopment of the ex-Sofer area. This function is followed by the sport complex, parks areas and accommodation complex. The ranking position of the park area function reflects the result of the analysis about the level of community satisfaction related to the transport efficiency (Nocca, 2017b). The last two places in the ranking are occupied by the function A (residential units) and E (business district), that are considered the less adequate from the community. This ranking shows that there is a greater demand for functions related to a collective/social use of the area.
Furthermore, as the final ranking of MacBeth method shows, the function having a greater impact on the overall goal is the equipped green park. It is followed by the touristic and

accommodation activities, consistently with the stakeholders' opinions emerged by NAIADE.
As the overall result shows (overall thermometer), there is no function resulting neutral (0 value) nor unsatisfactory (negative value). There is a function resulting more attractive respect to the level good (100 value): it is the equipped green park.
There are also five functions considered close to the "good solution" in the achievement of the overall goal: accommodation complex (92,98/100 score), polyfunctional complex (92,98/100 score), tourist service point and park areas for tourist terminal (92,35/100 score), museum center (92,23/100 score).
The function having less impact on the overall goal is the sail boat dock. Also the production industry (42,34/100 score) and residential units (42,34/100 score) are considered not too much appropriate to valorize the area and the territory resources.
It is interesting to note all the functions related to the valorization of local cultural resources (i.e. museum center, tourist service point) lie in the upper part of the ranking.
Functions and activities supporting cultural heritage are required in sea ports because the ports have major cultural assets and it needs to take into account their specific features, as emphasised also in the Opinion of European Committee (art. 43). The functions related to the tourism sectors are also considered appropriate for the valorization of the site and territory resources. These results suggest also that the socio-economic revitalization of the city of Pozzuoli can start just from the enhancement/valorization of endogenous resources of the territory and their increase in knowledge (tourist service; museum center; on-site command for the archaeological park of the Flegrea area; educational tourstic pole). These functions also allow the promotion of the tourism sector which could become the main source of wealth of the city, considering that it is characterized by "a treasure" of cultural and natural resources whose potential is not widely exploited today. These resources are able to produce multidimensional benefits for the city (Nocca, 2017a; 2017b).

9. Conclusions

The proposed evaluation approach and the multidimensional indicators matrix aim to provide a valuable tool for supporting city regeneration/ valorization projects/management strategies, that is for supporting decision-makers to orient and assess choices addressed to the achievement (and the increasing) of city multidimensional productivity.
The methodological approach based on the integration of participatory processes and multicriteria analyses in this proposed multidimensional perspective has allowed including the community opinions in the decision-making process. As highlighted also in the art. 58 of the Opinion on Regeneration of Port Cities and Port Areas (European Committee of the Regions, 2017), the involvement of the local community is one of the key factors to the success of this kind of project. In this study it has represented a fundamental support to the decision-making process; the integration between community and expert knowledge guarantees a higher level of acceptability of the results, reaching more consensus, outlining strategies as much as possible shared. It helps to better orient the strategic choices.
The involvement of all stakeholders and actors has facilitated the acquisition of information and knowledge that have supported the decision process; it has ensured also credibility and transparency to the process. Furthermore, this integrated evaluation process, in addition to considering the point of view of different stakeholders, has allowed generating new alternatives (possible functions) to considered.

The consultation of stakeholders allows making choices that are not top-down and thus having more social consensus: a bottom-up approach allows having results more shared and less conflicting (Cerreta and Fusco Girard, 2016). Participation plays a key role in decision-making processes transforming the evaluation process in a dynamic, flexible and adaptive "learning process" (Funtowicz *et al*., 2002). Dealing with the city, that is the space, decision-makers can also be facilitated by using of "spatial" tools combining support to public decision-makers with territorial analysis (De Toro and Iodice, 2016).

The proposed approach establishes an exchange of information among experts and different involved stakeholders. It allows paving a shared ground for future development; including multiple dimensions and visions; generating and producing ideas and innovative solutions (based also on the possibility offered by participants); increasing the perception of the acceptability of alternative proposals that can lead to an improvement of the alternatives.

Furthermore, the efficiency of the proposed approach lies also in the possibility to evaluate simultaneously multidimensional impacts. As underlined also in the 2030 Agenda, the impact and evidence-based assessment is necessary in order to track the progress and ensure the Agenda's effective and implementation (2030 Agenda, §161, 172). In order to make this principle operational, a transdisciplinary and multidimensional approach in development matters and appropriate evaluation processes are necessarily required. This represents a challenge to traditional evaluation processes (such as cost-benefit analysis) to address the multidimensional nature of the matter.

Monitoring and evaluating public policies in a multidimensional perspective is fundamental for sustainable urban development. The evaluation process is today mainly based on ex-ante assessments. Instead, public policies need also ex-post assessments, based on the critical analysis of concrete experiences. In this way, we can be able to gauge again the intervention policies and understand if we achieved our goal.

The present study dealt with the evaluation issue in choices at urban and territorial scale, particularly concerning the areas characterized by the existence of natural and cultural capital. It has aimed at the overcoming of the inherent limitations of traditional evaluations and purely economic ones to explore impacts related to social, cultural and environmental dimensions of the projects. The proposed indicators matrix (used in this study) can be used both for ex-ante and ex-post assessment (Nocca, 2017a; Nocca, 2017b; Fusco Girard and Nocca, 2018). The set of indicators can represent a general indicator framework that can be used in different territorial situation, but contextualizing it case by case. The choice of key indicators to be considered depends also on location and scale of intervention (building, site, etc.). It needs to carefully choose the grid of indicators, choosing the relevant ones (consistency with the objectives of the project) because a high number of indicators should make evaluation process more complex and less effective. To date, a shared set of indicators for the assessment of the multidimensional impacts of urban regeneration/transformation projects does not exist and it still represents a reach field of research.

References

Bana e Costa C.A., Vansnick JC. (1999), *The MACBETH approach: Basic ideas, software, and an application*. In N. Meskens, M. Roubens (eds.), *Advances in Decision Analysis*. Kluwer Academic Publishers, Netherlands, pp. 131-157.

Bana e Costa C., Correa E.C., De Corte JM., Vansnick JC. (2002), "Facilitating bid evaluation in public call for tenders: a socio-technical approach". *The International Journal of Management Science*, n. 30, pp. 227-242.

Cerreta M., Fusco Girard F. (2016), "Human Smart Landscape: An Adaptive and Synergistic Approach for the National Park of Cilento, Vallo di Diano and Alburni". *Agriculture and Agriculture Science Procedia*, vol. 8, n. 5, pp. 489-493.

Dalmas L., Noël J., Geronimi V. (2015), "Economic evaluation of urban heritage: an inclusive approach under a sustainability perspective". *Journal of Cultural Heritage*, vol. 16, n. 5, pp. 681-687.

De Toro P., Iodice S. (2016), "Evaluation in Urban Planning: a multi-criteria approach for the choice of alternative Operational Plans in Cava De' Tirreni". *Aestimum*, n. 69, pp. 93-112.

European Committee of the Regions (2017), *Opinion - The Regeneration of Port Cities and Port Area.* www.cor.europa.eu

Funtowicz S. O., Martinez-Alier J., Munda G., Ravetz J. (2002), "Multicriteria-based environmental policy", in Abaza H., Baranzini A. (eds.), *Implementing Sustainable Development. Integrated Assessment and Participatory Decision-making Processes*. UNEP/Edward Elgar, Cheltenham, UK, pp. 53-77.

Fusco Girard L. (2013), "Toward a smart sustainable development of port cities/areas: the role of the historic urban landscape approach". *Sustainability*, vol. 5, n. 10, pp. 4329-4348.

Fusco Girard L., Gravagnuolo A., Nocca F., Angrisano M., Bosone M. (2015), "Towards an economic impact assessment framework for Historic Urban Landscape conservation and regeneration projects". *BDC - Bollettino Del Centro Calza Bini*, vol. 15, n. 2, pp. 1-29.

Fusco Girard L., Nocca F. (2016), "The circular models for port city regeneration: port as cyclifier". *HoPue - Housing Policies and Urban Economics*, vol. 5, pp. 3-22.

Fusco Girard L., Nocca F. (2018), "Towards an integrated evaluation approach for cultural urban landscape conservation/regeneration". *Region*, vol. 5, n. 1, pp. 33-51.

Hosagrahar J., Soule J., Fusco Girard L., Potts A. (2016), "Cultural Heritage, the UN Sustainable Development Goals, and the New Urban Agenda". *BDC - Bollettino Del Centro Calza Bini*, vol. 16, n. 1, pp. 37-54.

Ishizaka A., Nemery P. (2013), *Multi-criteria Decision Analysis: Methods and Software.* Wiley, United States.

Joint Research Centre of the European Commission (JRC) - Ispra Site (1996), *NAIADE Manual and Tutorial. Version 1.0.ENG*, www.weadapt.org

Munda G. (1995), *Multicriteria Evaluation in a Fuzzy Environment: Theory and Applications in Ecological Economics.* Heidelberg, Germany.

Munda G. (2006), "A NAIADE based Approach for Sustainability Benchmarking". *International Journal of Environmental Technology and Management*, vol. 6, n. 1-2, pp. 65-78.

Nocca F. (2017a), "The role of cultural heritage in sustainable development: multidimensional indicators as decision-making tool". *Sustainability*, vol. 9, n. 10, pp. 1-28.

Nocca F. (2017b), "Hybrid evaluation tools for operationalizing Unesco Historic Urban Landscape approach". PhD Dissertation, University of Naples Federico II, Italy.

Smit A. J. (2011), "The Influence of District Visual Quality on Location Decisions of Creative Entrepreneurs". *Journal of the American Planning Association*, vol. 77, n. 2, pp. 167-184.

UNESCO (2011), *Recommendation on the Historic Urban Landscape, including a glossary of definitions*, www.portal.unesco.org

UNESCO (2016), *The HUL Guidebook. Managing heritage in dynamic and constantly changing urban environments. A practical guide to UNESCO's Recommendation on the Historic Urban Landscape*, www.historicurbanlandscape.com

United Nations (2015a), *Transforming Our World: The 2030 Agenda for Sustainable Development*, www.sustainabledevelopment.un.org

United Nations (2015b), *World Urbanization Prospects. The 2015 Revision Highlights. Key findings and advanced tables*, www.esa.un.org

United Nations (2016), *HABITAT III. Draft New Urban Agenda*, www.habitat3.org

Acknowledgments

We gratefully thank Prof. Roberto Gerundo (Assessor at the Municipality of Pozzuoli) for his precious support received during the elaboration of this work for the acquisition of data related to the Pozzuoli case study.

Pasquale De Toro
Department of Architecture, University of Naples Federico II
Via Toledo 402, 80134 Napoli (Italy)
Tel.: +39-081-2538659; email: pasquale.detoro@unina.it

Francesca Nocca
Department of Architecture, University of Naples Federico II
Via Toledo 402, 80134 Napoli (Italy)
Tel.: +39-338-1307921; email: francesca.nocca@unina.it