Article

Multi-Criteria Analysis and Decision-Making Approach for the Urban Regeneration: The Application to the Rimini Canal Port (Italy)

Margherita Pazzini [1,*], Rachele Corticelli [2], Claudio Lantieri [1] and Cecilia Mazzoli [2]

1 Department of Civil, Chemical, Environmental and Material Engineering (DICAM), University of Bologna, 40136 Bologna, Italy
2 Department of Architecture (DA), University of Bologna, 40136 Bologna, Italy
* Correspondence: margherita.pazzini2@unibo.it

Abstract: In recent decades, urban settlements have been greatly affected by globalisation, climate change, and economic uncertainty. When designing cities, these factors should be taken into account and adapted to the different contexts involved. The redevelopment of degraded urban areas is the first step toward achieving the sustainability aims set out in the Sustainable Development Goals. In this context, evaluation methods are required in the decision-making process, considering different social, economic, and environmental aspects to define the correct policies and actions for city redevelopment. In this paper, an evaluation methodology is proposed in order to obtain a priority scale of interventions for urban regeneration. Starting from on-site inspections to better know the current scenario, a set of indicators is established to evaluate the urban quality. Criticalities and potentials emerge through SWOT analysis and, with the ANP-BOCR method, the priority scale of the identified scenarios is defined. This decision-making approach was applied to the case study of the Rimini Canal Port, in the northeast of Italy, which is a degraded area of the city. This methodology is a tool that can be used in the future by decision makers (DMs) for the redevelopment of small port areas within similar urban contexts.

Keywords: urban regeneration; decision-making process; multi-criteria analysis; urban indicators; SWOT analysis; ANP-BOCR

1. Introduction

New demands for sustainable mobility and the urgent need to make cities more pleasant to live in, especially in peripheral areas, have resulted in a different way of conceiving the urban area [1]. City redevelopment aims to transform degraded areas into economically productive places for a community [2]. The regeneration process takes place through the recovery of infrastructure and services limiting the consumption of the territory to protect environmental sustainability [3].

Over the past decade, urban requalification has made significant progress, becoming a valuable opportunity to promote policies of social participation [4]. The regeneration process is also an opportunity to give cities not only a new look, thanks to a new territorial image, but also a reason to increase from a cultural, economic, and social point of view. Urban renewal is designed to recover underused assets and redistribute opportunities and resources, increasing urban prosperity and quality of life [5]. These purposes are within the 11 United Nations Sustainable Development Goals, which define sustainable cities as those dedicated to achieving green, social, and economic sustainability. Cities occupy only 3% of the Earth's surface but consume 60% to 80% of energy and produce at least 70% of carbon emissions. Therefore, the creation of safe, resilient, and sustainable cities is one of the top priorities of the Sustainable Development Goals [6].

The requirements to meet in order to achieve these goals are, first of all, the creation of environmentally friendly transport systems, particularly attentive to the needs of vulnerable people [7,8]. Secondly, citizens' access to decisions on city planning and improvement of the areas they live in should be ensured to everybody [9]. Then, protection and enhancing of the landscape and cultural heritage should be granted together with the provision of safe and quality housing. Finally, attention should be paid to waste management and to the control of the air [10].

Depending on the different aspects, urban regeneration is a long and complex process that requires a well-structured methodology [11]. Several tools and methods have been studied to evaluate the requalification of degraded areas in urban contexts [12–16]. The available methodologies take into account different variables in the development of urban regeneration plans, favouring an integrated and strategic approach in the choice of the best solutions [17,18]. An integrated methodology supports the decision-making process from the first steps to the final selection of the best scenario among those proposed thanks to the analysis. Having a priority scale of actions to be implemented is essential to assess the path to be followed to achieve urban renewal as quickly as possible, also developing all the main objectives in order to meet user needs [19,20].

The present study aims to find a method to support and justify the project proposals in the complex case of the regeneration of harbour areas where different interests are represented [21]. Also, the smaller ports, in the planning of the territory, demand a wide and unitary vision that not only takes the port into account, but considers it inserted inside a multipurpose city. The selected case study to apply the above methodology is the Canal Port of Rimini, in the northeast of Italy. It is a harbour area close to the city centre, degraded and not well connected to the urban centre and to the main nodes. The study consists of a preliminary analysis, the participation of stakeholders, and deepening with indicators, thus giving an all-round picture of the reality of the port. An important achievement of the present study is that the set of indicators adopted can be used in similar contexts, encouraging local administrations to adopt them. To such purpose, the fixed parameters are of easy finding and calculation.

This methodology, integrated with the ANP-BOCR analysis, evaluates the different possible scenarios considering the real needs of the territory, as well as those of the stakeholders. The next design phase must necessarily take into account what emerged from the previous analysis and identify best strategies and technical solutions.

The method applied to the case of the Canal Port of Rimini gave satisfactory results, suggesting the priority interventions to be carried out. The method applied to the case of the Canal Port of Rimini has given effective and satisfactory results, suggesting the priority interventions to be carried out. The flexible solution studied for the specific case and its criticalities was the best one to realise sustainability goals and the development of the area.

2. Literature Review

As multidimensional processes, urban regeneration projects involve social, economic, environmental, and technical aspects. The same solution is not suitable everywhere, since the evaluation of different design alternatives is based on complex empirical observations. Solutions adopted are often based on social visions, preferences, and feelings of the stakeholders involved [22]. Different evaluation techniques and tools can be selected depending on the phase the evaluation takes place in, before, during, or after project implementation [23]. The different types of evaluation of an urban regeneration project can be classified as follows:

- Ex ante evaluation: choice of the project among possible alternatives;
- Ongoing evaluation: monitoring of implementation of the intervention with possible correction of unexpected effects;
- Ex post evaluation: monitoring of objectives achieved.

The most suitable urban transformation project always depends on a large number of elements influencing each other. Therefore, different alternatives should be provided

already during the ex ante evaluation. Traditional methods of economic and financial feasibility, such as cost–benefit and cost–benefit analysis (CBA), are not suitable enough to understand complex cases [24]. In fact, in this type of analysis, the evaluation is limited to some quantitative variables and to the judgment of a few experts. Most cost information, particularly in the early stages of a project, is often limited, and many costs and benefits are difficult to count and quantify [25]. Some aspects relevant to the environment, sociality, and inclusiveness are difficult to quantify with CBA [26]. A wide range of aspects, including both technical elements based on empirical observations and nontechnical elements based on social values, should, therefore, be taken into account based on the basis of an overall view of the problem.

The evaluation of urban transformation projects is a complex decision-making problem often analysed using multi-criteria analysis (MCA). The MCA considers, at the same time, many different aspects of the problem to be faced, both qualitative and quantitative, highlighting the different points of view of the stakeholders involved [27]. This technique consists in the definition of a rational basis for the choice, identifying criteria according to which to evaluate the different possible alternatives. Several studies have shown that MCA analysis is appropriate and suitable for the evaluation of complex projects [28–30]. There are different types of MCA to be used depending on the context under consideration [31]. Within the class of MCA, the methodology of the analytical network process (ANP) plays a leading role. Developed by the American scholar Thomas L. Saaty [32], it represents the generalisation of the simpler linear analysis hierarchical methodology analytic hierarchy process (AHP) [33] to more complex problems involving varying degrees of interaction between the elements analysed.

The analytic network process (ANP) network system is a useful decision support tool for public and private managers and operators. It allows a final numerical ranking of alternative choices to be reached, based on the comparison in pairs between the different aspects that make up the problem. In ANP, the decision problem is schematised as a network of elements organised in groups and related by various relationships of influence. The structure of the network allows the assessment of interdependence relationships both within each group of elements and between the various groups of elements. Unlike other analysis techniques, the ANP network model is more suitable and beneficial when it comes to complex decision-making problems, usually difficult to represent through a hierarchical scheme. In these cases, not only does the importance attached to the criteria help to determine the priority scale of the alternatives, but also the importance of the latter affects that of the criteria. In contrast, the AHP method, which the ANP method comes from, simplifies reality by distributing criteria as a hierarchy and it simplifies reality by not considering the relationships among elements [34]. The AHP method is based on a linear hierarchical structure where relationships between the elements of the different decision levels are unidirectional along the hierarchy. Moreover, there are no dependencies either between elements of the same group or between elements belonging to different groups [35]. Although complex case studies can be solved through the ANP method, due to the complexity of this analysis method, many studies have used the AHP method as more comprehensible by decision makers [36]. However, it has been shown that, when comparing the two methods of analysis, results obtained with AHP are underestimated or overestimated compared to the results obtained with ANP. In fact, aspects evaluated in AHP are not directly compared with the other elements [37,38].

This study describes in detail all the phases of the ANP analysis method in order to obtain a tool that can be used in the future by decision makers (DM) for urban regeneration within similar contexts.

3. Materials and Methods

Starting from a qualitative and quantitative analysis, the purpose of the present contribution is to show the different steps to get to the most suitable project for the regeneration of degraded urban areas with a priority scale for the interventions proposed. Figure 1

shows the different steps followed to get to the definition of the final design suggested. After on-site inspection data collection to better know the current scenario, the first phase includes a qualitative analysis of the historical and urban context to identify the potential and the criticalities of the area. In the second phase, the qualitative data collected will be processed and interpreted through an SWOT analysis. However, this analysis does not establish the degree of priority of the actions to be taken. A matrix of indicators is set up, allowing a qualitative and quantitative assessment of the various aspects that contribute to pursue the goal of sustainability within the urban area of study.
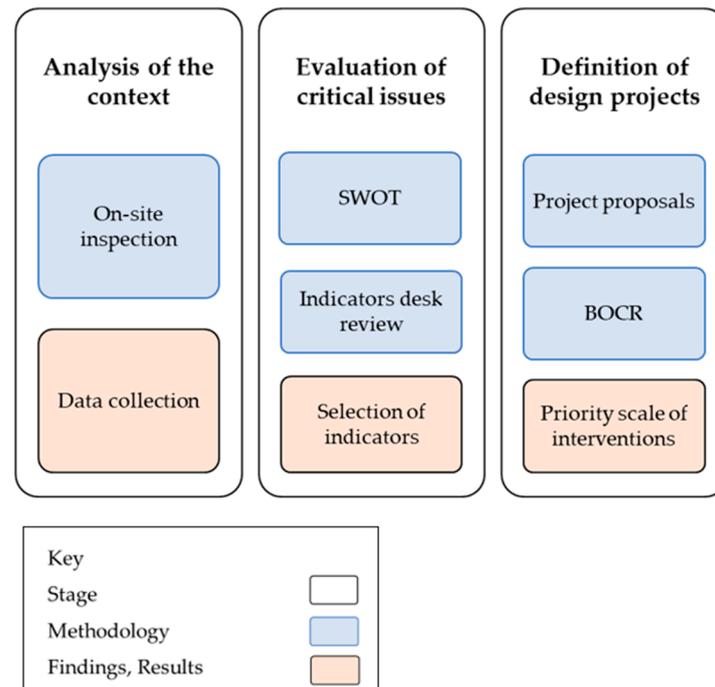

Figure 1. The method used to establish the priority scale of interventions.

In order to ensure optimal use of resources and a successful outcome of the project, in the third phase, the critical issues requiring priority action are identified. For this purpose, a model is used that considers benefits, opportunities, costs, and risks (BOCR). The results of this analysis represent the basis on which to focus the project proposal.

3.1. Stakeholder Involvement

The term "stakeholders" refers to all parties, private or public, that may be involved in a decision-making process. The involvement of the main actors from the early stages of the project stimulates the awareness and interest of the public, stakeholders, and politicians, as well as the willingness to work for change [39–41].

A qualitative–quantitative mixed approach to support the decision-making process helps to involve policy makers and stakeholders, improving connections between the actors of the system and taking their needs and objectives into account [42]. Opinions of key stakeholders can be collected in different ways: through interviews, social media, and instant messaging platforms [43,44]. More traditional techniques include questionnaires, round tables, and discussion groups. In general, stakeholder analysis is used in the very early stages of public project planning to analyse the context and identify and examine the different actors that have the power to promote or slow down decision making [45]. In this project, following on-site inspections, stakeholder involvement has the purpose to collect information and data useful to analysing the context. Moreover, through the BOCR analysis, the set of indicators used to assess the criticalities and priority of interventions are identified.

3.2. Urban Regeneration Indicators

A series of specific indicators have been identified to assess urban quality, support the design choices, and the monitoring phase of the interventions suggested pursuing the objective of a sustainable city. The purpose of the indicators is to improve communication, transparency, effectiveness, and accountability in the management of a highly complex project. These indicators should also help to describe easily the state of the system and to assess sustainable development objectives. In the process of measuring progress, they should also stimulate action to better achieve these objectives [46,47]. Indicators may be used for preliminary investigation, ongoing monitoring, or evaluation of final performance. Indicators can be used for ex ante, in itinere, or ex post evaluations. The importance of indicators as tools for knowledge and analysis, design, and monitoring has already been stressed in several areas. There are many examples of sets of indicators at both national and European levels [48–55]. Extensive literature agrees that indicators should meet the following requirements: accessibility—they must be measurable and easy to sample; operability—they must be directly and easily usable; reliability—must have minimum values of systematic error; and representativeness—they must be clearly related to the phenomenon or characteristic to be detected or monitored. Choosing the right information that makes up the matrix is essential to build synthetic indicators that are clear and easily interpreted [56–58]. The final aims should be pursued without unnecessarily increasing the burden of information. Consequently, it is necessary to avoid all those confusing phenomena, such as redundancy, excessive generality, or lack of specific relevance of the information collected, which would be detrimental to effectiveness and efficiency [47]. Sustainable urban development depends on the policies adopted, the infrastructure present, the assessment of socio-economic factors, the use of resources, emissions, and all other factors contributing to improving the prosperity and quality of life of cities. Proper measurement and evaluation of the urban situation will enable planners and policymakers to better identify the potential of different areas and to respond by pursuing realistic and sustainable goals with a long-term perspective. The indicators identified for the study area have been classified according to five categories, reported in Table 1, in order to analyse the infrastructural aspects related to transport and urban morphology related to the context. In Appendix A Table A1, a detailed description of all the indicators used is given.

3.3. SWOT Analysis

The SWOT analysis is a strategic planning tool used to evaluate strengths (S), weaknesses (W), opportunities (O), and threats (T) of an urban context, in order to identify the points on which to base the redevelopment project. It is used as an aid in decision making and allows the analysis of internal and external factors of a particular environment [59,60]. The structure of the SWOT analysis is a 4-quadrants matrix that allows decision makers to divide a given problem according to existing factors in the current situation (i.e., strengths and weaknesses) and possible future factors that could occur (i.e., opportunities and threats) [60]. The SWOT analysis has been used in different contexts as a tool to validate and guarantee the effectiveness of proposed strategies and as a support for evaluating alternative scenarios [61–65]. The categories of information collected in the SWOT analysis are: spatial characteristics (internal and external to the project area) and temporal characteristics (present and future). These categories are then divided into qualities, useful for the achievement of the objectives, and harmful qualities preventing the achievement of the objectives. Data provided by the SWOT analysis represent a first summary and interpretation of the information collected, as well as of what emerged from the meetings with stakeholders. The SWOT analysis is extremely useful in the first phase of processing and interpreting state-of-the-art data but does not provide information on the degree of priority of one intervention over the others [12]. It is a qualitative social science tool but quantifiable matrices, used to compare all four attributes, cannot be obtained.

Table 1. Categories of indicators for sustainable urban development.

1. Environmental aspects
Improve the sustainability of the city and contain its expansion, focusing on improving environmental conditions in parallel with the implementation of the functions provided. Urban regeneration projects must ensure health and well-being through the application of bio-climatic principles.
2. Economic aspects
Develop economic benefits for investors, public authorities, and citizens. Projects must balance the technical quality, timing, implementation efficiency, and overall cost of the intervention in coherence with the general development of the city as defined by the general urban and planning instruments. Finally, projects must have the capacity to produce lasting economic growth in the urban area.
3. Infrastructural aspects
Promote active mobility and public transport that contribute to reducing the environmental impact of mobility but also to improving citizens' lifestyles. The regeneration of road space must be integrated with the regeneration of the urban fabric, improving the quality of public space.
4. Urban aspects
Rebuild brownfield or degraded areas in a balanced and fully integrated way with the rest of the city, producing attractiveness for users–residents, city users, and businesses and investors. Improve connections, define a sustainable urban layout, balance functions. The objective is to build a relational space integrated in the urban context, a safe and flexible environment where civil coexistence and social aggregation are favoured.
5. Social aspects
Promoting cohesion and articulation of the social mix, offering adequate personal and family services, tailored to the real needs of the urban space. To develop a sense of belonging and identity by meeting the challenges of urban development.

3.4. BOCR Analysis

The analytic network process (ANP) is used to get a quantitative analysis of the factors evaluated by the SWOT analysis [62]. The ANP represents the decision problem as a network in which the elements of the problem are linked through interdependency relationships and at different levels [66,67]. In this study, an analysis of the BOCR, with indicators able to identify the priority of actions to be taken for the redevelopment of an urban area, allowed an in-depth analysis in the meta-design phase.

In the literature, the application of the ANP method for the evaluation of urban and spatial transformation scenarios is widely treated [68–70]. The basic steps for the development and application of an ANP model are:

1. Problem structuring and construction of the decision-making model;
2. Compilation of the pairwise comparison matrices;
3. Formation of the supermatrices;
4. Aggregation of results.

Once the model has been built, it is necessary to identify the relationships among the network elements. The decision-making model can be structured in two ways—simple network model: relations among clusters of criteria, alternatives, and nodes; or complex network model: existence of a control hierarchy giving rise to sub-networks, each organised according to the simple network structure. Figure 2 shows the complex network structure followed in this study.

After the schematisation of the model, the evaluation is carried out using the method of pairwise comparisons. The procedure is carried out by rotating each network element as "parent" and making a preference judgement between all "child" elements connected to it. At this stage, a binary preference relationship is established between the elements of comparison. Judgements are made according to Saaty's "fundamental scale" [71], i.e., a 9-point numerical scale that allows the preference between the two choice options to be identified.

Pairwise comparisons take place at both cluster and node level. The numerical values assigned in the evaluation phase form matrices of pairwise comparisons of the elements. Once these matrices have been completed, the priority of the respective components can be determined through the main eigenvector of the matrix, which represents the synthesis of the preference judgements expressed. There are three supermatrices within the ANP: initial supermatrix—composed of the priority vectors obtained from the pairwise comparison, it represents the influence flows identified by the network; weighted supermatrix—obtained by multiplying the values of the initial supermatrix by the matrix obtained from the comparison between clusters, it also serves to take into account the different weights attributed to the clusters; limit supermatrix—obtained by multiplying the weighted supermatrix by itself a number of times tending to infinity, its columns contain the vector of priorities of the analysis elements. In the case of simple network, the priority ranking of the alternatives is obtained directly from the boundary supermatrix, whereas, in the case of complex network, further aggregation of the results with the corresponding formulae is required. Finally, a sensitivity analysis is carried out to check the final preference ranking as the weights assigned to the control criteria change.
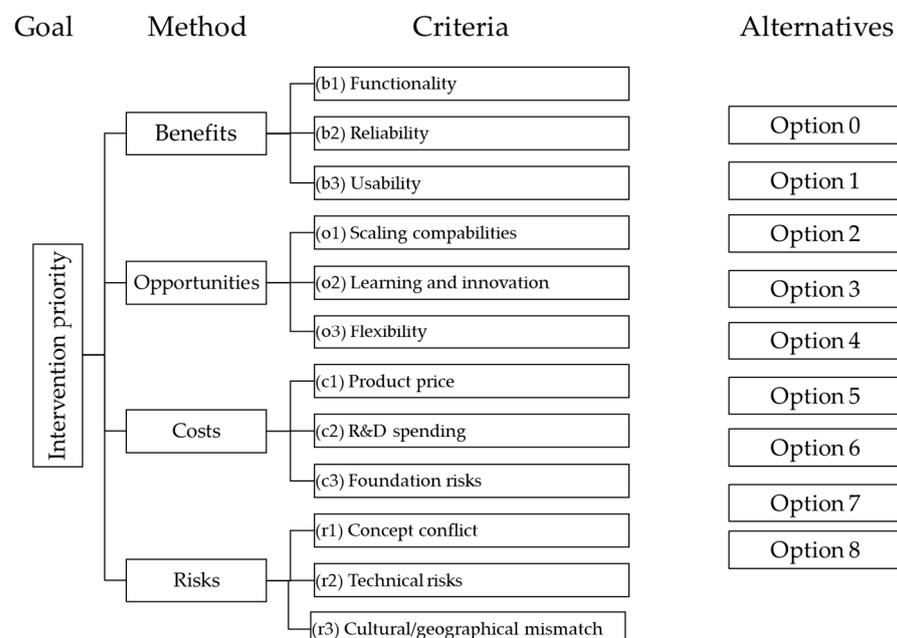

Figure 2. Complex network structure followed for the BOCR analysis.

The most common case of a complex network model with control hierarchies giving rise to sub-networks is the benefits, opportunities, costs, risks (BOCR) model, which, similarly to the strengths, weaknesses, opportunities, threats (SWOT) analysis, refers to two-time dimensions:

- Benefits and costs are measured in the present;
- Opportunities and risks are estimated on the basis of expectations of impacts of the intervention and in the long term.

  In detail, it identifies:

- Benefits: favourable aspects identified in the analysis of the area;
- Opportunities: potentially favourable aspects deriving from the planned project actions;
- Costs: negative aspects identified in the analysis of the area;
- Risks: potentially negative aspects that may be caused by the project actions.

In this model, the complexity of the problem is broken down into four sub-networks: benefits, opportunities, costs, and risks. Each of these four sub-networks contains five clusters of environmental, economic, infrastructural, urban, and social aspects. Each sub-

network produces a ranking of alternatives that will then be correlated with those of the other sub-networks to obtain an overall result that provides a ranking of choice options.

4. Case Study

The proposed case study for the urban redevelopment of degraded areas is the Canal Port of Rimini (Figure 3), a maritime city in northern Italy along the Adriatic coast. The Canal Port consists of the original mouth of the river Marecchia and connects the historic centre of the city and the promenade with the district of San Giuliano a Mare. Rimini is a tourist centre of international importance, mainly based on the beach and the sea. Tourism is also due to the offer linked to fairs and conferences, events, and the hotel industry. Although the Canal Port is close to the historic centre and is the only link between two important parts of the city, it is still in a state of decay and impoverishment.

Figure 3. The Canal Port of Rimini.

The Canal Port is located between two recently redeveloped areas, the XXV April Park and the seafront called "Parco del Mare" [72]. A study of the microclimate of these two areas [73] carried out before the redevelopment showed that the average values of temperature and humidity, both annual and summer, are within the standard values of temperate climates and the prevailing directions of the winds are east and northwest (wind from the sea). The modelling analysis of the two areas showed that, during the day, the main heating effect (heat island) occurs along the coast, while, at night, the thermal phenomenon is greater in the urbanised hinterland. This trend strongly supports the choice of urban regeneration related to the "Parco del Mare" as a mitigating intervention on the local microclimate. In contrast, precipitation does not show a particular trend (there is neither an increase nor a decrease in the average cumulative annual value). However, there is a correlation in years when the value of precipitation is above the average of the period (730 mm) with lower values of air temperature. Higher values of average annual air temperature, in some cases, are related to the drier years instead.

By its shape and nature, it is a natural urban mobility space, not intrinsically assuming the function of attraction pole. However, many points of high interest are present along its course. On the left of the port, there are activities closely related to fishing: shipyards and mechanical workshops, the wholesale fish market, and boat shops. On the right side of the canal, there are several historical and cultural attractions, such as Porta Galliana and the lighthouse, which, if well-connected, could increase the charm of the route.

To enhance the area of the Canal Port and increase the flow of tourism, in the next phase of urban regeneration, focus should be placed on the implementation of an efficient mobility system. Different transport systems can be present along the Canal Port: pedestrian, cycling,

vehicular, and nautical. However, inadequate design of transport spaces has led to poor and inefficient use of space, resulting in an infrastructure degradation of the area. From the point of view of sustainable mobility, connections with the main nodes, such as the railway station, have large gaps, not constituting a real alternative to the use of private cars. The area of the quays is subject to frequent flooding, discouraging citizens and tourists from using them. As part of the renovations in the 1980s, several water channels were built to drain the drainage fluid. However, these are inadequate, since they fill with water becoming stagnant and, especially in summer, causing the formation of algae and the spread of mosquitoes that discourage tourists from exploring the area. In addition, access to the quays is possible only through stairs, which greatly reduce the usability of the area and represent serious architectural barriers. A successful project leading to a shift from car mobility to soft mobility will necessarily involve greater integration between urban space of the quays and road infrastructure, increasing the flexibility of transport spaces and promoting more sustainable systems. The peculiar context of the study area, the presence of different transport systems, and actors gravitating around the Canal Port require a structured and reliable assessment method to find optimal solutions in order to redevelop the area. The Canal Port of Rimini is a useful example to evaluate an approach of urban regeneration considering several aspects at the same time: urban planning, infrastructure, social cohesion, and sustainability.

5. Application

In this section, the method described above is applied to the case of the Canal Port of Rimini. The complex morphology of the territory has allowed a detailed analysis of several aspects related to sustainable mobility and infrastructure. The methodology suggested can be used in similar cases in the future as a tool for evaluating alternative scenarios in decision making.

5.1. Stakeholders Involvement

During the data collection phases, a survey was carried out among the main stakeholders involved. A questionnaire was distributed to them in order to identify the most critical aspects and to quantify the parameters related to urban quality.

A multiple-choice anonymous questionnaire was sent online not only to public or private bodies, but also to all the actors who make daily use of the services of the Canal Port. Table 2 shows the main stakeholders involved in the analysis to collect their opinion. The questionnaire was sent to 30 different actors and it was divided into two sections: Section 1 about infrastructure and transport systems and Section 2 about public space. In the end, two open questions asked about the phenomena of urban and social degradation and about the main shortcomings and/or criticalities of the area under consideration. The entire questionnaire is reported in Appendix A, Table A2.

Table 2. List of stakeholders involved in the project.

Type of Stakeholders	Area of Expertise
Associations	- Nautical - Civil Protection
Institutions	- Mobility - Infrastructure - Public transport - Environment

The questionnaire showed that driving private motorised vehicles is safe enough and, on average, infrastructures are perceived as satisfactory, but considerable problems come from the traffic. Also, traveling by public transport is considered safe, even though

shortcomings in intermodality have emerged. As for cycle–pedestrian paths, they are generally well-lit and signposted and perceived as safe, even though they are scarcely shaded and not adequate to the needs. In contrast, parking lots are rated very negatively, especially for the small number of spaces available and the long time needed to find a parking space. The average expectations of stakeholders for public space are fulfilled satisfactorily, as well as for lighting and safety. However, some unsatisfactory elements remain, such as the scarce presence of green and urban furniture, the ineffective integration of the Canal Port area with the urban landscape of Rimini, poor cleaning and maintenance, as well as the presence of architectural barriers. Finally, the quality of water in the Canal is considered very low due to dirt and lack of water recirculation.

5.2. Urban Regeneration Indicators

There is no standard methodology for analysing urban sustainability through a predefined set of indicators. Each case study is unique and depends on the specific characteristics of its context. Therefore, a matrix of indicators for the Canal Port of Rimini was specially built. The selected indicators were subdivided on the basis of the five previously mentioned categories. Then, they were further divided into nodes to simplify the BOCR analysis described later. Each indicator was evaluated according to its own rating and unit of measure.

In the case of Rimini Canal Port, the inclusion and exclusion criteria adopted in the selection of indicators were as follows:

- Detectability and availability of information;
- Reliability and accuracy of data and sources;
- Comprehensibility and easy reading and interpretation;
- Validity and completeness of output information;
- Relevance in relation to the objectives set.

Within the environmental category, for example, indicators related to surface emissions, noise protection, and air quality were not taken into consideration, as they are difficult to find and not relevant to the case study under consideration. Being a port area, indicators such as permeability of the soil and level of exposure to flood risk are of greater importance. Rimini is a tourist city of international fame; therefore, all indicators related to tourism, such as business activities, productive activities in the area, the presence of points of interest, and the quality of public space, were of fundamental importance. In contrast, indicators such as the number of cars and motorcycles for residents, the detection of speeds within the town, road capacity, and service level were not taken into account for the difficulty in finding relevant data. In a study of urban regeneration, in order to encourage sustainable mobility, several indicators were found in the literature related to the presence of sharing (car sharing, bike sharing, and e-scooter sharing). In the case of Rimini, these indicators were not taken into account, as no accurate and updated data on the number of cars, bicycles, and e-scooters in the city and the coverage area were available.

The outputs provided by these indicators are very important because, when interpreted in a systemic way, they provide the picture of the state of the art, from which pilot actions can be deduced by means of the benefits, opportunities, costs, and risks (BOCR) analysis. The evaluation of the score obtained from the set of indicators was carried out by comparing the data collected for the project area with a wider area, including the urban areas surrounding the Canal Port.

Some considerations emerged from this study to understand which functions and services were already available in the project area and which were missing. The two comparison areas are shown in Figure 4. Table 3 shows the indicators taken into consideration in the analysis for the project area.
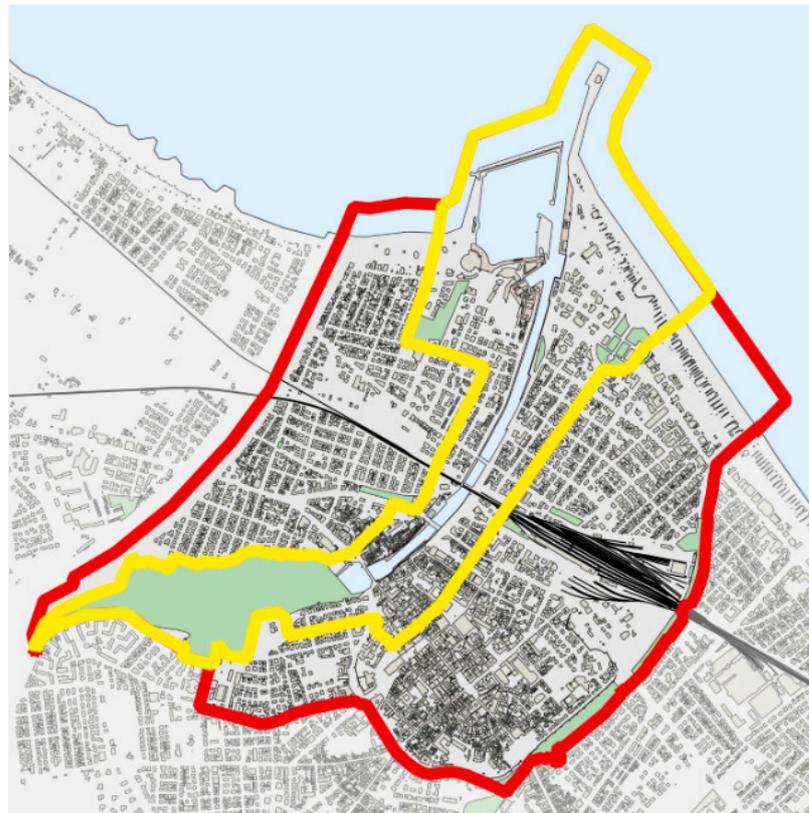
Figure 4. Areas for the analysis of indicators: yellow—project area; red—target area.

5.3. SWOT Analysis

The analysis of the context, on-site inspections, and the participatory plan with stakeholders showed criticalities and potentialities present in the area of the Canal Port through the following SWOT analysis (Table 4).

Results of the SWOT analysis showed that: (a) the main strengths of the Canal Port of Rimini are tourism, fishing, and cultural events taking place in this area; (b) the weaknesses are related to infrastructure, architectural, and degradation problems making the area difficult to use and unattractive; (c) the main opportunities include the growth of the area as a centre of attraction for tourism and for port activities; and (d) the greater challenges are the co-operation of the various actors insisting around the Canal Port and the strategic and efficient use of the spaces available. Starting from the SWOT analysis, different design proposals can be conducted to overcome the emerging critical issues. The priority of the interventions suggested for the redevelopment of the study area is evaluated through the following BOCR analysis.

5.4. BOCR Analysis

In the case of the Canal Port of Rimini, the priority of intervention among the redevelopment actions identified by the previous analyses are going to be evaluated. The alternatives considered refer to the current situation (option 0), i.e., the no-intervention option, and to the possible intervention solutions identified by the previous analysis phases. For the construction of the sub-networks benefits, opportunities, costs, and risks concerning the Rimini Canal Port, reference is made to the analyses carried out previously and proceeds as follows:

- Benefits and costs sub-networks emerge from the analysis of indicators carried out;
- Opportunities and risks sub-networks derive from the SWOT analysis.

Table 3. List of urban regeneration indicators.

Cluster	Node	Indicator	Source	Relative Score	Normalised Rating	Avg	B/C
1: Environmental aspects	Naturality index	Naturality index	OpenData—Municupality of Rimini	Class 2	2	2.0	C
	Level of exposure to flood risk	Level of exposure to flood risk	Hydrogeological plan—Emilia Romagna Region	P5	4	4.0	C
	Soil permeability	Soil permeability	OpenData—Municupality of Rimini	Class 2	9	9.0	B
2: Economic aspects	Commercial and productive activities	Commercial activities	Cadastral office	31%	7	8.5	B
		Production activities related to the canal port	On-site inspection	0.12/ha	10		
	Real estate value	Real estate value	Real estate market observatory	2650 EUR/m^2	7	7.0	B
	Hotel and residence capacity	Hotel and residence capacity	OpenData—Municupality of Rimini	88.18 beds/ha	7	7.0	B
3: Infrastructural aspects	Quality of road infrastructure	Presence of 30 km/h zones	OpenData—Municupality of Rimini	44%	10	8.6	B
		Presence of restricted traffic zone	OpenData—Municupality of Rimini	4.6%	10		
		Presence of pedestrian zones	OpenData—Municupality of Rimini	0.1%	10		
		Road accidents	OpenData—Municupality of Rimini	15.15/10 years	10		
		Perceived safety of infrastructure	Survey	5	5		
	Parking quality	Presence of car parks	OpenData—Municupality of Rimini	0.030 m^2/summer resident	2	1.5	C
		Presence of electricity columns	OpenData—Municupality of Rimini	1	1		
	Public transport services	Presence of digital parking management systems	On-site inspection	84.8%	10	7.8	B
		Bus stop coverage	Public transport company (START E-R)	100%	10		

Table 3. *Cont.*

Cluster	Node	Indicator	Source	Relative Score	Normalised Rating	Avg	B/C
	Quality of bicycle and pedestrian mobility	Population served by public transport	Public transport company (START E-R)	5	5	8.3	B
		Transport intermodality	Survey	6	6		
		Perceived quality of public transport services	Survey	0.58 m/summer resident	8		
		Cyclo-pedestrian index	OpenData—Municupality of Rimini	100%	10		
		Accessibility of cycling and walking routes	OpenData—Municupality of Rimini	7	7		
		Perceived quality of cycling and walking routes	Survey	1257 m	8		
	Continuity of the cycle–pedestrian network	Continuity of the cycle-pedestrian network	On-site inspection	6.67%	10	10.0	B
	Crossability of the Canal Port	Degree of implementation of the cycle–pedestrian network	SUMP	83.5%	8	5.5	C
		Degree of navigability of the Canal Port	On-site inspection	406.2 m	3		
4: Urban aspects	Quality of public space	Incidence of outdoor public spaces used as squares or meeting places	On-site inspection	32.9 m^2/summer resident	10	7.3	B
		Accessibility of public spaces	On-site inspection, Geographic Information System	100%	10		
		Perceived quality of public space	Survey	4	4		
		Integration of the Canal Port into the Urban Landscape	Survey	5	5		
	Coverage ratio	Coverage ratio	OpenData—Municupality of Rimini	40.8%	6	6.0	B
	Population density	Population density	OpenData—Municupality of Rimini, Geographic Information System	44.56 inhabitants/ha	4	4.0	C
	Functional variety of buildings	Functional variety of buildings	Cadastral office	4	4	4.0	C

Table 3. *Cont.*

Cluster	Node	Indicator	Source	Relative Score	Normalised Rating	Avg	B/C
	Phenomena of urban decay	Phenomena of urban decay	Survey	3	3	3.0	C
	Public greenery	Presence of green area	OpenData—Municupality of Rimini	33.0 m^2/summer resident	9	8.5	B
		Presence of trees	OpenData—Municupality of Rimini	5.92/ha	8		
5: Social aspects	Territorial coverage and level of accessibility of education services	Coverage of childcare services	Geographic Information System (SIT)	51%	7	6.2	B
		Primary school coverage (5–14 years old)	Geographic Information System (SIT)	36%	7		
		Secondary school coverage (15–19 years old)	Geographic Information System (SIT)	41%	5		
		Accessibility of childcare services	Geographic Information System (SIT)	64%	7		
		Primary school accessibility	Geographic Information System (SIT)	66%	6		
		Secondary school accessibility	Geographic Information System (SIT)	38.3%	5		
	Coverage of social and health services	Coverage of socio-medical services	OpenData—Municupality of Rimini, on-site inspection	0.85/1000 inhabitants	10	10.0	B
	Coverage of recreational and sporting activities	Coverage of recreational and sporting activities	OpenData—Municupality of Rimini, on-site inspection	0.34/1000 inhabitants	8	8.0	B
	Coverage of cultural activities	Coverage of theatres and cultural associations	On-site inspection	2	6	7.3	B
		Cultural and entertainment events	Tourist office	6/year	9		
		Presence of points of touristic interest	OpenData—Municupality of Rimini,	0.19/ha	7		
	Covering places of worship	Covering places of worship	OpenData—Municupality of Rimini,	0.048/ha	9	9.0	B
	Phenomena of social degradation	Phenomena of social degradation	Survey	4	4	4.0	C

Table 4. Main outcomes of the SWOT analysis.

Strengths	Weakness
- Presence of different attractions for tourists	- Promiscuity between areas dedicated to fishermen's activities and areas for citizens/tourists on Piazzale Boscovich
- Important fishing practice of different kind	- Reduced capacity of the current ferry service for the crossing of the Canal Port
- Existing projects of tourist links for the redevelopment of the seafront	- Interruption of the waterfront route currently under construction (Parco del Mare)
- Presence of important historical and cultural areas ("Ponte di Tiberio" Bridge and "Porta Galliana")	- Discontinuity of the cycle paths at the service areas along the Via Destra del Porto
- Redevelopment of green areas (XXV Aprile Park)	- Poor safety of the routes on the docks and irregularities of the moorings
- Area used for cultural events of the municipality (concerts or events)	- Architectural barriers that hinder access to the docks and inaccessibility during floods
- Presence of associations for nautical activities (nautical club and sailing club)	- Bottleneck that does not allow the construction of a cycle path near the Tiberius Bridge
	- Modernisation of the slipway in the port area
	- Water cleaning
	- Port entry security from the maritime front

Opportunities	Threats
- Creating better quality urban spaces	- Raising funding for the creation of new areas
- Functional spaces for loading and unloading goods and at the same time attractive for tourists	- Shape of the city areas representing an obstacle to network continuity
- Implementation of the ferry service in collaboration with START (local public transport)	- Involvement of many different players with different needs
- Exchanger parking located in a strategic position to promote intermodality	- Management of canal hydraulics (spillway of Marecchia river)
- Reconnection of cycle–pedestrian paths and interconnection of socio-cultural poles	- New berths may be empty after the requalification of the canal port
- Raising docks and regularising moorings	- More users may need additional parking in the port area

From the indicator analysis described, a score was obtained for each indicator with a rating scale from 1 to 10. From this rating, an average assessment for each node in the network can be identified. Then, nodes can be sorted into nodes with positive or negative rating. Nodes obtaining a sufficient rating ($\geq$6/10) are classifiable as "benefits" (B), while those that obtain an insufficient score (<6/10) are classifiable as "costs" (C). Table 3 shows scores and sorting of all analysed indicators. From the SWOT analysis, opportunities for improvement in the Canal Port area were identified as reported in Table 5. These potentials can be classified as nodes within the clusters of the "Opportunities" network criteria.

Table 5. "Opportunities" of the SWOT matrix classified as nodes within the clusters.

Cluster	Nodes
2. Economic aspects	Realisation of the new Fish Market
	Construction of new tourist links (Croatia)
3. Infrastructural aspects	Exchanger parking located in a strategic position to promote intermodality
	Restitching of cycle–pedestrian paths and interconnection of socio-cultural poles
	Cycle connection near the Tiberius Bridge
	Increase of Zone 30 and cycle–pedestrian paths
	Implementation of the SUMP to improve the connectivity of the urban fabric
4. Urban aspects	Creating better quality urban spaces
	Functional spaces for loading and unloading goods and at the same time attractive for tourists
	Raising docks and regularising moorings
	Redevelopment of the docks and consequent improvement of quality and safety of public spaces
	Redevelopment of the slipway

The same method may be applied for the risk subnet. Risks can be deduced from the sub-matrix "Threats" of SWOT collecting the "threats" that could hinder the redevelopment project. Risk factors for the success of project interventions can be identified in this list of threats reported in Table 6 divided into clusters.

Table 6. "Risk" sub-network classified as nodes within the clusters.

Cluster	Nodes
1. **Environmental aspects**	Management of the hydraulics of the canal (diverter of the Marecchia river)
2. **Economic aspects**	Insufficient funds for the creation of new areas
	Involvement of many different actors with different needs that do not find a common point
3. **Infrastructural aspects**	Increase in demand for parking in the Canal Port area
4. **Urban aspects**	Shape of urban areas that represents an obstacle to the continuity of the network
5. **Social aspects**	Disuse of spaces after the redevelopment of the Canal Port

Once all nodes in the network have been classified within their respective clusters and the four sub-networks, it is possible to proceed with the BOCR analysis. The Superdecisions software (http://www.superdecisions.com/ accessed on 11 February 2022) was used as a tool to support the analysis. It is a proven tool that guides the development of the model and automatically generates the comparison matrices. The development of the model coincides with the assessment phase and has two levels:

- Comparison between clusters: more general;
- Comparison between nodes: more specific.

Figure 5 shows the sub-network of benefits, which, as can be seen, is structured on different clusters connected by dependency relationships with the cluster of alternatives that provides the preference option resulting from the comparison of the individual nodes. Subsequently, the other sub-networks are constructed with their respective interdependency relationships.
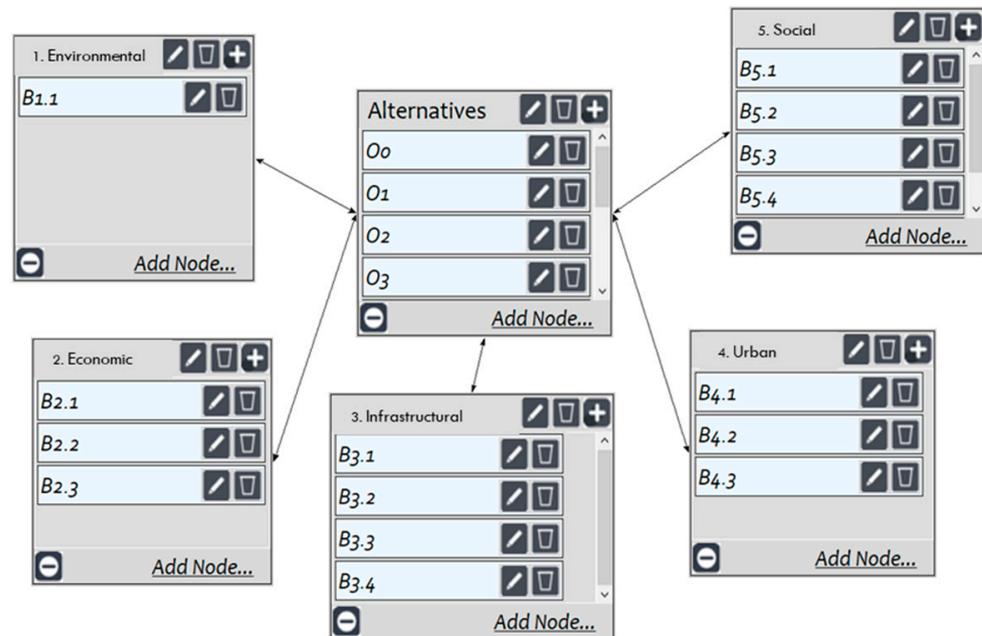

Figure 5. Benefits sub-network realised with Superdecisions software.

Once the decision network consisting of the sub-networks benefits, opportunities, costs, and risks has been defined, the interdependence relationships between clusters and nodes are established. The alternatives cluster is related to all other clusters, while the other clusters may or may not be related to each other. Then, a pairwise comparison is carried out by answering a questionnaire to identify which of the two examined alternatives is of greater relevance. Following the fundamental scale of Saaty, the score given to each answer follows a numerical scale of 9, allowing the choice between the two alternatives. From the three supermatrices, a final priority ranking is determined, which takes all previously identified relationships into account. Table 7 shows the priority of action of the eight proposed alternatives obtained from the BOCR analysis.

The BOCR analysis shows that the degree of priority in the implementation of the redevelopment of the Rimini Canal Port area is as follows:

1. Improvement of bicycle and pedestrian routes;
2. Requalification and raising of quays and regularisation of moorings;
3. Creation of better quality urban spaces (redevelopment of P.le Boscovich);
4. Construction of the new Fish Market;
5. Realisation of a new car park;
6. Construction of new tourist links (Croatia);
7. Implementation of the "Traghetto Vittoria" service;
8. Redevelopment of the slipway;
9. Maintenance of the current configuration (no intervention).

Table 7. Overall priority ranking.

Alternative	Description	Priority
Option 0	Maintaining the current configuration of the Canal Port area. This solution entails considerable criticalities of an urbanistic nature (inadequacy of the docks), infrastructural (interruptions to the cycle–pedestrian network), and social (lack of community spaces).	5.74%
Option 1	Creation of better quality urban spaces and improvement of existing community spaces (P.le Boscovich).	15.51%
Option 2	Implementation of the ferry service in cooperation with START (local public transport).	7.05%
Option 3	Interchange car park strategically located to promote intermodality.	9.63%
Option 4	Reconnection of cycle and pedestrian paths and interconnection of socio-cultural poles of attraction.	17.28%
Option 5	Redevelopment and raising of docks and regularisation of moorings and consequent improvement of the quality and safety of public spaces.	16.83%
Option 6	Construction of the new Fish Market.	12.72%
Option 7	Construction of new tourist connections (Croatia).	8.35%
Option 8	Redevelopment of the slipway.	6.89%

6. Discussion and Conclusions

This research suggests a method to support and justify project proposals in the complex case of the regeneration of port areas. The aim is to show how important sustainable mobility is within a deep urban redevelopment of a historical context, such as the Canal Port of Rimini (Italy). The reconnection of cycle–pedestrian paths, the redevelopment of the quays, and the creation of urban spaces for tourists and citizens are possible solutions to improve the quality of life in a degraded and underutilised urban area.

The proposed methodology reflects the sustainability criteria promoted by the Interreg Europe program. The multidisciplinary nature of sustainability follows the principles of the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002. Environmental protection, economic development, and social welfare are considered and well-balanced since environmental quality cannot be separated from people's well-being. In 2015, 17 objectives were defined within the framework of the 2030 Agenda for Sustainable Development [74], 11 of which aim to "make cities inclusive, safe, resilient and sustainable", criteria being the basis of this research project.

The combination of different analysis methodologies, such as stakeholder involvement, SWOT analysis, and the ANP-BOCR method, allowed for an objective and reliable result. A set of indicators described in a simpler and more detailed way the current state of the study area, obtaining a qualitative and quantitative evaluation of the analysed aspects. The selected indicators follow the parameters provided at national and European levels adapted to the context considered [48–55]. Such indicators can be used in other similar contexts, since they evaluate the environment under consideration not only to the current state, but also after the future requalification of the area, monitoring the progress of the project and comparing the two different scenarios.

In the literature, several studies use similar methodologies to solve decision-making problems in urban contexts [12,45,62,70]. The ANP analysis is often used in combination with other analytical methodologies, such as SWOT or BOCR or questionnaires to stakeholders. As shown, both qualitative and quantitative aspects being involved, reliable results on which to base the final choice of decision makers (DM) are difficult to obtain [30]. ANP analysis is often used in combination with other analytical methodologies, such as SWOT

or BOCR or questionnaires to stakeholders. As shown, both qualitative and quantitative aspects being involved, reliable results on which to base the final choice of decision makers (DM) are difficult to obtain.

Different solutions for the urban regeneration of the Canal Port were suggested by the SWOT analysis. Strengths, weaknesses, opportunities, and risks were estimated defining various project proposals for the requalification of the area. The SWOT analysis is extremely useful for a first interpretation of the data collected from the state-of-the-art examination but does not provide information on the degree of priority of the interventions to be carried out. A BOCR model—a particular subcategory of the ANP method—was developed to identify a ranking of necessary interventions resulting from the analysis of criticalities and potential issues. In the case of the Canal Port of Rimini, the requalification interventions to be carried out were considered among those emerging from the previous analysis. As for the redevelopment of harbour areas, the most relevant interventions are the improvement of cycle–pedestrian paths, the requalification of the docks, and the regularisation of the moorings. The reconnection of cycle paths and the construction of pedestrian access to the platforms represent low economic and environmental impact for the municipality. However, within an urban transformation, they can greatly contribute to improving the quality of life both of inhabitants and tourists.

After this analysis, an urban regeneration project was developed according to the proposed priority scale [75]. The design phase began with the identification of the height to lift the docks in order to solve the problem of frequent flooding due to tides and adverse weather conditions. Access to platforms and public spaces were designed to identify new functions for the benefit of the community. As a result of the raising of the docks, the cycle and pedestrian paths along the two banks of the Canal Port were revised accordingly. To verify the effectiveness of urban regeneration actions and the validity of the design choices made, the same indicators used in the planning phase will be reused in the monitoring phase to verify changes in relation to the starting situation. These changes should also aim to increase the economic productivity of the area.

Further development of research should deepen a study on the economic feasibility of the proposed interventions.

Appendix A

Table A1. Indicators' description and unit of measure.

1. Environmental aspects			
Node	**Indicator**	**Description**	**UoM**
Naturality index	Naturality index	Classification according to an increasing naturality gradient from 0 (absence of vegetation cover due to anthropogenic causes) to 10 (climax vegetation).	Rating 0–10
Level of exposure to flood risk	Level of exposure to flood risk	Incidence of the number of buildings and inhabitants living in the areas affected by flood events according to the hazard scenarios defined by the PAI of the Po River Basin Authority.	Rating 1–6
Soil permeability	Soil permeability	Determination of soil permeability classes, i.e., the capacity of the soil under saturated conditions to be traversed by a flow of water in a vertical direction.	Rating 1–3
2. Economic aspects			
Node	**Indicator**	**Description**	**UoM**
Commercial and productive activities	Commercial activities	Degree of business activity in the study area	%
	Production activities related to the canal port	Presence of productive activities linked to the canal port to navigation	no/hectare
Real estate value	Real estate value	Property value assessment within the study area	EUR/m^2
Hotel and residence capacity	Hotel and residence capacity	Estimation of hotel and non-hotel capacity	Beds/hectare
3. Infrastructural aspects			
Node	**Indicator**	**Description**	**UoM**
Quality of road infrastructure	Presence of 30 km/h zones	Presence of speed restricted areas	%
	Presence of restricted traffic zone	Identification of areas subject to limited traffic zones	%
	Presence of pedestrian zones	Identification of pedestrian areas	%
	Road accidents	Index to assess road safety based on the number of accidents over the last 10 years	no/10 years

Table A1. *Cont.*

	Perceived safety of infrastructure	Qualitative index obtained through a questionnaire concerning the perceived safety of infrastructure users	Rating 1–10
Parking quality	Presence of car parks	Number and location of parking spaces in the area	no/inhabitant no/summer resident
	Presence of electricity columns	Number and location of places for electric cars to encourage electric mobility	no
	Presence of digital parking management systems	Presence of digital systems (apps or sites) for parking management and payment	yes/no
Public transport services	Bus stop coverage	Index indicating the coverage of public transport services in the territory	%
	Population served by public transport	Index indicating the accessibility of the population to the public transport service	%
	Intermodalità dei trasporti	Parameter derived from the degree of satisfaction of public transport service users regarding intermodality of transport	Rating 1–10
	Perceived quality of public transport services	Parameter derived from the degree of satisfaction of public transport service users with the quality of the service	Rating 1–10
Quality of bicycle and pedestrian mobility	Cyclo-pedestrian index	Linear extension of bicycle and pedestrian paths and spaces available to residents in the consolidated city	m/inhabitant m/summer resident
	Accessibility of cycling and walking routes	The indicator aims to check the coverage of cycling and walking routes with regard to points of interest, i.e., whether the major points of attraction are accessible via dedicated soft mobility routes	%
	Perceived quality of cycling and walking routes	Parameter derived from the degree of satisfaction of cyclists and pedestrians with the quality of the routes dedicated to them	Rating 1–10
	Continuity of the cycle-pedestrian network	Degree of continuity of bicycle and pedestrian routes through the identification of discontinuity elements present on sections	m

Table A1. *Cont.*

Node	Indicator	Description	UoM
	Degree of implementation of the cycle-pedestrian network	Degree of continuity of the bicycle and pedestrian network by comparing existing and planned networks	%
Crossability of the Canal Port	Degree of navigability of the Canal Port	The parameter is intended to measure the level of longitudinal permeability (navigability) of the canal port taking into account possible impediments: draught, height of bridges	%
	Ease of crossing the Canal Port	The parameter is intended to measure the level of transversal permeability (crossing) by measuring on average every how many metres there is a bridge	m

4. Urban aspects			
Node	**Indicator**	**Description**	**UoM**
	Incidence of outdoor public spaces used as squares or meeting places	Presence of public areas intended as meeting places and for events, demonstrations, etc.	m^2/inhabitant m^2/summer resident
	Accessibility of public spaces	Parameter for measuring the accessibility of public spaces by residents and tourists on foot	%
Quality of public space	Perceived quality of public space	Parameter derived through the citizens' rank regarding the quality, adequacy, safety, and usability of public spaces dedicated to them	Rating 1–5
	Integration of the Canal Port into the Urban Landscape	The parameter aims to measure the extent to which the perception of the natural and urban landscape is integrated and enhanced	Rating 1–5
Coverage ratio	Coverage ratio	Useful indicator for identifying the incidence of covered area and its arrangement in relation to the total area	%
Population density	Population density	Indicator for understanding the distribution of population density in the area	Inhabitant/hectare
Functional variety of buildings	Functional variety of buildings	Identification of the presence and distribution of use functions in the area	%

Table A1. *Cont.*

Phenomena of urban decay	Phenomena of urban decay	Identification of spaces or buildings subject to degradation	Rating 1–5
Public greenery	Incidenza del verde	Identification of green and sports areas present per inhabitant	m²/inhabitant m²/summer resident
	Presence of trees	Identification of trees in the area	no/hectare

5. Social aspects			
Node	**Indicator**	**Description**	**UoM**
Territorial coverage and level of accessibility of education services	Coverage of childcare services	Value to indicate the actual availability of places that the service, consisting of nursery and kindergarten, provides in relation to the number of people using it	%
	Primary school coverage (5–14 years old)	Value to indicate the actual availability of places that the service, consisting of primary and secondary schools, provides in relation to the number of people using it	%
	Secondary school coverage (15–19 years old)	Value to indicate the actual availability of places that the service, consisting of secondary schools, provides in relation to the number of people using it	%
	Accessibility of childcare services	Value for indicating whether the service is accessible by soft transport mode (cycling or walking) by the population using it	%
	Primary school accessibility	Value for indicating whether the service is accessible by soft transport mode (cycling or walking) by the population using it	%
	Secondary school accessibility	Value for indicating whether the service is accessible by soft transport mode in relation to the population using it	%
Coverage of social and health services	Copertura servizi socio-sanitari	Value to indicate the actual presence of socio-medical facilities, consisting of public and private hospitals, RSAs, outpatient clinics and cp, compared to the number of people using them	no/1000 inhabitants

Table A1. *Cont.*

Coverage of recreational and sporting activities	Coverage of recreational and sporting activities	Value for indicating the actual presence of sports facilities in relation to the number of people using them	no/1000 inhabitants
Coverage of cultural activities	Coverage of theatres and cultural associations	Value to indicate the actual presence of structures and associations promoting socio-cultural events and activities	no
	Cultural and entertainment events	Presence and frequency of cultural and entertainment events	no/year
	Presence of points of touristic interest	Identification of points of interest and tourist attractions	no/hectare
Covering places of worship	Covering places of worship	Presence of places of worship and meeting places for religious minorities	no/hectare
Phenomena of social degradation	Phenomena of social degradation	Presence of phenomena of social degradation	Rating 1–5

Table A2. Questionnaire.

SECTION 1—TRANSPORT INFRASTRUCTURE AND SYSTEMS

1.　**Express an opinion on the following aspects concerning the infrastructures dedicated to the mobility to the Canal Port area by *private motorized vehicles*:**

Safety	*(very bad–insufficient–sufficient–good–excellent)*
Roads adequacy	*(very bad–insufficient–sufficient–good–excellent)*
Traffic	*(very bad–insufficient–sufficient–good–excellent)*

2.　**Express an opinion on the following factors regarding the mobility by public transport to the Canal Port area:**

Intermodality	*(very bad–insufficient–sufficient–good–excellent)*
Safety	*(very bad–insufficient–sufficient–good–excellent)*

3.　**Express a judgment on the following aspects regarding the mobility to the Canal Port area by *bike/on foot*:**

Visibility and illumination	*(very bad–insufficient–sufficient–good–excellent)*
Road signs	*(very bad–insufficient–sufficient–good–excellent)*
Roadway protections	*(very bad–insufficient–sufficient–good–excellent)*
Safety	*(very bad–insufficient–sufficient–good–excellent)*
Shading	*(very bad–insufficient–sufficient–good–excellent)*
Adequacy of the sidewalk/cycle-pedestrian path	*(very bad–insufficient–sufficient–good–excellent)*

Table A2. *Cont.*

SECTION 1—TRANSPORT INFRASTRUCTURE AND SYSTEMS	
4. **Express an opinion on the following aspects regarding *parking* in the Canal Port area:**	
Availability of car parks	*(very bad–insufficient–sufficient–good–excellent)*
Time taken to find a place	*(very bad–insufficient–sufficient–good–excellent)*
Price	*(very bad–insufficient–sufficient–good–excellent)*
Shading	*(very bad–insufficient–sufficient–good–excellent)*
Proximity to the place of arrival	*(very bad–insufficient–sufficient–good–excellent)*
SECTION 2—PUBLIC SPACE	
5. **Express a judgment on the following aspects concerning *public spaces* in the area adjacent to the docks of the Canal Port:**	
Lighting	*(very bad–insufficient–sufficient–good–excellent)*
Safety	*(very bad–insufficient–sufficient–good–excellent)*
Street furniture	*(very bad–insufficient–sufficient–good–excellent)*
Removal of architectural barriers	*(very bad–insufficient–sufficient–good–excellent)*
Presence of urban green	*(very bad–insufficient–sufficient–good–excellent)*
Cleaning and maintenance	*(very bad–insufficient–sufficient–good–excellent)*
Integration with the urban landscape	*(very bad–insufficient–sufficient–good–excellent)*
6. **Express an opinion on the following *environmental aspects* concerning the Canal Port:**	
Water quality	*(very bad–insufficient–sufficient–good–excellent)*
Water recirculation	*(very bad–insufficient–sufficient–good–excellent)*
7. **Use this space for observations and reports on the phenomena of *urban and social degradation* in the area of the Canal Port and surroundings:**	
To be filled in . . .	
8. Use this space to report any *suggestion and/or critical issues* that you need to make up for in the Canal Port area:	
To be filled in . . .	

References

1. Pellicelli, G.; Rossetti, S.; Caselli, B.; Zazzi, M. Urban regeneration as an opportunity to redesign Sustainable Mobility. Experiences from the Emilia-Romagna Regional Call. *Transp. Res. Procedia* **2022**, *60*, 576–583. [CrossRef]
2. Chiang, Y.C.; Deng, Y. City gate as key towards sustainable urban redevelopment: A case study of ancient Gungnae City within the modern city of Ji'an. *Habitat Int.* **2017**, *67*, 1–12. [CrossRef]
3. Pazzini, M.; Lantieri, C.; Vignali, V.; Simone, A.; Dondi, G.; Luppino, G.; Grasso, D. Case Studies in the Emilia Romagna Region in Support of Intermodality and Accessibility of Public Transport. In *Advances in Mobility-as-a-Service Systems*; Springer International Publishing: Berlin/Heidelberg, Germany, 2021; Volume 1278. [CrossRef]
4. Schmidt, L.; Falk, T.; Siegmund-Schultze, M.; Spangenberg, J.H. The Objectives of Stakeholder Involvement in Transdisciplinary Research. A Conceptual Framework for a Reflective and Reflexive Practise. *Ecol. Econ.* **2020**, *176*, 106751. [CrossRef]
5. Hou, D.; Song, Y.; Zhang, J.; Hou, M.; O'Connor, D.; Harclerode, M. Climate change mitigation potential of contaminated land redevelopment: A city-level assessment method. *J. Clean. Prod.* **2018**, *171*, 1396–1406. [CrossRef]
6. United Nations Department of Economic and Social Affairs, Polupation Division. World Urbanization Prospects: The 2018 Revision. In *Statistical Papers—United Nations (Ser. A)*; Population and Vital Statistics Report; United Nations: New York, NY, USA, 2019. Available online: https://population.un.org/wup/publications/Files/WUP2018-Report.pdf (accessed on 13 August 2022).
7. Pazzini, M.; Cameli, L.; Lantieri, C.; Vignali, V.; Dondi, G.; Jonsson, T. New Micromobility Means of Transport: An Analysis of E-Scooter Users' Behaviour in Trondheim. *Int. J. Environ. Res. Public Health* **2022**, *19*, 7374. [CrossRef] [PubMed]

8. Pazzini, M.; Lantieri, C.; Vignali, V.; Simone, A.; Dondi, G.; Luppino, G.; Grasso, D. Comparison between different territorial policies to support intermodality of public transport. *Transp. Res. Procedia* **2022**, *60*, 68–75. [CrossRef]

9. Boersma, K.; Berg, R.; Rijbroek, J.; Ardai, P.; Azarhoosh, F.; Forozesh, F.; de Kort, S.; van Scheepstal, A.J.; Bos, J. Exploring the potential of local stakeholders' involvement in crisis management. The living lab approach in a case study from amsterdam. *Int. J. Disaster Risk Reduct.* **2022**, *79*, 103179. [CrossRef]

10. Cheela, V.R.S.; Ranjan, V.P.; Goel, S.; John, M.; Dubey, B. Pathways to sustainable waste management in Indian Smart Cities. *J. Urban Manag.* **2021**, *10*, 419–429. [CrossRef]

11. Wang, H.; Zhao, Y.; Gao, X.; Gao, B. Collaborative decision-making for urban regeneration: A literature review and bibliometric analysis. *Land Use Policy* **2021**, *107*, 105479. [CrossRef]

12. Gkoltsiou, A.; Paraskevopoulou, A. Landscape character assessment, perception surveys of stakeholders and SWOT analysis: A holistic approach to historical public park management. *J. Outdoor Recreat. Tour.* **2021**, *35*, 100418. [CrossRef]

13. D'Adamo, I.; Gastaldi, M.; Ioppolo, G.; Morone, P. An analysis of Sustainable Development Goals in Italian cities: Performance measurements and policy implications. *Land Use Policy* **2022**, *120*, 106278. [CrossRef]

14. Hosseini, S.M.; Paydar, M.M.; Triki, C. Implementing sustainable ecotourism in Lafour region, Iran: Applying a clustering method based on SWOT analysis. *J. Clean. Prod.* **2021**, *329*, 129716. [CrossRef]

15. Guzman, P. Assessing the sustainable development of the historic urban landscape through local indicators. Lessons from a Mexican World Heritage City. *J. Cult. Heritage* **2020**, *46*, 320–327. [CrossRef]

16. Stacchini, A.; Guizzardi, A.; Mariotti, A. Smoothing down arbitrariness in planning: From SWOT to participatory decision making. *Land Use Policy* **2022**, *119*, 106213. [CrossRef]

17. Juanpera, M.; Domenech, B.; Ferrer-Martí, L.; García-Villoria, A.; Pastor, R. Methodology for integrated multicriteria decision-making with uncertainty: Extending the compromise ranking method for uncertain evaluation of alternatives. *Fuzzy Sets Syst.* **2022**, *434*, 135–158. [CrossRef]

18. Opabola, E.A.; Galasso, C. Multicriteria decision making for selecting an optimal survey approach for large building portfolios. *Int. J. Disaster Risk Reduct.* **2022**, *76*, 102985. [CrossRef]

19. Ozkaya, G.; Erdin, C. Evaluation of smart and sustainable cities through a hybrid MCDM approach based on ANP and TOPSIS technique. *Heliyon* **2020**, *6*, e05052. [CrossRef]

20. Nesticò, A.; Elia, C.; Naddeo, V. Sustainability of urban regeneration projects: Novel selection model based on analytic network process and zero-one goal programming. *Land Use Policy* **2020**, *99*, 104831. [CrossRef]

21. Wang, H. Preliminary investigation of waterfront redevelopment in Chinese coastal port cities: The case of the eastern Dalian port areas. *J. Transp. Geogr.* **2014**, *40*, 29–42. [CrossRef]

22. Munda, G. Social multi-criteria evaluation: Methodological foundations and operational consequences. *Eur. J. Oper. Res.* **2004**, *158*, 662–677. [CrossRef]

23. Bottero, M.; Mondini, G.; Oppio, A. Decision Support Systems for Evaluating Urban Regeneration. *Procedia-Soc. Behav. Sci.* **2016**, *223*, 923–928. [CrossRef]

24. Kelle, P.; Schneider, H.; Raschke, C.; Shirazi, H. Highway improvement project selection by the joint consideration of cost-benefit and risk criteria. *J. Oper. Res. Soc.* **2013**, *64*, 313–325. [CrossRef]

25. Marcelo, D.; Mandri-Perrott, C.; House, S.; Schwartz, J.Z.; World Bank PPP Group. An Alternative Approach to Project Selection: The Infrastructure Prioritization Framework. 2016. Available online: https://thedocs.worldbank.org/en/doc/8446314618746627 00-0100022016/original/160423InfrastructurePrioritizationFrameworkFinalVersion.pdf (accessed on 9 June 2022).

26. Van Wee, B. Transport and ethics: Ethics and the evaluation of transport policies and projects. In *Transport and Ethics: Ethics and the Evaluation of Transport Policies and Projects*; Edward Elgar Publishing: Cheltenham, UK, 2011. [CrossRef]

27. Campello, B.S.C.; Duarte, L.T.; Romano, J.M.T. Dealing with multi-criteria decision analysis in time-evolving approach using a probabilistic prediction method. *Eng. Appl. Artif. Intell.* **2022**, *116*, 105462. [CrossRef]

28. Kiker, G.A.; Bridges, T.S.; Varghese, A.; Seager, P.T.P.; Linkov, I. Application of Multicriteria Decision Analysis in Environmental Decision Making. *Integr. Environ. Assess. Manag.* **2005**, *1*, 95–108. [CrossRef] [PubMed]

29. Hermans, C.M.; Erickson, J.D. Multicriteria Decision Analysis: Overview and Implications for Environmental Decision Making. In *Ecological Economics of Sustainable Watershed Management*; Erickson, J.D., Messner, F., Ring, I., Eds.; Emerald Group Publishing Limited: Bingley, UK, 2007; Volume 7, pp. 213–228. [CrossRef]

30. Abanda, F.; Chia, E.; Enongene, K.; Manjia, M.; Fobissie, K.; Pettang, U.; Pettang, C. A systematic review of the application of multi-criteria decision-making in evaluating Nationally Determined Contribution projects. *Decis. Anal. J.* **2022**, *5*, 100140. [CrossRef]

31. Frini, A.; Ben Amor, S. MUPOM: A multi-criteria multi-period outranking method for decision-making in sustainable development context. *Environ. Impact Assess. Rev.* **2019**, *76*, 10–25. [CrossRef]

32. Saaty, T.L. The analytic network process. In *International Series in Operations Research and Management Science*; Springer: Boston, MA, USA, 2006; Volume 95, pp. 1–26. [CrossRef]

33. Saaty, R.W. The Analytic Hierarchy Process-What It Is and How It Is Used. *Math. Model.* **1987**, *9*, 161–176. [CrossRef]

34. Fountzoula, C.; Aravossis, K. Decision-Making Methods in the Public Sector during 2010–2020: A Systematic Review. *Adv. Oper. Res.* **2022**, *2022*, 1750672. [CrossRef]

35. Abastante, F.; Corrente, S.; Greco, S.; Ishizaka, A.; Lami, I.M. A new parsimonious AHP methodology: Assigning priorities to many objects by comparing pairwise few reference objects. *Expert Syst. Appl.* **2019**, *127*, 109–120. [CrossRef]
36. Khan, A.U.; Ali, Y. Analytical hierarchy process (ahp) and analytic network process methods and their applications: A twenty year review from 2000-2019. *Int. J. Anal. Hierarchy Process.* **2020**, *12*, 369–402. [CrossRef]
37. Jorge-García, D.; Estruch-Guitart, V. Comparative analysis between AHP and ANP in prioritization of ecosystem services—A case study in a rice field area raised in the Guadalquivir marshes (Spain). *Ecol. Informatics* **2022**, *70*, 101739. [CrossRef]
38. Jorge-García, D.; Estruch-Guitart, V. Economic Valuation of Ecosystem Services by Using the Analytic Hierarchy Process and the Analytic Network Process. Comparative Analysis Between Both Methods in the Albufera Natural Park of València (Spain). *Int. J. Des. Nat. Ecodynamics* **2020**, *15*, 1–4. [CrossRef]
39. Centis, L.; Micelli, E. Regenerating Places outside the Metropolis. A Reading of Three Global Art-Related Processes and Development Trajectories. *Sustainability* **2021**, *13*, 12359. [CrossRef]
40. Cerreta, M.; Elefante, A.; Rocca, L. A Creative Living Lab for the Adaptive Reuse of the Morticelli Church: The SSMOLL Project. *Sustainability* **2020**, *12*, 10561. [CrossRef]
41. Shibayama, T.; Pungillo, G.; Lemmerer, H.; Nocera, S. Stakeholder involvement in decision-making process: A test assessment towards transition to autonomous vehicles. *Transp. Res. Procedia* **2020**, *48*, 2550–2568. [CrossRef]
42. la Rosa, D.; Privitera, R. Lecture Notes in Civil Engineering Innovation in Urban and Regional Planning. Available online: http://www.springer.com/series/15087 (accessed on 11 August 2022).
43. Yiannakou, A. Urban regeneration as a perpetual planning process: Understanding the role of stakeholders in property-led regeneration projects in Greek cities. *Local Econ. J. Local Econ. Policy Unit* **2020**, *35*, 83–104. [CrossRef]
44. Sisto, R.; Lopolito, A.; van Vliet, M. Stakeholder participation in planning rural development strategies: Using backcasting to support Local Action Groups in complying with CLLD requirements. *Land Use Policy* **2018**, *70*, 442–450. [CrossRef]
45. Dell'Anna, F.; Dell'Ovo, M. A stakeholder-based approach managing conflictual values in urban design processes. The case of an open prison in Barcelona. *Land Use Policy* **2021**, *114*, 105934. [CrossRef]
46. Garcia, S.M.; Staples, D.J.; Chesson, J. The FAO guidelines for the development and use of indicators for sustainable development of marine capture fisheries and an australian example of their application. *Ocean. Coast. Manag.* **2000**, *43*, 537–556. [CrossRef]
47. Myrtveit, I.; Stensrud, E.; Shepperd, M. Reliability and validity in comparative studies of software prediction models. *IEEE Trans. Softw. Eng.* **2005**, *31*, 380–391. [CrossRef]
48. European Foundation (EF) for the Improvement of Living and Working. Urban Sustainability Indicators. Available online: https://www.eurofound.europa.eu/publications/report/1999/urban-sustainability-indicators (accessed on 8 February 2022).
49. ISPRA. Istituto Superiore per la Protezione e la Ricerca Ambientale. Available online: https://www.isprambiente.gov.it/it/servizi/mobilita-sostenibile/strumenti (accessed on 8 February 2022).
50. European Commission. Sustainable Urban Mobility Indicators. Available online: https://transport.ec.europa.eu/transport-themes/clean-transport-urban-transport/sumi_en (accessed on 8 February 2022).
51. Turner, P.; Walker, J.; Klehr, M. International Association of Public Transport. Urban Mobility Indicators for Walking and Public Transport. Available online: https://ec.europa.eu/futurium/en/system/files/ged/convenient-access-to-public-transport.pdf (accessed on 8 February 2022).
52. Tsinghua University and McKinsey & Company. The Urban China Initiative. A Joint Initiative of Columbia University. *The Urban Sustainability Index: A New Tool for Measuring China's Cities.* Available online: http://www.urbanchinainitiative.org/en/resources/report_2.html (accessed on 8 February 2022).
53. Sponsored by S. A. Economist Intelligence Unit (London). The Green City Index. A summary of the Green City Index Research Series. Available online: https://www.siemens.com/entry/cc/features/greencityindex_international/all/en/pdf/gci_report_summary.pdf (accessed on 8 February 2022).
54. R. G. L. Together with the Contribution of the E. Panel. European Green Capital Award Secretariat. Expert Panel. Technical Assessment Synopsis Report. European Green Capital Award. 2023. Available online: https://ec.europa.eu/environment/europeangreencapital/wp-content/uploads/2021/07/EGCA_2023_Technical_Assessment_Synopsis_Report.pdf (accessed on 8 February 2022).
55. Sustainable Cities International (SCI). Indicators for Sustainability. How Cities Are Monitoring and Evaluating Their Success. Available online: http://sustainablecities.net/indicators-for-sustainability/ (accessed on 8 February 2022).
56. Sharifi, A.; Yamagata, Y. *Urban Resilience Assessment: Multiple Dimensions, Criteria, and Indicators. Urban Resilience*; Advanced Sciences and Technologies for Security Applications; Springer: Cham, Switzerland, 2016. [CrossRef]
57. Cutter, S.L.; Burton, C.G.; Emrich, C.T. Disaster Resilience Indicators for Benchmarking Baseline Conditions. *J. Homel. Secur. Emerg. Manag.* **2010**, *7*. [CrossRef]
58. Frazier, T.G.; Thompson, C.M.; Dezzani, R.J.; Butsick, D. Spatial and temporal quantification of resilience at the community scale. *Appl. Geogr.* **2013**, *42*, 95–107. [CrossRef]
59. Yüksel, I.; Dagdeviren, M. Using the analytic network process (ANP) in a SWOT analysis–A case study for a textile firm. *Inf. Sci.* **2007**, *177*, 3364–3382. [CrossRef]
60. Datola, G.; Bottero, M.; de Angelis, E. Enhancing Urban Resilience Capacities: An Analytic Network Process-based Application. *Environ. Clim. Technol.* **2021**, *25*, 1270–1283. [CrossRef]

61. Ioppolo, G.; Saija, G.; Salomone, R. From coastal management to environmental management: The sustainable eco-tourism program for the mid-western coast of Sardinia (Italy). *Land Use Policy* **2012**, *31*, 460–471. [CrossRef]
62. Starr, M.; Joshi, O.; Will, R.; Zou, C.B. Perceptions regarding active management of the Cross-timbers forest resources of Oklahoma, Texas, and Kansas: A SWOT-ANP analysis. *Land Use Policy* **2018**, *81*, 523–530. [CrossRef]
63. Arsić, S.; Nikolić, D.; Mihajlović, I.; Fedajev, A.; Živković, Ž. A New Approach Within ANP-SWOT Framework for Prioritization of Ecosystem Management and Case Study of National Park Djerdap, Serbia. *Ecol. Econ.* **2018**, *146*, 85–95. [CrossRef]
64. Fan, T.; Xue, D.Q. Sustainable Development of Cultural Industry in Shaanxi Province of Northwest China: A SWOT and AHP Analysis. *Sustainability* **2018**, *10*, 2830. [CrossRef]
65. Zorpas, A.A.; Voukkali, I.; Pedreño, J.N. Tourist area metabolism and its potential to change through a proposed strategic plan in the framework of sustainable development. *J. Clean. Prod.* **2018**, *172*, 3609–3620. [CrossRef]
66. Bottero, M.; di Torino, P.; Lami, I.; Lucia, P.; Politecnico, L.; Torino, D. Analytic Network Process. La valutazione di Scenari Di Trasformazione Urbana e Territoriale Application of Territorial Integrated Evaluation for the Construction of Territorial Retail Scenarios in the Province of Trento View Project Pocacito-POst-CArbon CIties of TOmorrow-Foresight for Sustainable Pathways towards Liveable, Affordable and Prospering Cities in a World Context View Project. 2008. Available online: https://www.researchgate.net/publication/299496372 (accessed on 11 August 2022).
67. Assumma, V.; Bottero, M.; De Angelis, E.; Lourenço, J.M.; Monaco, R.; Soares, A.J. A decision support system for territorial resilience assessment and planning: An application to the Douro Valley (Portugal). *Sci. Total. Environ.* **2020**, *756*, 143806. [CrossRef]
68. Assumma, V.; Bottero, M.; Mondini, G.; Zanetta, E. An Analytic Network Process (ANP)-Based Approach for Investigating Alternative Planning Scenarios of Mining Activities in Piedmont Region. In *International Conference on Computational Science and Its Applications*; Springer: Cham, Switzerland, 2020; Volume 12253, pp. 355–365. [CrossRef]
69. Wijnmalen, D.J. Analysis of benefits, opportunities, costs, and risks (BOCR) with the AHP–ANP: A critical validation. *Math. Comput. Model.* **2007**, *46*, 892–905. [CrossRef]
70. Bottero, M.; Assumma, V.; Caprioli, C.; Dell'Ovo, M. Decision making in urban development: The application of a hybrid evaluation method for a critical area in the city of Turin (Italy). *Sustain. Cities Soc.* **2021**, *72*, 103028. [CrossRef]
71. Saaty, T.L. Decision making—The Analytic Hierarchy and Network Processes (AHP/ANP). *J. Syst. Sci. Syst. Eng.* **2004**, *13*, 1–35. [CrossRef]
72. Municipality of Rimini. Accordo Territoriale per la Valorizzazione Ambientale della Fascia di Territorio Compresa tra L'arenile e il Margine della Citta' Costruita, Finalizzata alla Realizzazione del Parco del Mare. 2019. Available online: https://archivio.comune.rimini.it/sites/comune.rimini.it/files/accordoterritorialeparcomare.pdf (accessed on 22 December 2022).
73. Nardino, M.; Georgiadis, T.; Cremonini, L. Studio del Microclima Locale per il Progetto Parco del Mare 1 Studio del Microclima Locale per il Progetto Parco del Mare, Comune di Rimini i Parte. Available online: http://www.smr.arpa.emr.it/dext3r/ (accessed on 22 December 2022).
74. Transforming Our World: The 2030 Agenda for Sustainable Development Transforming Our World: The 2030 Agenda for Sustainable Development Preamble. 2015. Available online: https://sdgs.un.org/2030agenda (accessed on 11 February 2022).
75. Corticelli, R.; Pazzini, M.; Mazzoli, C.; Lantieri, C.; Ferrante, A.; Vignali, V. Urban Regeneration and Soft Mobility: The Case Study of the Rimini Canal Port in Italy. *Sustainability* **2022**, *14*, 14529. [CrossRef]