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Circular Evaluation for Ranking Adaptive Reuse Strategies for Abandoned Industrial Heritage in Vulnerable Contexts

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Abstract: In recent years, the adaptive reuse of abandoned and underutilized cultural heritage has proven to be a sustainable winning strategy for the implementation of a new model of urban development centered on the principles of the circular economy. Cultural heritage, therefore, represents the entry point for the implementation of this new urban development model, and adaptive reuse practices, if integrated into strategic visions, can represent a driver to trigger a transition towards completely circular sustainability processes. However, resource allocation decisions for the adaptive reuse of assets require significant investments in the face of scarce available resources and investment projects characterized by high uncertainties. In this context, multiple-criteria approaches provide an adequate theoretical and methodological framework to address the complexity characterizing the adaptive reuse strategies of cultural heritage, with specific attention to adaptive reuse strategies of unused public assets of abandoned industrial heritage. This paper fits into this line of research by proposing a multi-criteria decision-making approach capable of supporting the decision-maker in optimizing investment choices for a more efficient allocation of public resources. In detail, applying A'WOT analysis to support decisions allows for classifying adaptive reuse strategies and establishing intervention priorities, especially in fragile and vulnerable contexts. The results provide useful information for the complex decision-making phase relating to the preliminary feasibility of interventions and the subsequent verification of their financial sustainability. In detail, the application of A'WOT analysis to supporting decisions allows for classifying adaptive reuse strategies and establishing intervention priorities, especially in fragile and vulnerable contexts. The results provide useful information for the complex decision-making phase relating to the preliminary feasibility of project intervention and subsequent verification of its financial sustainability.

Keywords: abandoned industrial heritage; adaptive reuse strategies; multi-criteria decision aid; A'WOT analysis

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1. Introduction

Some consequences of the linear economy, the model of economic growth that has characterized the last 150 years and which is based on the concept "from the cradle to the grave" or on the process of "taking, producing, using, throwing away", can be found in the declaration of the 2019 Global Footprint Network [1]. The Earth system is also under pressure from the excessive concentration of CO_2, the pollution of groundwater and the environment, the increase in average temperatures, and the consequent loss of biodiversity. This paradigm is putting under pressure two limits that underlie humanity's well-being: the ecological ceiling, composed of the nine "planetary boundaries" presented in 2009 by Rockström [2,3] and defined as a safe operating space in which to act without compromising the future of the planet, and the social base, which specifies the vital needs that everyone must be able to satisfy [4]. A profound change is therefore needed to change the image of progress that allows us to thrive in a safe zone within these two borders. This need was also acknowledged by the UN, which in 2015 approved 17 objectives for sustainable development with 169 related indicators, divided into three areas: biosphere, rights, and economy.

The circular economy represents a useful model for bringing the current system of disequilibrium back towards a balance that can optimize resources, starting from the awareness that resources are scarce and precious. Defined in 2012 by the Ellen McArthur Foundation, the circular economy is "a generic term to define an economy designed to be able to regenerate itself. In an economy, there are two types of material flows: biological ones, capable of being reintegrated into the biosphere, and technical ones, destined to be revalued without entering the biosphere" [5]. This economic model, therefore, aims to preserve and increase natural capital, optimize the yield of natural resources, and erase negative externalities through maintenance, reuse, re-functionalization, and recycling actions.

The urban layout and architecture represent two crucial areas in which to apply these principles to initiate the change of course. According to the report "World Urbanization Prospects 2018", presented by the UN [6], 55% of the world's population lives in cities and this figure is increasing (it is expected that in 2050, the percentage will be equal to 70%); 80% of global Gross Domestic Product (GDP) is generated in cities, where over 70% of global greenhouse gas emissions are produced, 50% of global waste is created, and two-thirds of the world's energy is consumed. Applying the principles of the circular economy would make it possible to reduce their environmental footprint on the planet, bringing enormous advantages and favoring the emergence of thriving, livable, and resilient cities (see General States of the green economy [7]). Therefore, there are six main targets for urban transformations can be made that can be managed locally and can have a significant impact: buildings, energy, water, transport, food, and products [8]. It is necessary to change the way that they are planned, designed, and financed and the way that they are created, used, and reused to safeguard and increase three fundamental capitals: natural, social, and cultural. These capitals ensure sustainable economic development, high quality of life, and wise management of natural resources.

Architecture also faces important challenges for creating a more sustainable future [9,10]. The construction sector is responsible for more than a third of the global consumption of resources, and waste deriving from urban construction and demolition together with municipal solid waste represents as much as 40% of the total. Furthermore, the emission of CO_2 into the atmosphere is also substantial and is linked to the energy production necessary for the use of buildings, which represents almost 30% of global production [11]. Considering this scenario, the goals of architecture are to improve urban land use by reducing the need for new construction and decreasing construction and operating costs, increasing resource efficiency, strengthening the local economy, and improving social and environmental conditions [12]. Adopting circular principles in construction can bring numerous benefits to this sector by reducing its impact. The construction industry, therefore, plays a crucial role in human well-being and environmental impact and faces one of the most ambitious challenges in the fight against land consumption.

According to these principles, long-term adaptive reuse is part of circular economy processes, as it allows the city to be reorganized through urban development that is no longer linked to settlement growth but involves intervening in the existing heritage to lengthen the life cycle of assets as much as possible through their re-functionalization [13,14]. Adaptive reuse of buildings can revitalize neighborhoods and generate environmental benefits by following sustainable urban planning that reduces land take and sprawl, optimizing the supply of raw materials and resources, as well as revitalizing urban areas through new creative/productive activities and new socio-economic actors. Intervening in heritage, with or without cultural recognition, brings with it benefits that go beyond the project itself but also have repercussions in the economic, social, and environmental fields [13,14].

Specifically, adaptive reuse is a term of Anglo-Saxon origin that describes intervention in an existing building, area, or infrastructure to counteract the obsolescence of the building or a state of abandonment caused by the disposal of its function by adapting it to the needs of new activity [15–17]. The term contains two different meanings: re-functionalization, which involves interventions on the building to make it functional again, and conversion, or a change in the function performed. The main objective of adaptive reuse is to change the characteristics of a space based on its changed context, extending the life cycle of buildings with a view to sustainability with minimal interventions of grafting, integration, parasitic architecture, or subtraction. It is essential to know how to reinterpret space that was designed for other functions in a resilient and reversible manner and to maintain an openness to future changes in response to possible socio-economic evolutions, thus giving the city an easier way to reorganize itself [13,14,18].

Furthermore, successful adaptive reuse also intervenes by revitalizing the local economic system, with positive results at an urban, environmental, and social level [19]. In particular, adaptive reuse has the potential to regenerate the social component, improve the well-being and quality of communities, and enhance human relationships beyond those purely of economic exchange that reflect dignity and human rights from a relational perspective; a known example that originated from these dynamics is the "The High Line" project in New York by architects Diller Scofidio+Renfro, a reuse initiative that started from the desire of residents, gathered in opposition associations, to prevent the demolition of an elevated railway line, proposing its redevelopment into an urban park [13,14].

This stance and sense of responsibility, which arises from society towards common goods to restore their identity and dignity, recalls the concept of care understood as a "cultural and governance paradigm that comes out of the house and offers particularly necessary tools to the contemporary city" [20]. Care can acquire a political value by becoming one of how citizens, increasingly distant from politics and institutions, fill and bring to life the public space with an invisible but invaluable added value consisting in the reconstruction and strengthening of community ties, in the creation of social capital, integration, cohesion, and a sense of belonging. The local care work on the territory, and its maintenance, are the precondition for the survival of the entire economic, social, and political system built by human civilization [21].

Furthermore, in 2018, adaptive reuse was an intervention approach recognized at the European level in the context of the European year of cultural heritage, during which the challenges and quality principles on the reuse of heritage were identified and then reported in "Adaptive re-use of the built heritage: Preserving and enhancing the values of our built heritage for future generations" [22].

Greater attention to the adaptive reuse of heritage combined with the awareness of the key role that industrial heritage can play in regenerative urban processes for sustainable development, as a conscious process of production of new values, originates from the growing sensitivity and concern for the consumption of territory. From this perspective, adaptive reuse is a promising strategy to preserve a building and its historical significance as a compromise between the preservation of symbolic values and the adaptation to new economically useful alternatives.

However, it should be noted that investment decisions for adaptive reuse of heritage, especially when these concern cultural heritage, are by nature complex and therefore require high costs and large investments, but are faced with scarce available resources and investment projects characterized by high uncertainties, which discourage investment by public and private entities [9,10,13–19].

In this context, this paper provides an evaluation framework based on Multi-Criteria Analysis (AMC), able to support the decision-maker in optimizing investment choices for the efficient allocation of public resources, with specific attention to adaptive reuse strategies of unused assets of abandoned industrial heritage, especially in fragile and vulnerable contexts [13,14].

The complexity that characterizes heritage reuse strategies must necessarily be addressed through Multi-Criteria Decision Aid (MCDA) methodologies, as they are capable of representing and managing the complexity of decision-making processes and the multiple dimensions of a project, the comparative evaluation between alternative projects according to more criteria simultaneously, and the consideration of the views of the different actors involved in the decision-making process. Above all, MCDA contributes to the definition of strategies, objectives, and intervention actions to reach shared decisions and choices [23–27].

In particular, this paper fits into this trend in the literature by proposing an A'WOT analysis, a mixed AHP-SWOT (or A'WOT) method that combines Hierarchical Process Analysis (AHP) and SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis.

The application of A'WOT analysis to the case study can provide a theoretical and methodological framework for classifying adaptive reuse strategies and establishing intervention priorities in the decision-making processes of adaptive reuse for the valorization of abandoned industrial cultural heritage and to build shared and sustainable development scenarios in vulnerable contexts [28–31].

The evaluation process is aimed at understanding and evaluating the related material and immaterial effects, which is useful for defining the potential and priorities of intervention in some areas of the heritage in question and defining new successful sustainable strategies from the perspective of a circular economy [5–8].

The results provide useful information for the complex decision-making phase as it relates to the preliminary feasibility of a project intervention and the subsequent verification of its financial sustainability.

This paper is organized as follows. Section 2 provides the theoretical basis of the evaluation approach implemented here (A'WOT method). Section 3 illustrates the A'WOT model through a real case study, related to adaptive reuse strategies of abandoned industrial heritage in Southern Italy. Section 4 presents the results obtained from the application of the model. Section 5 discusses the results, and Section 6 provides conclusions and proposes some prospects for the future development of the research.

2. Materials and Methods

The research aims to contribute to the stream of studies concerning urban regeneration strategies from a circular economy perspective that considers the adaptive reuse of the abandoned cultural and industrial heritage of some areas located in a vulnerable urban context: the city of Reggio Calabria. It is propose a decision-making aid approach to classify adaptive reuse strategies and enhance those places capable of expressing cultural and symbolic values where the ability to combine subjective interests and social values is clearly expressed. New investments in the city make it possible to increase its value through the combination of beauty, creativity, knowledge, social milieu, and economy. Urban strategies, focused on promoting human development, can foster economic productivity and at the same time determine the attractiveness and competitive character of the city. Orienting strategic choices and selecting actions capable of managing/preserving/enhancing even the physical urban space. All are capable of promoting a positive sum game (win–win) that can feed a virtuous and sustainable process aimed at establishing intervention priorities for the optimal allocation of increasingly scarce public resources [13,14].

Transformation operations on an urban and architectural scale often constitute complex and problematic situations due to the presence of multiple objectives or different actors who must interact with each other (e.g., owners, investors, and decision-makers). For this reason, evaluation methods are used to support decisions that can be monetary and benefit from quantitative–qualitative analysis methods. The latter methods are known as Multi-Criteria Analysis (AMC) or Multi-Criteria Decision Analysis (MCDA) and aim to help decision-makers deal with decision-making problems characterized by multiple points of view, objectives, and/or limited structuring. These methods can handle many complex dimensions, and data of different natures (quantitative and qualitative) are useful for structuring an evaluation process capable of incorporating and managing the conflict between different objectives, deducing priorities, and supporting the decision-maker in the final choice between different option alternatives [23–27].

In detail, the research illustrates the different methods and techniques of a new A'WOT multi-methodological approach that is based on the combined use of a SWOT analysis and an AHP multi-criteria analysis and that allows for tackling complex decision-making that is characterized by multiple variables and a high level of uncertainty for the implementation of adaptive reuse strategies of abandoned cultural and industrial heritage in vulnerable contexts [28–30]. The experimental approach was applied to a real case concerning the classification of adaptive reuse strategies of some areas of the abandoned cultural/industrial heritage of the metropolitan city of Reggio Calabria, in Southern Italy.

2.1. SWOT Analysis

SWOT analysis (also known as the SWOT matrix) is an acronym for defining Strengths, Weaknesses, Opportunities, and Threats. This analysis is based on a procedure for collecting data and information on a specific problem to organize the decision-making process.

Generally, the analysis technique is used in strategic planning. This analysis was developed fifty years ago by Albert Humphrey of Stanford University [28]. Initially, the purpose of the analysis was to support the definition of business strategies in highly competitive contexts. Subsequently, in the 1980s, it was used to support public intervention decisions to analyze alternative development scenarios. Today, however, the SWOT analysis has been extended to more fields to support choices that concern more actors [28].

SWOT can be used as an ex ante analysis if it takes place early in the decision-making process, because it illustrates the guidelines for pursuing the project. In some cases, it can be developed in an intermediate phase to verify whether, based on the changes that have occurred in a given context, the lines of action identified are still pertinent, providing a tool for deciding on changes to the program; it can also be used at the end of the decision-making process to contextualize the final results [28].

It has also been recognized that SWOT analysis can enable the development of in-depth knowledge on the territorial and socio-economic context of an investigation, and it can be useful for directing design strategies.

There are two methods for structuring a SWOT analysis. The first is at the table, where the points are determined by the researcher based on context data; here, the risk lies in the possible production of an overly simplified and subjective reality or an objective evaluation if only experts participate in the analysis. The second method, on the other hand, is conducted with working or participatory groups, where there is the involvement of experts and stakeholders for the relevant data.

Once the goal and the development scenario have been defined, the purpose of the analysis is to define the Strengths, Weaknesses, Opportunities, and Threats [23–26,28]. The Strengths are all the positive aspects, representing the potential of the area destined for transformation, and are therefore useful for the success of the project/program. Weaknesses are the aspects that represent an obstacle to the success of the project and are considered critical issues. Opportunities are all external aspects that can be exploited to improve the project. Threats are impacts that pose risks to transformation. Strengths and Weaknesses are defined as internal aspects of the analysis context. They involve the adopted policy and scenario, and thus, they can positively or negatively influence the process and can be modified. Opportunities and Threats are considered external aspects of the problem under analysis and condition actions with positive or negative implications and cannot be modified. The analysis is graphically represented by a square matrix organized into four sections which collect the identified characteristics. The internal aspects (Strengths and Weaknesses) are inserted in the upper part, while the external ones (Opportunities and Threats) are located in the lower part.

SWOT analysis allows the designer to check whether it is possible to achieve the set goal. If it is not possible, it will be necessary to revise the objective and repeat the analysis process. If, on the other hand, the goal is achievable, the analysis acts as an input for the development of design strategies. The development of design strategies implies the formulation of the following questions: "How to exploit the Strengths? How to fix Weaknesses? How to take advantage of the Opportunities? How to deal with Threats?" The weakness, therefore, of SWOT analysis is the lack of a global view of the four groups of the analysis, since they are not related to each other. This does not allow giving a positive or negative judgment to the whole and does not allow modifications to improve; therefore, the analysis remains neutral and simplified for the final judgment [29–31].

To overcome these disadvantages, Kurttila et al. [29–31] proposed the A'WOT analysis, a hybrid method that arose from an integration of SWOT analysis and Multi-Criteria Analysis as the Analytic Hierarchy Process (AHP), a multi-criteria technique proposed by Saaty in the 1980s [32].

2.2. Analytic Hierarchy Process (AHP Analysis)

The main multi-criteria models are many, but in this study, the AHP multi-criteria analysis was deepened and integrated with the SWOT analysis.

The Analytic Hierarchy Process, AHP, is part of the Multi-Criteria Analysis family and is a fairly consolidated technique that finds application in complex assessments to define the priority and feasibility of plans and projects of different natures and content [33,34]. AHP is a technique that provides support in choosing among different alternatives with different objectives and criteria [35–41].

The AHP was developed by the American scholar T.L. Saaty [32,34] and is a flexible and quantitative method that outlines a procedure for breaking down complex problems, which can be represented according to a hierarchical structure [32,34].

The AHP is a tool for analyzing political, economic, and technological problems based on the possibility of linking information to obtain decisions, and in particular, it is recognized as an effective support method for decision-making processes in the field of urban and territorial transformations. The AHP breaks down complex problems to organize them into more understandable sub-problems and allows decision-makers to evaluate and define a preferability ranking of different alternatives via pairwise comparison.

The different contexts in which the AHP can be applied include the creation of a list of priorities, the choice of the best policy, the optimal allocation of resources, the prediction of results and time dependencies, the assessment of risks, and strategic planning [37].

The AHP is based on three fundamental principles:

- The first is the identification of the objective and the breakdown of the complex problem according to a hierarchical tree, with criteria, sub-criteria, and alternatives. The hierarchical decomposition moves from top to bottom, starting from the objective/goal and gradually adding the criteria, sub-criteria, and finally, alternatives.
- The second is the principle of comparative judgments; i.e., the criteria are compared two by two to the corresponding group, which is considered from time to time as a comparison criterion. This is done to answer the question, "Which of the two elements is more important than a certain criterion, and by how much?"
- Criteria, sub-criteria, and the relative importance of the alternatives are determined through pairwise comparisons expressed in semantic judgments converted into numerical values according to the Saaty fundamental scale [32].

Finally, the numerical values established must be entered into a square, symmetrical, and reciprocal matrix of pairwise comparison of the elements, which are determined at each level of the hierarchy. The Consistency Index (CI) is then calculated (1), where λ is the maximum value of the eigenvector of the pairwise comparison:

$$CI = \lambda max - n/n-1 \quad (1)$$

Later, the Random consistency Index (RI)—the consistency value of the matrix—is defined. The ratio between CI and CR (2) must be less than 0.1 [39].

$$CR = CI/RI \tag{2}$$

2.3. A'WOT Method

The A'WOT method is a hybrid tool that combines two commonly used techniques, SWOT and AHP, which are used in complex evaluation processes to define intervention or development strategies. Many applications of this model have been identified in the literature in the field of protected areas [29–31,42]. The union of the two techniques allows for a more analytical determination and evaluation of the the priorities of the internal and external factors that belong to the groups of "strength", "weakness", "opportunities" and "threats" of the SWOT analysis to make them measurable and improve the quantitative information basis of strategic planning processes or the evaluation of alternative intervention scenarios [25].

The connection of the two methods, SWOT and AHP, as applied to the case study produced analytically determined priorities, providing quantitative information for the factors included in the SWOT analysis and making them commensurable using the method of eigenvalues to pairwise comparisons. The decision-maker was thus enabled to reflect on the weight of the factors and analyze the situation in a more precise way, making it possible to intervene on future weaknesses or threats [29–31].

Therefore, according to Kurttila et al. [30], the first step to structure the A'WOT hybrid model is to carry out the SWOT analysis by detecting the factors of the external and internal environment, identified as Strengths, Weaknesses, Opportunities, and Threats. Then, using the AHP, pairwise comparisons are made between the SWOT groups and between the various items within each SWOT group. Through these comparisons, it is possible to evaluate which of the two compared factors is more important and by how much. In this way, the mutual priorities of the factors are calculated and the respective local and global weights are measured, thus indicating the best strategy to integrate external and internal factors [30,31].

In SWOT analysis, the sub-criteria are compared in pairs with the following questions: "Which of these two elements gives greater importance to the criterion of strength (or Weakness, Opportunity, Threat)? And to what extent?". The values are interpreted according to the Saaty scale, a scale ranging from 1 to 9, where 1 indicates that the two elements are equally important, while 9 indicates the greatest importance. These comparisons are interpreted into numbers and calculated using the eigenvector method.

To compare SWOT criteria, the questions are as follows: "Which of the two criteria is more important than the other on a scale of 1 to 9?". In this step, the priorities of the groups are calculated with the eigenvector method as well. The factor with the most importance is chosen to represent his group. The four factors are then compared with each other to obtain relative priorities. These are used to calculate global priorities. The calculation s conducted by multiplying the local priorities of the factors, defined in the previous step, by the value of the corresponding scale factor of the SWOT group [30].

In this way, the reciprocal priorities of the factors are calculated and the respective local and global weights are measured, which indicates the best strategy to integrate external and internal factors [30,42]. The mutual priorities of the factors are determined by the stakeholders, directly and indirectly, involved in the decision-making process [43].

Finally, in the last phase, the final ranking is obtained, with the ranking of the alternatives passed through a weighted-sum aggregation procedure from the bottom to the top of the hierarchical levels. Thus, with the A'WOT model, the information bases of the strategic planning process are improved over those obtained using ordinary SWOT analysis alone, because the use of pairwise comparisons directs the decision-maker to prioritize the weights of the various analytical targets of the situation in a more precise and detailed way [42].

3. Application

The present study investigated the reuse of abandoned cultural and industrial heritage in Southern Italy. In particular, some disused industrial areas have been identified in the metropolitan city of Reggio Calabria in Calabria (Figure 1). These areas have characteristics that mark their past and present. In fact, in these areas, there are buildings that housed industrial activities in different sectors that were of significant importance in Reggio Calabria's past but had been abandoned by the mid-twentieth century, shifting from being resources to problems to be addressed.

In particular, these assets are located in urban contexts in the city with a degree of material and social disadvantage, "high" social vulnerability, and uncertainty; they are liable to transform into places of real economic and social hardship (a greater incidence of large families or families made up only of the elderly, single parents, young people who do not study and do not work, adults without educational qualifications or illiterates, families in economic hardship or who live in overcrowded houses). There is also social exclusion, forms of material deprivation and fragility that differ from economic poverty and extreme hardship as such, and deficiencies with respect to social ties, housing systems, training or work, and social integration. These are factors that contribute to material hardship and reduce resident ability to face difficulties (e.g., economic) [44].

However, no-longer-useful areas such as these have also been the subject of interest in various cities' regeneration and redevelopment plans. This heritage, left to decay, no longer being occupied allows for the introduction of new functions and destinations. Various stakeholders, public decision-makers, and private investors now discuss the potential for reusing abandoned industrial buildings for various purposes. The planning of interventions for the enhancement and reuse of this heritage would make it possible to revalue such spaces, offering innovative services and activities by redeveloping and returning these old, abandoned industrial buildings to the city.

Furthermore, the enhancement of this heritage could be a driving force for the regeneration of the territory, attracting new visitors and bringing benefits to the local inhabitants in the environmental, economic, and social dimensions.

Figure 1. Case studies of industrial heritage in vulnerable contexts. (1. Fiera; 2. Mattatoio; 3. Agrumario; 4. Polveriera).

A'WOT Implementation

Given the scarcity of public resources and according to the research objectives, was developed a hybrid A'WOT decision aid model to classify adaptive reuse strategies of disused cultural and industrial heritage.

In detail, the decision-making aid process is useful for classifying and defining intervention priorities for the four study areas, based on their potential reuse, with the aim to implement a successful valorization strategy. The industrial areas were ranked in terms of priorities for a potential successful reuse intervention, from best to worst.

To this end, the evaluation model was structured in three steps.

In the first step, a SWOT analysis was implemented and the decision problem, concerning the areas under study, was structured via SWOT matrix. In particular, the Strengths, Weaknesses, Opportunities, and Threats (SWOT) categories were further represented in specific sub-criteria to evaluate the key aspects of the assets of the analyzed heritage.

To define a preliminary structure of the SWOT matrix and identify the most relevant SWOT factors of the internal environment (Strengths and Weaknesses) and the external environment (Opportunities and Threats), an extensive review of the literature on the valorization of the heritage under study was also conducted. Subsequently, the final structure of the SWOT analysis (Table 1) was defined through direct interviews with an expert panel composed of experts with specific skills in the field of restoration, architecture, structural analysis, and economic evaluation.

Table 1. SWOT matrix 'Fiera' area.

Strengths (S)	**Weaknesses (W)**
S1. Proximity to public transport lines or bus stops to reach the areas	W1. Investment costs, maintenance, and management property reuse
S2. Current conservation of the property	W2. Current property ownership
S3. Historical/cultural value of the property	W3. Current destination and conditions of abandonment area
Opportunities (O)	**Threats (T)**
O1. Easy access to public infrastructure and services	T1. Degradation of the built environment
O2. Flexibility to new functions of the original structures	T2. Financial risks (funds/potential investors)
O3. Environmental quality of the context	T3. Regulatory risks on potential building interventions

Source: the authors.

Then, based on the aforementioned structure, four SWOT matrices were compiled, one for each asset under investigation. As an example, Table 1 shows the SWOT matrix that was constructed for the area 'Fiera'.

In the second step, the AHP [32] was implemented to allow the decision-maker to analyze and evaluate the different alternatives and also to adequately manage complex choices according to the preferences of the stakeholders [34]. Following the AHP methodology, the SWOT factors were organized according to a hierarchical dominance decision tree (Figure 2), where the top contained the general objective/goal (classify the intervention priorities of reuse for the potential of each area for the implementation of effective and circular/sustainable valorization strategies), and below the objective, the criteria (SWOT categories) and sub-criteria (SWOT factors) were arranged in order of level. Finally the lower part of the hierarchical tree contained the alternatives, which were evaluated to define their final ranking for the decision-making objective.

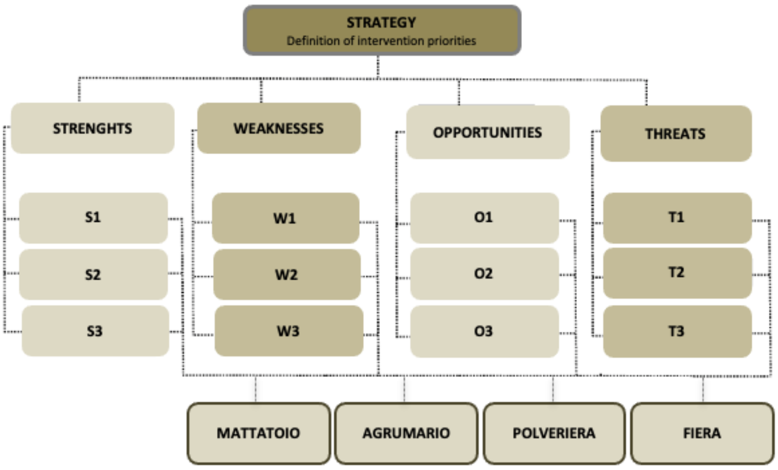

Figure 2. A'WOT—structuring the decision problem.

After the subdivision of the problem into levels and sub-levels, the relative importance of each level of the hierarchy was defined according to the method of pairwise comparison with the corresponding element of a higher order, considered from time to time. This helped to establish which element was more important and to what extent.

In detail, relative importance at the level of criteria (SWOT categories) was first evaluated, followed by relative importance at the level of sub-criteria (SWOT factors). Stakeholders' preferences were obtained using a questionnaire in which pairwise comparisons were made between the SWOT categories and between the SWOT factors of each category. Through these comparisons, the importance of each element compared to the others was established; scores on the Saaty scale were used for assessment.vEach expert that was involved in the panel was asked to reply to questions for all pairwise comparisons concerning the relative importance of SWOT categories and SWOT factors.

Figures 3 and 4 show, respectively, an example of questions to which the experts were asked to give their preferences or the evaluation of categories and SWOT factors. Through the following question: "Which of the two elements is more important than a certain criterion, and by how much?", it was possible to establish a binary preference relationship between the two elements, which led to assigning a positive real number taken from a 9-point Saaty fundamental scale [34].

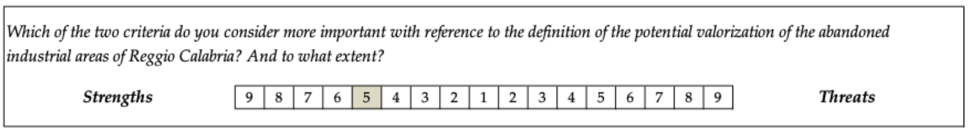

Figure 3. Preference assessing for SWOT categories.

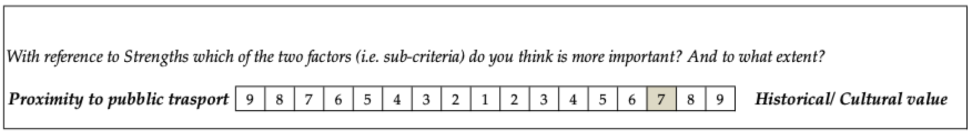

Figure 4. Preference assessing for SWOT factors.

After distributing the questionnaires that contained all the questions on pairwise comparisons to the stakeholders and processing the information collected, the priorities of both the categories and the SWOT factors were calculated (see Section 4. Results).

For the specific technical evaluation of the alternatives (study areas), similar pairwise comparison questions were subsequently structured and submitted to a panel of three experts who expressed their opinion for each alternative with respect to each selected factor (sub-criterion) and evaluated each factor against the SWOT categories (criteria).

For example, Figures 5 and 6 show two of the questions posed to the expert panel: if one alternative is more preferred, among others, does it mean that that alternative can maximize the Strengths and Opportunities (S/O) elements and minimize the Weaknesses and Threats (W/T) elements?

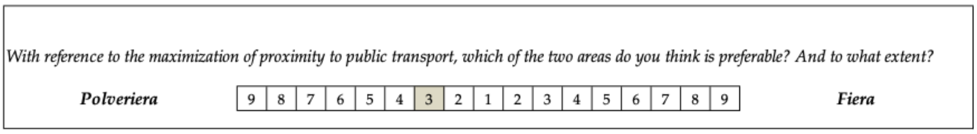

Figure 5. Preference assessing for the evaluation of the alternatives with respect to sub-criteria "accessibility"**.**

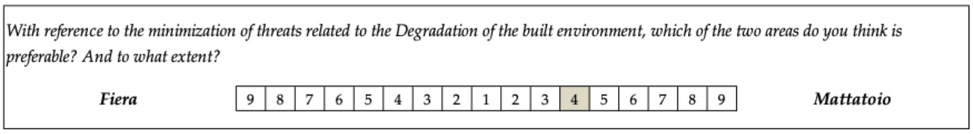

Figure 6. Preference assessing for the evaluation of the alternatives for sub-criteria "relationship with the context".

In the last step, applying the principle of hierarchical decomposition of AHP, the following were calculated: (i) the priorities of the decision alternatives for each criterion; (ii) the global absolute ranking (priority) of the decision alternatives, for which the specific weights of each alternative were multiplied by the weights of each SWOT category and related factors (see Section 4. Results).

4. Results

The implementation of the model was supported by the software 'SuperDecision'. Once the SWOT matrix was built, the different factors were further specified in twelve sub-criteria, and the hierarchical structure of the AHP model was defined. The hierarchical structure was built using the "SuperDecision" software, which sees the main objective linked to the cluster of four criteria (Strengths, Weaknesses, Opportunities, and Threats) and the respective sub-criteria, previously selected for the evaluation of the alternatives (Figure 7).

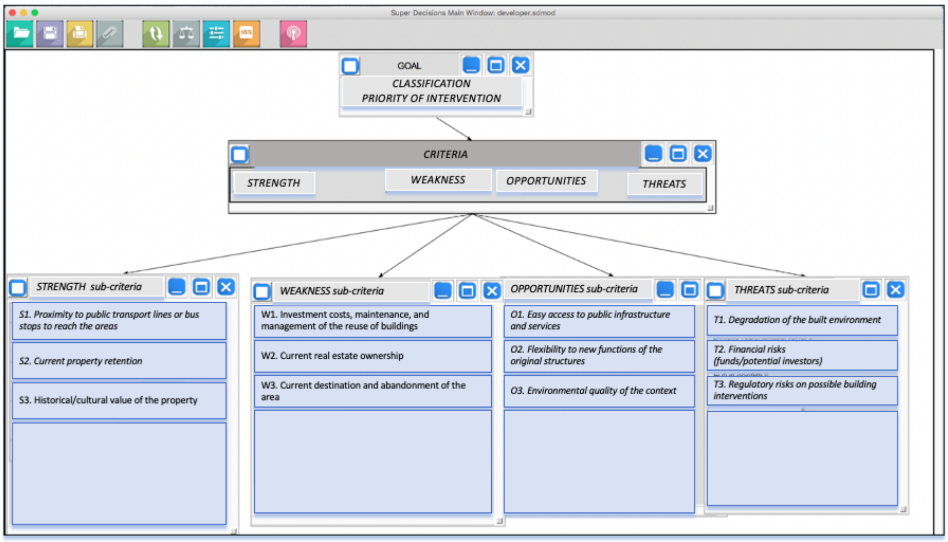

Figure 7. Screenshot from the SuperDecision program. Hierarchical structure representation of "objective", "criteria", and "sub-criteria" of the decision problem.

The elements of the SWOT analysis were then pairwise compared to each other to determine judgments of importance.

By applying the A'WOT method, a focus group composed of experts was organized to perform the pair comparisons. This was possible by using brainstorming activities [23–27], where the experts, based on the formulations of the questionnaire, expressed their preferences and judgments of importance on the various factors, using a numerical scale to determine the hierarchies of the SWOT analysis criteria.

In the pairwise comparison process, the nodes that need to be pairwise compared are always all in the same cluster and are compared against their parent: the node to which they are connected. This translates into "local priorities". Each sub-criterion is assigned a judgment of importance through the principle of pairwise comparisons according to the Saaty scale. The pairwise comparison process is presented in questionnaire format and the judgments to be used in the pairwise comparison matrices are derived from expert opinion through the organization of a focus group. The discussion among the various experts is supported by a moderator who facilitated the process of reaching a consensus on the final series of weights. The scores obtained on the 1-9 scale represent the numerical value to be used in the pairwise comparison matrices provided by the model.

Once this procedure has been performed for all the criteria and each pairwise comparison is analyzed, the geometric mean of the overall expert judgments yields final series of weights [39–43] related to all factors (Table 2), calculated using the SuperDecision software package (version 3.2). Furthermore, it is possible to verify the consistency index of each pairwise comparison matrix, which is calculated automatically by the software. For each comparison matrix, to verify the logical inconsistency of the expert judgments, the Consistency Ratio (CR) was automatically calculated. The result was less than 0.10, proving that all judgments were consistent [45].

As can be noted from Table 2, the criteria and sub-criteria priorities represent the relative importance of factors affecting the parent node's SWOT category. Furthermore, it is also easily verifiable that in the implementation of the strategy, the factors that had greater weight over the others belong to the SWOT group "Opportunities" (0.439), with a prevalence of the sub-criterion "O3. Environmental quality of the context" (0.709), followed by "O2. Flexibility to new functions of the original structures" (0.179) and by "O1. Easy access to public infrastructure and services" (0.112). These were followed by the SWOT group "Strengths" (0.362) with the related sub-criteria "S1. Proximity to public transport lines or bus stops to reach the areas" (0.124), "S2. Current conservation of property" (0.156), and "S1. Proximity to public transport lines or bus stops to reach the areas" (0.124). In last place was the SWOT group "Weaknesses" (0.069).

Finally, note that the highest priority for the Strengths and Opportunities factors positively encourages the achievement of goals, while a high value for Weaknesses and Threats negatively affects the achievement of objectives.

Table 2. Determining global priorities of the criteria and sub-criteria of SWOT analysis.

Criteria	Priority Criteria	Sub-Criteria	Priority Sub-Criteria
Strengths	0.362	S1. Proximity to public transport lines or bus stops to reach the areas	0.124
		S2. Current conservation of the property	0.156
		S3. Historical/cultural value of the property	0.720
Weaknesses	0.069	W1. Investment costs, maintenance, and management property reuse	0.258
		W2. Current property ownership	0.128
		W3. Current destination and conditions of abandonment area	0.615
Opportunities	0.439	O1. Easy access to public infrastructure and services	0.112
		O2. Flexibility to new functions of the original structures	0.179
		O3. Environmental quality of the context	0.709
Threats	0.130	T1. Degradation of the built environment	0.288
		T2. Financial risks (funds/potential investors)	0.598
		T3. Regulatory risks on potential building interventions	0.115

Table 3 illustrates the final classification of the alternatives and the global priorities for each sub-criterion and the final classification of the alternatives.

Table 3. Final classification of the alternatives and determining of global priorities.

Criteria	Sub-Criteria	FIERA	POLVERIERA	AGRUMARIA	MATTATOIO
Strengths	S1. Proximity to public transport lines or bus stops	0.369	0.062	0.434	0.135
	S2. Current conservation of the property	0.066	0.060	0.571	0.203
	S3. Historical/cultural value of the property	0.250	0.250	0.250	0.250
Weaknesses	W1. Investment costs, maintenance, and management	0.051	0.422	0.104	0.422
	W2. Current property ownership	0.406	0.476	0.068	0.030
	W3. Current destination and conditions area	0.446	0.046	0.065	0.043
Opportunities	O1. Easy access to public infrastructure and services	0.522	0.137	0.182	0.149
	O2. Flexibility to new functions of the original structures	0.410	0.060	0.072	0.061
	O3. Environmental quality of the context	0.483	0.076	0.288	0.153
Threats	T1. Degradation of the built environment	0.198	0.507	0.069	0.225
	T2. Financial risks (funds/potential investors)	0.250	0.250	0.250	0.250
	T3. Regulatory risks on potential building interventions	0.198	0.507	0.069	0.225
	Overall Normal Priority	0.038	0.032	0.025	0.025
	Overall Ideal Priority	**1.000**	**0.853**	**0.655**	**0.667**

In detail, the local weights are the internal priorities of a SWOT group and were derived from pairwise comparisons according to the eigenvalue approach and subsequently aggregated within the hierarchy to derive the global weights/priorities, which derive from the combination of the local weights with the weights of the higher-level groups. In calculating the global priorities, the weighted geometric mean aggregation method was implemented, as it correctly reflects the information on preferences contained in the local pairwise comparison matrices of alternatives [46,47]. To obtain priority carriers and the final ranking, was implemented the A'WOT model in the SuperDecision software.

According to the final results, FIERA had the greatest potential for the successful implementation of heritage valorization strategies for the enhancement of the heritage under study. The other areas also had good potential, with the POLVERIERA area ranking in second place, as the properties are in a good state of conservation, while the AGRUMARIO area follows almost on par with MATTATOIO at the bottom of the ranking due to the conditions of abandonment of the area and the buildings.

Considering that the main objective was to choose the best area priority among the four study areas that could best implement the reuse strategy, obtaining knowledge of the state of degradation with the identification of the pathologies represented a crucial phase in the choice to establish the urgency of the recovery and restoration works and their progressive order of intervention [24,25].

5. Discussion

From the two fundamental publications of Kurttila [28,29], a large and significant stream of studies on the A'WOT methodology has developed, with a conspicuous number of its applications being for real-world decision problems [29,48–50]. The contribution integrates the existing literature with a new application of A'WOT analysis to abandoned industrial heritage in vulnerable contexts.

To address the complexity of the specific problem, the proposed decision framework aimed at classifying adaptive reuse strategies and setting intervention priorities in conditions of scarce resources that are often difficult to obtain [51]. Through the application of the A'WOT method to the case study, a classification of each asset was obtained according to the decision scenarios. Based on the results obtained from the A'WOT evaluation, the 'Fiera' alternative, among the various areas considered, was the most qualified area to be used for various purposes. This was mainly due to the quality of the surrounding context and its favorable position. Furthermore, the buildings are still in a fairly good state of conservation, and the spaces are very flexible, enabling them to accommodate new and different functions.

The application that was developed confirmed the advantages of using the A'WOT method to support complex decisions, as it allowed for the comparison of alternative investment scenarios while taking into account the opinions of the different experts involved in the problem. The analysis of several experts proved to be very useful in the successful implementation of heritage enhancement strategies in reuse interventions.

In addition to the overall coherence of the results obtained in defining the most suitable area for adaptive reuse concerning specific uses that are capable of triggering circular processes on the overall urban scale, this study could have interesting policy implications. It could represent a useful tool for policy-makers for the implementation of enhancement strategies when rethinking the entire industrial heritage and during the conceptualization and design of a more general and multipurpose master plan that is aimed at revitalizing and enhancing the area under investigation.

The meta-design phase proved to be a fundamental step. Initially, an analysis of the current situation was conducted to develop the master plan for the valorization operation with the types of interventions that could be implemented.

From a future research perspective, it would be of scientific interest to carry out a feasibility study in collaboration with a panel of experts to support the policymaker in the implementation phase of the valorization actions for the single asset. All the aspects that can interact in the valorization process would be carefully evaluated together with the experts to obtain a sustainable proposal for functionalization and compatible reuse. The contribution of various disciplines and technical skills would also be fundamentally necessary for this phase to define the best design proposals to be subsequently developed in the preliminary design phase and the final design.

6. Conclusions

The city is a complex system, in which articulated economic, social, cultural, and environmental dynamics take place, and its centrality is constantly increasing. The city assumes a key role in being able to start the transition to the circular economy, improving the use of resources used in all processes, minimizing the production of waste products, and closing process cycles. Transition is also an opportunity to pursue economic, social, and environmental benefits through processes of cooperation and interdisciplinary collaboration [47]. Urban centers must restart by revisiting the linear economic model that has characterized them, rethinking organization and planning, and abandoning the idea of uncontrolled expansion beyond borders that leads to dispersion. The circular city must find solutions that make it possible to reduce times and distances, as well as the methods of travel, and introduce functional mixes that limit the need for them by reorganizing the structure of the existing infrastructures through urban redevelopment plans. Adaptive reuse has proven to be an approach that enables action according to the prerogatives described up to now, bringing social, economic, and cultural benefits at different levels. Orienting adaptive reuse in terms of circular economy is therefore one of the main challenges for architectural and urban design. In this context, impact assessment assumes a fundamental role by documenting and ascertaining the possible success or failure of interventions based on the objectives set through rigorous metrics. The adoption of the methodology described made it possible to develop the analysis and the ex ante evaluation of the circularity of some adaptive reuse interventions in the city of Reggio Calabria. The final result was an evaluation of adaptive reuse processes, carried out with an ex ante multi-criteria approach.

It is necessary to highlight the importance of developing ex ante evaluations of interventions, as these allow for the development of useful tools for analyzing if and how the project could achieve the set objectives, identifying the factors that could contribute to success or failure, and evaluating the circularity and sustainability of the results and impacts. Furthermore, the results of the evaluation can be used as a consultation tool capable of influencing investment choices and providing useful information for the complex-decision-making phase. Based on the results, the methodology provides an overview of the quality of circularity that is obtainable from adaptive reuse processes based on the recognition of the values of cultural assets and their possible integration into the local economic system, as well as their effects on the relevant economic, social, cultural, and environmental components [52,53]. A possible future development of the approach might involve the creation of a double evaluation method that is separately dedicated to a detailed study of the project intervention and a thorough examination of financial feasibility [53–56]. This duplication would guarantee a better understanding of the impacts that the individual phases have produced, identifying a greater number of indicators, increasing the precision of the analysis, and discussing the role of circularity obtained from adaptive reuse processes and strategies for abandoned industrial heritage in vulnerable contexts in terms of architectural intervention and business model and their effects on the relevant economic, social, cultural, and environmental components [57–60].

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References

1. Available online: www.footprintnetwork.org (accessed on 3 November 2022).
2. Rockström, J.; Steffen, W.; Noone, K.; Persson, Å.; Chapin, F.S.; Lambin, E.; Lenton, T.M.; Scheffer, M.; Folke, C.; Schellnhuber, H.; Nykvist, B.; et al. Planetary Boundaries: Exploring the Safe Operating Space for Humanity. *Ecol. Soc.* **2009**, *14*, 33.
3. Randers, J.; Rockström, J.; Stoknes, P.E.; Goluke, U.; Collste, D.; Cornell, S.E.; Donges, J. Achieving the 17 Sustainable Development Goals within 9 planetary boundaries. *Glob. Sustain.* **2019**, *2*, 1–11.
4. Raworth, K. L'economia della Ciambella. Sette Mosse per Pensare come un Economista del XXI Secolo; Cella, E., Ed.; Edizione Ambiente: Milano, Italy, 2017.
5. Ellen McArthur Foundation. Towards a Circular Economy Vol. 1: An Economic and Business Rationale for an Accelerated Transition; Ellen McArthur Foundation: London, UK, 2012.
6. Available online: https://population.un.org/wup/ (accessed on 3 November 2022).
7. Available online: www.statigenerali.org/manifesto-green-economy-citta-futura (accessed on 3 November 2022).
8. Ellen McArthur Foundation. *Circular Economy in Cities. Urban Building System Summary*; Ellen McArthur Foundation: London, UK, 2019.
9. Mondini, G. Valutazioni integrate per la gestione delle nuove sfide sociali. *Valori Valutazioni* **2016**, *17*, 15–17.
10. Brandon, P.S.; Lombardi, P.; Shen, G. Future Challenges for Sustainable Development within the Built Environment; Wiley: Chichester, UK, 2017.
11. World Bank. What a Waste: A Global Review of Solid Waste Management; World Bank, Washington, DC, USA, 2012.
12. UN Environment. *Global Status Report 2017: Towards a Zero-Emission, Efficient, and Resilient Buildings and Construction Sector*; UN Environment and International Energy Agency: 2017. Available online: https://worldgbc.org/wp-content/uploads/2022/03/UNEP-188_GABC_en-web.pdf (accessed on 3 November 2022).
13. Della Spina, L.; Giorno, C.; Galati Casmiro, R. An Integrated Decision Support System to Define the Best Scenario for the Adaptive Sustainable Re-Use of Cultural Heritage in Southern Italy. In *New Metropolitan Perspectives. NMP 2020;* Bevilacqua, C., Calabrò, F., Della Spina, L., Eds.; Smart Innovation, Systems and Technologies; Springer: Cham, Switzerland, 2020; Volume 177. https://doi.org/10.1007/978-3-030-52869-0_22.
14. Della Spina, L. Cultural Heritage: A Hybrid Framework for Ranking Adaptive Reuse Strategies. *Buildings* **2021**, *11*, 132. https://doi.org/10.3390/buildings11030132.
15. Robiglio, M. RE-USA 20 American Stories of Adaptive Reuse. A Toolkit Postindustrial Cities; Jovis: Berlino, Germania, 2017.

16. Fusco Girard, L.; Gravagnuolo, A. Circular economy and cultural heritage/landscape regeneration. Circular business, financing and governance models for a competitive Europe. *BDC Bollettino Del Centro Calza Bini*, **2017**, *17*, 35–52.
17. Latham, D. *Creative Re-Use of Buildings*; Donhead Publishing: Shaftesbury, UK, 2000.
18. Camocini, B. Adapting Reuse. Strategie di Conversione d'uso degli Interni e di Rinnovamento Urbano; FrancoAngeli, Milano, Italia, 2006.
19. Bottero, M.; D'Alpaos, C.; Oppio, A. Ranking of Adaptive Reuse Strategies for Abandoned Industrial Heritage in Vulnerable Contexts: A Multiple Criteria Decision Aiding Approach. *Sustainability* **2019**, *11*, 785.
20. Marinelli, A. La città della cura. Ovvero, Perché una Madre ne sa una più Dell'urbanistica; Liguori Editore: Napoli, Italia, 2015.
21. Arena, G. La "società della cura" e il Valore Politico dei Piccoli Gesti Quotidiani; Labsus: Roma, Italia, 2018.
22. Carlucci, R. Orientamenti Europei per Sostenere il Riutilizzo Adattivo degli Edifici Storici nel 2019–2020; Archeomatica: Roma, Italia, 2019.
23. Della Spina, L.; Giorno, C. Cultural Landscapes: A Multi-Stakeholder Methodological Approach to Support Widespread and Shared Tourism Development Strategies. *Sustainability* **2021**, *13*, 7175. https://doi.org/10.3390/su13137175.
24. Della Spina, L. Strategic Planning and Decision Making: A Case Study for the Integrated Management of Cultural Heritage Assets in Southern Italy. In *New Metropolitan Perspectives. NMP 2020*; Bevilacqua, C., Calabrò, F., Della Spina, L., Eds.; Smart Innovation, Systems and Technologies; Springer: Cham, Switzerland, 2021; Volume 178. https://doi.org/10.1007/978-3-030-48279-4_104.
25. Della Spina, L.; Rugolo, A. A Multicriteria Decision Aid Process for Urban Regeneration Process of Abandoned Industrial Areas. In *New Metropolitan Perspectives. NMP 2020*; Bevilacqua, C., Calabrò, F., Della Spina, L., Eds.; Smart Innovation, Systems and Technologies; Springer: Cham, Switzerland, 2021; Volume 178. https://doi.org/10.1007/978-3-030-48279-4_99.
26. Della Spina, L. Revitalization of inner and marginal areas: A multi-criteria decision aid approach for shared development strategies. *Valori Valutazioni* **2020**, *25*, 37–44.
27. Della Spina, L.; Viglianisi, A. Hybrid Evaluation Approaches for Cultural Landscape: The Case of "Riviera dei Gelsomini" Area in Italy. In *New Metropolitan Perspectives. NMP 2020*; Bevilacqua, C., Calabrò, F., Della Spina, L., Eds.; Smart Innovation, Systems and Technologies; Springer: Cham, Switzerland, 2021; Volume 178. https://doi.org/10.1007/978-3-030-48279-4_128.
28. Dente, B. *Policy Decisions*; Springer: Berlin, Germany, 2014.
29. Kajanus, M.; Kangas, J.; Kurttila, M. The use of value focused thinking and the A'WOT hybrid method in tourism management. *Tour. Manag.* **2004**, *25*, 499–506.
30. Kurttila, M.; Pesonen, M.; Kangas, J.; Kajanus, M. Utilizing the analytic hierarchy process (AHP) in SWOT analysis—a hybrid method and its application to a forest-certification case. *For. Policy Econ.* **2000**, *1*, 41–52.
31. Pesonen, M.; Kurttila, M.; Kangas, J.; Kajanus, M.; Heinonen, P. Assessing the priorities using A'WOT among resource management strategies at the Finnish Forest and Park Service. *For. Sci.* **2001**, *47*, 534–541.
32. Saaty, T.L. The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation; McGraw-Hill: New York, NY, USA, 1980.
33. Saaty, T.L. Fundamentals of Decision Making and Priority Theory with the Analytic Hierarchy Process, 1st ed.; RWS Publications: Pittsburgh, PA, USA, 2000.
34. Saaty, T.L. How to make a decision: The analytic hierarchy process. *Eur. J. Oper. Res.* **1990**, *48*, 9–26.
35. Albers, L.; Nijkamp, P. Multidimensional analysis for plan or project evaluation. How to fit the right method to the right problem. In *Metodi di Valutazione nella Pianificazione Urbana e Territoriale. Teoria e Casi Studio*; IRIS-CNR: Bari, Italy, 1989; pp. 63–74.
36. Bottero, M.; Mondini, G.; Valle, M. The use of the Analytic Network Process for the sustainability assessment of an urban transformation project. In Proceedings of the International Conference on Whole Life Urban Sustainability and Its Assessment, Glasgow, UK, 27–29 June 2007; pp. 27–29.
37. Brandon, P.S.; Ribeiro, F.L. The assessment of applications for the house renovation grant system (HRGS)—A multistrategy knowledge-based framework. *Eng. Constr. Archit. Manag.* **1997**, *4*, 41–57.
38. Girard, L.F.; Nijkamp, P.; Artuso, L. *Le Valutazioni per lo Sviluppo Sostenibile della Città e del Territorio*; FrancoAngeli: Milan, Italy, 1997; Volume 74.
39. Roscelli, R. Manuale di estimo. Valutazioni economiche ed esercizio della professione,UTET Università: Torino, Italy, 2014.
40. Nijkamp, P.; Van den Bergh, C.J.M.; Soeteman, F.J. Regional sustainable development and natural resource use. *World Bank Econ. Rev.* **1990**, *4* (Suppl_1), 153–188.
41. Voogd, H. Multicriteria evaluation with mixed qualitative and quantitative data. *Environ. Plan. B Plan. Des.* **1982**, *9*, 221–236.
42. Kangas, J.; Kangas, A.; Leskinen, P.; Pyka¨la¨inen, J. MCDM methods in strategic planning of forestry on state-owned lands in Finland: Applications and experiences. *J. Multi-Criteria Decis. Anal.* **2001**, *10*, 257–271.
43. Giuffrida, S.; Trovato, M.R. A Semiotic Approach to the Landscape Accounting and Assessment. An Application to the Urban-Coastal Areas. In Proceedings of the 8th International Conference on Information and Communication Technologies in Agriculture, Food and Environment, HAICTA 2017, Chania, Crete Island, Greece, 21–24 September 2017; Volume 2030, pp. 696–708; Salampasis, M., Theodoridis, A., Bournaris, T., Eds.; CEUR Workshop Proceedings ISSN: 16130073.
44. Available online: https://www.istat.it/it/files/2020/12/Le-misure-della-vulnerabilita.pdf (accessed on 1 February 2023).
45. Grosˇelj, P.; Stirn, L.Z. Acceptable consistency of aggregated comparison matrices in analytic hierarchy process. *Eur. J. Oper. Res.* **2012**, *223*, 417–420.
46. Dong, Q.; Saaty, T.L. An analytic hierarchy process model of group consensus. *J. Syst. Sci. Syst. Eng.* **2014**, *23*, 362–374.

47. Krejcˇí, J.; Stoklasa, J. Aggregation in the analytic hierarchy process: Why weighted geometric mean should be used instead ofweighted arithmetic mean. *Expert Syst. Appl.* **2018**, *114*, 97–106.
48. Moharramnejad, N.; Rahnamai, M.-T.; Dorbeiki, M. Application of A'WOT Method in Strategic Management of Sustainable Tourism in a National Park. *Environ. Eng. Manag. J.* **2017**, *16*, 471–480.
49. Chitsaz, N.; Azarnivand, A. Water Scarcity Management in Arid Regions Based on an Extended Multiple Criteria Technique. *Water Resour. Res.* **2017**, *31*, 233–250.
50. Kişi, N. A Strategic Approach to Sustainable Tourism Development Using the A'WOT Hybrid Method: A Case Study of Zonguldak, Turkey. *Sustainability* **2019**, *11*, 964.
51. Jelincic, D.A.; Tisma, S. Ensuring the sustainability of cultural heritage through effective public policies. *Urbani Izziv* **2020**, *31*, 78–87.
52. Carbonara, S., Stefano, D. (2021). Building Recovery, Property Values and Demographic Decline After the 2009 Abruzzo Earthquake. In: Bevilacqua, C., Calabrò, F., Della Spina, L., Eds; New Metropolitan Perspectives. NMP 2020. Smart Innovation, Systems and Technologies, vol 178. Springer, Cham. https://doi.org/10.1007/978-3-030-48279-4_73
53. Fusco Girard, L. Energia, Bellezza, Partecipazione: La Sfida della Sostenibilità. Valutazioni Integrate tra Conservazione e Sviluppo; Franco Angeli: Milano, Italia, 2005.
54. Carbonara, S.; Della Spina, L.; Stefano, D. Real Estate Values and Urban Quality: Definition of an Indicator. In *INTERNATIONAL SYMPOSIUM: New Metropolitan Perspectives*; Springer: Cham, Switzerland, 2022; pp. 1082–1090.
55. Carbonara, S., Stefano, D. (2021). The Valorisation of Public Real Estate Assets in Italy: A Critical Reconstruction of the Legislative Framework. In: Bevilacqua, C., Calabrò, F., Della Spina, L. Eds; New Metropolitan Perspectives. NMP 2020. Smart Innovation, Systems and Technologies, vol 178. Springer, Cham. https://doi.org/10.1007/978-3-030-48279-4_45
56. Della Spina, L., Carbonara, S., Stefano, D. The Financial Sustainability a Cultural Heritage Adaptive Reuse Project in Public-Private Partnership. In: Calabrò, F., Della Spina, L., Piñeira Mantiñán, M.J. Eds; New Metropolitan Perspectives. Post COVID Dynamics: Green and Digital Transition, between Metropolitan and Return to Villages Perspectives. Lecture Notes in Networks and Systems, vol 482. Springer, Cham, Switzerland, 2022; pp. 1262–1272. https://doi.org/10.1007/978-3-031-06825-6_122
57. Abastante, F.; Lami, I.M.; Mecca, B. Set of indicators as a tool to investigation of the factors enabling the success of six cases of urban cultural regeneration—Set di indicatori come strumento di indagine dei fattori abilitanti il successo di sei casi di rigenerazione culturale urbana. *LaborEst* **2022**, *24*, 31–37.
58. Locurcio, M.; Morano, P.; Tajani, F. Un modello di supporto alle decisioni per la riconversione funzionale di immobili pubblici dismessi—A decision support model for the functional conversion of public properties in disused. *LaborEst* **2016**, *13*, 28–33.
59. Trovato, M.R. A multi-criteria approach to support the retraining plan of the Biancavilla's old town. In 3rd International New Metropolitan Perspectives. Local Knowledge and Innovation Dynamics towards Territory Attractiveness through the Implementation of Horizon/Europe2020/Agenda2030; Bevilacqua, C., Calabro, F., Della Spina, L., Eds.; Smart Innovation, Systems and Technologies; Reggio Calabria, Italy, 22–25 May 2018; Volume 101, pp. 434–441. https://doi.org/10.1007/978-3-319-92102-0_46.
60. Trovato, M.R.; Giuffrida, S. The Protection of Territory from the Perspective of the Intergenerational Equity. In *Integrated Evaluation for the Management of Contemporary Cities*; Mondini, G., Fattinnanzi, E., Oppio, A., Bottero, M., Stanghellini, S., Eds.; SIEV 2016. Green Energy and Technology; Springer Nature Switzerland AG: Cham, Switzerland, 2018; pp. 469–485. https://doi.org/10.1007/978-3-319-78271-3_37.