Multi-criteria Decision Aiding for Adaptive Reuse of Cultural Heritage: An Application in the City of Naples (Italy)

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Abstract. The paper explores the adaptive reuse paradigm for revitalising unmovable cultural heritage assets. More in detail, this research addresses a real-world evaluation demand concerning the assessment of different adaptive reuse strategies for the requalification of the hospital building in Naples (Italy). According to the complexity and multi-perspective nature of the research topic and the evaluation demand, an integrated and multimethodological evaluation framework has been proposed. Different adaptive reuse strategies have been evaluated by combining the SWOT analysis, the Stakeholder analysis and the PROMETHEE method to address and manage the complexity, multidimensionality and multi-values nature of the evaluation demand. The obtained results underline that the final ranking of the proposed adaptive reuse scenarios is based on a multidimensional and multi-perspective evaluation, supporting thus Decision-Makers in identifying the most suitable scenario for the renovation of the unmovable cultural heritage asset according to the intervention objectives.

Keywords: Adaptive reuse · PROMETHEE · Cultural Heritage

1 Introduction

The paradigm of adaptive reuse is considered a promising approach for the preservation and requalification of Cultural Heritage (CH) assets [1–5]. It permits changes in the use of existing buildings, following the requirements of both the new owner and the community [6–8]. The main purpose of this paradigm is to protect the building through the preservation of its historical and heritage significance and improving the environmental, economic and social conditions [9]. Thus, different dimensions, values and objectives, that range from the cultural aspects to the aesthetic and economic ones, have to be considered in this context [10, 11]. Therefore, the adaptive reuse of CH is a real-world complex decision-making process [12, 13]. In this sense, the decision process concerning interventions on CH should be made based on a multidimensional set of

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criteria and the preferences of the stakeholders involved [14]. However, studies dealing with the complexity of the decision process of adaptive reuse of CH assets are quite recent [15–17]. Therefore, the topic of defining a proper evaluation method for assessing is still less explored and fragmented [3, 18]. In this context, the current research demand concerns the development of a comprehensive assessment framework, which has to include multidimensional values [18]. In the literature, many scholars have proposed several assessment frameworks to evaluate adaptive-reuse strategies to properly support the decision-making process [18]. The suggested evaluation frameworks can be mainly categorised into three different groups:

– the mixed method;
– the Multi-Criteria Decision Aiding (MCDA);
– the Preference-Measurement Model (PMM) [18].

Concerning the MCDA, some valuable studies can be reported to introduce the methodological background of applying these techniques for CH adaptive reuse assessment. Salerno proposes an MCDA to evaluate projects of adaptive reuse for CH assets, supporting the choice of the intervention strategy [19]. Dezio and colleagues apply MCDA with Geographic Information System (GIS) to support the decision process in identifying suitable buildings for the adaptive reuse approach [20]. Bottero and colleagues propose the PROMETHEE method to assess the tangible and intangible aspects of cultural heritage [11, 21]. Della Spina applies MCDA to classify adaptive reuse strategies of unused CH assets and to support Decision-Makers Decision Makers (DMs) in the implementation of development strategies, to generate new economic, cultural and social values [22]. Torrieri and colleagues develop an integrated evaluation model, based on MCDA and a financial model to support the choice of alternative reuse of an ancient monastery in Mugnano Municipality, according to the multidimensional impacts of investment and intervention in CH [23]. Angrisano and colleagues propose the application of the SOCRATES Multi-Criteria evaluation method to assess CH adaptive reuse projects, integrating environmental, social, economic, and cultural dimensions [17]. Garavagnuolo and colleagues apply the TOPSIS method to assess the adaptive reuse of a historical building in Salerno (Italy) [16].

The present paper addresses a real-world evaluation demand, which concerns the evaluation of different adaptive-reuse strategies for the requalification of the hospital of the city of Naples. For this purpose, a multi-methodological evaluation framework [24] which combines the SWOT analysis, the Stakeholder analysis and the PROMETHEE [25, 26] method has been proposed to address the complexity, multidimensionality and multi-perspective nature of evaluation demand. The paper is organised as follows: Sect. 2 describes the considered evaluation techniques; Sect. 3 describes the application of the multimethodological approach; Sect. 4 illustrates and comments the evaluation results; Sect. 5 concerns the conclusion of the work within some critical reflections of the proposed methodology and reasoning about the future challenge of this research topic.

2 Proposed Multi-methodological Assessment Framework

2.1 SWOT Analysis

The SWOT analysis is a technique to support the decision process. It was introduced by the economist Albert Humphrey, who proposed the implementation of the SWOT analysis in the field of business economics [27]. Over the years, its application has been extended to different fields, both private and public. Currently, the SWOT analysis is a common tool in spatial planning and the assessment of regional programs [28]. The acronym SWOT refers to Strengths, Weaknesses, Opportunities, and Threats. This analytical method is used to examine the positive and negative aspects, both internal and external, of a particular initiative. Specifically, strengths and weaknesses are internal characteristics of the context that the policy or project can directly influence. On the other hand, opportunities and threats stem from the broader external environment and are generally beyond the direct control of the intervention. The SWOT analysis thus permits the data collection and management concerning the specific decision problem according to the logical procedure at the basis.

2.2 Stakeholders Analysis

The Stakeholder Analysis concerns the identification of all the subjects involved in the decision process, especially when dealing with public policies [34, 35]. Thus, the stakeholder analysis is a fundamental step in strategic planning and sustainability assessment, due to its ability to identify conflicting interests at an early stage of the process. From a practical point of view, stakeholder analysis concerns the identification and classification of stakeholder groups. Indeed, stakeholders have access to and can mobilize different types of resources (i.e., political, economic, legal, and cognitive resources), determining thus different categories (i.e., political actors, bureucratic actors, special interest, general interest, and experts.), following their resources [34]. The target of this analysis is to develop a strategic view of the community and institutional context of the decision process, underlying the relationships between the different actors and the issues they care about most.

2.3 PROMETHEE Method

The PROMETHEE methods refer to the MCDA techniques that are widely applied to address real-world decision-making problems. Specifically, PROMETHEE is an outranking method [29]. These methods are based on the pairwise comparison of a finite set of alternatives to rank them concerning a set of multidimensional criteria. The PROMETHEE technique was introduced by Brans and colleagues [25] and after improved by Brans and Vincke [30]. In the real-world decision problems, PROMETHEE methods are widely used to address several issues, like (1) environmental and energy management, (2) water management, (3) business and financial management, (4) logistics, transportation, and urban transformation [31, 32], among others.

PROMETHEE methods are based on specific principles that can be summarised as follows: (a) the set of criteria is finite; (b) criteria are not hierarchically structured; (c) the parameters of the decision model can be precisely defined. Specifically, the PROMETHEE has normally been applied to rank a finite set of m alternative actions A = {a, b, …, m} concerning a finite set of k criteria G = {g_1, g_2, …, g_k}, also involving several Decision Makers (DMs) [33]. These techniques permit to evaluate and rank of a set of alternatives, identifying those variables that affect the ranking, also analysing the differences and similarities between alternatives. To evaluate alternatives using the PROMETHEE method, the process starts by comparing actions against each criterion, reflecting the DMs preferences. This is achieved through pairwise comparisons to give local scores, which are subsequently aggregated into global scores, resulting in either a partial pre-order (PROMETHEE I), a complete pre-order rank (PROMETHEE II), or an interval pre-order rank (PROMETHEE III). However, complex decision problems typically involve multiple and multidimensional criteria, making it impossible to simultaneously optimise all of them. Consequently, additional information is needed to establish the Preference (P) threshold, the Indifference (I) threshold, and the dominance graph [26]. Decision Makers (DMs) have thus to provide preference information regarding the variables and parameters involved in the evaluation model, either directly or indirectly. Therefore, they are required to assign weights to the criteria and specify the shape of the preference functions.

PROMETHEE methods identify a function P_j for each criterion j, that represents the degree of preference of action (a) over action (b) about criterion g_j. This function is grounded on the difference in their evaluation $g_j(a)–g_j(b)$ which is a non-decreasing function. The degree of preference has been obtained from the Decision Makers (DMs) preference function, which transforms the difference in the evaluation of the two alternatives into a numerical scale between 0 and 1. The value 1 is assigned in the case of a strong preference for alternative (a) over alternative (b), whereas the value 0 is used to represent the indifference between alternative (a) and alternative (b). Six typical preference functions are proposed by literature, that can be summarised as follows: (1) Usual criterion, (2) quasi criterion (U-shape), (3) criterion with linear preference (V-shape), (4) level criterion, (5) linear criterion, and (6) Gaussian criterion [26, 30].

The final step of the PROMETHEE methodology is evaluating how much action (a) is preferred to action (b), considering all of the criteria. An overall preference index Π(a,b) is calculated for this assessment. Π(a,b) performs the intensity of preference of (a) over (b) and it is calculated by a weighted sum through this formula:

$$\prod(a, b) = \sum_{j=1}^{k} w_j P_j(a, b) \tag{1}$$

where Π(a,b) represents the overall preference intensity of (a) over (b), with respect to all of the k criteria, w_j is the weight of criterion j and P_j (a,b) is the preference function of (a) over (b) about criterion j. It is important to underline that Π(a,b) ~ 0 represents a weak global preference for (a) over (b), whereas Π(a,b) ~ 1 shows a strong global preference for (a) over (b). The weights wj > 0 represent the importance and the relevance of each criterion within the decision problem.

Since each alternative action is compared to the others, it is possible to define both a positive outranking flow $\Phi + (a)$ and a negative outranking flow $\Phi - (a)$ that can be defined:

$$\Phi^{+}(a) = \frac{1}{n-1} \sum_{b \epsilon A} \Pi(a, b) \tag{2}$$

$$\Phi^{-}(a) = \frac{1}{n-1} \sum_{b \epsilon A} \Pi(a, b) \tag{3}$$

Specifically, $\Phi + (a)$ represents the global preference for action (a) compared to all the other actions and determines how the alternative (a) outranks the others. The higher is $\Phi + (a)$, the better alternative (a) is compared to the others. Whereas $\Phi - (a)$ represents the global weakness of the actions (a) about all the other actions and it expresses how the alternative (a) is outranked by the others. Furthermore, these two flows can be combined to obtain the net outranking flow $\Phi(a)$:

$$\Phi(a) = \Phi^{+}(a) - \Phi^{-}(a) \tag{4}$$

The higher the net flow, the better the alternative is.

3 Application

3.1 Case Study

The present research proposes the application of the PROMETHEE method to evaluate and rank four different adaptive reuse strategies for the requalification of the hospital building in Naples (Southern Italy). Specifically, this building is located in the historical centre of the city of Naples (Fig. 1).

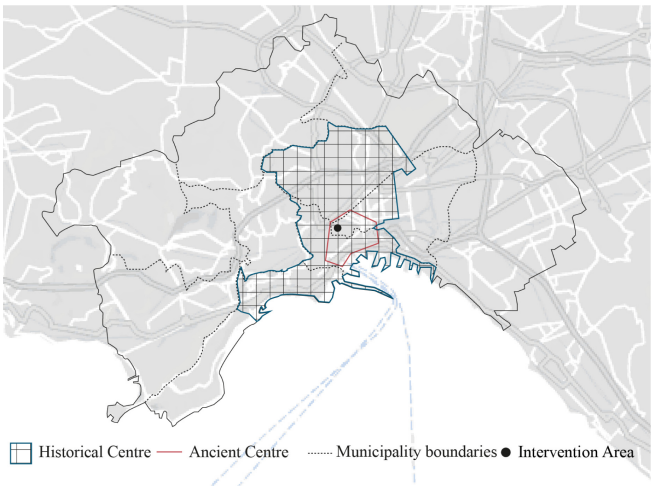


Fig. 1. Territorial framework.

One part of this building is currently used for a medical university, while the other part has no specific function, standing in neglected conditions. This state of the art also has negative impacts on the socio-economic conditions of the surrounding area. Several projects have been proposed during the last decade to requalify both the building and the neighbourhood to improve not only the physical condition of the unmovable asset but also the general socio-economic features of the interested area. However, none of the strategies proposed so far has been identified as suitable to overcome the above-mentioned issues through a multidimensional and comprehensive approach. All the proposed requalification scenarios were mainly focused on economic income, neglecting the social and environmental aspects.

The proposed multimethodological approach has been applied to address all the elements engaged. In detail, the SWOT and the stakeholder analysis are focused on collecting all the information of the area to identify the strategic elements to consider both in the alternative design and evaluation.

3.2 SWOT Analysis

Figure 2 illustrates the SWOT analysis performed for the decision-problem under analysis.

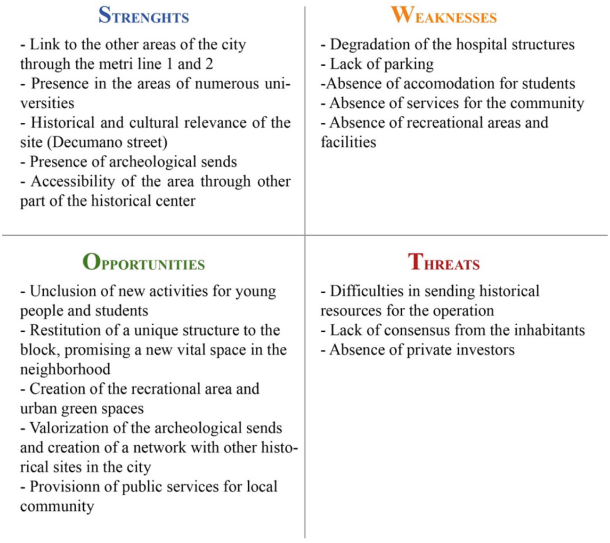


Fig. 2. SWOT Analysis for the adaptive reuse of the hospital building in Naples (Guarini, 2019).

The SWOT analysis (Fig. 2) offers a comprehensive overview of the endogenous and exogenous factors that distinguish the context in which the hospital building is located. Among the strengths, the high level of accessibility of the area through public transportation can be highlighted. As well, the proximity to several universities and archaeological sites underlines the strategic value of the intervention area.

However, some relevant weaknesses have to be addressed, including the current degradation of infrastructure, the lack of essential services, and the absence of both recreational areas and accommodations for students.

Therefore, some opportunities can be identified to stress the strengths and overcome the weaknesses. For instance, the potential for activating new functions aimed at young people and students, through the reuse of existing spaces and the creation of urban green areas. As well, the valorisation of the archaeological site to integrate it into a broader cultural network to attract both interest and investment.

However, some potential threats could affect the renovation process. These include uncertainty in securing historical funding, limited private investment, and possible resistance from the local population, which can underestimate the importance of inclusive planning and stakeholder engagement.

3.3 Stakeholders Circle Analysis

This study applies the Stakeholder Circle Methodology to map the stakeholders involved. This technique has been developed by Bourne [34], and it analyses and maps the stakeholders according to their proximity, power, and interest. According to these criteria, this methodology permits the identification of the key players of the analysed decision-making process. Table 1 lists the stakeholders engaged in the examined decision process, with specific reference to their level, typology, resources, and objectives.

On the other hand, Fig. 3 represents the performed circle analysis. Stakeholders have been mapped considering (1) their power, which is represented by the dimension of the wedge they occupy, (2) their proximity, which is figured out by the concentric circles, and (3) their urgency, which is illustrated by the depth of the wedge. Through this analysis, it was possible to determine the role and the position of different stakeholders. In detail, the Napoli Municipality, architects, and private investors can be considered the key players of this decision-making process. Their power and proximity are relevant, and the urgency of the Napoli Municipality and architects reaches the goal. Instead, MiBAC, hospital personnel, actual residents of the area, and students have medium power, proximity, and urgency. On the other hand, actual residents of neighbouring, the associations, UNESCO, the European Community, media and public opinion, and tourists have a low power, interest, and urgency. Therefore, this analysis has been fundamental to determining the position of the public and private stakeholders according to the goal, as well as clarifying their objectives and interests.

Table 1. Identification of the stakeholders involved in the decision process (Guarini, 2019).

Stakeholders	Level	Typology	Resources	Objectives
European Community	European	Politic / Bureaucratic	Political Legal	Political consensus and verification of normative observance
UNESCO	European	Politic / Bureaucratic	Political/legal	Political consensus and economic income
MiBAC (Superintendence of archeologic and landscape assets)	Council	Public / Bureaucratic	Political Economic Legal	Political consensus and economic income
Campania Region	Regional	Public / Bureaucratic	Political Economic Legal	Political consensus and economic income
Napoli Municipality	Council	Public / Bureaucratic	Political Economic Legal	Political consensus and economic income; improvement of the social, urban, and economic aspects of the considered area
IV Municipality	Local	Public / Bureaucratic	Political Economic Legal	Political consensus and economic income; improvement of the social, urban, and economic aspects of the considered area
"Amici dei musei di Napoli" association	Local	Special interest	Cognitive Social	Interest in the development of cultural and recreational activities
Private investor	Local	Special interest	Cognitive Social	Maximization of the economic income
"Borgo Dante e Decumani" Association of workers, artisans, and local dealers	Local	Special interest	Cognitive Social	Interest in the development of new activities to make the area more attractive, and also to improve their activity income
"I sedili di Napoli" association of artisans and cultural researchers	Local	Special Interest	Cognitive Social	Interest in the restoration of the historical and cultural assets
Students	Local	Special interest	Cognitive Social	Creation of new spaces for studying
Actual residents	Local	Special Interest	Cognitive Social	Creation of new spaces for the community and improvement of the actual conditions
Hospital personnel	Local	Special Interest	Cognitive Social	Maintaining the hospital service and improving the actual conditions
Actual residents of neighbouring areas	Local	Special Interest	Cognitive Social	Creation of new spaces for the community and improvement of the actual conditions
Architects	Local	Expert	Cognitive	Development of intervention strategies
Tourists	Local	Special Interest	Cognitive Social	Interest in improving the actual conditions
Media and public opinion	Regional Local	General Interest	Cognitive Political	Influencing public opinion

3.4 Identification of Alternative Adaptive Reuse Scenarios

The alternative scenarios have been designed considering the multidimensional and multi-value decision process, recognised through the performed SWOT and stakeholder analysis. Furthermore, these scenarios have also been differentiated from each other to give both the municipality and the developer a wide range of choices, to better respond to the real needs.

The four scenarios can be described as follows:

1. Scenario 0 (Business as usual). This scenario corresponds to the state of the art, without any interventions, foreseeing the maintenance of the actual function of the medical university in one part of the building, and leaving the other part empty;

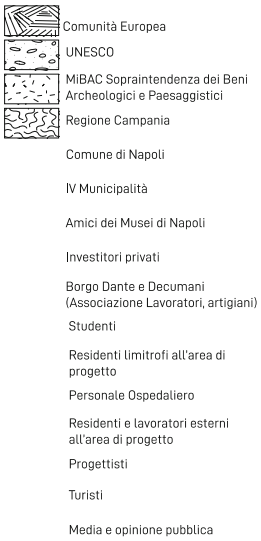


Fig. 3. Stakeholder Circle Analysis (Guarini, 2019).

2. The Community Hub. This project aims to fill the social and economic needs of the area. This strategy proposes requalification and adaptation interventions of the hospital building to create new spaces for the community. This scenario proposes the realisation of productive working spaces, characterised by the adaptability of their layout. The main objective is promoting community engagement by improving social innovation and inclusion;
3. The Student House. This scenario responds to the necessity of a new student house in the centre of the city of Naples. This project designs both public and private spaces to satisfy the requirements of both students and tourists;
4. The Archaeological and Cultural Park. This project provides the creation of an archaeological and cultural park to valorise the historical presence located both in this building and in the adjacent urban area.

3.5 Development of the PROMETHEE Method

3.5.1 Evaluation Criteria

The four scenarios have been evaluated according to a multidimensional set of criteria that refer to the environment, urban, social, and economic dimensions. Table 2 lists the criteria applied for the evaluation, which have been selected to engage in the evaluation from both public and private perspectives. The social criteria address the objectives and interests of citizens, tourists, and users. Whereas, the economic criteria consider the perspective of the private investors with a focus on the investment cost and profitability.

Table 2. List of multidimensional criteria applied for scenarios evaluation (Guarini, 2019).

Dimension	Criteria	Description
Environment	C_1 Permeable Surface / Territorial surface	The ratio between permeable surfaces and the overall territorial surface of the program [-]
	C_2 New green areas	Total of area designed to new green areas [square meters]
Urban	C_3 Architectonic Intervention	Restored area of the hospital [square meters]
	C_4 Archaeological Area	The revitalized portion of the archaeological area [square meters]
Social	C_5 Lodgings	Surface for residential functions [square meters]
	C_6 Sport and recreation area	Surfaces for sport and recreation activities [square meters]
	C_7 Didactics and cultural area	Surfaces for education and cultural activities [square meters]
	C_8 Mixitè Index	The index that describes the functional mix of the area [0-1]
	C_9 Co-working and labs	The surface of the structures for workshops, meetings, and training courses [square meters]
	C_{10} Healthcare assistance	Number of spaces designed for health assistance [number of people]
Economic	C_{11} New Jobs	Number of new jobs created [number]
	C_{12} Intervention cost	The total cost of the program [€]
	C_{13} Profitability	Income generated by the project [€]
	C_{14} Opening hours	Opening hours of the structure [number]

3.6 Application of PROMETHEE Method

Defined the evaluation criteria, the assessment has been performed according to the PROMETHEE method, following these steps:

1. Construction of the performance matrix. For each alternative, the performance over the set of criteria has been estimated;
2. Identification of the preference function P_j (a,b). For each criterion j, the Preference function (P) and Indifference (Q) threshold have been established. More in detail, the linear function has been selected for criteria C_1, C_2, C_6, C_7, C_9, C_{10}, and C_{12}. The level function has been chosen for criteria C_3, C_4, C_5, C_8, C_{11}, C_{13}, and C_{14};
3. Weighting the considered criteria. For this evaluation, the Simos' card method has been applied to determine the importance of different criteria [35]. For this purpose, a multidisciplinary panel of experts have been asked to weight criteria to represent and include in the evaluation the objectives of the identified stakeholders (Table 1). In detail, the panel of experts is composed of an expert in building restoration, to include the vision and objective of the private investor, a technician from Municipal Authority to assess the importance of criteria in according to the current municipality regulation, the city councillor, who represents the opinion, needs and requests of the community, both residents (workers, artisans, students) and tourists, and the superintendence of archaeology, who includes in the evaluation the principles of the UNESCO and also the interests of the local cultural initiatives. According to the Simos' card method, experts are given a set of pre-made cards representing each criterion (Table 2) and

asked to rank criteria from the least important to the most important. Moreover, it is also possible to differentiate the importance of the criteria through the addition of white cards between them. Thus, the greater the difference, the higher the number of white cards [36]. Figueira and Roy reviewed this method, introducing the z value [35]. This value represents how many times the last criterion is considered more important than the first, thus, z expresses a fixed interval between the criteria's weights [35]. In this application, the normalised weights have been calculated through the Simos-Roy-Figueira (SRF) procedure, to consider both criteria and the blank cards position. Figure 4 illustrates what emerged from the weighting procedure, underlying the different points of view of the four involved experts.

Moreover, both similarities and differences can be addressed among the declared weights, which can be justified for the different expertise and background of the involved experts.

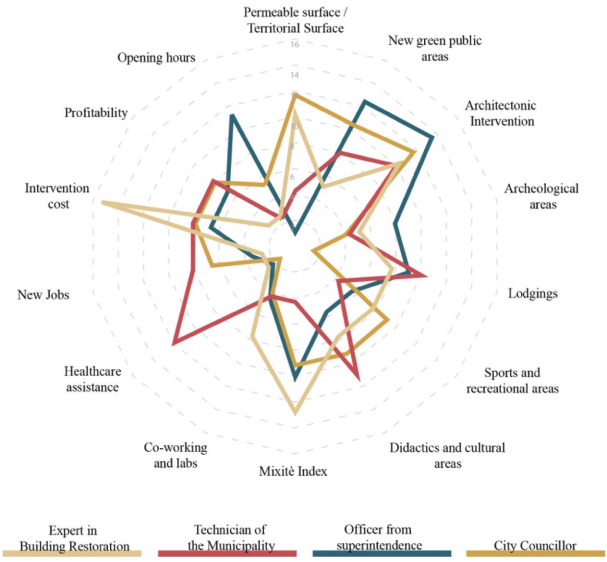


Fig. 4. Radar graph of experts' weights (Guarini, 2019).

Concerning the similarities, the criteria "C_3 architectonic intervention" and "C_8 mixitè index" have been evaluated as very important by all experts, underlying the urgency in renovating the physical aspect of the building, as well as the requirement in revitalising the intervention area according to social and economic dimensions. On the other hand, the criteria "C_{12} investment cost" and "C_{10} Health assistance" have been evaluated differently. The expert in building restoration evaluates the criterion "C_{12} investment cost" as highly important, according to its expertise and background, which reflects the necessity of proposing an intervention affordable according to the available investment budget. Instead, the technician of the municipality, the city councillor and the officer from the superintendence assessed this criterion as medium and low important. These

weights underline the interests of the municipality and the city councilor to represent the citizens' interests and needs, as well as the officer superintendence in proposing an intervention in line with the requirements to respect the historical characteristics of the unmovable CH asset.

4 Results

Calculation of the overall preference index Π(a,b), performing both the positive Φ + (a) and negative Φ-(b) outranking flows, and the comparison of the obtained outranking flows to define the complete ranking of the alternatives. In detail, the final ranking has been obtained through the implementation of the PROMETHEE method. Figures 4 and 5 show, respectively, the multi-actors' comparative rankings and the final ranking. The multi-actors comparative ranking (Fig. 5) shows that the Community Hub is the most preferred by the expert in restoration, by the technician of the municipality and by the superintendence officer. Whereas the city councillor prefers the Archaeological Park. It is interesting to notice that the restoration expert, the municipality technician and the superintendence officer have prioritised in their assessment the aspects related to mixité (criterion C_8) and architectural intervention (criterion C_3). This evaluation led them to appreciate more the community hub strategy, which excludes the construction of the new building and minimises the cost of intervention. As well, the city councillor assigned great importance to the presence of green areas (criterion C_2) and recreational facilities (criterion C_6). The evaluation performed by the city councillor identified the archaeological park scenario as the most preferable one, according to the fact that this scenario aims at valorising the open spaces of the intervention area.

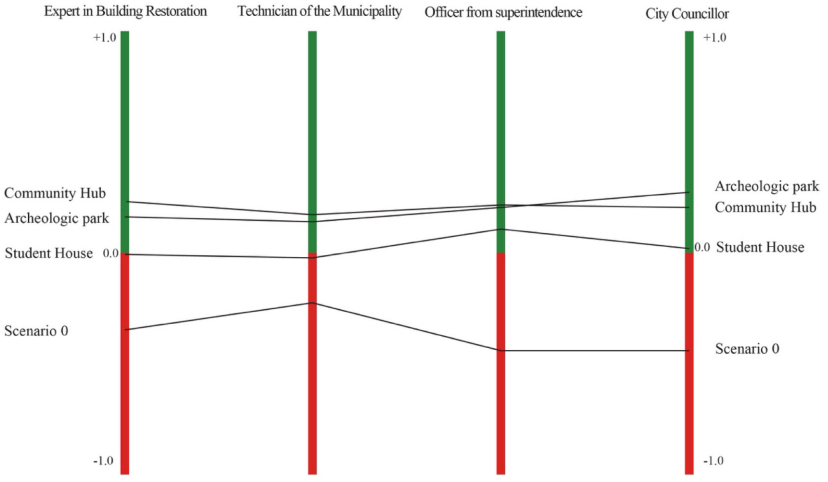


Fig. 5. Multi-actors comparative ranking (Guarini, 2019)

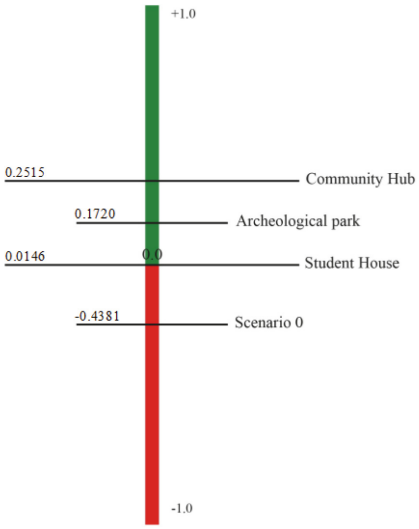


Fig. 6. Final ranking (Guarini, 2019).

Therefore, considering the experts' overall preferences, the preferred scenario is the Community Hub (Fig. 6). This final ranking shows the positive outranking flow that expresses how an alternative outranks all the others. Thus, it expresses its power and its outranking character. The higher the positive outranking, the better the alternative [37]. The obtained result is due to the Community Hub scenario's performance in different of the considered criteria. It has the best performance in many of the considered evaluation criteria, such as sport and recreation area, educational and cultural area, the mixité index, working space, new jobs, and profitability. Therefore, this scenario can satisfy the interests and objectives of both public and private stakeholders, according to its performance.

Moreover, it is possible to address that the scenario of the archaeological park has good performance in many of the considered criteria, but it presents the highest intervention cost, which is a criterion to minimise. As well, the archaeological park does not include any space dedicated to teaching and culture, which is an aspect considered very important by the involved experts. Scenario 0, the business as usual, is the least preferable scenario, according to the fact that it does not propose any intervention, without any improvement of the socio-economic conditions of the interested area.

5 Conclusion

The present research explores the issues and challenges of the evaluation of adaptive reuse strategies for unmovable CH assets. This research proposes a multimethodological evaluation framework to address the real-world evaluation demand for the renovation of the Policlinico, located in the historical centre of the city of Naples (Italy) [38]. The proposed evaluation framework integrates SWOT analysis, stakeholder analysis, and the

PROMETHEE method. The SWOT and stakeholder analysis have been applied to analyse the intervention context and the decision process, by systematising the information of the area of interventions, as well as identifying the different engaged stakeholders within their objectives and interests according to the project goal. These analyses have also been applied to define the multidimensional set of criteria for assessing the adaptive reuse strategies by taking into account the multidimensionality and the multiple values [39]. For this purpose, a multidisciplinary panel of experts were involved in weighing the different criteria, to determine their relevance according to the evaluation objective, as well as to guarantee the consideration of the perspectives of the involved stakeholders [31, 40]. According to the complexity of the addressed topic of CH adaptive reuse, the illustrated case study can be considered as a relevant application in considering and managing the multifaceted issues, which represent tangible real-world decision problems. This application underlines the suitability of the PROMETHEE method to support real-world complex decisions, considering its ability to compare the different alternatives considering the opinions of the different experts involved [41], as well as its implementation for adaptive reuse strategies evaluation in the context of CH. Moreover, the illustrated case study performed an evaluation which considers both the public and the private perspectives. This was possible by the engagement of a multidisciplinary panel of experts that represents the perspective of the developer, the public administration, and the citizens. The obtained results suggest that the proposed model provides an effective tool to support decision-making in highly complex contexts. It enhances transparency throughout the process and helps clarify the factors affecting the decision dynamics, facilitating the formulation of shared and inclusive development strategies [42].

Furthermore, some reflections can be made to set future research in this research context. First of all, the development and implementation of sensitivity analysis should be added to verify the robustness of the outputs of the evaluations, to better justify the final decision [11, 43]. Secondly, the financial analysis should be integrated into the multimethodological evaluation framework to estimate the cost of intervention and the cash flow to calculate the necessary economic resources to develop the selected intervention [44], as well as the Cost-Benefit Analysis (CBA) to calculate the economic cost, the cash flow and also the benefit of the strategy in the social and environmental field. Moreover, principles and criteria of the Circular Economy (CE) paradigm will be integrated into the proposed evaluation framework to be aligned with the recommendations of the European Commission (EC) [16].

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