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The Financial Sustainability of Cultural Heritage Reuse Projects: An Integrated Approach for the Historical Rural Landscape

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Abstract: In the last decades, the growing concern about land consumption, together with the awareness about cultural heritage's key role for sustainable development, has led to greater attention to cultural property reuse as a conscious process of new values production. However, decisions about heritage bring a high degree of complexity, related to the need to preserve properties' values and fulfill protection legislation, thus bringing high cost, which discourages public and private investments for reuse interventions. In this context, it becomes urgent to support reuse decisions through proper evaluation methodologies that, dealing with the complexity of interests at stake, allow individuals to assess the financial sustainability of conscious cultural heritage reuse projects. For these reasons, the paper proposes a methodological framework that, grounded on the recognition of cultural properties' values and their possible integration in the local economic system, assesses reuse projects' financial sustainability. This methodology's application is discussed through a case study, represented by a project for a historical rural landscape in Pantelleria island. The application to the case study allows us to discuss the role of the proposed evaluation framework in supporting and promoting cultural heritage reuse and its possible room for improvement.

Keywords: cultural heritage; reuse; values; methodological framework; financial sustainability

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1. Cultural Heritage Reuse: Which Challenges?

In the last decades, the growing concern about the harmful effects of traditional planning has driven decision-makers to look for alternative and more sustainable development models in projects and plans [1].

In particular, the widely recognized imperative to consider sustainability as a multidimensional paradigm has highlighted the opportunity to include cultural heritage as one of the primary sources of values for current and future generations [2]. In this sense, cultural heritage adaptive reuse, intended as a conscious process of new value creation [3,4], based on existing buildings' change of use to meet current needs [5], stands as a promising approach. The conceptual concurrence among sustainability and adaptive reuse approach places new challenges on the preservation since the expected outcome is both the assets' protection and the preservation of their historical and heritage significance [6,7]. Adaptation for heritage preservation is not new, being at the center of a theoretical debate from the second half of the XIX Century [8]. Later, in 1903 Alois Riegl proposed an interesting discussion point of view on the role of change of use in favor of preservation [9,10]. By outlining several types of values attached to cultural heritage, Riegl investigated different attitudes towards conservation. Framing choices about what and how to conserve through an adaptive reuse perspective sheds light on the many different—and sometimes divergent—values (economic, aesthetic, cultural, educational, and political) subjected to

discussion [6]. Indeed, adaptive reuse, besides providing cultural assets with a new function [11], places great importance on preserving their tangible and intangible values [12]. Thus, questions about the trade-offs between retaining symbolic values and adapting to new uses often arise.

Such a turning point in the approach towards heritage assets, together with the extension of the value categories related to environmental and cultural assets [13,14], has triggered reflections about reuse as an opportunity for heritage conservation and economic development [15]. Based on them, scholars have attempted to deal with the necessary trade-offs between preserving heritage values and the transformation required for new uses [10] by proposing evaluation models including social, economic, environmental, technical, and political dimensions of heritage buildings reuse decisions [6,7,16].

Concerning the trade-offs mentioned above, a relevant point is represented by the complex relationship among the challenge of preserving heritage system of values, the restrictions imposed by protection laws, and the high cost of interventions. This complexity, when meeting public administration economic constraints and private stakeholders' profit expectations, discourages both public and private investments for the reuse of heritage properties, thus resulting in a gradual abandonment [17] of these «unique material witnesses having a civilizing value» [18].

The linkage between cultural heritage and economic development implies that the former should not systematically be given precedence. The issue at stake is addressing reuse with proper evaluation methodologies that deal with financial sustainability to conserve this heritage better and minimize interventions that can adversely affect its integrity [19,20]. Finding an adequate balance between development and preservation when dealing with the widespread cultural heritage is still a challenging issue, especially in Italy, where the density and distribution of cultural heritage are the highest in the world.

Based on these premises, the paper proposes a methodological path that, resting on the integration of different evaluation methodologies to address the complexity of the issue to be faced, approaches assessing the financial sustainability of conscious cultural heritage adaptive reuse projects. In this light, after investigating in Section 2 the open problems related to assessing the financial sustainability for cultural heritage projects, Section 3 describes the proposed methodological framework. In Section 4, the methodology is applied to a case study, represented by a project for a historical rural landscape in Pantelleria island. Finally, Section 5 is devoted to discussing the results from the application to the case study and, stemming from them, the methodological framework's possible role in supporting and promoting heritage reuse.

2. Cultural Heritage and Financial Sustainability: Open Issues

Despite the unquestionable strategic importance of cultural heritage to achieve the objectives of sustainable development [1,21], the financial sustainability of cultural heritage conservation projects is still a critical point. Compared with the well-known social, economic, and environmental benefits of conservation of cultural heritage, the high costs of investment and management, and at the same time, the lack of public resources, has often led private investors to select projects with a higher Return on Investment (ROI).

Over time, numerous examples have highlighted the financial unsustainability of projects for architectural heritage conservation, thus determining the need to support them with public funds [22,23]. Indeed, cultural heritage preservation, protection, and maintenance are expensive and require financial resources, which are often difficult to obtain [24].

The increasing scarcity of public funds, together with the recognition of citizens' cultural needs, has prompted both public and private entities to experiment with new forms of governance for architectural heritage. These innovative approaches attempt to meet the needs of self-financing of interventions and their maintenance over time while respecting heritage's complex values [25].

Today, the focus on the cultural heritage sector is no longer just on preserving and protecting buildings and sites but on creating value [26]. Consequently, the importance

of setting new activities in heritage assets and finding new users for them [27] is widely recognized as crucial to overcome the private logic of *profit per se* versus shared value for all. New hybrid approaches, involving different actors (public, private, and civil), various management models (governance, business, and financial), and sustainable financial tools (equity, debt) are being tested for the enhancement of cultural heritage: i.e., private and public partnership (PPP) [28].

In this context, cultural projects need to demonstrate economic and financial sustainability [22,29] both to justify fundings and private investments and to assess the production of shared social value. In this sense, on the one hand, financial sustainability ensures that the conservation project will have enough resources to meet all financial obligations, such as operating and maintenance costs. On the other hand, the economic sustainability of a conservation project can express the project's capacity to contribute to society's wellbeing.

Cost-Benefit Analysis (CBA) is commonly used to evaluate an investment's economic and financial sustainability based on a Discount Cash Flow Analysis (DCFA). Furthermore, the European Union requires it as a quantitative method to evaluate the feasibility of a project to apply to EU funds [30].

The Net Present Value (NPV), the Internal Rate of Return (IRR), and the payback period are the indicators most used to assess the financial sustainability of investment to verify if the project's income exceeds the expenditure after a predetermined period of management. Usually, an investor establishes the IRR as the threshold for which investment is considered financially viable.

However, it must be emphasized that the not ordinary nature of cultural assets reuse makes it reductive and misleading to refer only to market categories and parametric estimates in assessing both the costs and benefits of a conservation project merely from an economic and financial point of view. At the same time, the only reference to market values does not allow for a full appreciation of the complex social value of cultural heritage [31].

Based on these well-known limits of economic analyses focusing on monetization of costs and benefit, when applied to the Cultural Heritage sector, there is a need to propose new hybrid measurement approaches that consider economic and social values [32].

3. Cultural Heritage and Financial Sustainability: A Methodological Framework

The urgent need to efficiently support decisions on the reuse of cultural properties by considering their complex system of values and addressing financial sustainability calls for the definition of a proper methodological path based on the integration of different decision-support and evaluation methodologies. According to the EU Guide on Cost-Benefit Analysis 2014–2020, a methodological framework is proposed [33] (Figure 1).

The following sub-sections provide a brief description of the different steps in the path by explaining their objectives and methodological bases.

3.1. Decision Context Analysis

The decision context analysis represents the first step in the methodological framework towards assessing the financial sustainability of cultural heritage reuse projects. It aims at framing the decision context for the reuse project and grounds on the System Thinking Approach, combining Hard System Analysis, Institutional Analysis, and Soft System Analysis [34]. Indeed, the Hard System Analysis allows collecting 'objective' information and data relevant for the decision issue [35]. At the same time, Soft System Analysis integrated this 'objective' knowledge with the one provided by local stakeholders [36], selected through the application of the Institutional Analysis technique [37].

The results from the application of the System Thinking Approach for the analysis and definition of the decision context are organized in a SWOT (Strengths, Weaknesses, Opportunities, Threats) matrix [38], thus providing a starting point for designing context-aware reuse strategies.

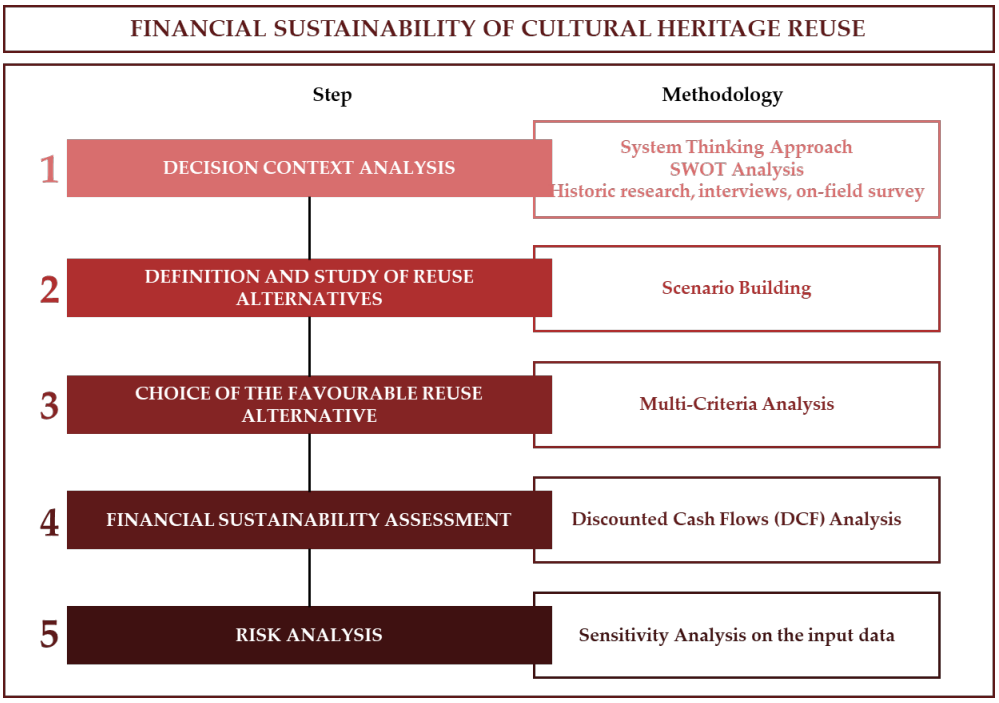

Figure 1. Methodological framework to address the financial sustainability of cultural heritage reuse.

3.2. Decision Context Analysis: Cultural Heritage Values Recognition

Within the decision context analysis, the cultural heritage values recognition is geared towards identifying the complex system of values embedded in the heritage understudy that must be preserved and enhanced by the reuse project [39]. The recognition process grounds itself on integrating different knowledge approaches: historical research, interviews with local experts in the conservation field, and on-field surveys [40]. The choice of grounding on these approaches to knowledge is related to the level of detail required for defining and evaluating reuse projects in a feasibility phase. Indeed, other fundamental tools for knowledge acquisition, like those provided by natural sciences and modern technologies of surveying and information gathering [41,42], become necessary when dealing with heritage projects in detailed and advanced stages.

3.3. Definition and Study of Reuse Alternatives

Based on the results of the SWOT Analysis, combined with the findings from the values recognition process, the methodological path goes through the design of alternative reuse scenarios through the application of the scenario building methodology [43]. Indeed, this step aims at designing reuse alternatives coherent with the heritage system of values and integrated with the local development trajectories.

For this reason, the scenario building process moves from a vision for the considered heritage's future and sets objectives and actions based on it. The integration of these actions, submitted to a performance check, leads to the alternative project scenarios definition [44].

3.4. Choice of The Favorable Reuse Alternative

The *choice of the favorable reuse alternative* step rests on the results from the previous phase: the alternative reuse project scenarios. Indeed, it aims at identifying the most suitable reuse solution according to the defined goals. The multi-dimensional nature of a decision issue dealing with heritage reuse calls for Multi-Criteria Analysis as the best methodology to support the evaluation of the alternative scenarios [45].

The obtained result can be analyzed to test its robustness through a Sensitivity Analysis and its level of consensus through implementing a Social Multi-Criteria [46].

3.5. Financial Sustainability Assessment

According to the set objectives, the *choice* phase returns the most appropriate reuse project, considering the complex values and interests required by heritage-related decisional issues. The last step in the methodological framework aims to assess the financial sustainability of the selected reuse project, thus providing a complete and solid ground for decisions both in the public and in the private sphere.

The financial sustainability assessment is based on the analysis of the monetary cash flows related to the project implementation and discounted to the present [47], according to the following Equation (1):

$$\sum \frac{R - C}{q^n}, \quad (1)$$

in which:

1. R stands for the revenues related to the reuse project, distinguished into revenues from direct management, coming from the activities directly run by the properties' owner, and revenues from indirect management, coming from some properties' renting;
2. C is given by the sum of the construction and management costs;
3. $q^n = (1 + r)^n$ is the discount factor, based on the definition of the discount rate r.

Besides the discount rate, fixing the analysis's time horizon and defining the different cost and revenue items is necessary.

The financial sustainability of the reuse project can be assessed by referring to two profitability indicators [46]. The former is the Net Present Value (NPV), given by the sum of the present values of the incoming and outgoing individual cash flows, as shown in Equation (2):

$$VAN = \sum_{t=0}^{N} \frac{CF_n}{q^n}, \quad (2)$$

where:

1. N is the time horizon for the analysis;
2. CF_n is the cash flow for the year n;
3. $q^n = (1+r)^n$ is the discount factor.

The financial sustainability assessment through this profitability indicator consists in verifying if the NPV is greater than zero. The latter profitability indicator is the Internal Rate of Return (IRR). It represents the discount rate making the NPV of all cash flows equal to zero, as shown in Equation (3):

$$VAN = \sum_{t=0}^{N} \frac{CF_n}{q^n} = 0, \quad (3)$$

The IRR, on its own, does not hint at the convenience of implementing a project or not. Based on this indicator, the financial sustainability assessment stems from comparing the IRR with the discount rate, intended as the opportunity cost of capital [45]; a project can be implemented when the IRR is greater than the opportunity cost of capital.

3.6. Risk Analysis

Since risk management is one of the main issues to be considered both in public and private investments, a comprehensive methodology towards financial sustainability assessment cannot disregard a risk analysis. In literature, there are different methods for the Treatment of Risk [48]. Among them, the proposed methodological framework relies on a *Sensitivity Analysis*, which consists of altering, one at a time, the input data in the financial analysis and studying the impact of these changes on the profitability indicators (NPV, IRR) [49].

Indeed, *Sensitivity Analysis*, while assessing the robustness of the obtained results, allows decision-makers to identify the critical input variables in the analysis, thus providing further significant reference points for the investment choice.

4. Evidence from a Case Study: A Reuse Project for a Historic Rural Landscape in Pantelleria Island

4.1. Why Pantelleria?

The methodological path towards assessing the financial sustainability of a reuse project is applied to a case study represented by a landscape project in Pantelleria island. The island of Pantelleria is set in the Mediterranean Seat, at the southwest of Italy (Figure 2).

Figure 2. Pantelleria Island localization.

The island stands as a perfect territorial context for the application of the defined methodological path. Indeed, on the one hand, Pantelleria is affected by shrinking dynamics, closely related to its insularity and scarce accessibility, thus requiring context-aware decisions to trigger the local economic development. On the other hand, over the years, the island has received wide recognition of its outstanding cultural value, both at the national and international level, which calls for a conscious and value-sensitive approach to its built heritage reuse.

This unique cultural value can be found in different elements, closely connected to the island's agricultural vocation:

1. The terraces used to mold the slopes through the use of dray-stone walls to create the conditions for setting cultivations;
2. The head-trained bush vines (*vite ad albarello*) cultivation (Figure 3a). It is a local agricultural technique, developed over centuries to deal with the strong wind exposure and the scarcity of water, that in 2014 was recognized as UNESCO Intangible Cultural Heritage [50];
3. The dry-stone fences (*giardino panetesco*), to create proper climate conditions for citrus tree cultivations;
4. The *dammusi*, extraordinary and traditional examples of vernacular architecture, scattered over the whole island (Figure 3b).

Furthermore, the coexistence of these elements within the island has led to recognizing its landscape as one of the Italian most representative rural landscapes and listing it in the *National Register of Historical Rural Landscapes* in 2018 [51].

(**a**) (**b**)

Figure 3. (**a**) The head-trained bush vines (*vite ad albarello)* cultivation. (**b**) Example of Pantelleria traditional architectural typology: the *Dammusi* (photos taken by Marco Rossitti).

4.2. The Project Area

All the pre-mentioned elements, contributing to recognizing Pantelleria cultural significance, can be found in the areas selected for the reuse project. With a total extension of 28 ha, the two project sites are located in the southeast part of the island (Figure 4).

Figure 4. Project area localization in Pantelleria Island.

In its current state, the whole property belonging to the same owner is wholly abandoned and on sale, thus making it possible to think about a unified reuse project. It includes several buildings, ascribable to the *dammuso* typology, and a terraced park, sloping towards the sea, devoted to the head-trained bush vines cultivation (Figure 5).

The following sub-sections describe the different steps in the methodological path applied to a reuse project for this area.

(**a**) (**b**)

Figure 5. (**a**) *Dammuso* building in the project area. (**b**) Terraced park, devoted to head-trained bush vines cultivation, with scattered *dammuso* buildings in the project area (photos taken by Marco Rossitti).

4.3. Decision Context Analysis

This phase, representing the initial step in the methodological path, aims at framing the knowledge basis and the decision context for the reuse project. All the relevant information about the island and the project area, collected through the integration of the *Hard System Analysis*, *Institutional Analysis*, *and Soft System Analysis* are systematized into a SWOT (Strengths, Weaknesses, Opportunities, Threats) matrix, thus providing a valuable reference for the reuse strategies design (Figure 6) [52]. More in detail, the *Hard System Analysis* allows us to build up a comprehensive knowledge framework about Pantelleria's physical and morphological aspects, its social structure, and economic system, thus providing valuable references for the SWOT matrix construction. Then, the *Institutional Analysis* is used to map the relevant stakeholders in the local community, whose interests are investigated through two different tools: an online questionnaire and interviews with preferential actors.

This direct interaction with local stakeholders integrates the 'expert perspective' with the local communities' one, thus obtaining a place-based SWOT matrix able to include factors that only those who live on the island can adequately detect.

4.4. Decision Context Analysis: Cultural Heritage Values Recognition

Given the peculiarities of Pantelleria territorial context and its widely recognized cultural significance, a proper *cultural heritage value recognition* process is essential to identify its complex system of values to be preserved and enhanced through a conscious reuse project. For this purpose, the most relevant built heritage assets (the terraces, the dry-stone fences, and the *dammusi*), characterizing Pantelleria landscape and the project area, are analyzed by integrating different knowledge approaches: historical research, interviews with local experts in the conservation field, and on-field surveys.

	POSITIVE FACTORS	NEGATIVE FACTORS
ENDOGENOUS FACTORS	**STRENGTHS** 1.Agricultural products with certification of territorial specificity (DOP, IGP) 2.Several touristic attraction factors; 3.Island vocation towards energy production from renewable sources, because of the climate conditions; 4.Harbor and airport to provide external connections; 5.Know-how related to traditional cultivation technique, winemaking and agricultural holding management; 6.A good number of tourist accommodation; 7.Pantelleria National Park institution; 8.Presence on the island of serveral wonderful examples of vernacular and traditional architecture 'i *dammusi*'; 9.Territorial system with a decent balance between nature and human intervention; 10.Presence of a proportion of cultural value real estate properties to conserve; 11.Presence of several artists on the island as tourists; 12. Presence of sea.	**WEAKNESSES** 1.Insularity; 2.Weakness of road infrastructure system in internal areas; 3.Weakness of external connection and high cost of transportation; 4.Internal mobility system private car based; 5.Facilities shortage and scattering on the island; 6.High level of degradation in Pantelleria historical centre; 7.Uneffective and inadequate promotion of Pantelleria sources; 8.Services and tourism activities seasonality; 9.Lack of an economical network among economic operators.
EXOGENOUS FACTORS	**OPPORTUNITIES** l.Growing demand on quality agricultural product; 2.A high proportion of natural and architectural heritage to regenerate an promote 3.Growth of eco, food and cultural tourism at international level; 4.Promotion on international touristic market; 5.Accessibility to funding for agricultural, touristic and cultural activities; 6.Accessibility to funding for energy efficiency and energy consume reduction interventions;	**THREATS** 1.Brain drain of highly skilled young people; 2.Ongoing abandonment of rural areas and ageing process; 3.Natural habit destruction and fragmentation; 4.Marginal areas abandonment and multi-dimensional depletion; 5.Risk of desertification; 6.Loss of touristic competitiveness and attractiveness compared to other territorial systems; 7.Lack of integration among transformation projects for the island; 8.Loss of knowledge about traditional culture and activities:

Figure 6. The SWOT Analysis.

4.4.1. The Terraces

Pantelleria terraces stem from the need to mold the landscape and to make it prone to cultivation. Their cultural significance rests in witnessing humankind's activity on a specific territory [53]. The terraces system is based on the dry-stone walls construction techniques, which in 2018 was recognized and listed as UNESCO Intangible Cultural Heritage [54]. Furthermore, this construction technique on the island has a strong historical value since its first application dates back to the Iron Age [55].

4.4.2. The Dry-Stones Fences (Giardino Pantesco)

The *giardino pantesco* is a fence built through the use of dry stone. It usually has a circular shape and creates a favorable micro-climate for the citrus trees' growth. Indeed, Pantelleria climate conditions, characterized by drought, strong winds, and frequent thermal shocks, make it possible to grow citrus trees only through this fence [56].

The entrance to the *giardino pantesco* is through a door, out of sight, and whose dimension requires anyone to bend down [57]: while finding a technical reason, this device strengths the spiritual value related to the protective action of the wall.

4.4.3. The Dammusi

The *dammusi* are extraordinary and unique examples of vernacular and traditional architecture. They witness a wise use of local materials and make the function the *raison d'être* of their architectural composition.

The first examples of *dammusi* date back to the Byzantine Era [56]. They are born as a typical peasant construction through local stones and dough of soil and water, named *taiu*. In the following centuries, the *dammuso* typology shows significant improvement in the construction techniques through the introduction of lime for roof waterproofing.

Concerning this typology's variations in formal and dimensional terms, they depend on the specificities of the different areas in the island [58], related to:

1. The typology and quantity of available stones. This factor influences the wall thickness and the openings' dimension;
2. The morphological features of the building site. This parameter strongly affects the volume composition, thus showing the intense level of integration of this building typology with its natural environment.
3. Exposition to the wind. As previously mentioned, the wind in Pantelleria is not only an environmental factor, but a design device, having a strong influence on the architectural shape. Indeed, prevailing winds' direction at the architectural scale determines the position of the openings, while at the urban scale influences the spatial orientation of the buildings.
4. Other climate conditions, as natural lighting. It affects the *dammuso typology* through the addition of porticoes where the sun-lightning conditions are better.

The *dammuso* building typology, in all its possible variants, is given by the sum of modular elements, represented by a square and vaulted volume [59]. Each variant has a specific traditional name and spaces arrangement, according to its function, and can be enriched by several outdoor spaces, mainly devoted to agricultural activities.

4.5. Definition and Study of Reuse Alternatives

The results from the analysis of the decision context systematized in the SWOT matrix (Figure 4) and from the cultural heritage values recognition process are integrated to design alternative reuse project scenarios. More in detail, the SWOT analysis provides the references for developing a project, leveraging local potentialities, and tackling the existing criticalities. The cultural heritage values recognition process allows making the design compatible with the project area's system of values. Even this step of the methodological framework resorts to stakeholders' involvement as an essential reference. Indeed, the interaction with the local community, carried out through questionnaires and interviews, on one side allows identifying drivers for sustainable reuse strategies coherent with its expectations. On the other side, it enables understanding the social perception of the islands' cultural values, thus identifying the most relevant one to preserve and enhance for developing a widely supported reuse project.

The alternative reuse project scenarios are defined by applying the Scenario Building methodology and leveraging the areas' potentialities and drivers for development through sustainable tourism and traditional culture promotion [60,61]. These scenarios can be identified into [4]:

1. A *Culture First* scenario, based on the reuse of the project area as a cultural center hosting exhibition spaces, conference rooms, a literary café, accommodation, and labs for artists;
2. *A Wine First* scenario, grounding the reuse on the traditional agriculture practice of viticulture. Indeed, the project area is devoted to producing and selling local wine and promoting wine culture through a wine museum, a wine school, and a farmhouse.
3. *A Culture and Wine* scenario, combining the previously described culture-based and wine-based visions by including a cultural park and a wine museum for the reuse project.
4. *A Trend Based* scenario, based on the projection of the actual trends into the future. Indeed, it makes no changes in the real estate complex's functional program by keeping the properties' existing functions (residential complex and touristic resort).

4.6. Choice of the Favorable Reuse Alternative

The willingness to develop a reuse project, coherent with Pantelleria local development trajectories and its high cultural significance, requires an accurate evaluation of the different scenarios to identify the favorable one. This evaluation is based on a multicriteria analysis since it includes multiple factors in a complex decision [62].

Coherently with the chosen methodology, the different alternatives are assessed in terms of performances according to a set of criteria related to the strategic goals of the reuse project (Table 1).

Table 1. Definition of criteria, indicators, scale, and unit of measurement for the multicriteria analysis.

Strategic Goals	Criteria	Indicators	Scale	U.m.	Min/Max
Promotion of traditional agriculture	Activities and events related to products	Numbers of activities and events	*Interval scale*	(0,+,++,+++)	max
	Lands recultivated with head-trained bush vines	Surface of recultivated lands	*Ratio scale*	%	max
Promotion of natural sources	Use of renewable sources	Presence of plants for energy production	*Binary scale*	SI/NO	max
	Recovered paths	Linear extension	*Ratio scale*	%	max
Promotion of art and culture with their hybridization characters	Spaces devoted to the culture	Useful floor area	*Ratio scale*	sqm	max
Promotion of the architectural heritage "I *Dammusi*"	Restored buildings	Restored buildings' surface	*Ratio scale*	%	max
Deseasonalization and strengthening of touristic and services offer	Existence of competitors on the island	Numbers of existing competitors	*Ordinal scale*	(0,−,−−,−−−)	min
Maximisation of promoter's individual profit	Profitability of project functions	Function	*Ordinal scale*	(0,+,++,+++)	max
	Accessibility of funding	Numbers of chances of funding	*Ordinal scale*	(0,+,++,+++)	max

The calculation phase is based on a specific multicriteria method: the *Electre method*. Its choice lies in the fact that it enables handling both quantitative and qualitative criteria and in its flexibility [63]. The system of weights, expressing the relative importance of criteria, is defined through the pairwise comparison method [64].

The application of the *Electre method* for evaluating the different scenarios, based on their performances according to the criteria set and the defined system of weights, returns a ranking of the four alternatives. Based on it, the *Culture and Wine* scenario emerges as the favorite alternative for the reuse project implementation.

However, the need to deal with uncertainty in planning issues with a high complexity level [65] calls for sensitivity analyses to understand the robustness of the obtained result [66]. Thus, the alternatives ranking's sensitivity is assessed through a Monte Carlo approach, based on the variation of the input values for the analysis [67].

Once the sensitivity analysis verified the robustness of the result, the widely acknowledged importance of social consensus [68] towards cultural heritage conservation leads to consider the possible conflicts among the different stakeholders' groups through an equity analysis. Based on quality judgments expressed by representatives of the different stakeholder groups, this analysis is conducted through the NAIDE method [69].

The equity analysis implementation returns the *Culture and Wine* scenario like the one reaching the higher level of alliance among the different stakeholders. This result, thus, confirms it as the favorable reuse project alternative to implement and assess in terms of financial sustainability (Figure 7).

Figure 7. Masterplan of the Cultural Park, according to the *Culture and Wine* reuse project scenario (authors' elaboration).

4.7. Financial Sustainability Assessment

Once the reuse project is selected, preserving Pantelleria's historic rural landscape cultural significance and designed in a sustainable local development perspective, it is possible to address its financial sustainability through a Discounted Cash Flow Analysis (DCFA) [70]. The evaluation of the project's financial sustainability calls for the definition of the different input data, as described below.

4.7.1. Building Technical Construction Cost Appraisal

The Appraisal of the Building Technical Construction Cost stands as a propaedeutic and fundamental step towards the financial analysis of the project. The appraisal is carried out through a synthetic approach, based on the definition of a parametric cost for

each typology of building intervention. More in detail, the project involves five different typologies of building interventions:

1. New construction of tertiary buildings;
2. New construction of residential buildings;
3. Military buildings restoration;
4. *Dammuso* buildings restoration;
5. Rural buildings restoration.

The parametric cost estimation for each intervention typology is based on defining summary tables of the different building work categories (Table 2).

Table 2. Example of a summary table for the '*Dammuso buildings restoration*' intervention typology.

Cod	Building Works Description	Cost in €	Incidence
01	Demolition, removal and transport to dump	€ 2982.96	8%
02	Floors and walls	€ 1736.14	4.5%
03	Plasters and paintings	€ 9221.55	24.0%
04	Windows and arbors	€ 7000.00	18.2%
05	Electrical system	€ 2516.00	6.5%
06	Hydro-sanitary system	€ 10,399.00	27.0%
07	Other systems	€ 4588.00	11.9%
	Total Cost	**€ 38,443.65**	
		Cost €/sqm	**Cost €/mc**
	Parametric Cost	**€ 520**	**€ 173**

The different cost items are defined by analyzing several official documents related to similar building interventions in Pantelleria island. Indeed, the specificities of the considered properties require referring to the local building market.

According to the Pantelleria Municipality regulation, planning fees are determined starting from the building construction costs defined for the whole project.

4.7.2. Capital Goods Costs Appraisal

Capital Goods Cost estimation stands as another requirement towards assessing the project's financial sustainability since it contributes to the definition of the Investment Cost. More in detail, capital goods costs are estimated for each building as a percentage of the construction cost, ranging from 6% to 24% according to the designed functional program.

4.7.3. Operating Costs Appraisal

For the Operating Costs Appraisal, the research work refers to an annual parametric cost, including materials needed for maintenance and repair of assets; consumption of raw materials, fuel, energy; general management and administration; insurance cost; waste disposal costs; taxes; gardening; and cleaning (Table 3). This annual parametric cost stems from elaborating and revising the cost items provided by the *DEI—Prezzi Tipologie Edilizie* [71]. Moreover, this cost item is completed by considering the costs for the staff involved in the designed activities.

Table 3. Example of a summary table for the calculation of the operating costs.

Exhibition Space in the Cultural Park		
Gross floor area	**sqm**	388
Yearly operating cost per sqm	**€/sqm**	€ 55.00
Yearly operating cost	**€**	**€ 21,340.00**

4.7.4. Revenues Appraisal

Based on specific management hypotheses, the research delves into the appraisal of the revenues from the reuse project implementation. More in detail, revenues are distinguished into:

1. Direct management revenues stemming from the activities directly run by the real estate complex owners (Table 4). Their estimation rests on market analyses of similar activities in the national context.
2. Indirect management revenues that come from renting some properties (Table 5). The reference for their definition is the *Osservatorio del Mercato Immobiliare* (OMI) from the *Agenzia dell'Entrate*.

Table 4. Example of a summary table for direct management revenues calculation.

Exhibition Space in the Cultural Park		
Number of tourists in 2017	**cad**	15,566
Average visitors coefficient	**%**	60%
Average yearly number of visitors (first four years of activity)	**cad**	9340
Average yearly number of visitors (following years)	**cad**	10,300
Ticket price (first four years of activity)	**€**	€ 600
Ticket price (following years)	**€**	€ 700
Average yearly revenues (first four years of activity)	**€**	**€ 56,037.60**
Average yearly revenues (following years)	**€**	**€ 72,100.00**

Table 5. Example of a summary table for indirect management revenues calculation.

Conference Center in the Cultural Park		
Net floor area	**mq**	114.5
Rent value (OMI)	**€/sqm × month**	€ 12.10
Monthly gross income from renting	**€/sqm × month**	€ 1385.45
Tax expenses	**%**	21%
Maintenance expenses	**%**	4%
Total amount of detractions	**€/sqm × month**	€ 346.36
Net operative income from renting	**€/sqm × month**	€ 1039.09
Average yearly revenues	**€**	**€ 12,469.05**

4.7.5. The Financial Analysis

Once the different costs and revenues items are defined, the analysis of the reuse project's financial sustainability calls for setting the *reference time horizon* and the *discount rate*:

The analysis' *reference time horizon* is placed equal to 16 years, as recommended by European Commission [72];

1. The *discount rate* is estimated as Weighted Average Cost of Capital (WACC), based on the defined financial structure, covering 30% of the investment cost with equity capital and 70% with debt capital, according to the Equation (4) [47]:

$$r = K_e \times \frac{E}{D+E} + K_d \times (1-t) \times \frac{D}{D+E}, \quad (4)$$

in which:

2. r is the discount rate;
3. K_e is the cost of capital, based on the Capital Asset Pricing Model (CAPM), providing a discount rate for investment according to its risk level;
4. K_d is the cost of debt, placed equal to the value of the IRS rate for 15-years fixed-rate loans;
5. E is the % of equity capital, according to the financial investment structure;
6. D is the % of debt capital, according to the financial investment structure;

7. t is the tax rate.

Based on these premises, the *discount rate*, intended as the opportunity cost of the capital, is equal to 3.5%. The last propaedeutic datum for the financial analysis is the properties' *residual value*, representing the estimated value of a fixed asset at the end of the analysis' *time horizon*. It must be considered as revenue in the *DCF* analysis and is defined through the income approach, based on the Equation (5):

$$V_r = \frac{R}{r_c} - D \tag{5}$$

in which:

1. V_r is the residual value of the properties included in the project area;
2. R stands for the net operating income in the last year of the *time horizon*;
3. r_c is the capitalization rate, expressed as a measure of the relationship between a property's current income stream and its price or market value in the Pantelleria real estate market;
4. D is the depreciation related to different factors, as physical deterioration, functional obsolescence, and external obsolescence [73].

Based on the pre-mentioned assumptions (Table 6), the research goes through the reuse project's financial analysis and the estimation of the profitability indicators (Figures A1 and A2 in Appendix A).

Table 6. Assumptions for the Cultural Park.

A	**Land and Properties Value**	
A.1	Land and properties value	€ 2,020,000.00
Total A		**€ 2,020,000.00**
B	**Construction Costs**	
B.1	New construction (tertiary buildings)	€ 823,970.00
B.2	New construction (residential buildings)	€ 76,356.00
B.3	*Dammusi* restoration	€ 325,000.00
B.4	Rural buildings restoration	€ 345,648.00
B.5	Recultivation of vineyards and citrus trees	€ 140,873.25
B.6	Photovoltaic system	€ 22,000.00
B.7	Other interventions	€ 841,779.05
Total B		**€ 2,575,626.30**
C	**Capital Goods Cost**	
	Capital Goods Costs for the Cultural Center	€ 151,980.40
Total C		**€ 151,980.40**
D	**Planning Fees**	
D.1	Urbanization fees	€ 6,489.00
D.2	Contribution on the Construction Cost	€ 78,548.70
Total D		**€ 85,037.70**
E	**Professional Fees**	**€ 206,050.10**
F	**Financial Fees**	**€ 72,657.97**
Total		**€ 5,111,352.48**

Table 6. *Cont.*

G	Operating Costs	
G.1	Average yearly costs for properties' management	€ 112,522.50
G.2	Average yearly costs for the working staff	€ 270,000.00
Total		**€ 382,522.50**
R	**Average Yearly Revenues** (first four years of activity)	
R.1	Average yearly revenues from direct management	€ 547,915.60
R.2	Average yearly revenues from renting	€ 12,469.05
Total		**€ 560,384.65**
S	**Average Yearly Revenues** (following years)	
S.1	Average yearly revenues from direct management	€ 563,978.00
S.2	Average yearly revenues from renting	€ 12,469.05
Total		**€ 576,447.05**

The *Discounted Cash Flows* (Figure A1 in Appendix A) return a Net Present Value (NPV) ex ante taxes equal to € 1,620,131.52 and an Internal Rate of Return (IRR) equal to 7.1% and, thus higher than the defined *discount rate*. Concerning the post taxes scenario, the NPV lies at € 504,997.94, while the IRR at 4.6% is still higher than the *discount rate.*

4.8. Risk Analysis

As the last step in the integrated methodological framework, a risk analysis is performed to evaluate the robustness of the results obtained from the financial sustainability assessment. It rests on a sensitivity analysis, based on changing the input values in the DCF, according to the main risk related to investments in the cultural sector [33].

With them, sensitivity analysis also includes environmental factors, since they represent a primary source of risk for cultural heritage projects that can no longer be dismissed [74]. More in detail, in Pantelleria island, the main environmental risk factor is represented by windstorms that, in terms of projects' implementation, can determine delays in the construction process or an increase in construction costs.

All the different risk scenarios (Table 7) return positive values of the ex ante taxes NPV and IRR values higher than the *discount rate*. In this light, it is possible to state that the reuse project for Pantelleria rural landscape, compatible with its complex system of values and integrated into a local development perspective, is also sustainable in financial terms.

Table 7. Profitability indicators values stemming from changes in the DCF input data, based on different risk scenarios.

Phase	Risk	Changing Input	NPV (Ante)	IRR (Ante)
Demand forecast	Wrong estimation of the number of users/visitors for the different activities	Revenues (**reduced by 5%**)	€ 578,870.97	4.9%
Administrative procedures	Delay in acquiring the necessary permissions from public administrations	Construction starts in the third year of the time horizon (**with one year of delay**)	€ 806,018.87	5.2%
Building complex acquisition	Higher cost for the building complex acquisition	Properties value (**increased by 15%**)	€ 1,201,072.34	6.1%
Construction	Higher technical construction costs	Technical construction costs (**increased by 10%**)	€ 1,163,524.74	6.0%
Construction	Environmental risk (windstorms)	Technical construction costs (**increased by 5%**) and delay in the construction processes (**it lasts 3 years instead of 2**)	€ 651,092.95	4.8%
Financing	Reduction of the investor's financial capacity	Financial structure of the investment (**80% debt and 20% equity**)	€ 1,834,416.95	8.1%
Management	Wrong estimation of the management costs	Management costs (**increased by 10%**)	€ 536,874.34	4.8%

5. Discussion of Results and Conclusions

The paper proposes an integrated methodology to ground decisions on cultural heritage reuse by addressing their financial sustainability while considering heritage's complex system of values and the need to conceive projects through a local development perspective [75].

Such an integrated methodology can represent a valuable reference for decisions both in the public and the private sphere. Indeed, by addressing reuse projects' financial sustainability, on the one hand, it allows dealing with the budget constraints affecting public administrations [76] by carefully evaluating the opportunity to ensure proper financial provisions to cultural heritage projects. On the other hand, it can guide private investors, often hindered by the low profitability of investments on cultural heritage [77], in managing the complexity of cultural assets reuse projects.

In this sense, the extensive application of this methodological framework can effectively support public administrations in defining a priority order for actions and projects on heritage assets according to their multi-dimensional convenience and sustainability.

Its opportunities are even more relevant for marginal contexts, as Pantelleria, where the reduced financial capacity of public administration and the deep fragility of economic and social systems calls for proper and focused resources allocation to guarantee the survival of places, values, and communities. The reuse project for Pantelleria rural landscape, indeed, stands as a practical example of a project, sensible to the building complex's significance and the local specificities, but also profitable from a financial point of view. Indeed, its ex ante taxes Internal Rate of Return (IRR) amounts to 7.1%. It is higher than both the *discount rate* used for the analysis (3.5%), the *financial discount rate* (4%), and the *social discount rate* (5%), suggested by the European Commission as reference for investments [33]. Furthermore, the project shows a Return on Investment (ROI), measured as net income divided by the capital cost of investment, of around 7%, which is considered a good value for an investment [78].

Regarding funding opportunities, such a methodological framework towards financial sustainability can trigger hybrid investments in cultural heritage reuse projects, considering their cultural and social impacts. These approaches can be identified in public-private partnerships [79] or access to heritage-focused funding programs [80], thus promoting a broader engagement in the complex task of conserving and enhancing built heritage. In this sense, the integrated methodology towards evaluating reuse projects' financial sustainability can be integrated with specific procedures to assess projects' social impacts in qualitative and quantitative terms [81–85].

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Appendix A

The appendix contains the spreadsheet used to implement the financial analysis and the definition of the profitability indicators.

	Investment costs	1	2	3	4	5	6	7	8
A	Properties value - Khamma	€ 606,000.00							
	Properties value - Ghirlanda	€ 192,000.00							
B	Technical construction cost - New construction (terziary)		€ 123,595.50	€ 123,595.50					
	Technical construction cost - New construction (residential)		€ 22,270.50	€ 22,270.50					
	Technical construction cost - *Dammusi* restoration		€ 66,573.00	€ 66,573.00					
	Technical construction cost - Rural buildings restoration		€ 51,847.20	€ 51,847.20					
	Technical construction cost - Recultivation of vineyards and citrus trees		€ 23,005.99	€ 23,005.99					
	Technical construction cost - Photovoltaic system		€ 8,550.00	€ 8,550.00					
	Technical construction cost - Other interventions		€ 209,721.61	€ 209,721.61					
	Technical construction cost - Military buildings restoration		€ 51,847.20	€ 51,847.20					
C	Capital goods costs			€ 75,484.07					
D	Urbanization fees		€ 1,527.24	€ 1,527.24					
	Contribution on the construction cost		€ 15,779.57	€ 15,779.57					
E	Professional fees		€ 44,549.52	€ 44,549.52					
F	Financial feees		€ 101,465.60	€ 101,465.60	€ 101,465.60	€ 101,465.60	€ 101,465.60	€ 101,465.60	€ 101,465.60
A+B+C+D+E+F	**Investment costs - TOTAL**	**€ 798,000.00**	**€ 720,732.93**	**€ 796,217.01**	**€ 101,465.60**	**€ 101,465.60**	**€ 101,465.60**	**€ 101,465.60**	**€ 101,465.60**
	Discount factor (1+0,04)^n	**1.04**	**1.07**	**1.11**	**1.15**	**1.19**	**1.23**	**1.27**	**1.32**
	Yearly discounted investment costs	**€ 771,014.49**	**€ 672,811.91**	**€ 718,142.12**	**€ 88,421.41**	**€ 85,431.31**	**€ 82,542.33**	**€ 79,751.05**	**€ 77,054.15**
	Discounted investment costs - TOTAL	**€ 3,104,835.57**							
	Mortage balance		€ 368,322.74	€ 368,322.74	€ 368,322.74	€ 368,322.74	€ 368,322.74	€ 368,322.74	€ 368,322.74
	Yearly discounted mortage balance		€ 343,833.22	€ 332,206.01	€ 320,971.99	€ 310,117.86	€ 299,630.79	€ 289,498.34	€ 279,708.55
	Discounted mortage balance - TOTAL	**€ 4,098,670.86**							
	Operating costs				€ 709,437.50	€ 709,437.50	€ 749,437.50	€ 749,437.50	€ 749,437.50
	Yearly discounted operating costs	€ 0.00	€ 0.00	€ 0.00	€ 618,233.80	€ 597,327.34	€ 609,667.89	€ 589,051.10	€ 569,131.50
	Discounted operating costs - TOTAL	**€ 6,895,596.23**							
	DISCOUNTED COSTS -TOTAL	**€ 10,000,431.81**							
	Revenues				€ 1,176,442.51	€ 1,176,442.51	€ 1,320,292.51	€ 1,320,292.51	€ 1,393,769.66
	Yearly discounted revenues	€ 0.00	€ 0.00	€ 0.00	€ 1,025,201.69	€ 990,533.03	€ 1,074,058.81	€ 1,037,737.98	€ 1,058,444.78
	Discounted revenues - TOTAL	**€ 12,461,678.68**							
	REVENUES - COSTS (ante taxes)	-€ 798,000.00	-€ 1,089,055.67	-€ 1,164,539.75	-€ 2,783.33	-€ 2,783.33	€ 101,066.67	€ 101,066.67	€ 174,543.82
	NPV (ante taxes)	**€ 1,620,131.52**							
	IRR (ante taxes)	**7.1%**							
	r	**0.035**							
	Taxes						€ 130,959.65	€ 130,959.65	€ 151,459.77
	REVENUES - COSTS (post taxes)	-€ 798,000.00	-€ 1,089,055.67	-€ 1,164,539.75	-€ 2,783.33	-€ 2,783.33	-€ 29,892.97	-€ 29,892.97	€ 23,084.05
	NPV (post taxes)	**€ 504,997.94**							
	IRR (post taxes)	**4.6%**							
	Properties residual value	**€ 3,257,555.51**							

Figure A1. The first part of the financial analysis spreadsheet (from year 1 to year 9).

	Investment costs	9	10	11	12	13	14	15	16	17
A	Properties value - Khamma									
	Properties value - Ghirlanda									
B	Technical construction cost - New construction (terziary)									
	Technical construction cost - New construction (residential)									
	Technical construction cost - *Dammusi* restoration									
	Technical construction cost - Rural buildings restoration									
	Technical construction cost - Recultivation of vineyards and citrus trees									
	Technical construction cost - Photovoltaic system									
	Technical construction cost - Other interventions									
	Technical construction cost - Military buildings restoration									
C	Capital goods costs									
D	Urbanization fees									
	Contribution on the construction cost									
E	Professional fees									
F	Financial feees	€ 101,465.60	€ 101,465.60	€ 101,465.60	€ 101,465.60	€ 101,465.60	€ 101,465.60	€ 101,465.60	€ 101,465.60	
A+B+C+D+E+F	**Investment costs - TOTAL**	**€ 101,465.60**	**€ 101,465.60**	**€ 101,465.60**	**€ 101,465.60**	**€ 101,465.60**	**€ 101,465.60**	**€ 101,465.60**	**€ 101,465.60**	
	Discount factor (1+0,04)^n	**1.36**	**1.41**	**1.46**	**1.51**	**1.56**	**1.62**	**1.68**	**1.73**	
	Yearly discounted investment costs	**€ 74,448.45**	**€ 71,930.87**	**€ 69,498.43**	**€ 67,148.24**	**€ 64,877.53**	**€ 62,683.60**	**€ 60,563.87**	**€ 58,515.81**	
	Discounted investment costs - TOTAL									
	Mortage balance	€ 368,322.74	€ 368,322.74	€ 368,322.74	€ 368,322.74	€ 368,322.74	€ 368,322.74	€ 368,322.74	€ 368,322.74	
	Yearly discounted mortage balance	€ 270,249.80	€ 261,110.92	€ 252,281.08	€ 243,749.84	€ 235,507.09	€ 227,543.08	€ 219,848.39	€ 212,413.90	
	Discounted mortage balance - TOTAL									
	Operating costs	€ 749,437.50	€ 749,437.50	€ 749,437.50	€ 749,437.50	€ 749,437.50	€ 749,437.50	€ 749,437.50	€ 749,437.50	
	Yearly discounted operating costs	€ 549,885.51	€ 531,290.34	€ 513,324.00	€ 495,965.22	€ 479,193.45	€ 462,988.84	€ 447,332.21	€ 432,205.04	
	Discounted operating costs - TOTAL									
	DISCOUNTED COSTS -TOTAL									
	Revenues	€ 1,393,769.66	€ 1,393,769.66	€ 1,393,769.66	€ 1,393,769.66	€ 1,393,769.66	€ 1,393,769.66	€ 1,393,769.66	€ 1,393,769.66	
	Yearly discounted revenues	€ 1,022,651.97	€ 988,069.53	€ 954,656.55	€ 922,373.48	€ 891,182.11	€ 861,045.51	€ 831,928.03	€ 803,795.20	
	Discounted revenues - TOTAL									
	REVENUES - COSTS (ante taxes)	€ 174,543.82	€ 174,543.82	€ 174,543.82	€ 174,543.82	€ 174,543.82	€ 174,543.82	€ 174,543.82	€ 174,543.82	€ 5,846,255.23
	NPV (ante taxes)									
	IRR (ante taxes)									
	r									
	Taxes	€ 151,459.77	€ 151,459.77	€ 151,459.77	€ 151,459.77	€ 151,459.77	€ 151,459.77	€ 151,459.77	€ 151,459.77	
	REVENUES - COSTS (post taxes)	€ 23,084.05	€ 23,084.05	€ 23,084.05	€ 23,084.05	€ 23,084.05	€ 23,084.05	€ 23,084.05	€ 23,084.05	€ 5,846,255.23
	NPV (post taxes)									
	IRR (post taxes)									
	Properties residual value									

Figure A2. The second part of the financial analysis spreadsheet (from year 10 to year 17).

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