

Article

# Cultural Heritage and Sustainable Development: Impact Assessment of Two Adaptive Reuse Projects in Siracusa, Sicily

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Received: 30 November 2019; Accepted: 22 December 2019; Published: 31 December 2019



**Abstract:** In this period of increasing urbanization, cultural heritage can play a key role to achieve sustainable development, as widely recognized by international institutions (i.e., United Nations (UN), UN Educational, Scientific and Cultural Organization (UNESCO), International Council on Monuments and Sites (ICOMOS)). In this perspective, it is necessary to operationalize the principles stated at international level and thus new approaches and tools are required. The paper aims to understand the relationships between the implementation of adaptive reuse projects and their success (or not) in terms of impacts on the buildings themselves and on the urban context. The assessment framework for evaluating the impacts of heritage conservation and rehabilitation projects is described through the analysis and comparison of two Italian case studies: the Ancient Market and the Basilica of St. Peter the Apostle, in Siracusa (Italy). Although realized both in the same place (Ortigia, the historic centre of Siracusa), during the same period and by the same architect, these two interventions have produced different results in terms of urban development. A set of indicators, deduced from recent scientific studies, has been used to analyse the different impacts on physical, cultural, social, environmental and economic systems. To understand in depth the causes of these two different results, a survey has been carried out involving experts. The proposed indicators used for the ex-post evaluation can be also adopted in other contexts and for ex ante evaluation, in order to orient the strategic design choices in cultural heritage adaptive reuse projects.

**Keywords:** adaptive reuse; building rehabilitation; cultural heritage; impact assessment

## 1. Introduction

In this period, cities are facing many challenges related to different issues as climate change, demographic growth, social inequalities, economic crisis. The United Nations (UN) declared that 68% of the world population expected to live in urban areas by 2050 [1]. This means that the aforementioned challenges will be increasingly concentrated in urban areas. So, cities play a key role in the sustainability of our future. For this reason, international institutions (such as the UN) are actively moving in promoting actions to achieve sustainable development.

In this paper the attention is focused, in particular, on the role that cultural heritage can play in sustainable development. Although the debate around this issue is very current, many discussions remain on a mostly theoretical level.

In the 2030 UN Agenda for Sustainable Development [2], cultural heritage is explicitly mentioned only once in goal 11 (one out of 17 goals) that referred to the cities, in particular to the need of making

cities and human settlements “inclusive, safe, resilient and sustainable”. It has a marginal role in the document, being mentioned in particular only in target 11.4 (“strengthen efforts to protect and safeguard the world’s cultural and natural heritage”), one out of 169 targets. Furthermore, this specific target is referred only to the *protection* and *safeguard* of cultural heritage, and not to its *valorization* and *regeneration* [3].

The “translation” of the principles of the 2030 Agenda in the cities, that is their territorialisation, is represented by the New Urban Agenda [4]. Here cultural heritage takes on a more important role. In fact, there are many points (i.e., points 10, 26, 38, 45, 60) of the document highlighting the role of cultural heritage (both tangible and intangible) in urban sustainable development. For example, the roles that it can play in the humanization of cities (point 26) and in developing vibrant, sustainable and inclusive urban economies (point 45) are underlined.

Furthermore, there are some international organizations, such as the UN Educational, Scientific and Cultural Organization (UNESCO) and the International Council on Monuments and Sites (ICOMOS), that stress the importance of cultural heritage in the achievement of sustainable development [5–7]. A very significant contribution by UNESCO to the international debate about this issue are the Historic Urban Landscape (HUL) Recommendations [5]. These recommendations recognize the necessity of supporting the protection, safeguard, conservation, and valorization of the Historic Urban Landscape, that is the «historic layering of cultural and natural values and attributes» ([5], art. 8), incorporating the intangible dimension of heritage and the related economic processes. In this document, the attention shifts from the “monument” to the context, to the recognition of the importance of the social, cultural and economic processes in the conservation of urban areas ([5], art. 4).

In the same perspective, the European Commission (EC) has recognized cultural heritage as a common good representing a strategic resource for sustainable development. In Section 2 the EC identifies it as a key element in the global competition using, for the first time in an institutional context, the notion of “intrinsic and social value of heritage” [8].

Many issues at the heart of the contemporary world debate concerning our future intersect with the theme of building reuse, ranging from the research of sustainable development models to the protection of cultural roots. Reuse is consistent with a sustainable approach to urban and landscape management, according to a model of “circular economy” capable of turning «goods that are at the end of their service life into resources for others, closing loops in industrial ecosystems and minimizing waste» [9] (p. 435). Nowadays, in line with instances of climate justice and the living planet, «it is unthinkable for anything to have no function, to be useless, to make no contribution to the betterment of society. The contemporary mantra “Reduce, Reuse, Recycle” is testament to this essential prerequisite of contemporary life. Everything has to be useful, and existing building cannot escape from this agency of usefulness» [10] (p. xviii).

There is an urgent need to make this principal operational and thus “to move from principles to actions” (Agenda for Sustainable Development art. 39–46, New Urban Agenda points 126–160). To this end, new approaches and tools are required.

The research question aims to understand the relationships between the implementation of adaptive reuse projects and their success (or not) in terms of impacts on the buildings themselves and on the urban context. After a review of the relevant literature related to the adaptive reuse (Section 2), the assessment framework (including multidimensional indicators) for evaluating the impacts of heritage conservation and rehabilitation projects is described through the analysis and comparison of two Italian case studies by a survey (Sections 3 and 4). The choice of the case studies has been oriented to two similar adaptive reuse projects by the same architect and in the same place in order to highlight exclusively the relationships between the intended use and the impacts on the context. The results of the investigation are then examined and discussed to answer the research question (Sections 5 and 6).

## 2. Review of Relevant Literature

Adaptive reuse, defined by Douglas as «any building work and intervention aimed at changing its capacity, function or performance to adjust, reuse or upgrade a building to suit new conditions or requirements» [11], allows conserving the different values of cultural heritage, both the use value and the intrinsic one. It allows extending the life cycle of a building, in line with the circular economy principles [12] that aim to prolong the lifetime of resources as long as possible and avoid resources consumption.

Building reuse is considered a means for conveying the legacy of the past, which consists not only of heritage buildings as physical items, but mainly of the wealth of information provided by each item. The reuse experience dates back a long way, but today we have a deeper understanding of its strategic importance. Considering the built environment as a resource does not only mean acknowledging its value as a result of human work or as a useful object. The built heritage can also acquire value for its talent to tell stories, to transmit knowledge, to recall the past, to be a symbol of events, traditions, shared knowledge, religions; in other words, it can be a source of cultural value.

To redesign a heritage building for new uses, knowledge of its history and past uses is critically important. A careful identification of exterior and interior architectural elements is needed to define the building's identity and assess the impact of the changes that the new use requires.

Since the 19th century, scientific debate has focused on the significance of physical evidence from the past and on the conservation of architectural heritage with cultural value. At the end of the 18th century, the sale of ecclesiastical properties confiscated by the State during the French Revolution in many cases brought about a change in their use as a production or military site [13,14], with transformations driven by functional and financial ends [15]. In the 19th century, «the needs linked to the new and even more complex functions, created as a result of the Industrial Revolution, as well as a new economic soils regime, whereby land value—rather than buildings—is the key to making a profit, encourage demolishing and rebuilding rather than adapting and adding» [16] (p. 6). As a reaction to these trends, the first theories on the relationship between conservation and transformation of the vestiges of past epochs have been developed; from these theories different positions have emerged.

To develop the idea of reusing the built heritage as a preservation strategy, the 20th century must be awaited. The Athens Charter, released by the International Museums Office in 1931, recommends «maintaining whenever it is possible, the occupation of monuments which can ensure the vital continuity, provided that the modern destination will be such as to respect the historic and artistic character» (art. 2). Nevertheless, only since the 1970s building reuse can be considered as an autonomous discipline. Indeed, just after the Venice Charter, which in 1964 affirmed the role of reuse as a means of conservation, the international scientific community focused its interest on this topic with conferences, articles and books. In 1972 a special issue of the journal *Architectural Review* entitled “New uses for old buildings”, edited by Sherban Cantacuzino, was published. In 1977 two symposia entitled “Old into New” in Glasgow and “Old and New Architecture: Design Relationship” in Washington were held [17–20].

Research by Bie Plevoets and Koenraad Van Cleempoel [14,20,21] has effectively described different theoretical approaches to the topic of adaptive reuse, coexisting throughout the scientific debate over the last 50 years: the typological approach, which examines compatible uses for specific building typologies [11,13,22]; the architectural approach, which analyses the morphological relationships between old and new and the different design strategies (for example, the addition of new volumes inside, above, around the existing building) [23–25]; the technical approach, which focuses on building adaptations required to meet the needs of safety, comfort and usability (fire resistance, thermal behaviour, acoustic performance, etc.) [26–29]; the programmatic approach, which starts from the choice of a specific function and compares it with buildings available for reuse, in order to select a building suitable to accommodate such function [15,30]; the approach of interior design, which focuses on the “soft” values of the building (immaterial aspects, atmosphere, narrative), with the focus on protecting the “meaning” of the building rather than preserving its physical integrity [31–33]. Each of

these theoretical approaches can be related to many reuse projects, as a principle of inspiration or as a deduction from past experiences.

The work of Italian researchers, developed through studies dating back to the 1970s, 1980s and 1990s, is based on the performance-based building design approach as a key to forecasting the results of adaptive reuse at the project stage [34]. Such an approach aims at establishing a system of rules to evaluate the existing buildings, considered as «organisms able to evolve and live in symbiosis with the needs of the people» ([35] p. 2). The rehabilitation project should choose what to preserve and what to transform, through an iterative process of information/decision [36].

Since the 2000s, multi-criteria assessment methodologies have been applied in research aimed at choosing new uses for heritage buildings, to find a balance between conservation and adaptation needs, as well as to define the preferable new function in relation to the impacts on the urban context [37–41].

An important issue in adaptive reuse projects is related to the “admissible limits for changing”, and thus related to the compatibility between intrinsic values (values linked to history and collective memory) and new use values (that is the problem related to the suitable “choices”) [42]. The starting point for choosing the new functions (use value) in the adaptive reuse projects is thus represented by the intrinsic value. It can contribute to orient choices for the most appropriate use for cultural heritage regeneration, adapting its use to changes in the needs of society and, at the same time, conserving its intrinsic value, minimizing the negative impacts on the urban context [42].

The reuse project involves a preliminary evaluation of the building, to identify criteria for the preferable design choices. These derive from the system of values ascribed to the building and its potential use. A wide-ranging scientific literature on the subject of reuse highlights the potential benefits on an urban and territorial scale, such as the increase in the market value of soils and buildings, social promotion and economic development in the surroundings [26,43]. The adaptive reuse can contribute to sustainable development producing, at the same time, multidimensional benefits: «cultural benefits (conserving “alive” a symbol of community identity), economic benefits (in terms of increase of productivity), environmental benefits (i.e., reduction of resource consumption) and social benefits (i.e., employment)» [44].

New functions may encourage new public and private investments, promoting the development of related activities and the provision of support services in the area in which the reuse project is carried out [11,45].

### 3. Case Studies: The Ancient Market and the Basilica of Saint Peter the Apostle in Ortigia

Siracusa is a coastal town in the south-east of Sicily (about 121,000 inhabitants in 2019), founded by the Corinthians between 734 and 733 BC and called “Siracusa” by the ancient Siculan language *Sùraka* (meaning abundance of water). Included in the UNESCO World Heritage List in 2005, the city preserves everywhere memories of its ancient history, classic and Baroque works in spectacular scenery (Figure 1). Thanks to an enviable geographic position, since the Greek period Siracusa has been the junction of commercial exchanges and melting pot of customs and traditions of the populations (and of the dominations), that have succeeded in the Mediterranean area: from the Byzantines to the Bourbons, from the Arabs to the Normans up to the Aragonese. During the Classical period it was one of the leading urban centres of the Mediterranean basin and, because of its geographical position, it played an outstanding role in trading and cultural exchanges until the Middle Ages. As a result of the heavy earthquake of 1693, the town was rebuilt in Baroque style. The homogeneity of the style and the widespread use of light-coloured limestone, as well as the particular location of the old town on Ortigia Island, strengthened the urban identity of Siracusa, coming from the fragile balance between tradition and innovation, technical knowledge and creativity, built environment and nature [46].



**Figure 1.** Three views of Ortigia: the eastern seafront, S. Martino and Minerva streets. Source: photos by the authors.

In the 1950s, the most important chemical and petrochemical industrial centre in Europe developed in the Siracusa area, where oil refining, derivative processing and energy production were carried out [47–49]. For decades this provided the main employment opportunity for citizens of Siracusa. Since the mid-eighties, industrial activities have been significantly reduced, leading to serious reconversion problems and the need for land decontamination. In more recent years the situation has changed. The decline of the chemical industry is driving investment in agriculture, food industry and tourism. In particular, this latter activity has developed as a result of the policies implemented by the local government over the last 30 years. Exceptional historical and artistic testimonies and the outstanding landscape value of the area, which combines cultural heritage harmoniously with natural resources, are driving an increasing number of people to visit the site and in 2005 this resulted in the inclusion of the town, along with the Rocky Necropolis of Pantalica, in the UNESCO World Heritage List.

Ortigia Island (Figure 2) is the main attraction for visitors, alongside the Neapolis area, which is almost completely devoid of tourist facilities. Ortigia is located at the eastern end of Siracusa in an area of 45 hectares. Two bridges across a narrow channel connect the island to mainland Sicily. Nowadays, the island is an extremely popular place for tourist accommodation, shopping, food and entertainment. This is the result of political choices and investments over the last fifty years.



**Figure 2.** Ortigia Island. Source: [www.flickr.com](http://www.flickr.com), author: Falk Petro, 2016, no changes were made [Attribution 2.0 Generic (CC BY 2.0)].

Since the beginning of the 20th century, Ortigia has been affected by a progressive decrease in the number of inhabitants. The depopulation process was particularly marked after the Second World War and overlapped with the expansion of the town on the mainland. The Ortigia inhabitants dramatically

decreased between 1960 and 1970 from 23,000 to 12,000 units, up to 5994 in 1991 [50]. In recent years, data show that the number of residents has stabilised between 4450 and 4550 from 2003 to date [51].

The subsidies granted by the Regional Law for Ortigia (1971) and the special law no. 70 on “Protection of the historical centres and special regulations for the Ortigia district and for the historical centre of Agrigento” (1976) are the leading factor behind the depopulation of the town centre in the 1970s and 1980s [52]. Such laws had the purpose of implementing strategies of conservative restoration for heritage buildings and urban rehabilitation in the old town. In addition, the special law no. 70/1976 authorised the variant of the General Regulatory Plan of Siracusa through the Detailed Plan for Ortigia, drawn up by Giuseppe Pagnano and approved in 1990. The urban renewal policies arising from the Pagnano’s plan were implemented in an area characterised by deep physical and socio-economic degradation. Most of Ortigia’s population was destitute and its displacement to other neighbourhoods was considered a necessary condition to accelerate the process of urban rehabilitation. The strategy of the Detailed Plan is based on the reuse of the building heritage to combine housing, tourist and accommodation services, cultural activities, headquarters of local government, university and education. Minor physical transformations were planned for the old town centre, but significant changes were expected in the use of the buildings. The investments concerned not only the conservation of cultural heritage, but also the creation of culture, as “one of the most powerful engines for the functional and economic revival of the historic center [...] able to build significant processes of reuse in disused areas of the island” [53] (p. 167). The implementation of the plan mainly encouraged the development of tourist and cultural activities in the historical centre, and increased hotels, restaurants and commercial activities for guests.

The process of urban rehabilitation has progressively extended beyond the area of the main tourist attractions (Duomo, Fonte Aretusa, Castello Maniace, Museo Bellomo, etc.) towards other urban areas (such as the ancient Jewish district of Giudecca) and the waterfront. Nevertheless, Ortigia still retains degraded areas, borderline to the tourist circuits. In particular, marginal areas such as the Graziella district and the Market district retain a large number of abandoned buildings and are perceived by the inhabitants as unsafe areas. Even the reuse of heritage buildings for public use is not always as effective as it should have been in terms of increasing local vitality, attracting new users, and encouraging private businesses.

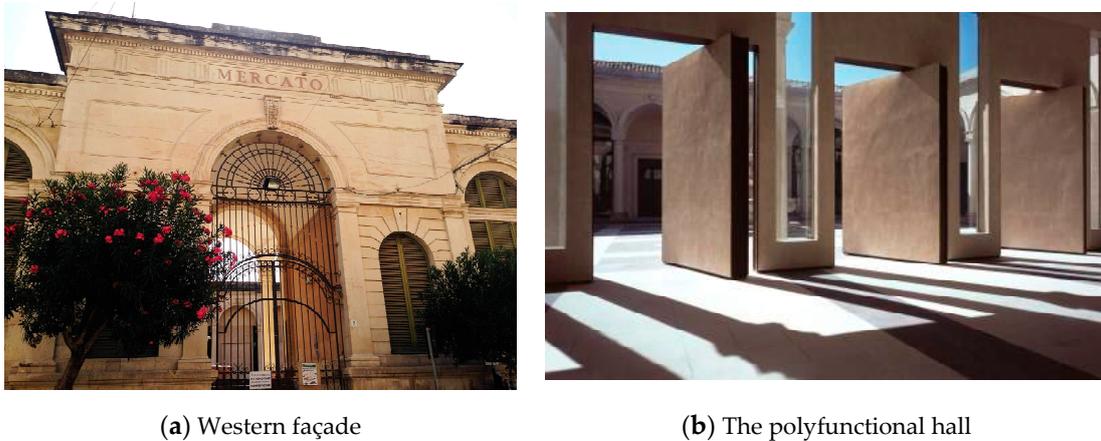
In order to verify the research hypotheses, the Ancient Market and the Basilica of St. Peter the Apostle have been analyzed as examples of reuse of public buildings in marginal areas of Ortigia. These reuse works, both designed by the architect Emanuele Fidone, professor at the Master’s Degree Course in Architecture of the University of Catania, are good examples of a compatible adaptation. Although such cases have several common characteristics (location, designer, public use, public client, acknowledgements and awards for the quality of design), the impacts on the urban context seem different.

### 3.1. *The Ancient Market*

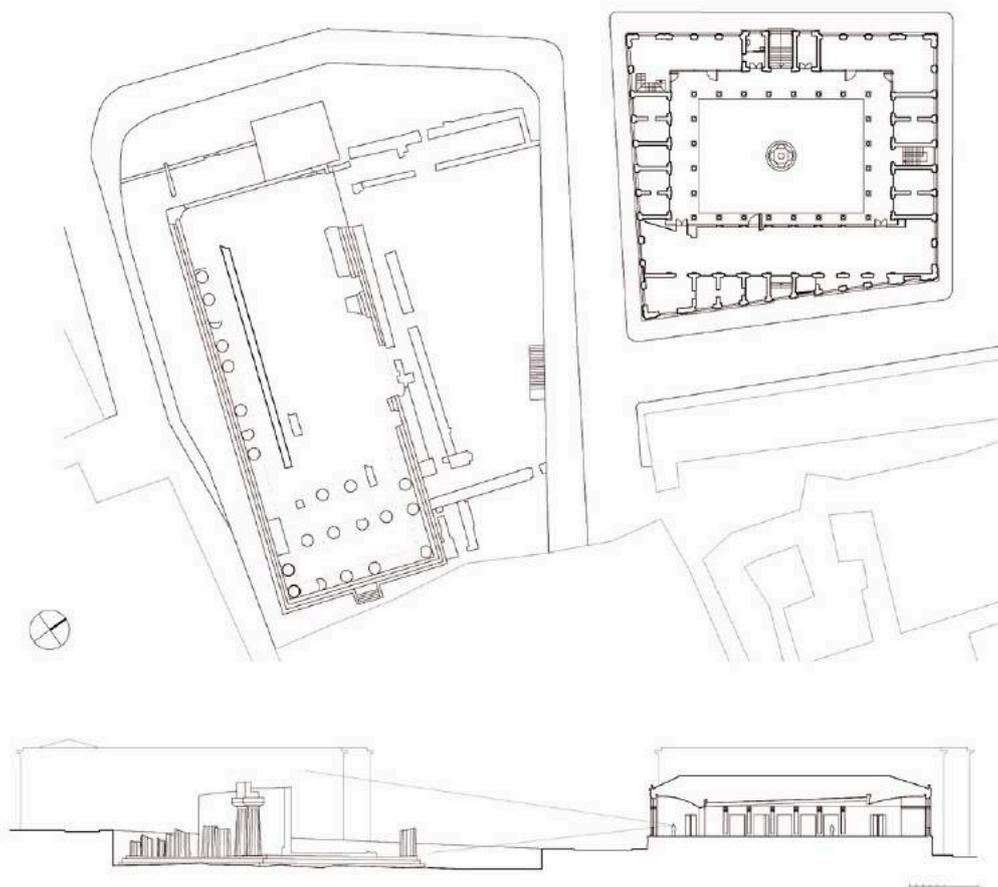
The Ancient Market of Siracusa is a building dating back to 1900, built on the remains of the Spanish city walls, next to the Temple of Apollo. Designed by Edoardo Troja, an engineer of the Municipal Technical Office, it follows the design of the Livorno Market, with large arches and windows with shutters. The internal rectangular courtyard has an ornamental fountain in the middle and a portico with 24 arches surrounded by shops. From the early 1950s to 1985 the building has been transformed in order to adapt the retail spaces. The building was used as a city market until the end of the 1980s, when the sale of food products and local handicrafts moved outdoors, in the nearby streets. The Ancient Market was restored in 2000 and reused for cultural and commercial events and trade fairs (e.g., farmers’ market, display and sale of typical products, exhibitions, music and cultural events).

The reuse project included the repair of windows and walls, the restoration of stone surfaces by keeping the erosion of materials visible and replacing only unstable stones (Figures 3a and 4). The structural improvement works and the partial reconstruction of the roofs were carried out using

traditional techniques. A large polyfunctional hall (Figure 3b) on the east side was created closing the portico with self-supporting panels, which frame the columns from the inside with high vertical cuts.



**Figure 3.** The Ancient Market. Sources: Figure 3a, [www.commonswiki.org](http://www.commonswiki.org), author Davide Mauro, 2017, no changes were made [Creative Commons Attribution-Share Alike 4.0 International license]; Figure 3b, photo kindly provided by Professor Emanuele Fidone, the designer of the reuse projects of the two case studies.



**Figure 4.** The Ancient Market, project drawings by Emanuele Fidone.

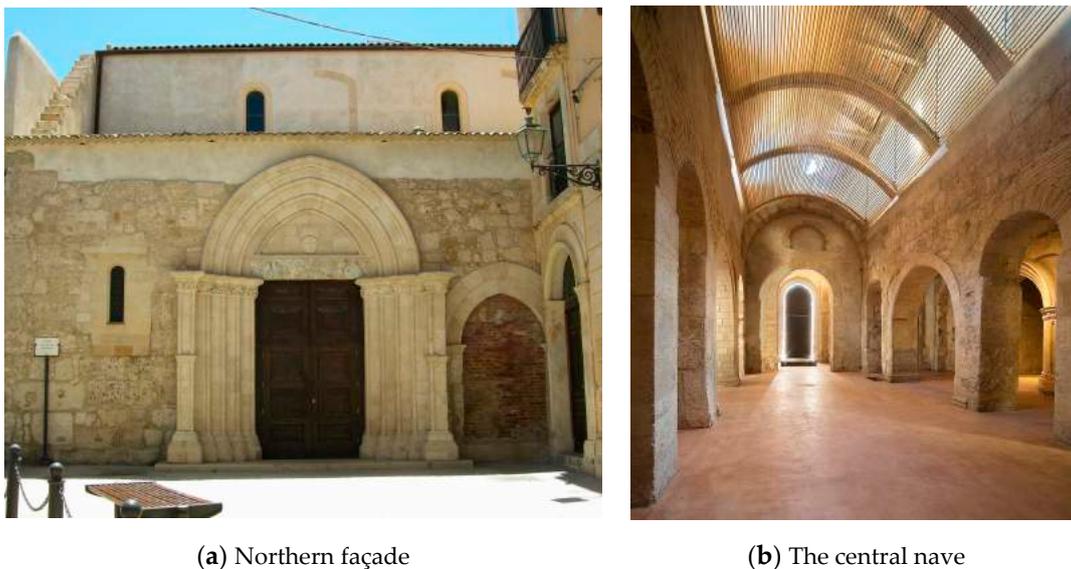
The roof of the new hall is divided into three sections, designed as fragments of large barrel vaults shaped like a telescope, and lead the eye towards the Temple of Apollo, which can be seen from the two large windows at the end of the hall. The western rooms have been redesigned with a structure in

oxidized steel and glass which separates functions without altering the overall view. The building now houses a service centre for tourists.

### 3.2. The Basilica of St. Peter the Apostle in Ortigia

The early Christian Basilica of St. Peter the Apostle is one of the oldest churches in Ortigia, dating back to the end of the fourth century, and has been repeatedly transformed. The first adaptation, occurred in the seventh century, inverted the position of apse and facade, and added a tripartite transept. In the early 1400s the Gothic portal was built, and the previous entries were closed. Many decorations were added in the Baroque period. The restoration of the 1950s has altered the interior spaces in an irreversible way, with the goal to restore the original appearance of the church.

The project of the architect Emanuele Fidone, awarded with the Italian Heritage Award in 2013, has reused the church as music hall (Figures 5 and 6). The project highlights the stratigraphy of the surfaces, showing traces of the Byzantine frescoes. The architect has built two new structures, the false ceiling and the large portal, clearly identifiable as a contemporary addition. The false ceiling restores the original dimension of the interior space: it is made of wooden lamellae and is at the height of the supports of the barrel vault of the early Christian age, apparently detached by the building's bearing structure. This lightweight wooden element filters the view of the roof trusses, modulates the daylight entering from the upper windows made in the 1950s and improves the acoustics of the church.



(a) Northern façade

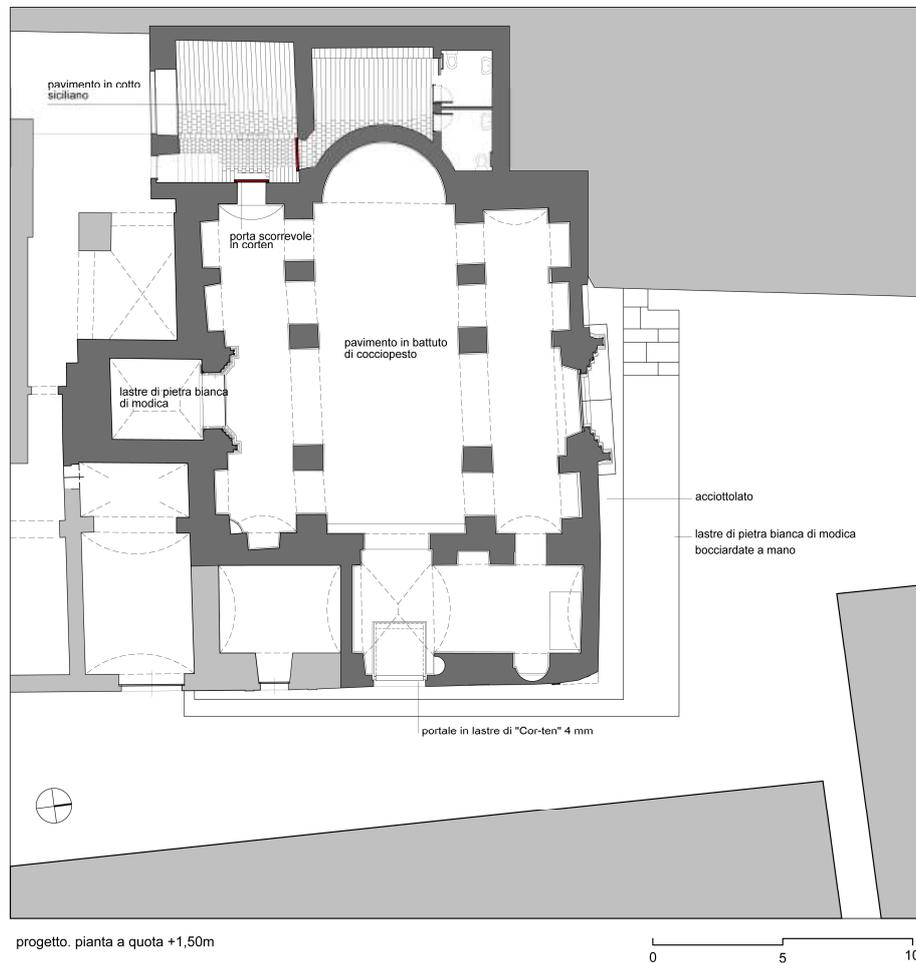
(b) The central nave

**Figure 5.** The Basilica of St. Peter the Apostle. Sources: Figure 5a, [www.commonswiki.org](http://www.commonswiki.org), author: Sailko, 2009, the picture has been cutted [GNU Free Documentation License, Version 1.2; Creative Commons Attribution-Share Alike 3.0 Unported license]; Figure 5b: photo by Emanuele Fidone.

The new portal consists of a thick corten steel panel, slightly spaced from the sides and the lower surface of the arch. The opening requires a frontal push of the lower part of the panel, which looks like a screen, a filter towards the internal space. The floor made in “cocciopesto”, a flooring material made of a compound based on hydraulic lime and crushed bricks, with natural wax finishing, is a continuous surface, which highlights the preserved part of the Byzantine flooring.

In such building conservation goals are not restricted to safeguarding the building's exterior appearance, but are also taken on to spaces and interior elements. Moreover, we can clearly distinguish the new parts by the ancient ones. It demonstrates that good contemporary architecture is not incompatible with the needs of restoration and can improve building performance. Today the building can be visited daily, paying an entrance fee.

Both of the case studies are in marginal areas as compared to the exceptional tourist development of Ortigia. Nevertheless, while the area of the Ancient Market seems to benefit from the users' flows attracted by the activities held in the building, the Basilica of St. Peter the Apostle is still visited only by a few people, moving away from the traditional tour of the island or involved in the seldom cultural events which take place in the building.



**Figure 6.** The Basilica of St. Peter the Apostle, project drawings by Emanuele Fidone.

#### 4. Materials and Methods

There are many factors affecting the success (or failure) of an adaptive reuse project. The selected case studies, in fact, demonstrate as the same design approach in the same place can have different results on the socio-economic system.

The process for understanding and analysing the proposed case studies has been organized into three main steps (Figure 7):

- knowledge phase;
- critical analysis of indicators for assessing the impacts of adaptive reuse;
- participatory phase.

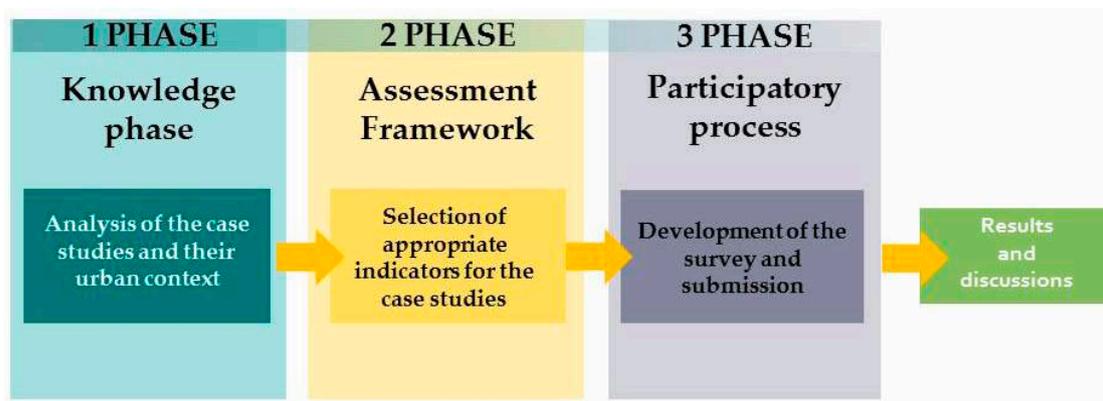


Figure 7. Methodology.

The first step was characterized by the analysis of the projects' area and thus data collection to understand in depth the two case studies and their contexts. During this phase, the context in which the Ancient Market and of St. Peter the Apostle are placed was analyzed, including the analysis of values, and existing regulatory, planning instruments.

The second step concerned the identification of indicators able to understand the reasons of the different performance of these two projects.

In particular, two studies and research works [54,55] about the multidimensional impacts that conservation and regeneration projects are able to produce were considered as the starting point. The first study [54] highlighted a set of multi-dimensional indicators for assessing the impacts of cultural heritage conservation and regeneration projects, both on cultural heritage and from cultural heritage on the entire city system (both in the short and medium and long term, whether direct, indirect or induced).

The indicators to assess these impacts were deduced from concrete experiences of conservation/regeneration projects from 40 case studies of cities (from all over the world) [54].

They were organized in the following 9 identified impact categories (with related sub-categories):

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

In the present work, the indicators included in the aforementioned categories were integrated with other indicators identified by De Medici et al. [55] mainly focused on the protection of building's characteristics (and thus on impacts on cultural heritage). Such indicators are classified according to the following categories of characteristics they refer to: perceptual-cultural, morphological-dimensional and material-constructive characteristics.

The indicators selected from the sets of the two aforementioned research studies were deduced by expert knowledge on the basis of the context and of the expected goals of the two adaptive reuse projects. The survey (described below in the third phase) was based on the indicators that allow assessing and highlighting the difference among the effects produced by the two case studies.

- The selected indicators are the following [54,55]:
- No. of visitors per year or per day (attractiveness);

- Percentage of crowding;
- Contribution of heritage tourism to the city;
- No. of visitors for cultural reason;
- No. of participants in cultural events;
- No. (or percentage) of projects of cultural programmes and events;
- No. of people involved in organising events;
- Percentage growth rate of cultural events and creative activities;
- No. of cultural (and creative) enterprises (attractiveness);
- No. of new start-ups (attractiveness);
- No. artists (attractiveness);
- Attraction of new investments in cultural heritage and cultural/creative events-activities;
- Economic impact generated by cultural events;
- No. (or percentage) of craft stores/new handcraft shops/small scale manufacture/local production activities;
- Percentage of crafts, small scale manufacture, production activities;
- No. of licenses granted in retail and services for artisan;
- New funds to support activities of non-profit organizations;
- No. of new businesses;
- Percentage of increase in employment in activities (or n. of new jobs) related to typical local production/distribution;
- Average price of properties;
- Average rent value for residential properties;
- Average rent value for commercial-use properties/offices;
- Average market value for residential properties;
- Average market value for commercial-use properties;
- Percentage of increase in private land/properties value;
- No. (or percentage) of commercial units;
- No. of use change of properties;
- No. of new constructions/rehabilitations;
- No. (or percentage) of well-preserved buildings;
- No. (or percentage) of buildings in poor condition;
- No. (or percentage) of historic building with minor problems;
- Percentage of used/partially used historic building;
- Percentage of vacant historic building;
- No. of restoration and adaptation works undertaken on historic buildings/sites;
- Percentage of re-functionalized historic buildings;
- Area of facades of historic buildings rehabilitated;
- Recognizability and acceptability of the transformations;
- Shape preservation of the building envelope;
- Conservation of the aesthetic relationship with the context;
- Conservation of the original dimensions of the building;
- Conservation of the geometric features;
- Conservation of the indoor spaces;
- Preservation of the finishes;
- Compatibility of the transformations;
- Percentage of citizens satisfied with historic buildings quality;
- Willingness to pay for a contribution to heritage restoration;

- Percentage of citizens feeling safe in the city/perception of personal safety;
- Average number of crimes (murders, thefts in dwellings, pickpocketing, robberies);
- Percentage of citizens satisfied with cultural facilities supply.

These indicators are used in the following phase to assess both the impacts of the project on the buildings themselves and the urban context.

The third step, that is the participative phase, was based on the involvement of different stakeholders through interviews aiming at understanding the reasons why two projects by the same architect and in the same place have had different impacts and success. To this end, a questionnaire was developed and submitted to the different identified stakeholders.

The participative phase was, in turn, organized in different phases: identification of experts at local level; development of the questionnaire; submission of the survey to the identified experts; deduction and critical analysis of results.

The experts were representatives of institutions, technical-professional organizations and experts in the field of adaptive reuse.

The questionnaire was submitted through an on line survey tool by Google Form and 12 questionnaires were filled in over a time span of two weeks: a representative of the Professional List of Architects, Planners, Landscape Architects of Siracusa and its Province; a representative of the Chamber of Commerce of the Province of Siracusa; a representative of the General Confederation of Italian Industry (Confindustria) of Siracusa; a representative of the Municipal Administration (Councillor); an urban planning expert at the University of Catania, Siracusa headquarters; a building and urban rehabilitation expert at the University of Catania, Siracusa headquarters; an expert in adaptive reuse and valorization of the cultural heritage at the University of Catania, Siracusa headquarters; an expert in architectural design at the University of Catania, Siracusa headquarters; an architect, freelancer professional, expert in architectural design; an expert in history of architecture at the University of Catania, headquarters of Siracusa; an expert in architectural conservation at the University of Catania, Siracusa headquarters; and an expert in restoration and consolidation of cultural heritage at the University of Catania, Siracusa headquarters.

The survey was structured in 6 main sections:

- introduction about the object and aim of the questionnaire and respondent data;
- questions related to the urban quality perception;
- questions for understanding the interviewees' knowledge/opinion about the project area of the Ancient Market in Ortigia (knowledge and perceptive aspects of the project area);
- questions for understanding the interviewees' knowledge/opinion about the reuse project of the Ancient Market of Ortigia (knowledge and perceptive aspects of the project);
- questions for understanding the interviewees' knowledge/opinion about the project area of the Basilica of St. Peter the Apostle in Ortigia (knowledge and perceptive aspects of the project area);
- questions for understanding the interviewees' knowledge/opinion about the reuse project of the Basilica of St. Peter the Apostle in Ortigia (knowledge and perceptive aspects of the project).

The questionnaire aimed at assessing different aspects related to the analysed projects, with a particular focus on the multiple impacts that they have produced and are still producing. The perception of different experts and thus their different points of view were investigated.

The set of indicators for assessing the impacts of cultural heritage conservation and regeneration projects represented the starting point for structuring the questions of the survey, based on qualitative and perceptual aspects. In fact, based on these, we selected the most appropriate indicators for analysing and assessing the impacts of the two projects (Ancient Market and Basilica of St. Peter the Apostle in Ortigia) both on the buildings themselves and on the context in which they are placed.

The questionnaire addressed issues (in Sections 2 and 4) related to the project area and thus to the interviewees' perception about its state of conservation, accessibility level, attractiveness (both in

terms of activities, initiatives and investments), crowding level, liveliness (or not), social and real estate values, capacity to provide public spaces and services. Moreover, the survey addressed issues (in Sections 3 and 5) closely related to the reuse projects. In particular, Sections 3 and 5 aimed to understand the interviewees' opinion about the suitability of the intended use both with the building and with satisfaction of local needs, their perception of the success (or not) of the projects, their opinion about the recognisability of the asset after the implementation of the adaptive reuse projects. Furthermore, through the questionnaire the willingness to pay for the conservation of the buildings was investigated.

At the end of these sections, there were some open questions. They aim to ask the interviewees some alternative uses (if any) that they considered more appropriate for the adaptive reuse of the Ancient Market and the Basilica of St. Peter the Apostle. Furthermore, they included questions to identify aspects of the projects that could be eventually improved to enhance the adaptive reuse of the two case studies (they will be shown in the results section).

## 5. Results and Discussion

The preliminary section of the survey concerned the introduction about the object and aim of the questionnaire and respondents' data. Then, some questions about the context of both projects were asked.

Most of the respondents perceived a positive improvement in the state of conservation of buildings and urban spaces in Ortigia in the last 20 years (58.3% "good", 16.7% excellent). Only 8.3% of them considered it as "poor" (Figure 8). Furthermore, the results show a clear positive perception about the contribution of the two adaptive reuse interventions to the improvement of the area in the last 20 years (91.7% of respondents) (Figure 8).

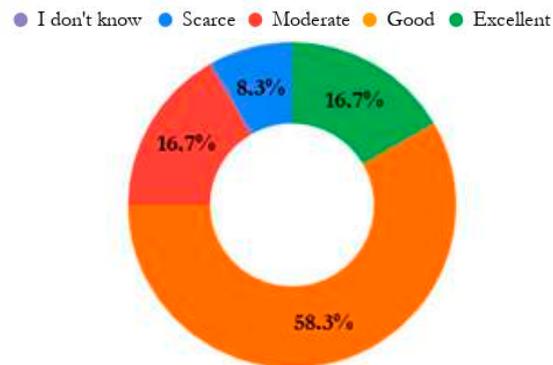
Among these interventions, the Ancient Market project was the one most frequently reported for the benefits produced (75% of respondents). Other projects mentioned were: Bellomo Museum and the rehabilitation of the nearby square, the Faculty of Architecture, recovery of "Porta Marina", Maniace Castle, Bottari Courtyard, rehabilitation of residential buildings, the convent of the "Ritiro", the reuse of some historic buildings as tourist accommodation, the paving of Piazza Duomo, Via Minerva, Piazza XXV Luglio and Corso Umberto. None of the interviewees recognized the reuse project of the Basilica of St. Peter the Apostle as an intervention that has significantly contributed to the improvement of the urban quality of Ortigia. This shows that there is a lack of perception of the positive impacts (if any) of the Basilica adaptive reuse project on the improvement of the area, in contrast to the Ancient Market project whose benefits were perceived by almost all the respondents.

If on the one hand the interviewees assessed on average positively both the selected reuse projects in relation to the investments made, on the other hand, there were significant differences in the assessment of the capacity to trigger new investments in building and urban rehabilitation. In fact, 50% of interviewed experts declared as "good" and 8.3% as "excellent" the capacity of the Ancient Market reuse project in contributing to generating new investments, while in the case of the Basilica of St. Peter the Apostle the negative percentage was higher (41.7% declared it as "scarce") (Figure 9). The benefits of the project, as mentioned above, were not limited to the building itself, but also to the context: a reuse project can become an engine capable of triggering further investments that can contribute to the development and regeneration of the area. The new investments undertaken in relation to a reuse project are significant in terms of its attractiveness.

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At what level do you think that the state of conservation of buildings and urban spaces in Ortigia has improved over the last 20 years?

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In your opinion, are there any interventions for the reuse of cultural heritage already carried out that have contributed to the improvement of the area in the last 20 years?

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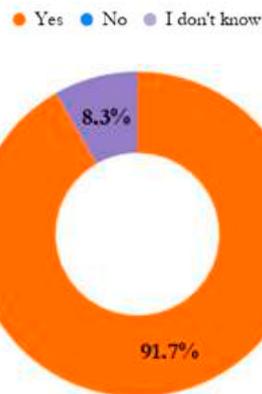


Figure 8. Results of the survey.

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How do you consider the benefits produced by the implementation of the reuse project compared to the investment made?

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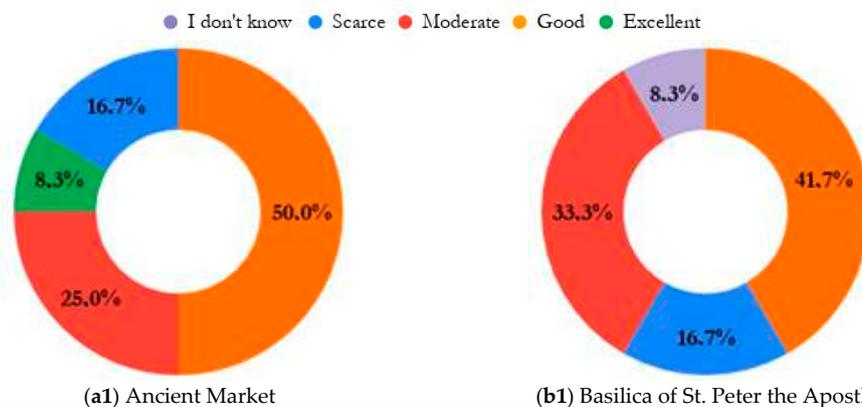
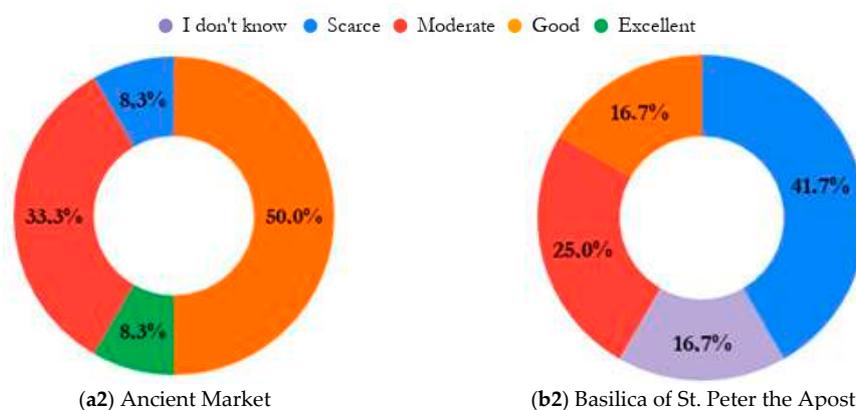


Figure 9. Cont.

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To what extent the implementation of the reuse project has triggered further investments (public and/or private) in building or urban renewal projects in Ortigia?

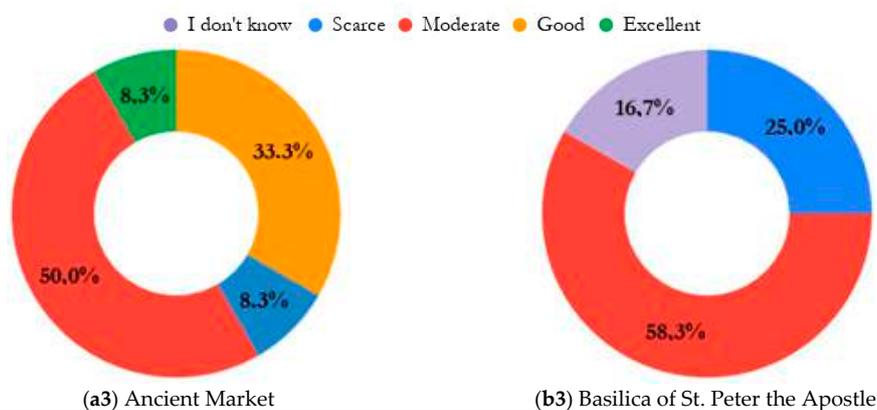
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To what extent the implementation of the reuse project has contributed to reduce the crime rate in the area?

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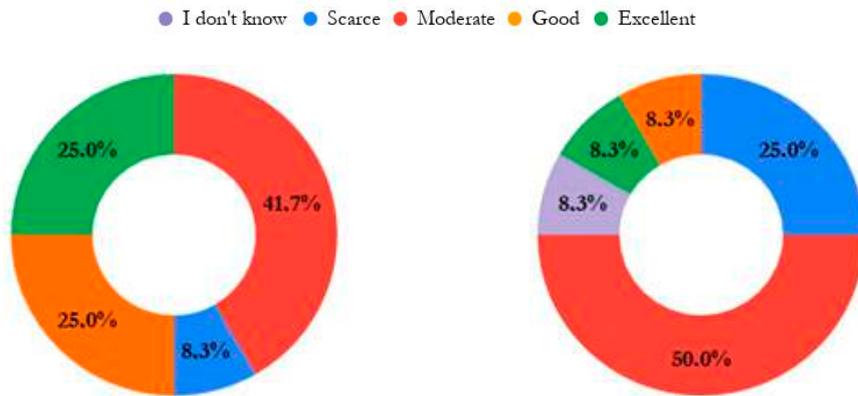


**Figure 9.** Results of the survey.

Moreover, the respondents expressed a different opinion about the two projects in terms of their effectiveness in reducing the crime rate in the area: 33.3% of the respondents considered the impact of the reuse of the Ancient Market to be “good” and 8.3% to be “excellent” for this aspect, whereas 25% considered the impact of the reuse of the Basilica of St. Peter the Apostle to be “poor” (Figure 9). The safety perception can be affected by an adaptive reuse project and it is an important indicator of the wellbeing category [54] linking the project not only to the transformation of the space, but also to the human capital.

The sample of respondents deemed significant the change of use of the area as a consequence of the reuse of the Ancient Market (25% “good”, 25% “excellent”), while in relation to the reuse of the Basilica of St. Peter the Apostle only a low percentage expressed a positive perception (8.3% “excellent”, 8.3% “good”) (Figure 10). The intended uses of both projects were considered compatible with the characteristics of the buildings. In fact, both the Ancient Market (41.7% “excellent”, 25% “good”) and the Basilica of St. Peter the Apostle (33.3% “excellent”, 50% “good”) reached a great consensus (Figure 10). So, there was a positive perception of the adaptive reuse projects with respect to the objectives of protecting the materic-constructive and morphological-dimensional characteristics (identified by De Medici as criteria for evaluating projects for reuse [55]).

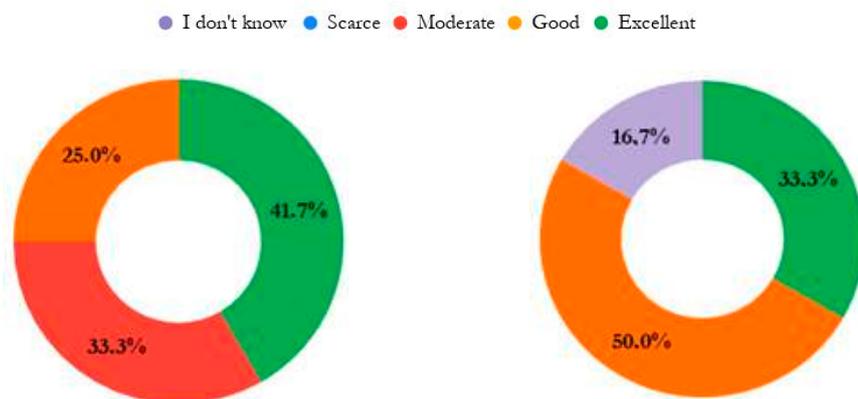
At what level do you consider that there has been a change in the vocation of use of the area after the reuse project?



(a1) Ancient Market

(b1) Basilica of St. Peter the Apostle

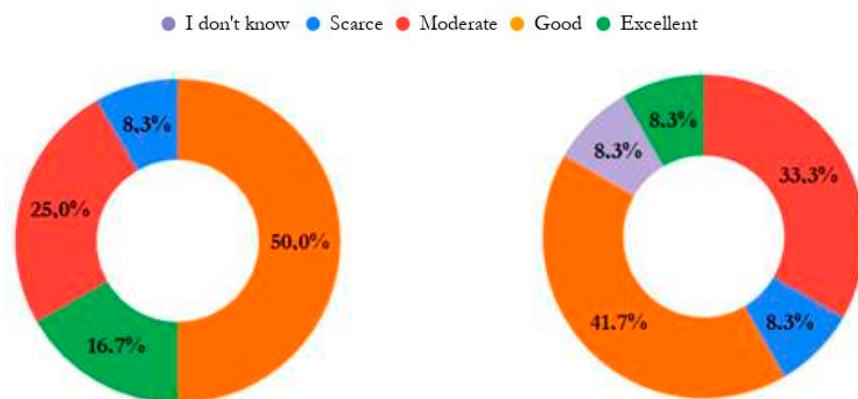
To what extent do you consider that the intended use is compatible with the building?



(a2) Ancient Market

(b2) Basilica of St. Peter the Apostle

To what extent do you consider that the intended use chosen for the reuse project is adequate to meet needs of the area?



(a3) Ancient Market

(b3) Basilica of St. Peter the Apostle

Figure 10. Results of the survey.

The new functions play a key role in adaptive reuse projects as they should meet and satisfy the need of our ever-changing society and, at the same time, not to compromise the possibility of future generations to enjoy the resource. The new intended use of the Ancient Market was considered adequate for satisfying the local community needs (16.7% “excellent”, 50% “good”). Concerning the Basilica of St. Peter the Apostle, the number of positive answers was lower (8.3% “excellent”, 41.7% “good”) (Figure 10). Indeed, 60% and 40% of the respondents would have chosen the same new intended use respectively for the Ancient Market and the Basilica of St. Peter the Apostle. Other respondents proposed to enrich the Ancient Market with the retail of typical products or to consider a new function such as a municipal library. Concerning the Basilica of St. Peter the Apostle, it was proposed to integrate the chosen function with that of museum for the exhibition of religious collections, preserved in the Curia.

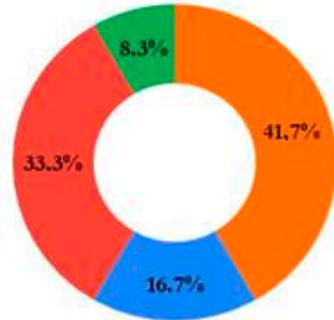
Overall, the reuse project of the Ancient Market was assessed to be almost as successful (41.7% “good”, 8.3% “excellent”) by the sample interviewed, while the project of the Basilica of St. Peter the Apostle was considered successful by only 30% (Figure 11). The answers that considered the success of such projects to be “scarce” were equal to 16.7% for the first and 25% for the second.

The panel of experts recognized in both projects a high capacity to conserve the cultural value of the building (Ancient Market: 50% “excellent”, 33.3% “good”; Basilica of St. Peter the Apostle: 75% “excellent”, 16.7% “good”) (Figure 11). Furthermore, after the two interventions both the buildings remained almost recognizable, preserving their identity (Ancient Market: 75% “excellent”, 16.7% “good”; Basilica of St. Peter the Apostle: 83.3% “excellent”, 8.3% “good”) (Figure 11). The questions of the survey concerning the perception of the recognizability of the buildings after the interventions and the ability to preserve the cultural value were related to the protection of the perceptual-cultural characteristics. Therefore, these results refer to the recognizability of the transformations (understood as the possibility of clearly distinguishing the new elements from pre-existence), acceptability of the transformations (understood as the ability to ensure that changes in the intended use and interventions upon the existing ones are admissible for the client and for the direct, indirect and potential users of the building) and respect for the collective memory (understood as the ability to ensure that the transformations do not alter the recognizability of the asset as an element representative of the identity of social groups, which attribute specific symbolic values to it) [55]. In fact, as mentioned in the previous paragraphs, the reuse project should, first of all, ensure the preservation of the intrinsic value of the building (representing the “limit in managing change” [5]), its identity and recognizability and ensure its enjoyment by future generations.

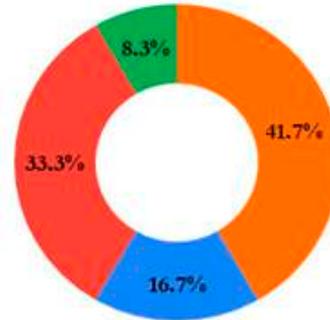
In both case studies analysed, as highlighted by the survey, some issues could be improved to enhance the success of the interventions. Among these, the need to increase the activities carried out in the buildings (in terms of type and duration) was a priority, guaranteeing continuity of use and balancing underutilisation characterising the two buildings today (in particular the Basilica of St. Peter the Apostle). Moreover, as underlined by the interviewees, the management of both buildings represented a weakness to be faced through maintenance and improvement of accessibility. The long-term success of a reuse project depends not only on the project itself, but also on a number of factors linked to its functioning and use. Therefore, it does not end with the project, but covers the entire life cycle of the “transformed” building, including aspects related, for example, to management and maintenance which, if not properly implemented, can produce negative impacts.

At what level do you think that the reuse project was a success?

● I don't know ● Scarce ● Moderate ● Good ● Excellent



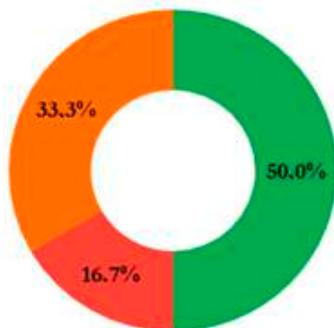
(a1) Ancient Market



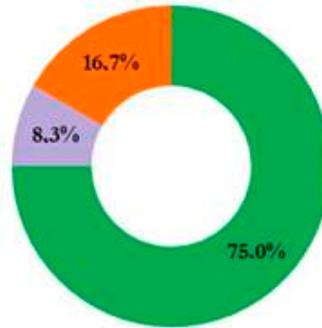
(b1) Basilica of St. Peter the Apostle

At what level do you think that the reuse project has contributed to preserving the cultural value of the building?

● I don't know ● Scarce ● Moderate ● Good ● Excellent



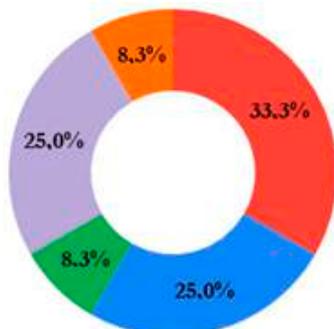
(a2) Ancient Market



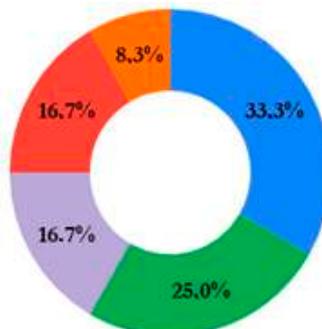
(b2) Basilica of St. Peter the Apostle

At what level do you consider that the project actions have been invasive for the building?

● I don't know ● Scarce ● Moderate ● Good ● Excellent



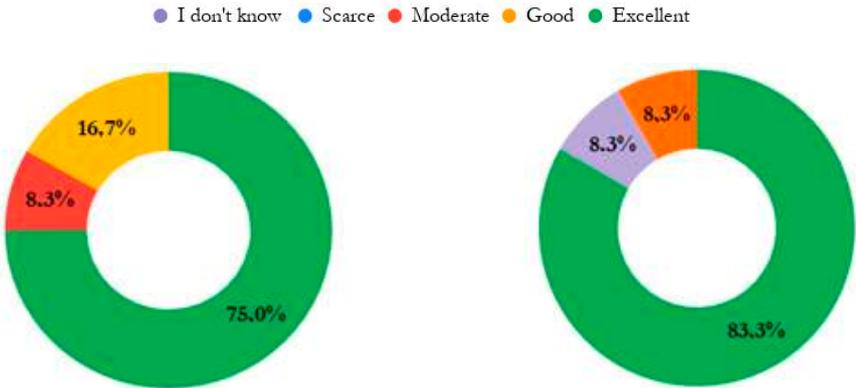
(a3) Ancient Market



(b3) Basilica of St. Peter the Apostle

Figure 11. Cont.

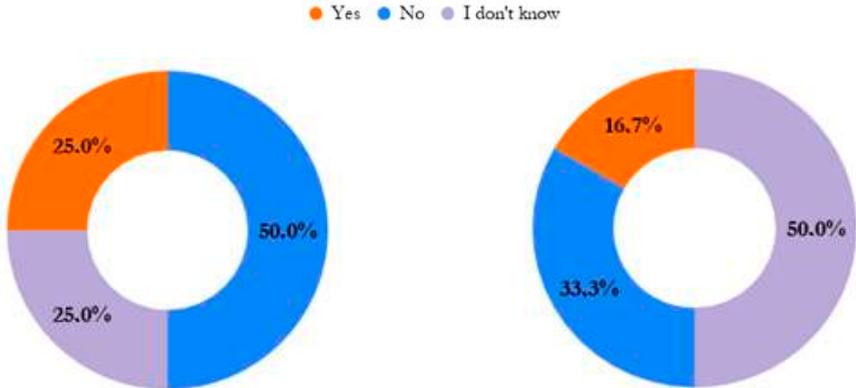
At what level do you think that the building is still recognisable in its original features after the reuse project implementation?



(a4) Ancient Market

(b4) Basilica of St. Peter the Apostle

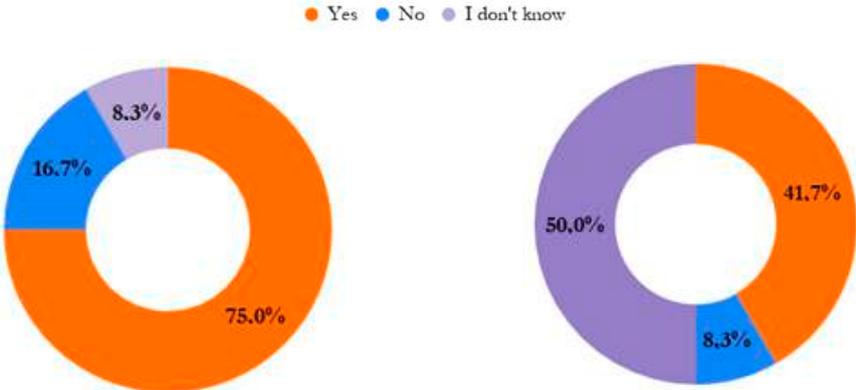
Would you have chosen a different use for the building?



(a5) Ancient Market

(b5) Basilica of St. Peter the Apostle

In relation to the transformation of the building, do you think that some aspects could be improved?



(a6) Ancient Market

(b6) Basilica of St. Peter the Apostle

Figure 11. Results of the survey.

6. Conclusions

The global scientific community and the main international institutions recognise the role of cities and their cultural heritage for the sustainability of our future. Abandoned or under-used buildings are

both a threat to urban quality [56] and a resource for triggering local development processes [54,57]. According to the circular economy model, adaptive reuse complies with sustainable management strategies for urban regeneration, as it helps to reduce the consumption of soil and resources that would be needed to construct new buildings.

The research discussed in the present paper investigates the impacts of adaptive reuse of heritage buildings, in terms of preserving the identity of cultural heritage, protecting its intrinsic values, and enhancing, at the same time, the development dynamics of the urban area in which the reuse project is implemented [58]. In particular, previous studies by the authors identify indicators able to describe the impacts of conservation, rehabilitation and adaptive reuse on heritage buildings and the urban context [54,55]. These research studies have represented the starting point to verify the following specific aspect of building reuse: how much a new function in an urban area can change its quality and trigger new value chains. The indicators selected allow verifying the compatibility of the project transformations in terms of safeguarding a building's identity, by preserving its shape, its construction systems, its materials, and above all the relationship between the building and the urban context. This investigation has been made possible by choosing two case studies which allow many of the variables involved in the adaptive reuse projects, such as the urban context, the design approach, the implementation date, the client, and the public/private use to be kept constant.

The results highlight that the choice of a new function for an abandoned building should be based on the attraction power of the building to its users, as well as on a prolonged and continuous attractiveness, both during the day and over the years. An unsuccessful reuse in terms of power of attraction condemns the building to a new abandonment.

As an additional validation of the outcome of the comparison between the two selected case studies, we can compare the impacts of the projects of the Ancient Market and the Basilica of St. Peter the Apostle with the effects of the settlement of the Faculty of Architecture on the island of Ortigia, in the same years. As shown by De Medici, Riganti and Viola [51], the Faculty of Architecture in Ortigia is an exceptional example because the university moved into old buildings without adapting them with a reuse project in the old town centre of Siracusa. Nevertheless, the establishment of academic research and teaching activities has significantly changed the dynamics of development of the area, triggering a virtuous process "based on knowledge sharing and resources' protection that promoted processes of social engagement and institutional empowerment for both new residents and entrepreneurs" [51] (p. 1).

Therefore, a reuse project does not necessarily have positive impacts on the abandoned building and its context. The quality of the reuse intervention depends both on the quality of the architectural project and on the adequacy of the new intended use both in relation to the building itself and to the urban context in which it is located. It has to be able, in a circular perspective, to satisfy the needs of the community, keep the building "alive" (use value) and, at the same time, preserve its intrinsic value.

**Author Contributions:** Conceptualization, S.D.M., P.D.T. and F.N.; Methodology, S.D.M., P.D.T. and F.N.; Formal Analysis, S.D.M. and F.N.; Investigation, S.D.M. and P.D.T.; Data Curation, S.D.M. and F.N.; Writing—Original Draft Preparation, S.D.M., P.D.T. and F.N.; Writing—Review and Editing, S.D.M., P.D.T. and F.N. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Conflicts of Interest:** The authors declare no conflict of interest.

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