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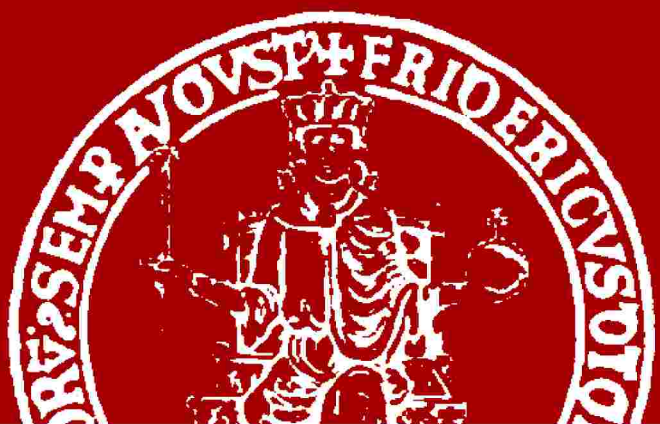

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Towards a Circular Relationship between Territory and the City

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Indice/Index

ADAPTIVE REUSE IN CIRCULAR ECONOMY: THE GOVERNANCE MODEL IN THE HORIZON 2020 CLIC WORKSHOP

Francesca Ciampa, Patrizio De Rosa, Carlo Mele, Maria Giovanna Pacifico

Abstract

This contribution is part of the European Horizon 2020 CLIC project, within the co-designed Workshop launched thanks to the collaboration between the CNR IRISS and the Municipality of Salerno, which aimed at selecting virtuous proposals for adaptive reuse. In the perspective of circular economy, which is applied to the adaptive reuse of cultural heritage, this paper proposes a new form of capital regeneration to enable the transition of settlement systems towards a cohesive, sustainable and de-carbonized growth. The case study describes the design proposal of Edifici Mondo, refined during the Workshop experience, through a methodology attentive to the integration of participatory approaches and circularity. The result is the "circular business model", obtained from the workshop process, strategic tool for the recovery of cultural heritage settlements.

Keywords: adaptive reuse, urban regeneration, circular business model.

IL RIUSO ADATTIVO NELL'ECONOMIA CIRCOLARE: IL MODELLO DI GOVERNANCE NEL WORKSHOP HORIZON 2020 CLIC

Sommario

Il contributo si colloca nell'ambito del progetto europeo Horizon 2020 CLIC all'interno del Workshop di co-progettazione bandito tramite la collaborazione tra il CNR IRISS e il Comune di Salerno, finalizzato alla selezione di proposte di riuso adattivo virtuose. Nella prospettiva dell'economia circolare, applicata al riuso adattivo del patrimonio culturale, il paper propone una nuova forma di rigenerazione del capitale al fine di consentire la transizione dei sistemi insediativi verso una crescita coesa, sostenibile e de-carbonizzata. Il caso studio descrive la proposta progettuale degli Edifici Mondo, perfezionata durante l'esperienza di Workshop, attraverso una metodologia attenta all'integrazione tra approcci partecipativi e circolarità. I risultati consistono nel "circular business model", esito del processo di workshop nonché strumento per strategie di recupero del patrimonio culturale insediativo.

Parole chiave: riuso adattivo, rigenerazione urbana, circular business model.

1. Introduction

On March 11th, 2020, Europe issued a Circular Economy Action Plan focused on the definition of initiatives that affect the entire life cycle of the elements of settlement systems. This document defines the processes and methods of design and production which are functional to the founding principles of circular economy. At the basis of the circular economy production model that arises from these careful methodologies, are directives aimed at sharing, lending, reusing, repairing, reconditioning, and recycling materials and products. What these virtuous perspectives have in common is their goal of extending the life cycle of products and reducing waste to a minimum (European Parliament, 2018).

Loss of heritage, through degradation or wrong reuse interventions, can cause irrecoverable damage. For this reason, ICOMOS (International Council on Monuments and Sites) has developed a document for the European Commission, called "European Quality Principles for EU-funded Interventions with Potential Impact Upon Cultural Heritage", to guide EU interventions for the European Year of Cultural Heritage 2018 (ICOMOS, 2019). Intervention on cultural heritage through reuse processes must follow appropriate management models without which values and resources, stratified over centuries, could be compressed in their authenticity and value. The adaptive re-use proposed in the above-mentioned document aims at providing conservation and transformation action guidelines to be followed. Thus, reuse aims to mediate on the recovery actions of the cultural heritage to preserve the collective identity values reputable as a community resource (ICOMOS, 2019). Adaptive reuse has an inherent meaning of circularity as acting on cultural heritage means guaranteeing future generations the extension of the life cycle of a vector of sustainable development both from the point of view of values and transformations of the building environment (UNESCO, 2014). This kind of interventions, therefore, revitalise cultural heritage in a vision of functional adaptation aimed at the economic, social, and environmental sustainability of the urban context in which it is installed (Pinto *et al*., 2021).

The adaptive reuse of cultural heritage can trigger sustainable development processes that act in an ambivalent way: on one hand they reinforce the original values and preserve them, on the other, they create new ones by improving the physical consistency of the heritage itself (ACE, 2020). Furthermore, the disuse and loss of building heritage negatively affects the environment, bearing in mind that the construction sector is among the most active and uses large resources with a high potential for circularity. The construction sector consumes approximately 50% of all extracted materials and is responsible for over 35% of the total production of the Union's waste (European Commission, 2020). In this context, adaptive reuse, in fact, can play a key role in the implementation of a territorial circular economy. If this line of thought is applied to cultural heritage, it could be considered as a form of regenerative and sustainable reuse that acts on the extension of the life cycle of the heritage. This direction allows moving adaptive planning towards strategic actions aimed at increasing civic sense and the conscious responsibility of one's actions, thus preserving cultural values for future generations (Gravagnuolo *et al*., 2019).

The adaptive reuse of cultural heritage, therefore, affects not only the dynamics of the built environment but also the quality of life of the communities that inhabit it, as its reactivation determines a greater attraction of economic, cultural, and social flows. These different types of sustainability are reflected in Goal 11 adopted in the 2030 Agenda and formulated in 2015 by the United Nations General Assembly (United Nations, 2015). This Sustainable Development Goal (SDG) aims to make cities inclusive, safe, resilient, and sustainable,

highlighting the link between development, regeneration and reuse operations of settlement assets and quality of life (United Nations, 2017). The fulfilment of this objective is most evident where the built environment is in a state of neglect or degradation and with it its cultural heritage. In this context, reuse acts both by reinterpreting sub-systemic fragilities (environmental, social, cultural, economic, and technological) into resources capable of sharing in the extension of its life cycle and the increase of values (UN-Habitat, 2016). This highlights how adaptive reuse gains value in the circular economy precisely because of the attribution of capital to the cultural value of the built heritage (Bullen and Love, 2011).

The adaptive reuse of cultural heritage, in the perspective of circular economy, considers regenerating different forms of capital: manufactured, natural, human, economic-financial (Pinto and Talamo, 2015). This peculiarity makes it collaborative in the transition to a de-carbonized local economy and a generator of virtuous circular processes at different scales (environmental, economic, and social). The adaptive reuse of cultural heritage could be considered as a driver of sustainable development oriented towards innovation (Jokiletho, 2006). The goal is to develop new models of cultural heritage management that can support cohesive growth at local and regional level (European Commission, 2015). Cultural heritage is no longer an obstacle to growth, on the contrary, in the context of culture 3.0 (Sacco, 2011), it contributes Technological Innovation to increasing resilience, reducing environmental problems, growth and improvement of the urban context and increase in real estate value (Fusco Girard and Nocca, 2019).

The values to which reference is made are both symbolic and cultural values of economic assets determined by the regenerative capacity of the reuse process, which revitalises both building and local context in which it is located through the requalification of its relations (Throsby, 2001). The adaptive reuse of a heritage building allows both the action on the technological and environmental units constituting the building (Pinto, 2004), allowing the lowering of climatic impacts, and satisfying sustainability at different scales. This makes it possible both to avoid wasting energy for the extraction, processing, manufacturing, and delivery of building materials to the construction site (cause of about 40% of carbon emissions and construction waste on a European and even Italian scale) (Global Alliance for Buildings and Construction et al., 2019). This sustainability also lies in the value sphere linked to the capacity of adaptive reuse to rediscover the identity of a given area or historic building. The reuse operation therefore also invests in the meaning of the place, providing new opportunities for community development.

To this end, the structure of the paper is articulated into an introductory phase relating to the importance of the topic in the international and European scenario. This is followed by a section dedicated to the theoretical background in which the principles and the scenario within which the proposal of the contribution is articulated are presented. The third session is dedicated to the tested materials, referred to the case study and to the development of technical details for costs and sustainable technologies. The fourth section is dedicated to the methodology of articulation of the experimentation proposed within the contribution. Finally, the fifth section is dedicated to the results in the restitution of the elaborated model, the description of which then opens new scenarios for research in the conclusions.

2. Theoretical background

Based on the aforementioned reference context, the municipality of Salerno promoted a public consultation, which ended on March 4th, 2020, and aimed at collecting proposals for

the adaptive reuse of the "Edifici Mondo" in the perspective of circular economy.
The "Edifici Mondo" complex is a set of buildings located in the upper part of Salerno's historic centre. The complex was built in 1810 thanks to a Napoleonic decree that suppressed all religious orders in the Kingdom of Two Sicilies. This resulted in the existing convent structures being used for new purposes. In particular, the convents of San Francesco and San Giacomo and San Pietro a Maiella were used as a male prison, while the monastery of Santa Maria della Consolazione was used as a female prison. They were used for these purposes until the mid-1980s and were subsequently abandoned after the construction of the Fuorni site. Since then, the City of Salerno has launched an international competition for ideas to restore the "Edifci Mondo". The name derives from the size of the buildings - covering a total area of 18,000 square metres - and from their value and construction complexity in load-bearing masonry (Monestiroli, 2015).
The consultation was born as an operational experimentation of a possible governance tool to be included in the Regulation for the shared management of cultural heritage as a "common good" (UNESCO, 2014), being prepared as part of the European research and innovation project Horizon 2020 "CLIC - Circular models Leveraging Investments in Cultural heritage adaptive reuse" (www.clicproject.eu). The consultation aims to attract new sustainable investments from an economic-financial point of view for the recovery of abandoned buildings and landscapes of cultural value (De Medici and Senia, 2014). It constitutes an opportunity for research in which to identify the needs perceived by the local community, and to express ideas, points of view, opinions, and proposals, aimed at starting a qualified and constructive comparison with all the interested parties, acquiring adaptive reuse proposals that can direct the enhancement of the object of study.
All the proposals received constituted guidance elements for any subsequent procedural processes of enhancement and from them, the suitable ones were selected and presented to the "Circular Business Model" co-design Workshop, following the consultation. A necessary and sufficient condition for the acquisition of suitability and validity of the proposals was compliance with the circular economy model. Among the selected proposals, and with a score that guaranteed the acquisition of first place in the ranking of the proposals, we have the project as well as the subject of the paper. The research question that is expressed through the structuring of the proposal refers to the application of the circular economy to the city of Salerno and the Edifici Mondo through the definition of an adaptive reuse strategy for them.
This experience follows the articulation into two design phases: the first, preliminary which refers to the result of participation in the public consultation with the proposal for adaptive reuse for the convent of San Francesco; the second, the design, which regards an articulated elaboration and is extended to the other buildings of the model proposed in its initial form. The proposal is structured on the multidimensionality and multisectoral of the cultural heritage resources, both as an economic and environmental flow exchange and as multi-actor synergies. Adaptive reuse operations are based on the collaborative perspective between decision-makers and stakeholders, which allows projects to intervene in the built environment in a regenerative way (European Parliament, 2017). This interconnection of places and people affects the social sphere of cultural heritage by creating cohesive and relational relationships; at the same time, it also affects the cultural sphere by determining the transmission of identity values through creative forms of education and information dissemination. Finally, it also affects the economic sphere through a new employment offer

and the increase of real estate and urban attractiveness; as well as affecting the environmental sphere through the improvement of environmental quality and the well-being of collective living conditions (Pinto, 2004).
The rough estimate of the investments is formulated from the belief that the mixture of the intended uses must ensure the economic convenience of the investment through the ability to produce income without violating previous cultural and social values. This economic benefit generates a partially usable revenue for the management and maintenance of the property. Employing a workforce determines positive impacts on the quality of life and on individual and collective well-being by contributing to the creation of jobs, the conservation of natural resources and the regeneration of heritage-related micro-communities. Promoting the development of the circular economy and a circular city (Nocca and Fusco Girard, 2018), the public consultation of the Salerno Municipality concerned the identification of proposals for adaptive reuse and enhancement of public goods. It identified in the complex of Edifici Mondo, the operativity in the upper part of the Salerno city and in a central position. The geographical context in which the Edifici Mondo are located refers to four complexes of historical-architectural value connoting the Salerno building fabric, comprising the Convent of San Pietro a Maiella and S. Giacomo, the Convent of Santa Maria Della Consolazione, the Convent of San Francesco and the Palazzo San Massimo.
The consultation was intended to resume the threads of a discourse begun years ago: in 1997, an international call for ideas was launched to recover this complex to make it the new tourist driver of the city. The call for proposals offered the transformation of abandoned places into regenerated "living systems" (European Commission, 2014), in order to produce positive effects in the context, contribute to the resilience of the city/territory system over time and implement the transition to a local ecological economy. Attributing to the cultural heritage the meaning of a living system allows to intervene on the cultural stratification followed, over time, by the communities that have preserved it. These interventions develop from the need to adapt to contemporary social, economic, environmental, and cultural needs by means of Rehabilitation Technology (Pinto, 2004). Within this vision it is possible to integrate cultural heritage with adaptive actions that are attentive to the culture in which it is rooted, contributing to the collective well-being of current and future generations (Fusco Girard, 2011). The competition aimed to reflect on the complex interrelationships between society, culture, economy, and environment, looking at the adaptive reuse process required as an interdisciplinary and collaborative project between expert and common knowledge to generate new solutions for sustainability and development of the built environment. In this "multi-productive" mechanism (Hosagrahar *et al*, 2016), the proposal is called to introduce a circular model of valorisation rather than growth. The competition did not include a commitment on the part of the administration to make the selected project proposals operational. It was an opportunity to analyse the local stakeholder needs, gathering ideas and investigating their financial feasibility in respect of a circular business model. The outcome of the consultation was a reuse project (the result of the synthesis and reworking of all the project ideas collected) presented by the city of Salerno in a call for proposals by the Ministry of Infrastructure and Transport and which received funding for 8 million euros.
The recovery of large disused complexes, through the attribution of new functions in response to the needs of the contemporary community, could improve through the design of

new squares, green and urban paths, and new possibilities for fruitful contamination (Del Regno and Cucco, 2017). By transferring this objective to contemporaneity, the paradigms that guide the transformations of settlement systems must be changed (De Medici *et al.*, 2018).

In compliance with the project proposal, discussed into the paper, the circular economic model applies to a historical urban landscape (Pinto *et al.*, 2020), which allows maximizing the value of the settlements, activating social, economic and environmental synergies (Fusco Girard, 2014). It is necessary to accelerate the transition to a circular economy model as a nature-based type of economy (Fusco Girard, 2012), to introduce the new transformations of settlement systems in an ecological perspective.

The strategic reuse of cultural heritage at making buildings as similar as possible to a "living organism", capable of mimicking the cycle of nature (Fusco Girard, 2007). According to the previous goal, the project proposal chooses nature-based solutions, among the various definitions of adaptive reuse strategies (Pinto *et al.*, 2021) aimed at implementing the circular economy, in order to minimize the consumption of virgin resources, reintegrating the economy into ecology (Zeleny and Hufford, 1992). By developing the adaptive reuse proposal, coherently with the paradigms of building regeneration technology, the design solution by our research team ranked as first classified in the abovementioned public consultation, returning a new strategy for the building complex with a well-defined historical identity (Pinto and Viola, 2015). The proposal, with reference to the Convent of San Francesco as part of the Edifici Mondo, was discussed to align the transformations hypothesize to the context of contemporary needs and the standards of the circular economy.

The proposal considers circular economy as a type of economy that incorporates the characteristics of the natural system in its cyclical nature (Fusco Girard, 2019). Adaptive reuse, configuring itself as a self-sufficient system, based on the use of nature-based technologies and capable of making the behaviour of the building emulate nature.

The ability to reuse places by redeveloping them in a green and ecological way creates eco-technological spaces. The latter can be the outcome of adaptive processes acting on the reconfiguration of spaces in response to climate mitigation and impact. In adaptive reuse, nature-based solutions are interpreted as strategic devices in the resolution choices of environmental criticalities, with particular attention to the building-user-built environment relationship (Mussinelli *et al.*, 2018). Nature-based solutions are soft technical solutions, aggregable, inclusive of or inspired by nature's functional mechanisms and processes (Musssinelli *et al.*, 2018).

The characteristic elements are closure of the cycle, the reduction of their scale / size, the deceleration of cyclical processes, together with the minimization / elimination of waste, self-organization / self-productive / self-regenerative capacity (Turner, 1993; Fusco Girard and Nijkamp, 1997; Zeleny and Hufford, 1992; Maturana and Varela, 2001; Costanza *et al.*, 2014). Specifically, the proposal, discussed, chooses as a strategy that emphasizes a participatory decision-making process, the use of renewable technological solutions, and the use of non-toxic and biodegradable materials. This position, understood as a type of circularity, incorporates the characteristics of the natural system in its cyclical nature using innovative nature-based technologies, exploiting the lowest impact on the life cycle, thus encouraging green and blue solution technologies.

Specifically, the themes of adaptive reuse and circular economy, as mentioned, have been

outlined within the definition of our project proposal through the mixing and integration of main approaches. The first according to a Heritage Led approach (Bosone and Ciampa, 2021); the second through a technological approach based on the use of blue and green technologies; the third based on the Community Led approach (Bosone and Ciampa, 2021); the fourth phase based on the evaluation of the economic feasibility.

The first two approaches allowed conveying the design choices in compliance with the intrinsic values (Fusco and Vecco, 2016) of the building and the constraints that emerged during the knowledge phase. In particular, the intrinsic value of adaptive reuse lies in the link between the conservation of the past and resources for the modern community, so that relational dynamics and heritage can coexist in a synergic and circular way.

The action was carried out by identifying the constraints to the transformation of the built environment being studied: material-constructive constraint, morphological-dimensional constraint, and perceptive-cultural constraint. In this phase, particular attention was paid to the latter constraint, which contains within itself attention to historical value, aesthetic value, psychological value, and constructive-cultural value. The perceptive-cultural bond is determined by the need to preserve the artistic and historical-documental values of the building and the psychological and perceptive values that users recognise in it. The historical value that is linked to this type of constraint relates to the ability of the building, or parts of it, to bear witness to historical events or periods. On the other hand, the aesthetic value is the ability of the building or its parts to represent stylistic and artistic standards recognised by the community. Psychological value is the ability of the building or parts thereof to stimulate the psychological and perceptive sphere of its direct and indirect users. Finally, the constructive-cultural value is the ability of the building or its parts to represent the material and constructive culture of a place or an era (De Medici, 2021).

The emerged constraints guided the design of the performance adjustments necessary for the insertion of the new functions (Viola *et al.*, 2014). These approaches have allowed the reactivation of the life cycle of the building complex through a skilful combination of conservative and transformative actions (Pinto, 2008). The identification of the Convent of San Francesco as a pilot project and activator of an urban regeneration process was necessary to build a replicable model by investing in the Edifici Mondo complex.

Historical centres can be extraordinary laboratories to evaluate how Cultural Heritage (CH) can become an effective factor of sustainable development and economic growth for them, and an interesting experimentation ground for regeneration strategies of an innovative nature (Boeri *et al*., 2016). The project idea aims to promote strategies for the reuse of pre-existing cultural, natural, social, and economic resources by interpreting the criticalities connoting the building as an opportunity to renew the historical urban landscape for the creation of new values (Viola, 2016).

The third approach, implemented during the Workshop phase that followed the public consultation, saw the validation of the design choices identified in the preliminary project through the answers obtained from the questionnaires administered to stakeholders and decision makers.

The questionnaire was used to understand the needs and desires of users / customers / beneficiaries. The questions were open and in relation to an updating practicable solution. The answers describe what stakeholders thought of the project, what could be improved, what was missing in their built environment. The questionnaire was also used as in-depth survey of the territory to verify the validity of the preliminary proposal and to improve the

project.
This approach, also implemented during the workshop phase, focalized on a set up based on the intervention costs for the structural and architectural-functional recovery of the building, which used to be a convent with a historical character bound by the current municipal planning instruments.

3. Methods and Materials

3.1 Technical details: costs and sustainable technologies

Within the broader theme of building and urban recovery, disused public buildings with cultural value can constitute, through their re-destination, strategic opportunities to activate sustainable development processes. It is essential that this process considers the impacts that future functions will have, therefore the choices must fall on functions capable of protecting the identity of the asset (Pinto and Viola 2016) and at the same time ensuring a significant increase in economic and social value. In the reuse strategy, the expectations of the community must be considered in relation to the results to be achieved in terms of improving the scope of intervention (Pinto, 2010). In this perspective, the proposal looks at the Edifici Mondo complex as a central node of a corridor of public green spaces that connected form a green mesh of reactivated areas promote territorial synergies. The building fits into a context of private and public green areas that allow the building's private garden to be connected to this system, activating the green network that is traced. This last meaning pushes the building to be not only part of a system but also a site for experimentation of nature-based technologies aimed at its functionality. So that the hypothesized interventions do not compromise the spatial characteristics and structural behaviour of the building and with them also the positioning of the systems, responds to the needs of environmental sustainability, accessibility, and usability in line with the analysis of spatial possibilities.
In the preliminary phase, the project at the Convent of San Francesco, the pilot building to activate the redevelopment processes, in the perspective of the circular economy, of the historic centre of Salerno through adaptive reuse strategies also focused on the use of natural-technologies-based applied to Edifici Mondo.
The Convent, located in a central position with respect to the historic centre of Salerno, is configured as a panoramic viewpoint of the City as well as, due to its spatial development, a possible connecting element between two different urban dimensions. Already surrounded by informal greenery and gardens, it is in a strategic position in respect to of important urban attractions: the Conservatory, the Minerva Garden, the Salerno Medical School. However, today it is practically isolated from the city and difficult to access.
The presence of the Martucci Conservatory and numerous other cultural associations operating in the area bring a fervent cultural production, which needs places in which to become active.
By integrating the imperatives of the recovery of the building heritage with the rebalancing of the urban metabolism, taking as an example an animal's metabolism as the result of a cooperation between the brain, organs, and enzymes, needs to facilitate the city's governance policies, its infrastructure, and its citizens (European Commission, 2018), is a strategy to reach a circular business model perspective. The proposal of Convent of San Francesco aims to be handed down to future generations as a cultural infrastructure capable of generating value (Foster, 2020) and at the same time citizen awareness. It could be a

green infrastructure capable of self-sustaining and focusing its operation on the circular reuse of environmental, social, and economic resources. The Convent has a high regenerative potential due to its location and capacity; thinking about the relationship between the Convent's urban vegetation and its proximity to the territorial landmarks mentioned above, we intend to promote social, environmental, and territorial economic synergies.

The reuse project proposed for the convent of San Francesco, as the reactivated fulcrum of a system of public gardens, leads to rethink the building as a porous and creative living system, an essential link between the city, the coast, and the hills. The relationship between the Convent and the territorial context inspires the conversion of the vocation of closure and isolation then former city prison into the city and the different elevations that characterize the convent become new points of access to the property - the use of which allows citizens to reach places in the city at different altitudes. In addition, the preliminarily economic study consisting of a convent with a historical character bound by the current municipal planning instruments. Starting from the calculation of the cost limits for public and subsidized housing in the Campania Region (in Italy where the projects are), the most probable value of the intervention cost - per square meter of surface - needed for the recovery was established of the building. This cost, established at €/m^2 687.36 (Barthelmes *et al.*, 2016), takes into account a series of variables such as, for example, the need to improve energy efficiency, the elimination of architectural barriers, difficulties arising from the position and location of the construction site, etc.

Economic forecasting calculations, aimed at establishing the NPV (Net Present Value) and the IRR (Internal Rate of Return), have shown that the proposed intervention has an excellent chance of success. In particular, the calculations were performed starting from the cost of intervention € 6,623,777.00 and assuming a period of use of 25 years. It is also assumed that part of the structure may be able to provide an estimated income of € 200,000.00 per year that there will be management and personnel expenses. Finally, it is assumed that part of the investment comes will come from subsidized sources or from European funding. It is estimated that the proceeds deriving from the rent of a part of the rooms and laboratories, from the income for exhibitions and events will be equal to € 200,000.00 per year and that the management and personnel costs will be equal to € 450,000.00 per year. With this data and with the estimated cash flow it emerges that the NPV (Net Present Value) is equal to € 676,000.00, that the IRR (Internal Rate of Return) is 8% and that the Pay back Period is 11 years. This demonstrates the validity of the proposed project both from an architectural and functional point of view and from an economic and social point of view as the intervention will be able to generate new jobs (estimated at a minimum in the calculations) and promote management of a common part of the local community. The latter could be used in the operating phases of the structure both in relation to the management of the functions assigned to it and in relation to the production of energy from renewable sources.

The final phase of the development process of the proposal object of the paper is inherent to its development within the Workshop whose results were aimed at the construction of a circular business model for the reuse and reactivation of the building described above.

3.2 Case study

The team rethinks the Convent of San Francesco as the fulcrum of the system of public

green spaces in the urban surroundings that take the form of a green plot of reactivated areas. The cooperation between the green spaces of the Convent and the urban cultural initiatives is able to encourage innovative forms of territorial creativity and the care and maintenance of pre-existing urban and public gardens. The reuse of the structure as the fulcrum of a set of public gardens leads to rethink the building as a living, porous and creative system, and an essential link between the city, the coast, and the hills. To do this, our team reflected on the relationship between the convent and the local context, reversing the vocation of closure and isolation of the convent - former prison - towards an opening to the city. The convent is in a strategic position in relation to the ancient city and the modern expansion of the city of Salerno; as per the latter, it is both a territorial landmark and vantage point of the city; as per the ancient city, thanks to its development in height, it is able to reach two different heights in the ancient centre and acts as a connector between these two different heights. It is a masonry building on five levels, with terraces on the second and fifth levels, an internal courtyard with accessed from the second level and an external garden accessible by a staircase from the first level of the east wing. It has a complex volumetry that allows the location to function at different levels with the public.

The design proposal draws from the study of connections aimed at enhancing the usability of the building according to a macro (territorial scale), meso (urban scale) and micro (architectural scale) connection approach. At a macro level, the restoration and enhancement of a promenade is planned which, extending along the walls of the convent, exploits an already existing path: it is assumed that the ramp reaches an elevator inserted in the project, which allows the connection with the higher level of the Old Town. In this way, the building becomes a connecting node between the two different parts of the city. At the meso level, accessibility to the property from the urban context is improved with the inclusion of two lifts: one to the north, which takes advantage of an existing access allowing direct access to the building; and one to the south that allows access to the higher floors. Finally, at the micro level, the internal accessibility is facilitated by the insertion of two lifts (one in the courtyard that connects level 1 with level 3 and the other between the convent and the west wing that connects levels 4 and 5).

The choice of its new use depends on the relationship of continuity with the existing cultural assets. Due to the presence of significant places for the city, the hypothesized use is as a “House of Music”: an evolutionary empowerment for the local nearby Conservatory. The House of Music will support the Conservatory’s average reception of 860 students, 160 teachers, 62 courses, 100 events, and strengthen ties with the third sector, activating new production dynamics in the territorial economic context. This intervention proposes the reuse of existing resources, raw materials, and systems, to reduce the state of decay and encourage operations to enhance the existing structure. It is a process of democratization of the building, creating a multifunctional residence which could hypothetically accommodate both the musicians of the Conservatory for learning purposes and performance and for a further widespread use connected to the activity of musical events (concerts, creative workshops and instrument recycling workshops).

The inclusion of multiple functions within a single vision minimizes the transformations of tangible and intangible cultural resources and adapts the building to the needs of the new user. This is because the function must preserve the architectural integrity of the building, considered as collective cultural heritage, but must also respond to the needs of the contemporary community. Compatibility with the reuse functions is necessary, considering

cultural heritage as a resource, both because of the increase of declared sites of interest and their maintenance costs and the decrease of economic and human contributions to its support over time (Conference of Minister of Culture, 2018). The inclusion of inappropriate functions can increase the risk of heritage degradation and loss of value, stratified over time, which are no longer repeatable. For this reason, appropriate reuse must ensure both a reduction in environmental impact associated with its reactivation, both by decreasing greenhouse gas (GHG) emissions and by extending the life of the building and avoiding the production of Construction and Demolition Waste (CDW) (Yung and Chan, 2012). In this reading, the function introduced by the adaptive reuse operation is aimed at modifying the capacity (requirements) and performance to adapt and update a building in response to new conditions or needs, thus extending the life cycle of the building (Douglas, 2006). Reuse promotes sustainability and mitigation of irreversible heritage loss. The articulation of the functions follows a double logic: that of a horizontal distribution for compatibility of type, and a vertical one to open the building to the community. The collective functions are distributed on the lower levels while the residential ones on the upper levels, respecting the lower porosity of the building and in accordance with the privacy required for that use.
The layout considers that:

- the independent volume south of the complex of guest buildings, on the first and second levels, be used as the recycling workshop for damaged or disused musical instruments, which, once repaired or regenerated, can be resold in the sale points located on the ground floor.
- On the first level of the convent there will be a community library also fir use by students of the conservatory, with study rooms and services.
- On the second level, thanks to direct access to the pertinent gardens and taking advantage of the different altimetry, the space will be transformed into an open system of knowledge flow designed to accommodate extended users for outdoor concerts. On the same level, in the volume to the west, there will be exhibition rooms for temporary exhibitions and a refreshment terrace that opens to the surrounding vegetation. The convent has been designed to house a media library, recording rooms and congress and conference rooms. On this level, functions for public use have been inserted thanks to the presence of an internal courtyard;
- The third level houses other exhibition halls in the west volume, and in the convent there will be some rehearsal rooms and residential rooms for guests (one double and 7 single rooms), with classrooms and show rooms with an adjoining foyer.
- The fourth level will be the musician's residences (four single rooms and seven double rooms). On the same level there will also be the services, laundry, and canteen.
- The fifth level will be the accommodation of musicians and the common area for students. Specifically, the functions are "drive" and "driven" (Caterina, 2007). This happens because the driving functions confer sustainability to the project from an economic point of view, closely linked to the conversion of the building towards green principles (Fig. 1).

Fig. 1 – Methodological process from Convent of San Francesco to the "House of music"

Source: designed by authors

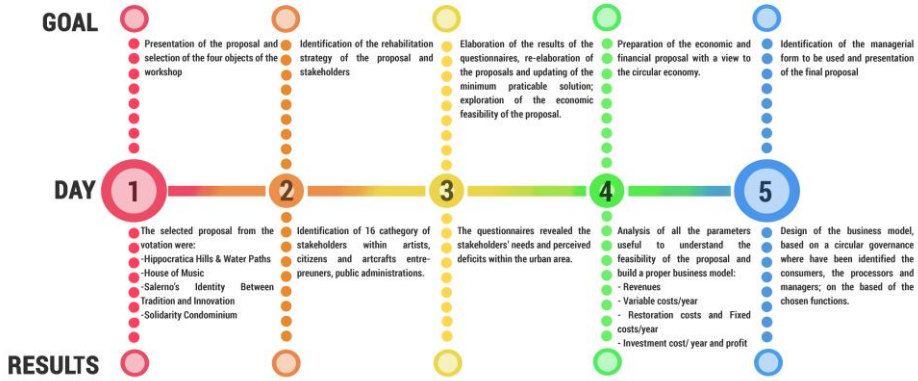
An asset with a consolidated identity can also be rethought and enhanced through the use of technologies that improve its ecological footprint; starting from the recovery of the green areas of the convent, the installation of a Phyto-depuration tank is hypothesized, a natural response to the wastewater refining plants. It purifies the wastewater using a waterproofed basin in which the gravelly substrate and the vegetal substrate combine their action in order to make the water clean and reusable for systems and irrigation. Furthermore, the appearance of the place is improved through the inclusion of aquatic plants of different sizes. Green solutions are also adopted in the consolidation of the building envelope. The roofs are differentiated by type: pitched or flat. Green roofs are proposed for flat roofs aimed at reducing the energy needs of the building through economic advantages on summer cooling by 25% and on thermal resistance for winter heating, as well as urban pollution filtering machines for rainwater recovery strategies. In the second case, we have thought about the use of photovoltaic tiles that can be integrated into the roof, they are less invasive and more maintainable than the panels. They offer high resistance to thermal shocks and atmospheric agents, guaranteeing a conversion of solar energy, satisfying the building's electricity needs and ensuring a longer duration than the elements usually used.
The green solutions are hypothesized to push the linear metabolism of building waste towards the circularity of the reuse of waste. Aiming to obtain an almost zero impact of the building, mini-composting plants with aerobic function are located in the perimeter rooms that the community of the property manages. It is in accordance to an eco-innovative process of mechanical bio-stabilization of organic waste, reducing the production of waste and environmental impacts. The energy obtained is used for the central heating of the structure. To strengthen the strategy, mini pyrolysis plants have also been included for the treatment of the remaining organic waste; the thermochemical decomposition produces energy that can be used for the electrical needs of the structure.
The rough estimate of the investments is formulated from the belief that the mixture of the intended uses must ensure the economic convenience of the investment through the ability to produce income without violating previous cultural and social values. This economic benefit generates a partially usable revenue for the management and maintenance of the property. Employing a workforce determines positive impacts on the quality of life and on individual and collective well-being, contributing to the creation of jobs, the conservation of natural resources and the regeneration of micro-communities connected to heritage. This economic study is set up and preliminarily based on the intervention costs for the structural and architectural-functional recovery of the building, consisting of a historic convent bound to the existing municipal planning instruments.

4. Methodology of the final project within the Circular Business Model Workshop

As already mentioned in the background scenario, the public consultation was followed by an international design workshop, held online from 14 May to 18 June 2020, which saw the participation of the proposers and their 14 proposals selected to access the workshop.
The public consultation was aimed at collecting proposals for the adaptive reuse of Edifici Mondo in the perspective of circular economy. The proposal had to be able to structure a vision capable of generating new employment, triggering processes of urban regeneration, and raising users' awareness of the cultural and architectural heritage. Ten of the fourteen participating proposals were selected. The ten selected groups of designers had the opportunity to take part in the international workshop “Business Circular Model” on the

adaptive reuse of Edifici Mondo, during which four of the winning concepts were selected, following a vote by the participants. The proposal object of this paper was part of the selected ones, and it was then developed during the above-mentioned workshop. In particular, the latter was held over five days of the duration of four hours each, during which the themes that led to the formulation of the business model, discussed in the following paragraphs, were addressed (Fig. 2).

Fig. 2 – Workshop Timeline



Source: designed by authors

During the first day, following the presentation of the selected projects, votes were held for the selection of four proposals to work on in the workshop. Among the four selected projects, "House of Music" (project shown in the previous paragraph), "Hippocrata Hills Health Heritage Hub", "Hippocrata Civitas solidarity condominium", "The identity between tradition and innovation: solidarity, art, science and knowledge for the rebirth of the ancient centre of Salerno". The aim of the workshop was to create a collaborative environment between professionals to increase the strength and value of the four selected proposals to improve their characteristics of circularity, desirability, economic feasibility, and sustainability.

The project team, being the promoter of "House of Music", intended to focus the workshop on the same project, making use of the collaboration of other professionals among those promoters of the 14 selected proposals. The development on the ZOOM platform made a shared work strategy possible through the MURAL digital workspace (www.app.mural.co).

The development of the project proposal, conducted as part of the workshop, was divided into different phases that took place during the days of participation:

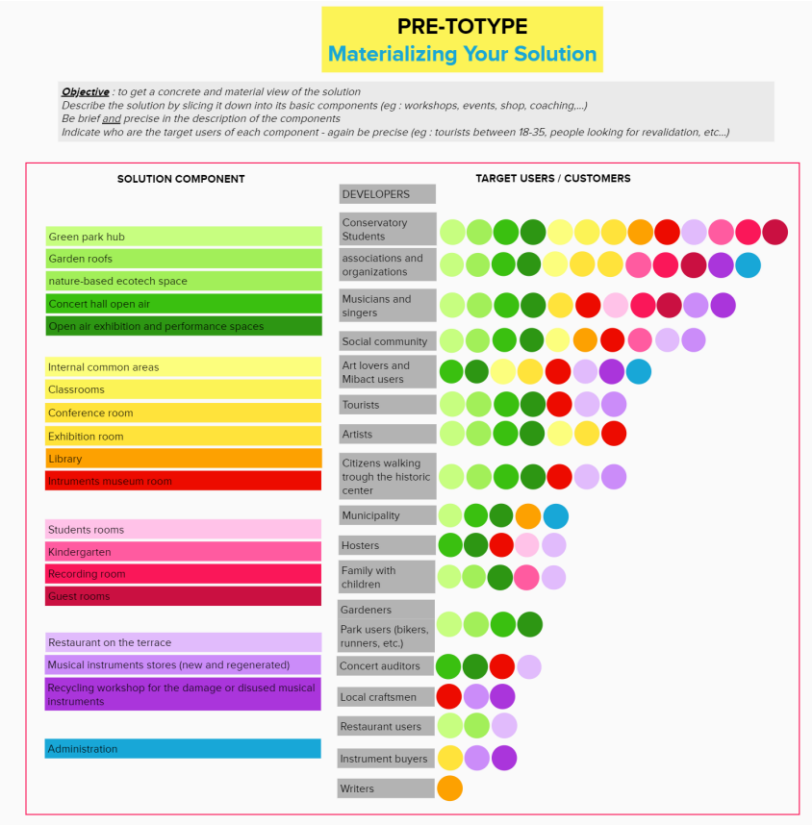
– Day 1: presentation of the proposals and selection of the four objects of the workshop.
– First the presentation of the project and then the vote by those present. The presentation of the 14 projects by one of the members of the proposing group determined a first important confrontation between the participants.
– Day 2: identification of the rehabilitation strategy of the proposals and stakeholders.

– Following the delineation by the workshop owners of the strategies to be implemented with a view to the circular economy, shared planning tables were created, with at least 5 components.

The worktables, as already mentioned, saw the MURAL on which they were used as an operational tool:

– describe the minimum practicable solution;
– identify the proposals for each user/beneficiary/customer/target;
– list the specific proposals of the project to be investigated, and for each list the proposals of the interlocutors to be interviewed;
– list the questions to be submitted to the interlocutors chosen according to the specific proposals identified (Fig. 3). The figure 3 shows the relationship between the proposed uses and the specific users interested in each of them; the colours shown next to each type of user are indicative of the uses listed in boxes that correspond to the colour of the points.

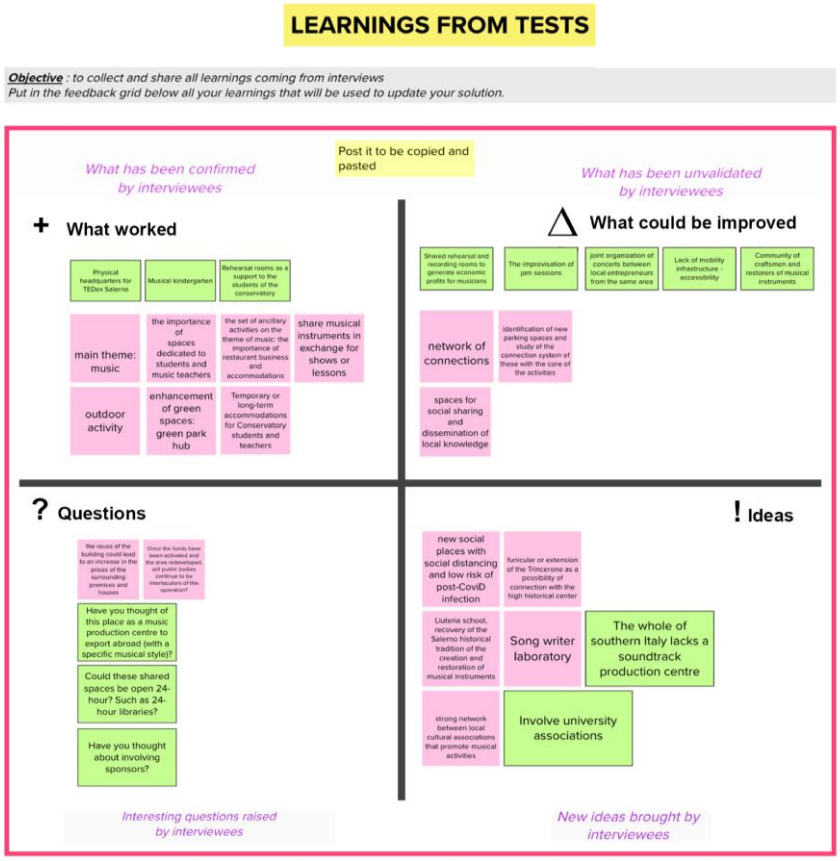
Fig. 3 – Analysis of the different solution components and the associated target users/customers



Source: designed by authors

In the week between the meeting on day 2 and the next, the questions identified for the interest groups were submitted by telephone and by email, and in rare cases followed by one-to-one meetings. The questionnaires, necessary to understand the needs and desires of users/customers/beneficiaries, were formulated through open questions that left room for the interviewees to express themselves in relation to the proposal.
Day 3: elaboration of the results of the questionnaires, re-elaboration of the proposals and updating of the minimum practicable solution; exploration of the economic feasibility of the proposal.

Fig. 4 – Feedback grid to update the solution

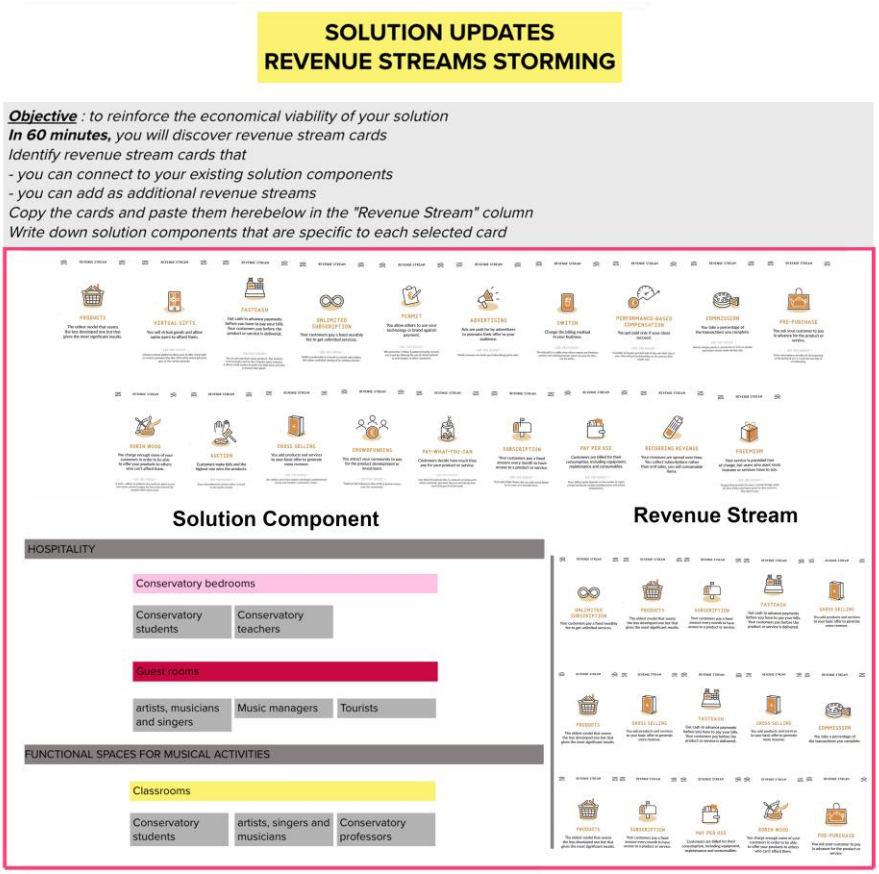


Source: designed by authors

The answers obtained from the questionnaires, once collected, were discretized according to four aspects: what works, what could be improved, what is missing, new proposals. Then the updating of the design solutions followed in the light of what emerged from the elaboration of the interview answers. Each member of the group worked to deepen an

essential theme of the project, to update the minimum viable solution and revisit the value proposition based on the results of the interviews. According to the suggestions received from the various users, the initial ideas were also updated/strengthened such as the need to have spaces that also respond to the security and distancing needs generated by the COVID-19 pandemic (Fig. 4).

Fig. 5 – Solution components associated to a set of revenue stream proposal



Source: Designed by Authors

The last step of the day consisted in associating the profitable functions of our design to users and to the different forms of income, to explore the economic feasibility of the solutions with the help of the revenue stream cards. The revenue streams that could potentially be activated for each component of the solution were examined. In the specific case, six components have been identified and for each a series of sub-components with the specific user. The cash flows selected vary from the more traditional sale of a specific

product, which although it seems to be the least developed is always the one with the most significant results, to solutions such as crowdfunding or with a system that we could call Robin Wood. It, through paying a slightly higher fee for the service, offered by wealthier customers, means that the same services can be offered to those who do not have the resources to use them (Fig. 5).

Tab. 1 – Revenues

Type of revenue stream	**For what feature/ product/ service/ solution**	**How many customers/ sales per year?** Extension (SQM)	Capacity	Average filling coefficient (%)	Daily users	Annual users
Revenue stream 1	Conservatory bedrooms	3055,00	160 ppl	85	136 ppl	44880 ppl
	Guest rooms	2924,00	120 ppl	60	72 ppl	23760 ppl
Revenue stream 2	Classroom	830,00	83 ppl	65	54 ppl	16200 ppl
	Recording rooms	652,00	12 h/day	40	5 h/day	1650 h
	Recycling workshop for damage or disused musical instruments	211	6 h/day	30	2 h/day	660 h
Revenue stream 3	Training school for artistic traditions	266	27 ppl	70	19 ppl	5700 ppl
	Library	291,50	37 ppl	30	11 ppl	5700 ppl
	Kindergarten	188,00	23 ppl	40	9 ppl	2700 ppl
Revenue stream 4	Concert hall open air	370,00	58 ppl	65	38 ppl	1540 ppl
	Open air exhibition and performance spaces	1921,00	300 ppl	50	150 ppl	49500 ppl
	Exhibition room	266,00	33 ppl	40	13 ppl	4290 ppl
Revenue stream 5	Instruments museum room	266,00	33 ppl	40	13 ppl	4290 ppl
	Restaurant and bar	998	370 ppl	60	222 ppl	73260 ppl
	Musical instruments stores	200,00	-	-	-	-
Revenue stream 6	Spaces for installation of renewable energy	725,00	6500/prs	14,5	-	-

Elaborated by Authors

Day 4: preparation of the economic and financial proposal with a view to the circular economy. In relation to what was analysed in the previous session, the cash flows were

calculated. A category of users was associated with the type of product/service offered, along the lines of what has already been investigated in session number 3, and once the possible number of users was hypothesized, the annual revenue was identified. Specifically, the following values were obtained: rough surfaces indicative of the spaces useful for hosting the identified functions, capacity to accommodate the environment in terms of the quantity of users that can be contained, the filling coefficient of the environment, number of daily users and annual. The turnout of some functions has sometimes been calculated on a temporal rather than a spatial basis, given the presence of types of environments that are subject to leasing for longer or shorter periods, as in the case of recording rooms. In this case the cash flow is obtained by multiplying that of the single room unit by the months of annual use and by the number of rooms with the same function present in the same building (Tab. 1).
The second type of survey relates to the identification of the type of funds/contributions available for the planned refurbishment and the skills of the building.
Fixed costs and variable costs were then calculated, where fixed costs refer to the cost of salaries of employees inside and outside the structure, taxes, and insurance; the variable ones refer to the users (telephone, water, energy, gas, etc.).
It emerged that the largest flows come from the activities of the music school, in relation to the registration fees for courses, masters and workshops, as well as other important amounts deriving from accommodation activities, from the rents of outdoor areas for shows and various events, and from tickets to attend the events themselves.
Private investments have been calculated taking into consideration the cost and the income per square meter of the function to be installed within the environment, then multiplying the latter by the number of environments, it is then possible to obtain the investment value from the first and the value of income from the second. By dividing the investment by the annuity, the years of amortization of the investment are obtained, which in the case in question vary in a range from 5 to 11 years in relation to the type of investment and investor (Tab. 2, 3,4).

Tab. 2 – Variable costs/year

Cathegory	**Opere**	**Variable Costs**	**Cost / Unit**	**# Of Units**		**Cost / Year**
			€ / mq € / person € / month	mq / people	months	
Hospitality	Guest Rooms	Electricity, heating, air conditioning, water	25,00 €	3055	-	76,375,00 €
		Telephone, internet	-	80	12	960,00 €
		Preparation	80,00 €	3055	-	244,400,00 €
		Routine maintenance	10,00 €	3055	-	30,550,00 €
		Marketing	1,500,00	-	12	18,000,00 €

			€			
	Conservatory bedrooms	Electricity, heating, air conditioning, water	25,00 €	2924	-	73,100,00 €
		Telephone, internet	-	80	12	960,00 €
		Preparation	-	2924	-	2,924,00 €
		Routine maintenance	10,00 €	2924	-	29,240,00 €
		Marketing	1,500,00 €	-	12	18,000,00 €
Functional spaces for music activities	Classrooms	Electricity, heating, air conditioning, water	25,00 €	830	-	20750,00 €
		Telephone, internet	-	50	12	600,00 €
		Preparation	50,00 €	830	-	41,500,00 €
		Routine maintenance	5,00 €	830	-	4,150,00 €
	Recording rooms and recording film soundtracks rooms	Electricity, heating, air conditioning, water	25,00 €	652	-	16,300,00 €
		Telephone, internet	-	50	12	600,00 €
		Preparation	80,00 €	652	-	52,160,00 €
		Routine maintenance	10,00 €	652	-	6,520,00 €
		Marketing	1,500,00 €	-	12	18,000,00 €
	Recycling workshop for the damage or disused musical instruments	Electricity, heating, air conditioning, water	25,00 €	211	-	5,275,00 €
		Telephone, internet	-	30	12	360,00 €
		Preparation	50,00 €	211	-	10,550,00 €
		Routine maintenance	5,00 €	211	-	1,055,00 €
		Marketing	1,500,00 €	-	12	18,000,00 €
	Training school for whose want to learn or improve the	Electricity, heating, air conditioning, water	25,00 €	266	-	6,650,00 €

	skills related to artistic tradition.	Telephone, internet	-	30	12	360,00 €
		Preparation	80,00 €	266	-	21,280,00 €
		Routine maintenance	5,00 €	266	-	1,330,00 €
		Marketing	1,500,00 €	-	12	18,000,00 €
	Library	Electricity, heating, air conditioning, water	25,00 €	291,5	-	7,287,50 €
		Telephone, internet	-	50	12	600,00 €
		Preparation	80,00 €	291,5	-	23,320,00 €
		Routine maintenance	5,00 €	291,5	-	1,457,50 €
		Marketing	1,500,00 €	-	12	18,000,00 €
	Kindergarten	Electricity, heating, air conditioning, water	25,00 €	188	-	4,700,00 €
		Telephone, internet	-	50	12	600,00 €
		Preparation	80,00 €	188	-	15,040,00 €
		Routine maintenance	5,00 €	188	-	940,00 €
		Marketing	1,500,00 €	-	12	18,000,00 €
Events	Concert hall open hair	Electricity, heating, air conditioning, water	15,00 €	370	-	5,550,00 €
		Cachet and stage expenses	5,000,00 €	-	12	60,000,00 €
		Preparation	80,00 €	370	-	29,600,00 €
		Routine maintenance	5,00 €	370	-	1,850,00 €
		Marketing	1,500,00 €	-	12	18,000,00 €
	Open air exhibition and performance spaces, such as TED talks	Electricity, heating, air conditioning, water	15,00 €	1921	-	28,815,00 €
		Cachet and stage expenses	2,000,00 €	-	12	24,000,00 €
		Preparation	-	-	-	0,00 €

		Routine maintenance	5,00 €	1921	-	9,605,00 €
		Marketing	1,500,00 €	-	12	18,000,00 €
	Exhibition room	Electricity, heating, air conditioning, water	25,00 €	266	-	6,650,00 €
		Telephone, internet	-	50	12	600,00 €
		Preparation	50,00 €	266	-	13,300,00 €
		Routine maintenance	5,00 €	266	-	1,330,00 €
		Marketing	1,500,00 €	-	12	18,000,00 €
	Instruments museum rooms	Electricity, heating, air conditioning, water	25,00 €	266	-	6,650,00 €
		Telephone, internet	-	-	-	0,00 €
		Preparation	80,00 €	266	-	21,280,00 €
		Routine maintenance	5,00 €	266	-	1,330,00 €
		Marketing	1,500,00 €	-	12	18,000,00 €
Commercial activities	Restaurants and bar	Electricity, heating, air conditioning, water	25,00 €	998	-	24,950,00 €
		Telephone, internet	-	50	12	600,00 €
		Preparation	80,00 €	998	-	79,840,00 €
		Routine maintenance	5,00 €	998	-	4,990,00 €
		Raw materials / other	8,000,00 €	-	12	96.000,00 €
		Marketing	1,500,00 €	-	12	18,000,00 €
	Musical instruments stores (new and regenerated)	Electricity, heating, air conditioning, water	25,00 €	200	-	5,000,00 €
		Telephone, internet	-	30	12	360,00 €
		Preparation	50,00 €	200	-	10,000,00 €
		Routine maintenance	5,00 €	200	-	1,000,00 €

	Marketing	1,500,00 €	-	12	18,000,00 €
			VARIABLE COSTS / YR 1,369,194,00 €		

Elaborated by Authors

Tab. 3 – Restoration costs and Fixed costs/year

Category	**Opere**	**Fixed Costs**	**Cost / Unit** € / mq € /person € /month	**# Of Units** mq / people	months	**Cost / Year**
Hospitality	Guest rooms	Restoration costs	2,200,00 €	3055	-	6,721,000,00 €
		Internal staff	1,200,00 €	2	12	28,800,00 €
		External staff	1,500,00 €	15	12	270.000,00 €
		Insurances	4,00 €	3055	-	12,220,00 €
		Taxes	3,00 €	3055	-	9,165,00 €
	Conservatory bedrooms	Restoration costs	2,000,00 €	2924	-	5,848,000,00 €
		Internal staff	1,200,00 €	1	12	14,400,00 €
		External staff	1,300,00 €	12	12	187,200,00 €
		Insurances	4,00 €	2924	-	11,696,00 €
		Taxes	3,00 €	2924	-	8,772,00 €
Functional spaces for music activities	Classrooms	Restoration costs	1,600,00 €	830	-	1,328.000,00 €
		Internal staff	1,100,00 €	2	12	26,400,00 €
		External staff	-	-	-	0,00 €
		Insurances	4,00 €	830	-	3.320,00 €
		Taxes	3,00 €	830	-	2.490,00 €
	Recording rooms and recording film soundtracks rooms	Restoration costs	1,600,00 €	652	-	1,043.200,00 €
		Internal staff	-	-	-	0,00 €
		External staff	1,300,00 €	4	12	62,400,00 €
		Insurances	4,00 €	652	-	2,608,00 €
		Taxes	3,00 €	652	-	1,956,00 €
	Recycling workshop for the damage or disused musical	Restoration costs	1,600,00 €	211	-	337,600,00 €
		Internal staff	-	-	-	0,00 €
		External	1,400,00 €	2	9	25,200,00 €

	instruments	staff				
		Insurances	4,00 €	211	-	844,00 €
		Taxes	3,00 €	211	-	633,00 €
	Training school for whose want to learn or improve the skills related to artistic tradition.	Restoration costs	1,600,00 €	266	-	425,600,00 €
		Internal staff	-	-	-	0,00 €
		External staff	1,400,00 €	2	9	25,200,00 €
		Insurances	4,00 €	266	-	1,064,00 €
		Taxes	3,00 €	266	-	798,00 €
	Library	Restoration costs	2,000,00 €	291,5	-	583,000,00 €
		Internal staff	1,200,00 €	2	12	28,800,00 €
		External staff	-	-	-	0,00 €
		Insurances	4,00 €	291,5	-	1,166,00 €
		Taxes	3,00 €	291,5	-	874,50 €
	Kindergarten	Restoration costs	2,000,00 €	188	-	376,000,00 €
		Internal staff	Keeper 7,420,00 €	1	12	13,200,00 €
		External staff	Director 1,800,00 €	1	12	21,600,00 €
			Vice - director 1,600,00 €	1	12	192,00 €
			Segreteria 1,200,00 €	2	12	28,800,00 €
			Docenti 1,500,00 €	3	12	54,000,00 €
			Pulizia 220,00 €	1	12	2,640,00 €
		Insurances	4,00 €	188	-	752,00 €
		Taxes	3,00 €	188	-	564,00 €
Events	Concert hall open hair	Restoration costs	200,00 €	370	-	74,000,00 €
		Internal staff	1,200,00 €	1	12	14,400,00 €
		External staff	1,300,00 €	5	12	78,000,00 €
		Insurances	4,00 €	370	-	1,480,00 €
		Taxes	3,00 €	370	-	1,110,00 €
	Open air exhibition and performance spaces, such as TED talks	Restoration costs	200,00 €	1921	-	384,200,00 €
		Internal staff	-	-	-	0,00 €
		External staff	-	-	-	0,00 €
		Insurances	-	-	-	0,00 €
		Taxes	-	-	-	0,00 €
	Exhibition	Restoration	1,800,00 €	266	-	478,800,00 €

	room	costs				
		Internal staff	1,200,00 €	1	12	14,400,00 €
		External staff	1,200,00 €	2	12	28,800,00 €
		Insurances	4,00 €	266	-	1,064,00 €
		Taxes	3,00 €	266	-	798,00 €
	Instruments museum rooms	Restoration costs	2,000,00 €	266	-	532,000,00 €
		Internal staff	1,300,00 €	2	12	31,200,00 €
		External staff	-	-	-	0,00 €
		Insurances	4,00 €	266	-	1,064,00 €
		Taxes	3,00 €	266	-	798,00 €
Commercial activities	Restaurants and bar	Restoration costs	2,000,00 €	998	-	1,996,000,00 €
		Internal staff	-	-	-	0,00 €
		External staff	Kitchen 1,400,00 €	4	12	67,200,00 €
			Hall 1,100,00 €	8	12	105,600,00 €
			Barman 1,200,00 €	2	12	28,800,00 €
		Insurances	4,00 €	998	-	3,992,00 €
		Taxes	3,00 €	998	-	2,994,00 €
	Musical instruments stores (new and regenerated)	Restoration costs	1,600,00 €	200	-	320,000,00 €
		Internal staff	1,100,00 €	1	12	13,200,00 €
		External staff	1,200,00 €	4	12	57,600,00 €
		Insurances	4,00 €	200	-	800,00 €
		Taxes	3,00 €	200	-	600,00 €
				RESTORATION COSTS 20.447.400,00 € FIXED COSTS / YR 1.301.654,50 €		

Elaborated by Authors

Once the above issues had been investigated and systematized, it was necessary to update the solution in relation to the dimensions of circularity and sustainability. The solutions already identified in the preliminary and collaborative design phase; new solutions were identified to be connected to the new business models taken into consideration among those present in the cards of the range of proposals offered by the workshop owners.
Among the new and / or improved solutions compared to the existing ones, in the area of circularity, there are a store of new and used musical instruments, bars and restaurants,

nature based eco-technological spaces. In the context of inclusion music lessons are provided for people with disabilities and spaces such as anti-covid buffer zones, and finally in the context of local & collaboration a bookshop next to the library and a gadget-store.
Day 5: identification of the managerial form to be used and presentation of the final proposal.

Tab. 4 – Investment cost / year and profit

Investments		**Total**	**Years of amortization**	**Cost/year**
Investment 1	Partnership Private/Public	€ 6,623,777,00	11	200,000 €
Investment 2	Recording business team	€ 500,000,00	7	65,000,00 €
Investment 3	Hosting business association	€ 3,000,000,00	4	720,000,00 €
Investment 4	Micro enterprises association	€ 600,000,00	5	115,200,00 €
Investment costs/year				1,100,200,00 €
Total yearly revenues				14,483,903,00 €
Total variable costs				1,369,194,00 €
Total fixes costs				1,100,200,00 €
Total Costs				12,014,509,00 €
Profit				12,014,509,00 €

Elaborated by Authors

This is the phase in which the business model to be implemented has been established. In the process of circular governance, consumers are identified who in the case in question are citizens, students, tourists, musicians, music lovers, processors or all the actors who make it possible to implement the specified functions such as local associations, public administrations involved and finally the corporate and therefore managerial operational form of when it is intended to be implemented.
During the international workshop, the possibility of carrying out a more in-depth survey on the territory, also carried out through questionnaires administered to different categories of possible users, made it possible to verify the validity of the preliminary proposal and to improve some of the activities already identified, as well as select new ones. Furthermore, the network of small entrepreneurs and social realities, which expresses a quality economic potential in the area, has been included in the project proposal through the following solutions:

– Luthiers' workshops: very widespread activities with an excellent market demand, which however are absent in Salerno. In this sense, the project envisages places where, in addition to the sale, the exchange and maintenance of musical instruments is encouraged, favouring reuse and therefore quality circular economy strategies.

– Recording rooms: in the music scene, a strongly consolidated market, which, however, is scarce in southern Italy, is that of the production of soundtracks for films. The proposed solution provides spaces for recordings in order to generate a dominant hub in the area for this practice.
– Recycling workshops for old or damaged musical instruments.

The thought process of regeneration sees students, associations, tourists, families, artists, traders, musicians, entrepreneurs, and artisans as the main actors. The project includes the local community, promotes territorial synergies through a top-down approach and triggers practices of participatory regeneration of the buildings, identity values and the economic context of the historic centre.

The comparison with the various stakeholders of the territory during the international workshop shaped the initial idea of the project which, passed in a wider and more open scale to the city, and extended the analysis to the Edifici Mondo that had not been included in the preliminary proposal. It determined the identification of other social and economic values of the urban context and of regenerated and shared cultural horizons, compared to those already identified in the first proposal, with the aim of extending the identity value that the community recognizes to the creativity of the site.

5. "The House of Music" project become "The Citadel of Music"

Participation in the workshop resulted in an improvement and validation of the preliminary proposal, stressing some of the characteristics already foreseen in the preliminary phase and providing for new ones, especially in relation to a vision of circular economy. The House of Music project, which had as its object the adaptive reuse proposal for the Convent of San Francesco alone, has expanded to embrace the entire complex of Edifici Mondo, giving itself the nickname "The citadel of music."

The focus on the minimum feasible strategy and on the specific proposals of the project in relation to the beneficiaries, analysed in depth through the questionnaires administered to the selected users, allowed to validate the proposals and to identify the framework of their needs identified (Tab. 5).

For each category of user, the design objectives have been identified: for example, in relation to music lovers, the goal is to create a space that does not exist in the area, this is possible thanks to the large spaces present and the architectural resonance of the whole complex. The interconnection between all the possible activities related to the world of music makes this context unique in its kind. Technical spaces where you can rehearse not only record or perform, in alternative and sustainable economic forms for everyone, but also a large amount of public space where music is the heart of the territory. The reuse project gives the opportunity to play or listen to music in a historical architectural context with a strong artistic value and in a green context, enjoying nature in the city of Salerno. Citizens will be able to regain possession of a public space that they have been deprived of for many years, thus creating a solid alternative to the now peripheral historic centre. They will have at their disposal, at a short distance from each other, various activities: a large library serving the city and young students, a kindergarten for the activities of the little ones, shops, and large green spaces. In these spaces, they can carry out different types of outdoor activities and in all cases safely, a reference place for the enjoyment of musical performances in the city, new meeting points with numerous bars and restaurants.

Tab. 5 – Users' needs and aspirations

Customers/ Users		Needs	Weakness	Aspirations
Music Lovers	Musicians Music teachers/students Tourists Music publisher People with disabilities	Spaces dedicated to rehearsing and where sharing music lessons Spaces where follow music events Temporary or long-term accommodations for conservatory's students and teachers	There is an absence of Network in terms of connections between spaces useful for social sharing and dissemination of music events	Strong network between local cultural associations that promote musical activities Music lessons Sharing of knowledge between musicians and people
Park lovers	Local citizens Communities garden Municipality Park associations Park users	Enhancement of green spaces: green park hub Spaces for outdoor activities	Lack of spaces where, after Covid infections, could stay safely in sociality	New social places with social distancing and low risk of post- Covid infection
Music Employers	Owner of a recording room Local musicians Small music bands Manager of the conservatory Record managers Music Teachers/students	Share musical instruments in exchange for shows or lessons Shared rehearsal and recording rooms	Local music entrepreneurs are not able to organize concert and event jointly	Generate economic profits for musicians Creation of a southern Italy soundtrack production Centre
Green-Tech users	Renewable energy investors Structures users	Reducing the operating costs and CO2 emissions in atmosphere Finding appropriate solutions to make an historical building sustainable	Lack of spaces where can invest on research in renewable energy	Energy saving of the structure Reducing operating costs Generating profit for renewable energy businesses

Common users	Citizenship Cultural associations Tourists Municipality	Physical headquarters for TEDex Salerno Spaces for events A better connection system in the high part of the city	Lack of parking spaces and study of the connection system of these with the activities' core Lack of mobility infrastructure-accessibility	Funicular or extension of the Trincerone as a possibility of connection with the historical centre
Entrepreneurs	Artisans Small entrepreneurs Local entrepreneurs	A set of ancillary activities on the theme of music: the importance of restaurant business and accommodations Spaces where improve artisans activities related to music instruments	There is any community of craftsmen and restores of musical instruments, this absence affects the possibility to have a circular active process of reuse and also in terms of sharing knowledge	Liuteria school, recovery of the Salerno historical tradition of the creation and restoration of musical instruments Recycling laboratories of damage musical instrument and vernacular local music lessons

Source: Elaborated by Authors

Local artisans will benefit from the availability of spaces where they can simultaneously carry out sales and production activities in one place. The large spaces available and the strong network of people that such an intervention is able to draw creates an expansion of business horizons even for small artisans, giving them possibility of offering their knowledge through courses and workshops. Local entrepreneurs will be able to invest their resources in a place of new expansion, with a strong attraction of a national character. The main activities are certainly linked to the hospitality sector, both in the long term for those who will work or study in the area and in the short term for all spectators. There are numerous bars and restaurants as driving functions to complement the activities connoting the selected intended use.

Local associations and organizations today complain that they no longer have valid interlocutors with whom to propose initiatives related to their activities. Thanks to these new spaces and the renewed interest of the Municipality, they will be able to relaunch a series of initiatives related to the world of music that have supported their social activities for years. Workshops, festivals, concerts are just some of the unheard and unsatisfied proposals that can finally find life in these new spaces. Finally, the urban renewal intervention can only be the mirror of a profitable and positive action by the Municipality.

The media return is enormous; Salerno could be the driving force for the launch of a series of similar interventions throughout the national territory. Furthermore, all the planned activities are not only in support of citizenship, but would be a great attraction for active and selective tourism.

The outcome is a circular business model based on seven points. The key points of the project that can be summarized in:

- integrating the recovery of the building heritage by rebalancing the urban metabolism (the reduction of waste), in a circular economy perspective, the vision proposed for the World Buildings not only as building complexes to be handed down to future generations, but above all as a cultural infrastructure capable of generating value.
- in order to promote territorial synergies, the team has thought about the relationship between the urban vegetation belonging to the Edifici Mondo and that of the nearby territorial landmarks such as the Salerno Medical School, the Conservatory of Music and the Minerva Gardens. The team has rethought the Edifici Mondo as "joins" in a corridor of public green spaces in the urban environment that, networked together, form a green network of reactivated areas. The cooperation between green spaces and cultural urban initiatives encourages innovative forms of territorial creativity, care and maintenance operations of pre-existing public spaces.
- The reuse of the structures as the fulcrum of a set of public gardens leads to rethink the buildings as a porous and creative living system, essential connecting poles between the city, the coast, and the hills. The team proposes the study of connections aimed at enhancing the usability of the building according to a macro, meso and micro connection approach. The articulation of the functions follows a double logic: that of a horizontal distribution for compatibility of type, and a vertical one to open the building to the community. The collective functions are distributed on the lower levels while the residential ones on the upper levels, respecting the lower porosity of the building and in accordance with the privacy required for its use.
- The intended use recovers the lost link between the community and the property, circulating previous cultural resources by reversing the vocational closure and isolation of the buildings towards an opening to the city. Through a process of democratization of the building, a multifunctional structure is hypothesised to accommodate both the musicians of the Conservatory for learning and performances and the widespread use connected to the activity of musical events.
- The choice of basing the functioning of buildings on nature-based solutions that simulate the natural cycle of nature makes it possible to integrate the economic cycle into the ecological one. The recovery of rainwater, a real resource for the ecosystem, allows it to be recycled an infinite number of times. Energy self-sufficiency, through the reuse of renewable energy from the sun and/or from the wind, is another fundamental element that defines the reuse strategy implemented, detailed in the perspective of the circular economy as defined in the introduction. In addition, the choice of the pyrolysis micro-system guarantees the production of energy necessary for the operation of the building through the reuse of food waste.
- Economic sustainability is demonstrated by a cost-benefit analysis analysing the individual operational functions. From our analysis, it emerges that the function capable of generating more income is certainly that of the music school. The other particularly profitable sector is hospitality, followed by the outdoor concert hall. The goal is to

promote the micro-economy from below in order to make the structure self-sufficient over time from an economic point of view. This feedback was calculated through the cash flows assumed by the project idea (€ 14,483,903.00).

– The relationship between costs and revenues gives us what we identify as the profit of urban redevelopment. The layout offers guests workshops for the school of luthiers, recycling workshops for damaged or disused musical instruments, which, once repaired or regenerated, can be resold, or given to the poor; a library for the community and for the students and a winter garden, with study rooms and services, gardens as an anti-Covid buffer zone, open-air concerts, exhibition halls for temporary exhibitions, a multimedia library, recording rooms and halls for congresses and conferences, restaurant bar and residential rooms for guests, classrooms and showrooms, residences for guests and musicians.

The results look specifically at the changes in the demographic fabric and highlights the limited sustainable vision in the planning of interventions that have reduced entire neighbourhoods in ruins, countless disused buildings, waste of space and consequent waste of urban resources. With the implementation of circular economy and adaptive reuse strategies, old buildings take on new value, representing a deposit of local knowledge and configuring themselves as places for production of goods and services and as entities capable of re-producing their own production processes, regenerating themselves producing knowledge and innovation.

The tender proposed the transformation of abandoned places into regenerative living systems (ACE, 2020), to produce positive effects in the context, contribute to the resilience of the city/territory system over time and implement the transition to an ecological local economy. Hence the regeneration of historical and cultural values of buildings, the regeneration of environmental resources through technical solutions and technologies compatible with the cultural heritage. The project idea, which took shape during the preliminary phase, which was then validated and defined during the workshop, is aimed at promoting reuse strategies of pre-existing cultural, natural, social, and economic resources by interpreting the criticalities connoting the building as an opportunity to renew the historical urban landscape for the co-creation of new values. The opening of the buildings to the city, their becoming urban paths and part of a reactivated network of green areas would result in the improvement of the cultural liveliness of the area by virtue of the significant relationship between the Edifici Mondo complex and the territorial landmarks. The intended use also recovers the lost link between the community and the buildings, circulating past cultural resources and transforming the complex of monastic buildings from a place of silence and meditation to a space full of notes, “Notes in Silence”. No less noteworthy is the strong ecological footprint that is intended to be given to the entire project and which is based on a nature-based approach, where the selected ecological technologies are able to functionally connect to the elements of the pre-existing building system. It happens without upsetting the connoting features and making the investigated building systems the real drivers of a circular and green economy.

The recycling of musical instruments, the network of eco-technological green spaces, green roofs, renewable energy production systems are all the means through which to implement the themes of reuse, reparability, recycling, lengthening of the life cycle and reduction of the material waste. The circular project that does not end only in the reuse of technologies and material goods is closely linked to the sharing of knowledge and values of the

community through inclusion. Music lessons for the disabled, the presence of elements of vertical connection and of crossing buildings that become urban arteries and improved accessibility and usability of places; the recording rooms, open-air concerts, exhibition halls, the reactivated green spaces become safety precautions for an area that today seems to have lost its connoting centrality. What has just been said must be concretized through business models that take up the concepts of micro financing, universal accessibility, inclusive production and distribution, participatory production of service with the consumer.

The circular business model envisages virtuous practices of social and environmental responsibility that generate repercussions on the territory; a promising model for the environment, for consumers, for businesses and governments, as it can reduce unnecessary waste, obtain greater value from products, and eliminate harmful emissions. In this perspective, through the reactivation of a natural system of green spaces, the project area becomes the driver of a process of circular development of resources, where the recovery of the lost link between the community and its identity places its primary objective in the adaptive reuse process that we intend to implement. By giving new life to the stones with appropriate economic-financial and governance models, the social capital is renewed, and the cultural capital is perpetuated dynamically, it is not just an identity crystallized in time and space. The model describes an innovative multi-actor governance process that places adaptive reuse of cultural heritage sites as a driver of circular transformation (Bosone *et al.*, 2019). Specifically, the model helps to outline the contemporary development of urban areas in which degraded buildings can be reactivated as connected resources (Fig. 6).

Fig. 6 - Governance model

Source: Elaborated by Authors

6.Conclusions

The historical urban landscape, with its system of spaces and relationships, is a connotative pillar of European identity, so it is essential to experiment with new inclusive procedures for controlling the transformations of the built environment.

Over the last decade, the culture of reuse has progressively been characterized by

sensitivity to the needs of the Circular Economy, with a commitment to waste reduction, the lengthening of the life cycle of manufactured goods, the rebalancing between urban growth and sustainability through new business models. It is in fact necessary, especially if we think about how much Europe today focuses some of its fundamental policies around the implementation of the circular economy, to convey the strategies for the protection and recovery of the cultural heritage connoting the urban space on scenarios of reuse of the circular model organization. On how cities can benefit on a social, economic, and ecological level from the social, economic and environmental synergies that these strategies activate, reducing their agglomeration diseconomies. Furthermore, it is necessary to validate the design choices for the reuse of heritage through a Community led approach that allows to field a circuit of knowledge that produces knowledge and innovation, taking into account the expectations of the community and therefore the impacts that the to settle can generate. Therefore, the choices must fall on functions capable of protecting the identity of the asset and at the same time ensuring a significant increase in economic, social, and environmental values.

From this perspective, adaptive reuse becomes an entry point for the implementation of circular economy strategies, especially if enriched by an ecological perspective of functional reuse of cultural heritage. The building system must be able to draw energy from the sun, purify the air with appropriate plants, and manage water without wasting it, configuring itself as a living organism that has its own metabolism and mimics nature.

The Istat census of 2011 records the presence of over 750,000 buildings in a state of neglect throughout the country. Sites like the Edifici Mondo in Salerno are project opportunities and represent a basis for building sustainable communities for a resource-poor future that is upon us. Adaptive reuse is placed in a systemic perspective that connects the built environment and the natural environment, produced capital and natural capital with human and social capital in a reciprocal relationship. In this context, it is necessary to recognize the multiple values that the cultural good carries with it. The future of humanity depends on effective planning and management of resources, the reuse of buildings represents a strategy to achieve a balance between urban growth and the quality of life. The project has the task of preserving environmental quality, improving the productive and sustainable use of urban spaces, recognizing their dynamic character, and promoting social and functional diversity. If properly managed within the project, the new functions can significantly contribute to the regeneration of the social and economic well-being of communities.

Author Contributions

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