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Experimenting with New Ways of Circular and Participatory Design: The Case Study of a Traditional Sicilian Architecture Transformed for Experiential Tourism

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Abstract: Circular economy, participatory design, and experiential tourism are the starting points for the "Il Pagliaru Novu" research project, whose aim is to redesign, in an innovative scope, a traditional Sicilian rural architecture called pagliaru. This paper aims to present such research, which experimented—in parallel—a circular design approach and a virtual participatory design experience to develop a microarchitecture for experiential tourism. We describe the method and design process behind the Pagliaru Novu, and the features—combining tradition and innovation—of such microarchitecture. The design, and especially the entire design process, highlights how a series of constraints related to the pandemic may turn into opportunities.

Keywords: circular design; experiential tourism; participatory process; traditional architecture; green architecture; post-pandemic scenario; appropriate technology

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1. Introduction

The COVID-19 pandemic has been and continues to be a testing ground to reflect on socioeconomic consequences worldwide. It is a crisis that has not only swiftly changed health conditions, but has affected every business sector, everyday life, and human relations. In this paper, which focused on the construction sector, we present a reflection on some of the changes linked to the pandemic and the lessons we may learn, particularly in relation to a different production model compared to the past, which allows for planning of a new start; the potential of new tools that may be used in the professional lives of designers, and their role; new ways to travel; and new forms of tourism that affect the design of buildings destined to serve reception/hospitality purposes.

At the 2020 edition of the World Circular Economy Forum [1], the debate focused on the resilience potential of the circular economy as a valid choice to relaunch the economy in the post-pandemic world, so that the new start may be in line with other global challenges. The circular economy in its multiple definitions [2] offers considerable opportunities not only for competitiveness, but also for the reduction in emissions across the value chain, contributing to climate change mitigation [3].

The construction sector plays a significant role in the transition toward a circular economy [4], along with the mobility, packaging, fashion, and food sectors as identified in "The circular economy: a transformative COVID-19 recovery strategy" by the Ellen MacArthur Foundation [5]. Rethinking buildings along circular principles to have a more positive impact (low carbon) can provide solutions to this issue and a strong impetus for the sector's transformation.

In this transformation scenario, the figure of the architect takes on a central role. The transition to a circular economy (CE) produces a range of new challenges for designers and requires specific knowledge, strategies, and methods [6].

The pandemic has triggered an abrupt change in professional tools in general, and those available to the designer. For instance, the participatory approach to architectural design needs a different structure. A change in the method of user and stakeholder involvement is required because the participation tools have also changed. Nevertheless, such a change in method should not alter the general purposes of the participation process, the sharing of ideas and issues, active participation, and the tangibility of each participant's contribution [7].

Travel has also undergone a renewal. The post-pandemic has led to the search for new experiences providing a sense of safety granted by the reduced number of people in one place. The need to reconnect with nature has also become predominant. Experiential tourism was not born thanks to the pandemic, but it has certainly drawn strength from it [8].

These preconditions were the starting points for "Il Pagliaru Novu", a joint-venture research project by the Department of Architecture and Design at Politecnico di Torino (with the support of the AUT—"self-construction and tactical urbanism"—student team) and the off grid cultural NGO on a real-life case, in response to the demands of an entrepreneur in the reception/hospitality business (Tenuta La Greca, Cammarata, Agrigento, Italy) planning to expand his services by promoting local circularity scenarios and investing in an initiative founded on the principles of circular economy.

This paper aims to present such research, which experimented—in parallel—a circular design approach and a virtual participatory design experience to develop a microarchitecture for experiential tourism. We describe the method and design process behind the Pagliaru Novu, a traditional Sicilian architecture reinterpreted in an innovative scope as an occasion for experiential tourism.

In the first part of the paper, we describe the key concepts at the basis of our research that fall under the circular economy umbrella. We then outline the research method, which includes the experimentation of a virtual participatory design process allowing for the involvement of people living in different and distant locations. Finally, we describe the microarchitecture of the Pagliaru Novu, a form of experiential tourism housing located in one of the inland areas of Sicily.

2. Key Concepts under the Circular Economy Umbrella

2.1. Circular Design for Experiential Tourism

Experiential tourism [9], responsible tourism [10,11], and slow tourism [12] are all terms used to define a kind of tourism that leads to a series of benefits that may not be replicated by other forms of travel. In particular, experiential tourism aims to promote not only the territory, but even the feeling of respect for it. Experiential tourism allows the tourist to observe a culture from close-up and benefit from a network of opportunities created by the local community.

Experiential tourism is a form of tourism characterized by four main factors: (1) short duration of stay; (2) fullness of the experience; (3) close interaction with tradition and local ways of life, whatever they may be; and (4) attention to the conservation of the territory and the environment.

This inclusive experience makes tourists deeply acknowledge the area of their stay through observation of its people, food, and culture. It may be stated that such forms of tourism have the strong potential to be a circular experience because that which the tourist benefits from is based on the things the area produces and offers, for instance, dishes prepared with local products and reception facilities designed to respect the material and technological traditions merge into a fully sustainable experience. Therefore, it is a form of tourism that may develop and grow in the scope of minimum impact but maximum value for the territory; a form of tourism that has found in the pandemic context new opportunities for development.

From a designer's perspective, applying a circular logic to the design of reception facilities means reinventing ways to create an artifact both in terms of design and in terms of how it is experienced.

The method most coherent with the principles of circularity is Life Cycle Thinking (LCT), considered "the state-of-the-art for analyzing potential impacts" [13]. LCT is also used as an implementation tool in the Circular Economy Action Plan EU legislation package [14]. This implies designing a building or product in all of its stages and being able to predict what changes it may undergo over time. In fact, "the circular design process differs significantly from the standard design approach. Interdisciplinary collaboration with experts is needed within the process, and the design process should encompass the lifecycle of the materials in order to consider and define future methods of maintenance, disassembly, and the reuse of building materials" [6].

In the past few years, different approaches to circular design have been developed, based on the five phases of the life cycle of buildings identified by Benachio, Freitas, and Tavares [4]: Project Design, Manufacture, Construction, Operation, and End-of-Life. In particular: (1) the Manufacture and End-of-Life phases, envisaging the use of by-products and waste materials [15] or materials that are recycled and recyclable at the end of their life [16]; (2) the Project Design phase, reasoning in terms of design for disassembly [17] and design by modules [18]; (3) the Construction and Operation phase, which involves designing in terms of waste reduction and reasoning on the durability of materials and components, encouraging their replacement with a view to preventive maintenance [19].

These approaches are strictly correlated to the "appropriate technology" approach developed by the economist Ernst Friedick Schumacher in his book "Small is beautiful", published in 1973 [20]. The term "appropriate technology" refers to the use of technology that may enable production and social processes with a positive impact at a local level. This leads to designs that—by using local materials—allow for both economic and practical access by the local communities [21].

2.2. Circular Design and Participatory Tools

The circular economy does not only involve a transition toward environmentally sustainable approaches, but even social equality and inclusiveness.

Inclusion in a design, regardless of its nature, occurs by means of participatory tools. "Participation is a form of design that implies the association and combination of different perspectives to create the best solution possible in terms of plans, projects, and strategies in any field. It is thus essential that it produces the interaction between different abilities, skills, and experiences" [22]. With this approach, participants are the key actors of change.

A design developed following circularity mechanisms must not strictly consider the material and technological aspects, but even consider the people for which the area in concern has been designed.

Participation in the design phase is crucial because each participant has a unique and different view of the issue: personal way of life contaminates the result.

This grants the design a greater success percentage, given that unskilled people—but that may have lots to share—are given the chance to take part in the design of something that has yet to materialize but is conceived by them and for them. This factor also encourages care for the living space: the enthusiasm to live in a place designed by the people blends with the feeling of pride to have found local solutions [23] to local issues.

Therefore, the participatory approach favors inclusion and the active involvement of the beneficiaries of the design itself. However, the pandemic context requires a revision of the tools normally used for participatory processes. The participatory approach in architectural design needs to be structured in a different way. A change in the methodology of user and stakeholder involvement is necessary because the methods and tools of participation are also changing.

3. The *Pagliaru Novu*: A Research Experience between Tradition and Innovation

We shall describe, hereinafter, a participatory circular design experience that led to the development of a microarchitecture for experiential tourism. The context is Sicily, at the intersection of the provinces of Palermo, Agrigento, and Caltanissetta, the home of Tenuta La Greca, an 1800s baglio (a traditional rural structure built around an internal courtyard) surrounded by many little towns, each inhabited by a few thousand people such as Vallelunga Pratameno, Valledolmo, or Villalba. These are examples of the so-called "inner areas": weak fragments of territory, distant from essential services, and infrastructure such as health care, education, and mobility, which have seen a gradual population decline [24] but where there is an enormous potential for development, thanks to the valorization of the natural and cultural heritage and local communities [25].

It was the very owners of the property who suggested turning a piece of rural Sicilian architecture—the pagliaru—into an opportunity for experiential tourism within the structure itself.

3.1. U Pagliaru

In the words of Vincenzo Mortellaro, an 1800s Sicilian lexicographer and Arabist, u pagliaru is "a room of twigs and hay, where the countrymen could find a shelter and rest at night" [26].

U pagliaru is the most ancient example of rural Sicilian architecture, given its protohistoric origins. U pagliaru is a tangible testament to the nomadic culture of Sicilian cowherders, shepherds, and farmers who, for work reasons, needed to travel several miles from their homes. The presence of such temporary architectures, which fully embody the principles of circular architecture, has a unique value from a historic and landscape perspective because it is an account of the everyday life of a social class—the farming class—that no longer exists [27]. Over the years, the living use of the structures was lost, and they became simple warehouses for work equipment or occasional shelters.

The anthropological research of the Sicilian writer, doctor and ethnologist Giuseppe Pitrè, who lived between the nineteenth and twentieth centuries, were essential to immortalizing some aspects of Sicilian culture that would have been lost over time. In "Biblioteca delle Tradizioni Popolari Siciliane" [28], published from 1871 to 1913, the pagliaru is described as a shack with a one-meter base in dry stonework, whose holes are closed with mud. The stone base was not always present. For example, one was not present when the pagliaru was used as a temporary shelter. Wooden poles were embedded along the perimeter of the base and joined together in a single high point, giving the roof a conical shape. This structure was covered with layers of water reeds. The shape of the plant varied according to social class: circular for common people, quadrangular for land-holders.

Both the raw material and the ancient building technology changes depending on the area. Close to Mount Etna, given the strong presence of volcanic rock, the pagliaru appears as a black rock ashlar construction, which makes it much more resistant than the inland pagliaru, with a log coating added to the stone base covered, in turn, by compacted soil and hay (Figure 1).

The circularity aspect lies both in the use of easily attainable raw material [29] and in its ease of disassembly. Ever since the 1800s, u pagliaru has been designed and built following a circular approach. As the first autumn rains came along, the huts started to decompose, and the families returned to their towns for the winter. Nothing remained of the pagliaru that could not naturally mingle with the surrounding environment or that could be used in different ways at home: the wood used for the load-bearing structure could be burnt to bring heating to entire families.

Despite the varying sizes, u pagliaru was always a simple and uniform 'loft' [30] hosting both humans and animals.



Figure 1. Example of *Pagliaru Longu*, Monte Carcaci, Sicily. This type of *pagliaru* is distinguished by a rectangular base. Its maximum size was around 5 m^2 (54 ft^2). Photo credit: Stefano Giacchino [31].

As Leonardo Sciascia stated in his book "Nero su nero" [26], there were extremely few things inside the pagliaru including two crockpots: one to make soup, and one to make tomato extract. The number of tin or pewter dishes and cutlery corresponded to the expected number of dwellers. Clothes were very scant, as were blankets. The *pagliaru* has been so influential in Sicilian culture that local idioms related to such architecture are in use to this day. For instance, "tenere la casa a pagliaru" (to keep the house like a *pagliaru*) means keeping a house messy and dirty.

3.2. The Research Methodology

The research aim has been to redesign, in an innovative scope, the traditional *pagliaru*. The methodology adopted is inspired by Design Sprint [32], a five-phase process that uses design thinking with the aim of solving a large business challenge in a short time, reducing the risk when bringing a new product, service, or a feature to the market by making solutions very tangible and testing them with a target audience before starting development.

In this research, the Design Sprint methodology was declined to be applied to architecture. The main features of the methodology adopted were the rapidity of the decision-making process, the inclusion of circular economy principles in the development of the concept, and the virtual participatory approach to the project.

In particular, the methodology adopted was based on the following aspects:

1. compression into a few days of activities that usually cover a longer time frame (the architectural project may take months or years to be completed);
2. interdisciplinary brainstorming workshops to develop the first design idea, leveraging the ability of the people involved (selected experts) to be creative, thanks to tools and methodologies that support the generation of ideas even remotely;
3. development of a concept following principles of circular design [33] using an appropriate technology approach [20,21] and reasoning, for example, in terms of assembling and disassembling processes, a reduction in resource consumption, use of local or renewable material; and

4. end-user feedback, which plays an important role in the innovation process as it allows them to understand the pros and cons of the solution. It also allows us to learn from it without making the design team become attached to the solution developed internally and not open to variations and suggestions given by users. Based on the concept, interviews were conducted with potential users, which opened up to new design scenarios.

In the following, we describe in detail the actors involved, the tools used, and the different phases of the project that led to the development of Pagliaru Novu.

3.3. How it Started: The Actors

The request by the client to build a traditional Sicilian architecture to encourage experiential tourism within his estate was the occasion to experiment with a participatory design based on a circularity mechanism. Design activity was performed in partnership with the cultural NGO OffGrid Italia, which promotes sustainable practices. Design activity was performed in partnership with the cultural NGO OffGrid Italia, which promotes sustainable practices.

The actors involved in the design process were:

1. Mariano La Greca, owner of the building and land in concern;
2. AUT, Acronymous of Autocostruzione Urbanismo Tattico, a student team at Politecnico di Torino that designs temporary structures and self-built installations and architectures at a low cost but with a high impact on the area; and
3. Experts in the circular design and architecture fields.

The following roles were assigned to the actors:

1. The decision-maker, an essential figure because they need to choose the best solutions among the many born throughout the phases of participatory design;
2. The facilitator, with the responsibility for time management of the entire process and the synthesis of discussions and suggestions emerged throughout the design phases;
3. The tutors, required to channel the project toward the right direction and essential to provide information concerning the design phases; and
4. The experts, essential figures to provide design advice. Their insights are important in the definition of end-user demands, the inherent design features, and the experiential services related to such.

3.4. Design Phases

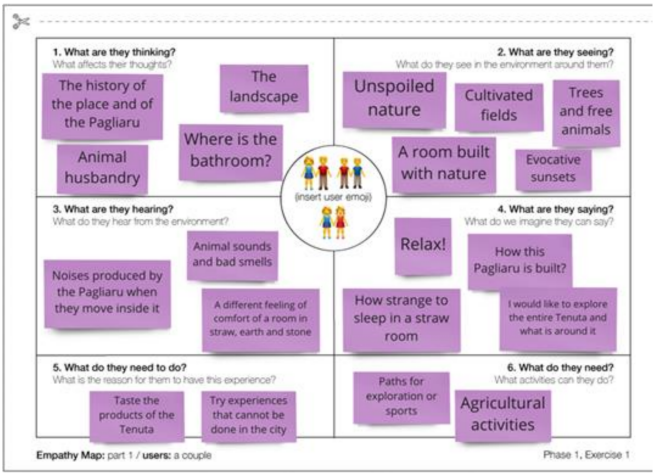
Participation and circular economy have been the key elements of the design process, whose aim was to create a prototype of *Pagliaru Novu* with the smallest investment possible in terms of human resources and time. The designer served as a mastermind using co-design strategies to satisfy the needs of the stakeholder. Every subject involved in the creative process—including architects and designers—participated and was actively involved, with a shared vision of the goals and results. The circular economy framework was the core of the process, especially to satisfy the need to design with local raw materials or waste materials to promote as new resources.

The design process was organized through a 4-phase workshop that took place between June and September 2021. Each phase had very specific goals that were expressed thanks to templates filled by each participant. The main instrument used was Miro: an online collaborative whiteboard for teamwork. Each participant was given their template to fill with virtual post-its corresponding to the color assigned to them.

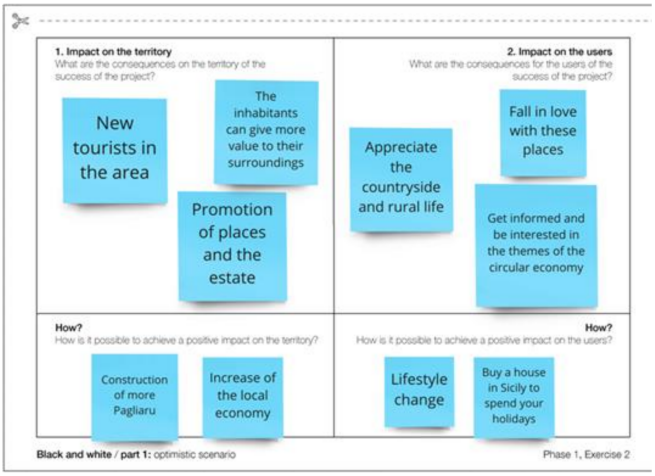
1. Phase 1: To predict the impact of the project on the area and the user base. The aim of the first day was to assess the impact of the project on the area and the user base, in both a positive and negative scenario. Each participant performed three exercises to achieve such a goal: Empathy map, Black and White, and Wordmaker (Figure 2). All exercises were coordinated by the facilitator.
2. Phase 2: Inspirations and design requirements. The aim of the second day was to give a tangible form to the outputs of Phase 1 by investigating the design references guiding the development of the pagliaru. An exercise named brainstorming was created for this purpose (Figure 3).
3. Phase 3: First design idea. After the first two phases, the facilitator started the *pagliaru* metadesign phase. Within two weeks, the subject developed a first version of the design that—despite still requiring in-depth analysis—could encompass most of the suggestions proposed by the participants throughout the first two days (Figure 4).
4. Phase 4: Design feedback from a random pool. The aim of this phase—which lasted three days—was to verify whether the group had achieved the user-impacting results hoped for. A series of interviews were made with a heterogeneous random pool of users. A brochure (Figure 5) was created to briefly—though exhaustively—present the entire design workshop experience to the interviewees as a feedback tool. Ten people were interviewed, and the following four questions were asked:

a. What feelings do you feel when you observe this location?
b. What touches would encourage you to live a sustainable tourism experience?
c. Once you reach Tenuta La Greca, what would you like to find or try within the Pagliaru Novu?
d. Imagine you have reached the end of your stay . . . What would you mentally bring back with you?

The interview results offered interesting design perspectives that may be observed in more depth. For instance, some suggested not restricting the user pool to a young couple, as established on the first day of workshops, but expanding it to child tourists with their parents, which would lead to new design scenarios.

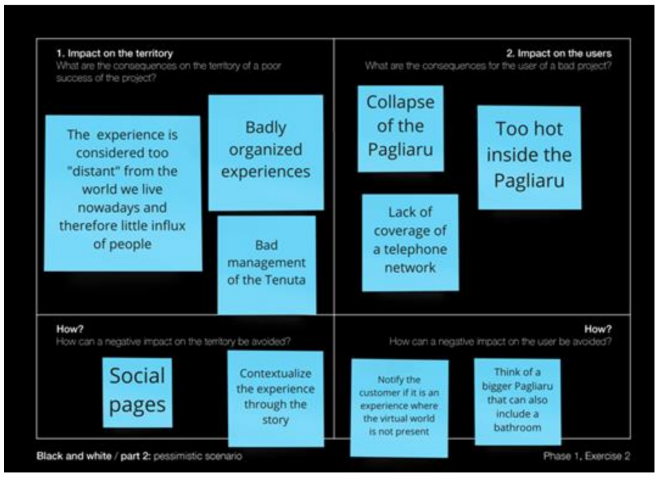


(**a**)



(**b**)

Figure 2. *Cont.*



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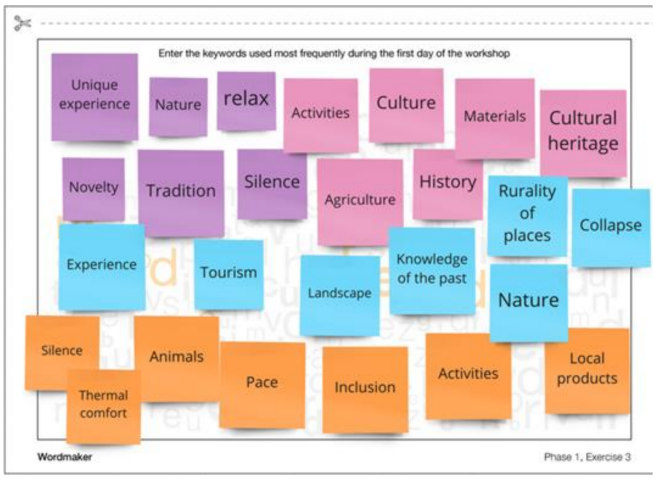

(**d**)

Figure 2. (**a**) The Empathy map had the goal to express user behavior. (**b**,**c**) In Black and White, the participants hypothesized the potential impact of the project. (**d**) In Wordmaker, participants wrote the words most frequently used in the first phase.

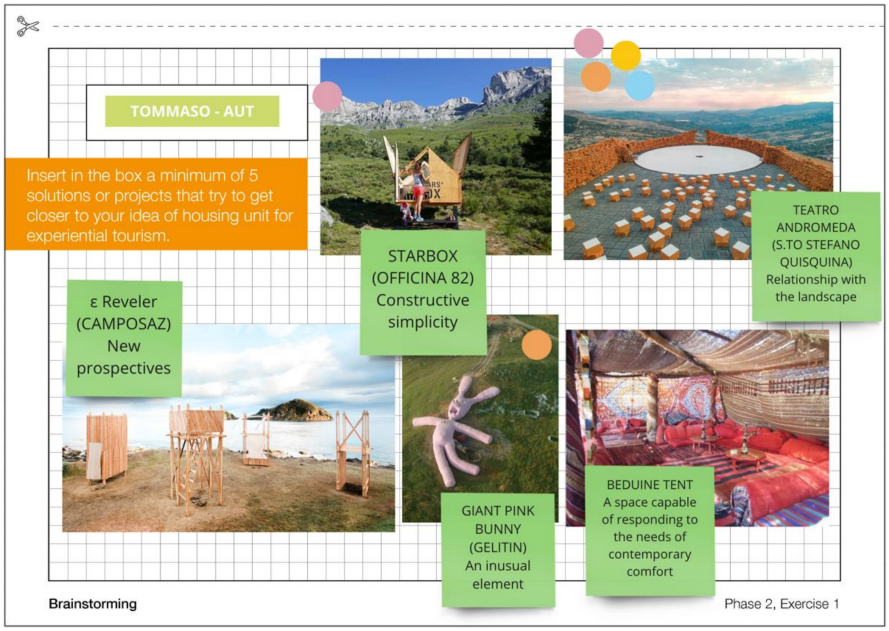

Figure 3. Each participant inserted into the template the design references searched for on the web over a given period of time. Subsequently, the references to focus on among those brought to the table by the participants for the *pagliaru* design were determined by vote.

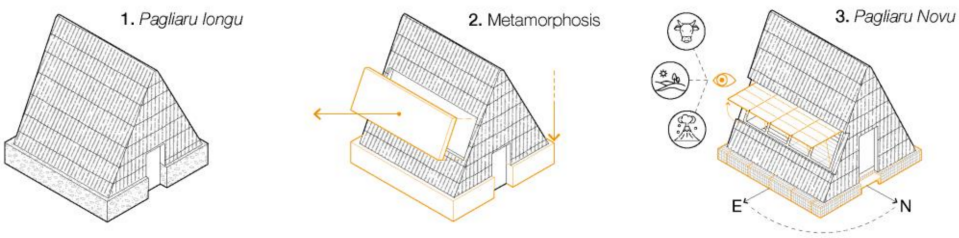

Figure 4. A concept design of the *pagliaru* was presented in this phase.



Figure 5. The brochure summarizes the highlights of the *Pagliaru Novu* as well as the services it offers and the activities the tourist can choose from.

4. Results and Discussion

The process outlined in the previous paragraph led to the design of the *Pagliaru Novu*, a circular microarchitecture for experiential tourism.

The innovative aspects of the design may be summarized as follows:

1. the entire design process, from the participatory tools to the development ideas;
2. the building technology employed; and
3. the intended use.

The first innovative aspect lies in the design process: the methodology leading to the final *Pagliaru Novu* design was experimented in a period marked by the social distancing imposed by the pandemic. The methods and tools were adapted to the new virtual mode, thus transforming a moment of crisis into an experimentation opportunity.

From the material and morphological point of view, the *Pagliaru Novu* is slightly more distant from the traditional structure. The first noticeable feature is the design of its four windows. Given that the *Pagliaru Novu* is an integral part of the tourist experience, the concept revolves around the idea of enjoying the surrounding landscape, even from inside the architecture. When the windows are shut, they blend with the rest of the *Pagliaru Novu*, also being covered with water reeds.

The inside is simply furnished with two drawers and a king-size mattress resting on a recycled pallet structure. The orientation of the *Pagliaru Novu* and the height of the windows allow the guests to gaze at the Sicilian hillside while lying in bed. Nature itself enters the living space all day long.

The *Pagliaru Novu* is a game of Chinese boxes (Figure 6). The outer water reed layer hides the fir wood structure, which in turn is attached to the innermost box, made of fir plywood boards. This wood was chosen as fir is one of the most common species in Sicily, and because of its durability and low cost: such factors reduce the environmental impact of transportation. Moreover, it comes from fast-growing trees. Along with the water reeds, even the pallets and stones for the gabions were included in the design scope.



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

Figure 6. (**a**) Exploded axonometry of the layers: (1) Water reed layer; (2) Triangular frame structure; (3) Wooden layer; (4) Base of the triangular structure; (5) Base of gabions filled with rocks. (**b**) Rendering of the *Pagliaru Novu* inside the project area. With the addition of the word *Novu*—"new" in the Sicilian dialect—we aimed to summarize the three innovation concepts we have worked on and specify that the design presented is an evolution of the classic *pagliaru*.

The structure is composed of five triangular frames connected with wooden slats. Each frame is formed by two slats corresponding to the triangle legs and one slat at the base. The final part of the legs inserted in the ground is covered in galvanized steel and treated with a dense vegetable oil able to create a thick protection layer (against humidity and biodegradation) when applied to wood. To avoid instability, the holes were filled with rocks. The water reeds were fixed to the wooden structure using galvanized steel rods.

The *Pagliaru Novu* is supported by a low wall of gabions filled with rocks, which recalls the ashlar base of the traditional rectangular *pagliaru* constructions. The gabions allow for separation of the structure from the ground, thus protected from humidity. The height of the wooden entrance door was left unchanged compared to the ancient *pagliaru*—1.50 m (just under 5 ft)—to represent the entrance in a protected and cozy space (Figure 7).

The final innovation aspect is intended use. The *pagliaru* was a place of gathering for families, tired workers, and animals in a few square meters. The *Pagliaru Novu*, on the other hand, welcomes responsible tourists who consider this small dwelling an element of a greater tourist experience designed for them.

It has maintained the distinguishing elements of circularity of the original structure: the use of easily found and sustainable materials, and the building technology that makes it easy to disassemble. This feature, above all, satisfies the client's demand to own easily maintained microarchitectures.

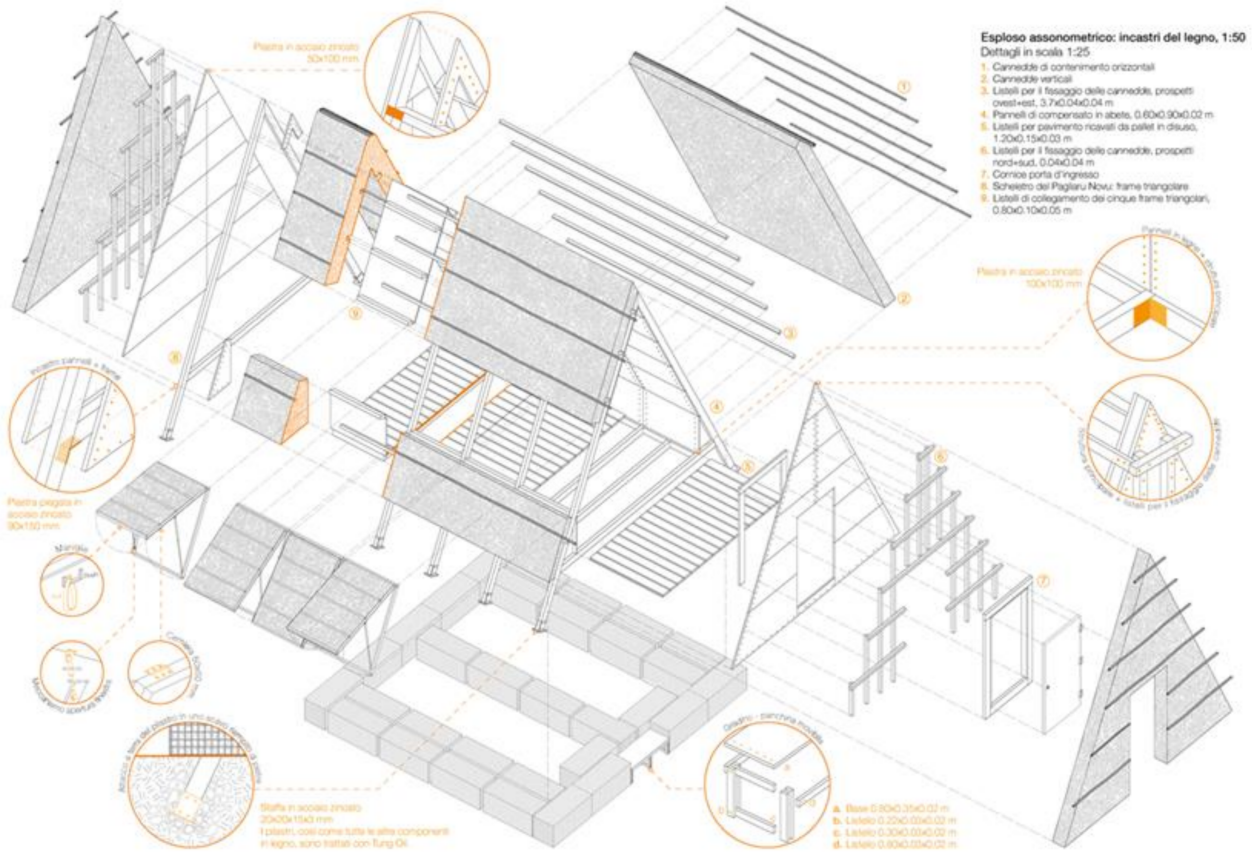

Figure 7. Technological details of the wooden joints: (1) Horizontal containment water reed; (2) Vertical water reeds, (3) Laths for fixing the water reed, elevations west and east, 3.7 × 0.04 × 0.04 m; (4) Fir plywood boards, 0.60 × 0.90 × 0.02 m; (5) Floor battens made from disused pallets, 1.20 × 0.15 × 0.03 m; (6) Laths for fixing the water reeds, elevations north and south, 0.04 × 0.04 m; (7) Front door frame; (8) The structure of Pagliaru Novu: triangular frame; (9) Connection strips of the five triangular frames, 0.80 × 0.10 × 0.05 m.

5. Outlook and Conclusions

The *Pagliaru Novu* research is still under way. The aim of the second phase of the project is to assess the circularity of the project through a life cycle design approach and create an executive design, develop the construction site setup for the microarchitecture, and procure the materials required.

The erection of the *Pagliaru Novu* would thus close the circle. The actors involved in the design process, and above all, the AUT team, would have the chance to discuss on the field and, together with the local workforce and the property owners, build the microarchitecture by favoring inclusion and active involvement of the design beneficiaries.

Moreover, the *Pagliaru Novu* would become a 'real' potential catalyst for the territory and its inhabitants.

The *Pagliaru Novu* project has underlined a series of opportunities that may emerge following the unexpected changes dictated by the pandemic.

First, the design method implemented allows us to make a series of reflections.

Though not replacing the traditional design approach, the participatory path experimented was useful for the active involvement of subjects able to contribute to the decision-making process. The different phases took place in a 'virtual setting', and the design locations have also become, in turn, 'virtual'. In this context, we have been able to share ideas, conduct surveys, and design prototypes of our ideas in a reduced space and time.

In this framework, the designer is a transversal figure able to create new connections between the communities, stakeholders, and users. Architectural design is the tangible mark of such connections, connections that find the experiential tourism sector a challenge to deal with. The pandemic has shown a trend in tourism toward a dimension of sustainability; the development of new sustainable reception facilities will play crucial roles in this process.

The principles of circular economy applied to the design have been fundamental inputs for choices related to technology and materials.

Given its double meaning as a theoretical model and an experimental approach, the circular economy is a new frontier for architecture to explore.

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