

INTERVENTION IN THE POMBALINE LIVING SPACE THROUGH SUSTAINABLE ATTITUDE

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Abstract

During the last decades, Lisbon's downtown population has decreased considerably. Its current residents are mostly older people, whose economic and social situations are brittle. Although they are the ones who allow traditions and cultural values to persevere, it is necessary to avoid the process of museification and to encourage the newer generations to inhabit this area. These new residents are characterised by a new life style, where working and leisure are beginning to merge. This makes it necessary to adapt the old living space to a new living and social reality. These buildings are a result of the XVIII century urban and architectural plan where every floor consisted of several small rooms with small dimensions, no longer necessary for today's needs. The pombaline cage, originally built to be simply a structural system, can now serve new purposes. By inserting key elements from the pombaline period in the contemporary living space, the present becomes a stratum from multiple generations. Since Lisbon was rebuilt on large wooden stakes during this century, all the buildings' structural systems had to be made of lightweight wood. Therefore, when selecting new materials for these buildings, it is important to consider the structure's weight limitation without neglecting environmental impact. Furthermore, the current habitants' lifestyle must not be disregarded when planning for the needs of the new residents. Through a social and economic sustainable attitude, a new business model is generated. This solves both housing needs and contributes to the enhancement of local employment.

Keywords: Interior design; Historic centre; Sustainability; Pombaline cage; Contemporary lifestyle

Introduction

The house itself is an anonymous and silent space, where its identity is formed when it is inhabited. It is the residents "*who see "character" in its empty rooms and transform an existing house into their home*" (Lane, 2006). The definition of housing has changed over the years, since new solutions

emerged from the residents' new needs (Daab, 2006). The diversity of solutions that can be found in some rooms of the house made them polyvalent, which enables them to adjust to several needs. With a constantly changing lifestyle, work has been becoming more important on the citizens' lives (Roberts, 2006) and having to deal with choices on work and family, individuals begin to merge them (Rapoport and Rapoport, 1965). With a society constantly changing as well as the space that inhabits, it is intended to create the appropriation of a leisure space that is able to respond to various uses.

Contextualization

The current situation of Lisbon's downtown is characterised by loss of residents, residents aging, and predominance of tenants occupants (Machado, 2001). This demographic dynamic "reflects an internal organization on the distribution of the resident population" (Esteves, Hortas and Caldeira, 1997). In 2001 approximately 3269 people were living in Baixa Chiado - way under the average comparatively to the rest of the city. These numbers reveal that the historic center of Lisbon has public, economic and mercantile potential, but not residential (Mateus et al., 2005). To avoid the tendency of desertification it is necessary to perform quality urbanism in order to "improve their urbanity - that is, their ability to be supportive of social relationships and exchanges without saturating or congesting their functional or social use" (Guerra, 1999). However, there has been an increased interest on the revaluation of historic centers. The new habitants begin to constitute a "standard-profile": young people up to 35 years old, with high academic degrees and yields, and belonging to small families (Pereira, 2011). Given the discrepancy between old and new inhabitants, it is beneficial to design with different purposes. Older citizens, whose economic and social situations are unstable and precarious, can be included in the production stage of the product. This might improve the housing and social situations, which can counter the demographic and social trends in Baixa Pombalina.

Lisbon's reconstruction on the XVIII century still has repercussions on the imaginary of today's inhabitants, where affective and emotional values are "deposits of the history of the community" (Salgueiro, 2004). For intervention projects in spaces with these values and characteristics, the dichotomy between physical and immaterial heritage is relevant. It is relevant to physically adapt the space to new users and their new lifestyles. However, it is important to preserve the physical and immaterial values of the building. Thus, some construction techniques from the pombaline era can be selected and adapted in order to improve the contemporary living space.

The intervention in buildings and their adaptation to the society's new uses and demands can help to improve the values from the past, avoiding their museification. Intervening in buildings can even trigger the touristic potential (Moura, Pinto and Guerra, 2008). As they are areas with strong historic roots they hold a great potential for tourism as they refer to past eras with a great historical value. The history which seeks to preserve the past and indicate the future is related to memory. The collective memory transmits a feeling of belongingness and sharing to the individuals allowing them to integrate into the society and it can also be a crucial element to the history (Goff, 1990). To preserve a space it is necessary to keep present some elements that recall past events in order to avoid the oblivion (Pereira, 2011).

With the urbanistic rules applied after the 1755 earthquake, the type of construction used became a representative element of the pombaline period. The pombaline architecture is characterised by buildings of up to three floors, the structural wood system (known as the "pombaline cage") in which masonry walls bind, and usage of wooden partitions to inner partition that does not cause weight overload (Cabrita, Aguiar and Appleton, 1992).

The pombaline cage can be characterised as "a wooden structure that because of its elasticity adapts to the movement of the soil shaken by an earthquake resisting upright and detachment of the masonry that can (or not) fall, without the entire building to collapse" (França, 1989).

Since Lisbon's downtown was rebuilt on large wooden stakes, it was necessary to find a lightweight yet resistant constructive solution. The use of the wood on the pombaline cage made it thin, lightweight, elastic, easy to assemble, and offered a good resistance to the soil movements (Segurado, n.d.). Just like what happened with the pombaline cage, the weight limit was a restriction to this project. As such, the wood and cardboard allowed a lightweight and functional construction. Through common and economically viable materials, a new possible solution to adapt the pombaline living space to new living realities emerges.

Even though the inner partitions of pombaline buildings no longer fit the new user's needs, they are an inherent characteristic and must be taken into consideration. It is therefore suggested a communication between rooms using the pombaline cage as a connecting element. If the walls can be perceived as space and communication barriers, the pombaline cage for its characteristics can break this notion of enclosure. Through the revelation of the cage structure, the spaces which were limited and confined, now become interrelated. By including in the contemporary living space a key element from another era which is able to solve some problems of the new inhabitants, the present time becomes a stratum from several generations.

Sustainability (environmental, social and economic):

As the concept of “sustainability” is normally used to refer to the capacity of a generation to solve their needs without compromising the future generations (Lewis *et al.*, 2001), it is necessary to act upon different areas. For this purpose, low impact and economically viable materials were chosen, which allowed the involvement of local citizens in the production process.

To assure the environmental sustainability, the selection of materials can be crucial. To make a project more efficient it is preferable to choose a small number of materials in large quantities, over a large number of materials in small quantities (Lewis *et al.*, 2001). For this project only two materials were selected – cardboard and wood. If at the pombaline era the use of wood was due to the need of an economic and functional construction, there are currently more implications. Today, there is greater concern to balance the environmental impact with functional requirements. However, the goal is still the same: it is necessary meet the user’s needs. Thus it can be said that the techniques and resources used reflect the society’s requirements and concerns.

In this project it was decided not to use wooden species used in the pombaline architecture, since nowadays their expression in Portugal is reduced. The cluster pine was the species selected as it is abundant in Portugal and whose properties make it possible to adapt to environments where humidity levels are always high. From the different types of cardboard, the honeycomb cardboard was chosen because it has high resistance to crushing and has high flexural strength (Barboutis and Vassiliou, 2004). The physical characteristics of honeycomb cardboard made it possible to design modules aiming to interact with the user. Since the weight is a limit on the pombaline constructions, the cardboard can be characterised by a suitable ratio between its weight and resistance to external forces. This material can also be characterised for an abundant availability and low cost, which make it economically accessible to a larger group of users.

The term social sustainability refers to a condition of improvement of life on the communities but also the process that is necessary so that the communities can achieve that condition (McKenzie, 2004). Since citizens’ qualifications are the basis of the development of society, it was incited to hand labour to local carpentries. Given the economic recession in Portugal, small carpentries tend to close. Since these workers' age and educational levels can make it difficult to find new jobs their social and economic situations become unstable. In order to improve and boost the economic and social local situation, the wooden structure was designed so it could be

produced in local carpentries. Local labour is therefore dignified and it is made possible to reintegrate the workers in the society.

Economic sustainability can be defined as the implementation of already existing strategies in order to achieve a long-term balance. It is necessary to manage the resources and costs efficiently and improve the economic models, especially through the creation of an economic and labour structure located and distributed locally (Vezzoli *et al.*, 2004). The economic and social sustainability are correlated, and as for the creation of a local initiative it is beneficial to assign positions to local citizens since they have the knowledge of techniques and/or situations.

The wooden structure was designed to make the production process easier and therefore can be produced by a larger group of local workers. Since this project aims to be produced locally and by a larger group of workers, it is necessary for it to adapt to the tools available. To this end, some components of the wooden structure were designed accordingly to the available tools and technology. This decision was considered in order to ensure that carpentries and workshops do not need to buy certain tools to produce the structure. As to the cardboard module, it can be cut by cutter or blade. Both options allow drilling the patterns regardless of its depths. Using local and industrial production simultaneously, this project intends to demonstrate that it is possible that both complement and benefit each other. With the local production, the project acquires a handmade and authentic character since it is produced with local citizens. The module, because of cardboard's physical characteristics, has to be produced at factories with more specific tools. This way, two very different types of production represent the combination of techniques from the past with technologies from the present. In a time where there is a tendency to globalise products in order to adapt to a larger group of users, is necessary to value and give priority to the local systems. By creating a system that uses low impact materials and local labour, the project intends to respect the diversity and cultural values, while it is economically viable and environmentally sustainable.

Analysis

The research for conceptual referents focused on four different areas whose characteristics influenced the final result: origami, pombaline tiles, special repercussions and pombaline carpentry. With the analysis of referents it is possible to combine several and different projective attitudes, particularly adapting traditional values to a new context.

As cardboard is one of the main materials of the project, several projects influenced by the origami technique were analysed. Characterised by a construction through plans, this referent joins shape and movement.

This characteristic influenced the project to adapt an attitude of interaction with the user. Thus, the project adapts and adjusts to the user's requirements instead of being the user to adapt to the project. Given the user's needs and requirements, these characteristics resulted in a project that allows the user to control the visibility and perception of space.

Tiles are used with identical purposes regardless of the field of application: it is intended to cover areas. In order to enrich the tradition with new approaches, a way to transform the pattern's two-dimensionality into the module's three-dimensionality was looking into. Since the goal of the project is to create a multigenerational living space, an element that refers to the pombaline era was created. This project opted for a language that combines the contemporary users' trends and needs with the characteristics of tiles. Thus, even though the tile art is not directly used, it is possible to enhance its values.

Since leisure and working space are beginning to merge, it is necessary to consider the new ways of work. A relevant concept for the analysis of special repercussions is the "citizen office", which is based on the creation of products that do not interfere with the space's structure but are able to change its environment. This way "*the workers decide autonomously which rhythm and which form is right for their respective activity at which location*" (Vinnitskaya, 2011). Since information is available anywhere and anytime, it is no longer possible to clearly distinguish the working and non-working hours. This has repercussions on worker's lives, since work is no longer limited to a specific location and time. As such communication can be done from any location including home (Vitra, n.d.). While the citizen office allows visual and sound privacy through fixed structures arranged accordingly on the space, this project was designed in a more flexible way. This project was conceived to be able to adapt to the user and surrounding space. So the user has the capacity to define areas with different levels of visibility and privacy, without changing the building's structure.

To enhance the values of the pombaline living space, some techniques of pombaline carpentry were selected. This conceptual referent made it possible to reduce the production's difficulty level of the wooden structure. Since it is not a product that required detailed and fine work, it is possible to employ a large number of workers. Due to technological advancements, carpentry techniques and shops are no longer required. Using old techniques, it is intended that these may be transmitted to future generations and so remain. Although these techniques had been used in the XVIII century, they are still valid and able to solve current problems. This attitude intends to combine values from the past and present in order to solve future problems. To make the assembly of the structure and modules easier, it was necessary to analyse wood paneled doors. These types of doors are

characterised by different divisions which related to the structure because it had to be designed with individual partitions for the modules. Since doors mean the partition of different spaces, this project sought for a new interpretation.

Application

As a case study, a building with a typically pombaline typology was chosen – two habitations per floor with stairs in the middle – still preserves its original structure. Because the intervention was still in an initial phase, it was possible to observe that the front walls had no materials covering it. Although the walls are solid elements, when withdrawing the masonry that was covering the wooden cage it enabled new ways of perceiving the space. Since none of the structural elements were removed, the exiguous partition remains - however some rooms are now interconnecting. By leaving the pombaline cage bare, this project assumed a non-invasive attitude towards pombaline architecture. Instead of removing the front walls to achieve bigger rooms, the wooden skeleton was considered as a mean to achieve a closer connection between spaces.

The pattern used for the module resulted from a process where the goal was the adaptation and application of pombaline tiles patterns in cardboard. For the creation of the pattern several pombaline tiles were selected whose patterns could be beneficial for this project. During the designing stage we tried to combine interactive features with the physical limits of the cardboard while the tile patterns remained. The shape of the module was designed considering the material limits but also the technology available, whether it is cutter or blade. This option made it possible to expand the group of factories or workshops able to participate in the production of the module.

During the analysis of doors and windows it is concluded that regardless of the material in question, there are structural and non-structural elements. The systems analysed show structural elements required for a proper function and support, whilst other elements were used to border the space and define the shape. As the systems presented, the wooden structure of this project consists of structural and non-structural elements. The sidelines and top and bottom rails play a structural role, as they give the structure a bigger cohesion and stability. All the other elements, such as the horizontal and vertical muntins, are meant to support and organise the modules.

To simplify the production process of the structure and for it to be possible to be produced by a larger group of local workers, the mortise and tenon joint was selected. Adding to its technical simplicity, this joint offers good physical resistance to the forces to which the structure may be

subjected. Two options of production were created for each of the elements of the structure - using cutting disc or cnc milling machine. To minimise the difficulty of creating a mortise with precise corners, the possibility of drilling holes in these corners was provided. This way the production process is simplified while it exalts little of the structure.

Since the pombaline cage's dimensions can change, it was necessary to find a fastening system capable to adapt to this feature. From the existent solutions analysed, the rope proved to be an element capable of adapting to the structural and projective needs. As it happened during the designing stage of the structure, the fastening system was considered for an easy assembly and intuitive interaction. It was mandatory throughout the project to use only wood and cardboard, using only metal screws to secure the fastening system to the masonry wall. This decision was considered because it was intended to enhance common and economically viable materials. By using only wood, this project encourages the use and adaptation of pombaline carpentry techniques to new contexts.

Conclusion

Lisbon has already been recognised as an important European centre in the past and for it to still be a historic centre of reference, today's problems weaken its position and the suburbs are in constant development which contribute to a weaker capital city. In a scenario where the causes are also effects, problems in the buildings can be observed. Because they result from the urbanistic plan established after the 1755 earthquake, they are no longer adapted to contemporary society. However that fact does not invalidate that they cannot be adapted. This project tried to enhance the capacities and values of pombaline buildings with the aim to adapt it to new lifestyles. By highlighting the features and possibilities of old buildings, the project is expected to attract new residents and mark a new stage of development. The introduction of local labour in the production process contributes economically and socially to the city. This factor allows the improvement of the worker's social situations as well as the local economic situation. On a side more related to historic values, this project tried to give a bigger appreciation of carpentry techniques and its adaptation to new projects. Thus there could be new ways to adapt these techniques avoiding its oblivion.

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