Interventions to Built Heritage

The expression of genius loci in architecture implies the reflection of memory and symbols, which serve to root the society that can be traced on the cultural heritage and the language of architecture. This property of architecture is essential for human beings to associate themselves with the place since it contributes to culture and cultural sustainability. As stated by Abusafieh, there is a significant link between culture and sustainability, and the rules, values, beliefs, and norms of the culture transfer the sustainability of vitality of the communities.

1. Introduction

If people see the reflection of themselves in the environment they inhabit, they feel more comfortable in these environments. However, the interventions implemented with respect to cultural heritage due to the need for new spaces in developed cities can establish unavoidable transformations of heritage buildings in the city centres. Furthermore, they can negatively affect the requirement of the cultural heritage buildings to remain recognisable as historical marks, which might affect the cultural sustainability of these artefacts. Moreover, they can impact the language of architecture, which might give rise to inadmissible results and disrupt the existing architectural language permanently. Such a significant alteration or even demolition of cultural heritage is not a sustainable way of urban development in opposition to a way for cultural heritage to continue to resonate in future developments [1]. Therefore, it is essential to identify the impact of these changes on the perceptions of people.

In this regard, this research tries to analyse the correlation between the changes in the façades of cultural heritage artefacts with the perception of the people before and after the adaptive reuse applications, which involve contemporary interventions, and the impact of adaptive reuse on the volume of the façades. The analysis for identifying all these different aspects can be achieved by various methods which are used in architectural research. One of the most common methods which has been used in recent years is analysis by eye-tracking technology [2][3]. With this technology, it is possible to identify the parts of the façades which catch the attention of observers the most. However, identifying the reasoning behind this selection cannot be achieved by eye-tracking glasses. Therefore, more detailed research is required to determine and understand the perception process. In the course of perception, especially if the observer does not have enough knowledge or has uncertain evidence, it is likely that the observer will use prior knowledge to achieve an optimal solution [4]. Therefore, it would be beneficial to use the other possible approaches such as fractal analysis of the façades or pattern approach and apply them as the sources of prior knowledge for analysing, classifying, and predicting responses [5][6].

2. The Function of Façades in Architecture

According to the Cambridge Dictionary, a façade is the front of a building [7]. However, structures can contain different façades, which are not necessarily the front but also the side or the back of the building. Most of the time, people have their first connection with the design by the front façade, and as Pallasmaa describes, the door handle is the first handshake that people share with a building [8]. Especially when the front façade of the building is analysed, it is possible to state that it is the display of a design that provides information to observers or users in a similar way as one visual representation of an object with a visually complex design gives valuable information about the more visually complex object, as Dotson states [9]. Furthermore, according to various studies, the changes that appear on the façades can affect the preference, complexity, and impressiveness of the buildings for observers. They can change the familiarity and the liking of the structures [10][11]. As Mao et al. state, the façades of heritage buildings can also establish an impact on the behaviour of people and human activities in public spaces [12]. Therefore, even though the façades might seem as if they are one of the physical elements of the structures, they do have an important role both in the environment and in the perception of the structures for people.

It could be argued that the same façade might look differently from different observation points while changing proportions, making some parts invisible, etc. In this case, two aspects of façades as building faces should be mentioned:

- If the description of the façade is focused on the architectural pattern concept (Salingaros) instead of a detailed description of architectural form, then it opens a way to look for some general, fundamental features of architectural composition which are not sensitive to small changes in form because of changing observation points.

- Based on the logical analogy with the human face recognition process, it could be assumed that at least known façades, e.g., cultural heritage objects that are perceived in situ and potentially through various media channels, could be recognised from various positions of observation.

In this regard, the message or the information that the front façade provides with the language it uses is essential because it establishes the initial impression that people need to understand or perceive the whole structure.

According to Gehl, there are two types of façades. The first type is the active façade which gives an adequate impression to observers or users since it contains the material whereby people can communicate with the language of the architecture [13]. The other one is the passive façade which does not cause any feelings or emotions. As Ellard states, the buildings which have passive façades are structures where people feel as if they are on the wrong side of the façade [14]. However, it might not just be a matter of being active or passive, but it might also be about the reflection it creates on people's perceptions. In that regard, it is essential to understand the languages that architecture uses for communicating with people on buildings' façades.

The urbanist and controversial theorist Salingaros states that architecture is established by two distinct, complementary languages: a pattern language and a form language [15]. The pattern language involves the interaction of human beings with their environment, and it is appropriate for local customs, society, and the climate where the building is. It is a set of repeatedly tried and true solutions inherited from the previous generations, which developed optimisations that create a sense of well-being for the people. However, Alexander was the first to propose the definition of a pattern language for architecture [16]. As he points out, while many, if not most, of the patterns in pattern language, are universal, there are an infinite number of existing individual patterns that can be included. According to him, each pattern language tends to reflect a different mode of life or customs or behaviours. Additionally, it is appropriate to specific climates, geographies, cultures, and traditions. Therefore, the pattern language of a building establishes the interpretation of the architecture and how architecture was formed in different regions by the effects of the local architecture and experience. Furthermore, it reflects the culture.

On the other hand, form language is defined by the elements of a building that establish the whole. The elements which determine the form are the floors, the walls, the windows, the doors, the ceilings, the partitions, and all the architectural components which together represent the style. In the accumulation of all the different elements in the form language, the building expresses its architectural style. Furthermore, every traditional architecture has its own form language as well. It has been established from various influences of daily life, traditions, and practical concerns, which act together to define the structures that take the most natural visual expressions of a specific culture. Architecture becomes an accumulation of the circumstances of culture and a signifier of the collective when establishing a system of relations between the differentiating elements. Therefore, the form language which was used in architecture is also affected and influenced by the culture, like the pattern language. Pattern language makes buildings more readable and understandable since it is possible to have a universal form language, but it is not that easy to have a pattern language valid in every culture since they have their own characteristics related to the region. When architecture utilises both of these languages in its design, it establishes a valid architecture, and furthermore, primarily with the effect of the pattern language, it establishes an environment for the people where they feel familiar with their surroundings. According to Alexander, it is possible to improve the patterns by testing them against experience by recognising how the patterns make people feel regarding the existence of the patterns in their surroundings [16]. However, in his research, Alexander did not describe patterns and how to test them quantitatively.

The quantitative approach regarding the description of the patterns has been designed by Salingaros. In this book called *A Theory of Architecture*, he explains the scientific basis of creating architectural forms, hierarchical cooperation, modularity, and the number of design choices in the formation of architecture [15]. As he states, architecture is an expression and, at the same time, the application of geometrical order; therefore, if the order can be understood, it will give the knowledge to understand the language of architecture and what it is trying to explain to users/observers as well. When the information quality which passes to the user/observer is rich, it is more likely that there will be an emotional

bond established. However, the method Salingaros established has a high degree of interpretation regarding the selection of symmetries and asymmetries or which elements of the façade should be analysed.

Furthermore, the selection of the elements of the patterns for the identification of the symmetries is indefinite as well. When the elements of the patterns are identified by different people, their interpretations might be dissimilar. Therefore, it is possible to state that the same façade might give different results depending on the perception or the evaluation of the person who identifies the elements. As a result, his model establishes a level of subjectivity to some extent. In his approach, he mainly focuses on the structural order and the scaling rules, which are independent of architectural styles or architectural shapes as well.

According to Salingaros, there is an ideal scaling factor, which is approximately equal to the logarithmic constant 2.7, and it leads to the scaling coherence of the objects [15]. His proposal of the scaling rule derives from Alexander's scaling rule; however, he adds another dimension to it, which is the designation of the ideal number for the scale. On the one hand, his approach helps the architects or the people who want to understand what architecture is communicating by establishing a set of rules and order in the process. On the other hand, it does not consider other aspects of the perception of architecture, such as the colour, material, and texture. All these aspects have an impact on perception as well. Therefore, the method that should be followed is still ambiguous. However, according to Hillier, the meaning reflected in the façades of the buildings by the language that architecture is adopting can be identified [17].

As Hillier states, building façades are physical shapes that are capable of being understood as communicators of information. However, to understand the shapes, the shapes need to be identified and recognised by the observer [9]. According to him, the recognition of the shape of an object occurs in two stages. The first stage of recognition is the syntactic stage, and the second stage of recognition is the semantic stage. In the first stage, people tend to determine the object by the identification of the elements that they perceive in its configuration; however, in the second stage, people attach meaning to the object or they interpret what they see. In that regard, it might not be possible to measure the attached meanings or interpretations; however, the syntactic stage of recognition can be measured by analyzing the configuration as the symmetry index.

Symmetry is a concept acquired from mathematics, specifically from the group theory by Miller and Carter [18][19]. However, it is widely used in other disciplines, such as physics, chemistry, biology, psychology, art, and architecture. According to the APA Dictionary of Psychology, symmetry is "the mirrorlike correspondence of parts on opposite sides of a centre, providing balance and harmony in the proportions of objects, and it is considered an aesthetically pleasing quality" [20]. Furthermore, as Hodgson states, symmetry can be a persisting feature for the perception of the visual world since it provides valuable means which can be encoded for the purpose of efficient recognition of the objects [21]. Therefore, symmetry is a distinctive peculiarity for the perception of objects, and furthermore, it is essential for analysing and understanding nature, art, and architecture.

According to Mitra and Pauly, symmetry and structural regularity in architectural design are not coincidental [22]. Most of the time, it is the consequence of economical, manufactural, functional, or aesthetic considerations that make the structure universally appealing. Therefore, symmetry can affect the visual perception of the architecture in the environment by its peculiarity of reflecting the nature and natural orders that can influence the recognition of the objects and the sense of beauty.

The symmetry of architectural objects can be measured by the symmetry index which is based on calculations of node centralities of the convex graph of a building façade based on Space Syntax approach (**Figure 1**), which Hillier has suggested. According to him, the symmetry index is a considerable ratio in which low and high values can demonstrate similarities and differences in how the parts relate to the whole [23]. Therefore, by measuring the symmetry indexes of the buildings before and after the cultural heritage intervention and comparing them to the human perception of the selected façades, it might be possible to identify how the perception of the building has changed and if it could be reflected by the offered space syntax indexes. In that regard, two experiments are conducted in this research.
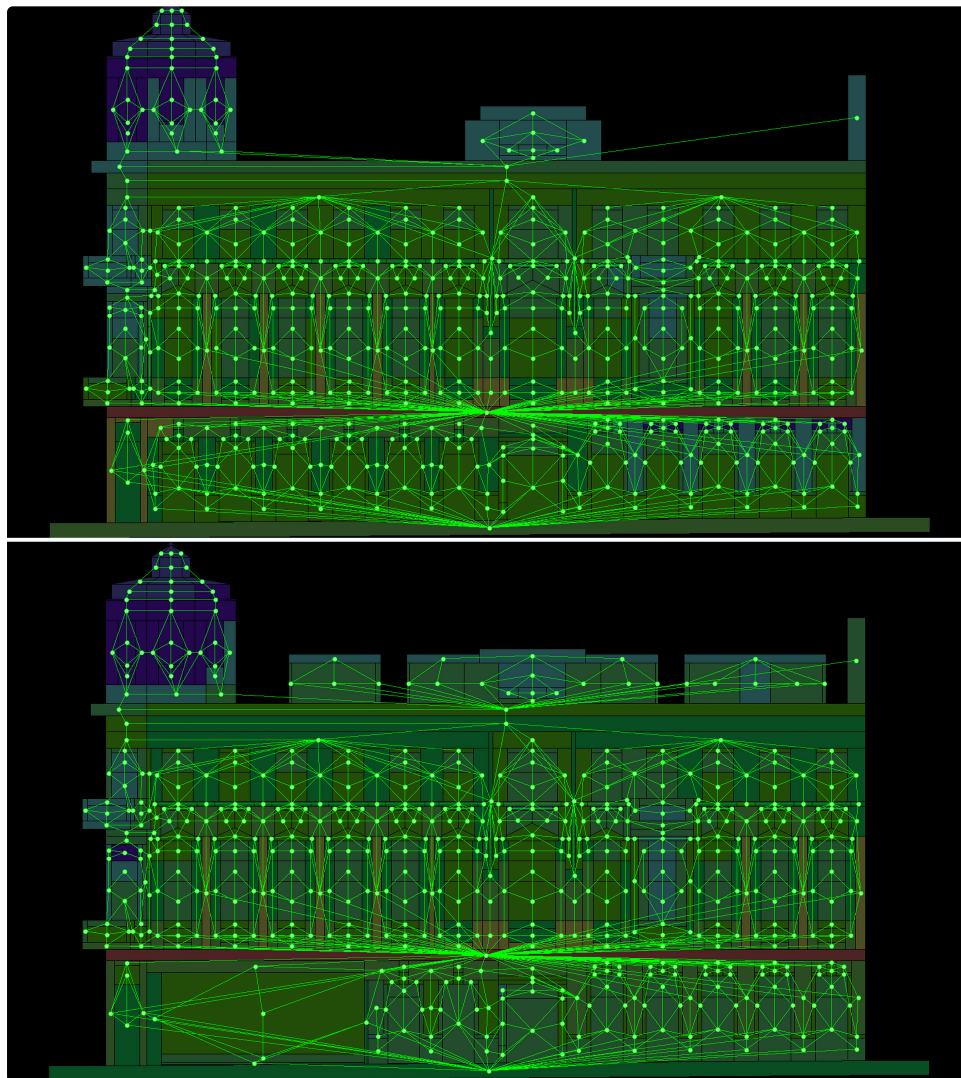
Figure 1. Convex graph of the facades of the same building before and after renovation. Each element of the façade becomes a node of the graph; if two nodes have common boundary then they are connected by common edge of the graph.

In the last decades, specifically in recent years, interventions regarding cultural heritage buildings in the city centre started to be seen more in Kaunas, Lithuania. One of the reasons for this can be explained by the nomination for Inscription on the UNESCO World Heritage List. In the course of the preparation of the protection and management plans for the city centre, the demolition of existing buildings or construction of new structures in this area started to be controlled and regulated by different institutions [24]. Furthermore, additions and interventions to the heritage buildings are administered and authorised as long as they are coordinated with the relevant governmental organisations responsible for cultural heritage protection. Therefore, with the requirement for more space in this valuable area of the city, heritage revitalisation and all the new additions to these buildings started to be seen more often [25]. Moreover, adaptive reuse projects in the city accelerated and monitoring façade changes became more essential [26][27]. As a result, the structures which were used in this research were selected from the cultural heritage buildings from various eras in the city centre of Kaunas, which had different interventions regarding their façades.

3. Adaptive Reuse and Built Heritage

Over the centuries, the concept and treatment of heritage and approaches to the conservation of it have changed as values have changed as well. As Vecco states, the monument is no longer considered alone but is now taken in its context in heritage studies [28]. Therefore, the adoption of an integrated approach towards heritage, its evaluation and its preservation does not merely affect the structure itself but also has an impact on the environment. Adaptive reuse is a commonly used method that provides a new function to an existing structure; therefore, the structure adjusts to the current needs. Even though most of the time, the reason for this action is due to the requirements of the market and financial gain, in contemporary conditions, adaptive reuse is implemented with respect to the cultural heritage buildings for their protection. According to Haldrup and Bærenholdt, heritage has traditionally been bound with the conservation of the imagined past [29]. However, heritage is not only about the past, but it also has a reflection in the present. By the method

of adaptive reuse, it is possible to keep the progression of the artefacts and, at the same time, the environment, which can help people to associate with them better and more easily.

In the book called *Uses of Heritage*, Smith states that there is no such thing as 'heritage', and heritage has to be experienced for it to be heritage [30]. Therefore, heritage must be a part of daily life, and it should contribute to the genius loci of the environment. According to Vecco, genius loci is the intangible quality of a material place, which can be perceived both physically and spiritually through visible tangible and perceivable non-material features [31]. Therefore, while adaptive reuse can provide the continuity of the material characteristics of the heritage, its outcome, which is cultural sustainability, can contribute to its non-material aspects. It is crucial to indicate that one of the leading characteristics of heritage is that it is a carrier rather than a solid concept. It only endures when used on a daily basis and perceived by society itself. In that regard, adaptive reuse provides both aspects for the cultural heritage buildings to be experienced.

However, adaptive reuse has another constraint which is its collaboration with the sustainable development of the environment. Most of the time, the meaning of sustainability is merely associated with the sustainability of nature, recycling, and self-sufficiency; however, sustainability has many different aspects which have a direct impact on the built environment as well. As stated by various authors, the main assets of sustainable development are society, the environment, and the economy. However, according to Hawkes, sustainable development contains a fourth pillar, which is culture [32]. The main concern of sustainability and sustainable development is the protection and continuity of resources that are irreplaceable. In that regard, it is possible to state that cultural heritage is irreplaceable when it vanishes as well. It is crucial to maintain the continuity of cultural heritage to maintain the culture and, at the same time, maintain the built environment. According to Hristova, a city remembers through its buildings; thus, the preservation of the old urban fabric is analogous to the preservation of memories in the human mind [33]. Therefore, a city is a collective memory of its people, and it is a way of remembering which is associated with objects and places. Associations that people obtain through the built environment help establish potential stimuli for people to remember, which is one of the crucial impacts of architecture on people. Therefore, when the built environment carries its own characteristics, it stays recognisable to the people, which supports sustainability. Sustainability derives from the ability of continuum. Therefore, adaptive reuse of buildings also has the same impact on the environment since it helps the structures to continue their lives and helps to keep the environment the way it is. However, some of the interventions with respect to the structures can change the perception of the building as well as the proportion and the symmetry, which has an impact on the intelligibility of the structure. As Rabun and Kelso state, a building to which the adaptive reuse will be applied with a change of use must be evaluated from both the exterior and the interior, and the assessment of it must be done in a comprehensive manner [34]. Furthermore, it is essential to pursue the acceptance of the artefact in its environment. Therefore, modern additions, which might affect the recognition of the original elements, need to be omitted. As a result, there are various factors that have a direct and indirect effect on the process of adaptive reuse and the built environment and its perception.

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