

Research Article:

The effect of the additional architectural intervention on the heritage urban scene: Sulaimani city as a case study

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Abstract

Since visual regularity is concerned with the clarity or ease of perceiving parts and organizing them in a coherent pattern, the most essential quality that can be accomplished through harmony is the unity of additive elements in building facades, and relate to their context by creating visual continuity between adjacent buildings. As the scope of interventions within the built environment may vary in many levels (from preservation to reconstruction), at many scales (from individual building elements to entire context), and are characterized by one or more activities; ranging from maintenance to addition. It causes a disorder in the characteristics of the whole of and the parts of the heritage buildings and city's townscape; style, patterns, details, shape, building materials, texture, height (sky line), human scale, and colors. That affecting the relationships which connect its elements and buildings with each other within the urban scene such as balance, continuity, harmony, enclosure or integration. As a result, the research problem is about identifying the contradictions between traditional context and contemporary additional interventions in Sulaimani city's center. Causing the lack of coherence when adding new additions. Thus, the research goal is to clarify the appropriate design mechanisms for solving visual deformation problems to put forward cohesion indicators in the design of additions that have a significant influence on improving the mental and visual image of the urban environment. Thus, the general aim of this study is to develop an evaluation method that can be used to determine the integration in the architectural intervention of new additions in relation to the heritage urban scene according to the principles of conservation and the study also aims to provide clear and consistent guidance for professionals who are responsible for the resolving of ethical priorities and values concerned with conservation by proposing a methodology of evaluation.

1. Introduction

An urban scene is considered as a tangible, visible component of the city, consisting of many components and features that physically interact with one another, influencing the recipient's perceptions and feelings based on their memories and sense of belonging to the urban environment [1]. As each architectural legacy is unique and has a specific personality in connection to its historical context, authenticity is an essential aspect to preserve. Because it determines the qualities of the culture. An awareness of authenticity is required for the design of new interventions as a part of heritage conservation process [2]. "Authenticity can be

jeopardized by the destruction of historical strata, the modern replacement of original elements (particularly if based on conjecture) and the addition of new elements. A heritage resource that has passed the test of authenticity maintains its original integrity, as created or as it has evolved through its historical time line" [3]. Currently, visual distortion and chaos have appeared in local architecture and the historical context as a whole, resulting from a disorder in the relationships that link its elements; the connections that connect the buildings with each other within the urban scene could indicate harmony, similarity, balance, or integration [4]. Although Sharp (1986) has emphasized the role of social

and economic factors in the transformation of the urban scene and the morphology of urban structures. It may also be described as the absence of any aesthetic qualities in any of the streets, sidewalks, or buildings that surround us. Nevertheless, it might be seen as a distortion of the image that Human perceives and is unsatisfied with [5]. Thus, the general aim of this study is to develop an evaluation method that can be used to determine the integration in the architectural intervention of new additions in relation to the heritage urban scene according to the principles of conservation. The study also aims to provide clear and consistent guidance for professionals who are responsible for the resolving of ethical priorities and values concerned with conservation by proposing a methodology of evaluation.

2. Literature Review on Architectural Intervention

Preserving the characteristics of the heritage building and being respectful to the existing fabric is critical in the design of new additions [6]. Interventions to heritage structures are one of the most significant concerns in architectural conservation [7]. As there is considerable debate regarding how to address new developments in historical context. Essentially, an appropriate intervention should work as part of the whole composition, rather than as a single project attached to the existing fabric. In order to arrange the urban environment and establish physical cohesiveness, considering skyline, directionality, enclosure, scale, size, texture, openings, and architectural style [8]. The architect and designer have to apply a method known as 'Contextualism,' which means recognizing a place's identity in order to build architecture that is more relevant to its location while without destroying the sense or character of place. Kenneth Frampton emphasizes the importance of architecture and design in condensing the artistic potential of a region while reinterpreting cultural influences from outside [2]. The building should also demonstrate an acute awareness of place and tectonics, and evoke the oneiric essence of the place, as well as the inevitable materiality of the building. As a specialized research, Byard's study emphasized that the old and new overlap in a way that allows for continuity and communication with one another, both morally and physically within new context. Byard discussed various features of intervention in the context of adding three types of additions, relying on meaning as the basis for his classification. These are; when the new work expands the meanings of the old one, derive new meanings from the old or appear with strength to transform the old meanings [9]. Moreover, in order to preserve coherence and balance relations in the built environment, Torres' research provides specific and thorough indications that could support in the process of creating a new intervention. By relying on the following elements: the original building or architectural context that relates to the human scale, the control of general volumes, mass, and proportions, avoiding competition between the intervention and the original building; and the use of compatible materials, colors, and textures [7]. Furthermore, design principles have a significant role in determining the physical arrangement of these elements in the

built environment. That is related to the physical or spatial relationships and at different levels, including what is related to a partial level of the building or the level of the whole context [10]. Brolin's study also emphasizes continuity relationships of physical blocks, chromatic continuity and continuity of openings through the use of a specific type of intervention that aims to create a harmonious contextual structure which achieves visual integration between buildings built at different times and styles, without contradicting it except in certain cases [11]. The study concentrated on a specific type of additions that relate to the physical dimensions of establishing a sympathetic relationship between the urban scene and neighboring structures in terms of height, similar materials and massing. This pattern can be created in a number of ways, including closely replicating the existing design motifs, rearranging essentially similar forms, creating new forms that have the same visual effect as the old, and abstracting the original forms in a way that affect their recognizability [11]. Before proposing a new intervention, heritage values in the existing environment should be carefully analyzed and recognized. Rather than proposing a form for the heritage building, a new addition should complement and help to restore the sense of proportion, style, and historical pattern [3]. As the human eye naturally groups and connects related elements to gather within a context. Meiss study identifies four indicators of homogeneity in intervention design that the architect bases on that derives from Gestalt theory laws: closeness, enclosure, repetition or similarity, and element orientation [12]. The guidelines request new structures to be "differentiated" and "compatible," rather than requiring them to have a contemporary design or to have a contrasting character. Either the new and the old can be harmonic or contrasting, but in order recognize the differences, the new addition needs to be separated apart from the existing [13]. "It's old doesn't mean It's good, and It's new doesn't mean It's bad, good can happen," Venturi stated in his investigation of the conflict between the old and the new [4]. Venturi emphasized the importance of interrelated contrasts in the urban environment, as well as diverse relations of juxtaposition and continuity between the different elements, to develop a sense of excitement and visual attraction between old and new [4]. While Chris Abel takes it the other way around, he says, "If you want to create something new, search for what is old," where "new conceptions do not emerge independently from the consequences of the past, new ideas emerge mainly to perceiving the new in the language of the old". Abel pointed out that architectural identities are "built," and that they are not just based on coherence or a common set of values; diversity is a feature of local architecture [14].

2.1 Research Problem is about identifying the contradictions between traditional context and contemporary additional interventions in Sulaimani city's center. Causing the lack of coherence.

2.2 Research Aim is to clarify the appropriate design mechanisms for solving visual deformation problems to put forward cohesion indicators in the design of interventions that

have a significant influence on improving the visual and mental image of the urban environment, the study in general aims to develop an evaluation method that can be used to determine the integration in the architectural intervention of new additions in relation to the heritage urban scene according to the principles of conservation

2.3 Research Hypothesis: Urban scene deformation may occur when additions disrupt the whole or partial characteristics of the urban scene. Which causing the lack of coherence of the urban scene

3. Research Methodology

3.1 Additional Intervention Concept

Additional interventions in the urban design demonstrate the relationship of the new with the origin and the process of its organization, as well as the possibility of investing traditional elements through architectural formation principles for the development of historical centers, based on the relationship between the parts on the one hand and the part and the whole on the other within the built environments [4]. Added volumes have the potential to generate new urban relationships as well as restore links that have changed, been reduced, or lost over time [15]. The difference between the past and the present helps and improves one another [16]. "The elements enter into the city like the introduction of foreign bodies into a living being, but he exaggerates the disconnection between the old and the new and between context and meaning," Colkhaon says, referring to how to improve the city's character. Its distortion is dictated by the patterns of the new structures and their interaction with their urban context, which employ the contrast, symmetry, and connectivity formulas. As a result, recognizing historical significance is critical to preserving the city's identity and cultural continuity [17].

3.2 The Scope of Interventions

In order to define the scope of this study, we must first specify the range of interventions. It is based on national and international guidelines and standards applicable to historic buildings of different sizes, materials, occupancy, and construction types. However, when it comes to historic structures, consideration must be taken to ensure that the degree of intervention is appropriate and fits the conservation criteria relevant to the new additions [18]. Below is a classification of the interventions' scope, ranging from small-scale to large-scale:

1. **Protection and Maintenance:** It requires minimum degree of intervention and preparation for subsequent work. For example, protection might take the form of installing fencing, protective plywood, alarm systems, and other temporary measures, or it can involve cleaning roof gutter systems on a regular basis. It can also involve limited paint removal, caulking, removal of historic material, and reapplication of protective coating.
2. **Repairing:** Adapting a structure to current conditions requires more than just preserving its physical characteristics. Repairing historic materials like masonry, wood, and architectural metals involves minimal intervention, such as patching, piecing-in,

splicing, consolidating, or fortifying according to preservation procedures. Repairing involves replacing severely damaged or missing features with a compatible alternative

3. **material,** such as brackets, dentils, staircases, plaster, or slate or tile roofs.
4. **Replacement of Existing Features:** When deterioration or damage of a historic building's materials cannot be repaired, it may be necessary to replace them with new materials. If the original form and details are still visible, and the physical evidence can re-establish the feature as an important part of the restoration effort, then replacement is permitted.
5. **Replacement of Missing Features:** If an interior or exterior feature is missing, it no longer defines the building's historic character. However, it can be accurately retrieved in form and detailing by carefully documenting its historical appearance. This form of intervention is usually used to replace the missing characteristics with a new design that is compatible with the existing character-defining trait.
6. **Alterations:** Historic buildings often require external and interior changes to ensure their continuing usage. These modifications do not fundamentally alter or remove character-defining spaces, materials, features, or finishes. Alterations may involve cutting new doors or windows on secondary elevations, adding a story, installing a whole new mechanical system, or constructing an atrium or light well. Alteration may also involve the selective removal of features, walls, floors, or a reconfiguration of internal spaces.
7. **Completion of the missing parts:** Conservation process focuses on implementations for the first group of structures that comprise monumental architectural properties. The objective here is to complete the missing parts by using either traditional or contemporary building materials and techniques while maintaining to the authentic condition.
8. **New additions to historic buildings:** These interventions include additions that were not included in the original structure. If extra space is needed due to a functional change or an expansion in possible usage, new wings are linked to increase their size from one or more façades, either horizontally or vertically.
9. **Destruction of ruined historic buildings:** Despite currently illegal, this practice allows for the removal of existing ruins after its documentation. Because the majority of architectural property was already in ruins, such a massive intervention resulted in the destruction of numerous historic structures during the time it was permitted. If there were detailed records on the original state of the old structure, or if it was an important a structure, a comparable one is erected; in general, the approach represents a completely new construction [3].

3.3 Urban Scene

According to Cullen study, an urban scene is defined as the integrated and cohesive organization of elements represented

by the art of relations that come together to generate the city's specific personality as well as its coherent, aesthetic, and dramatic image of the city [19]. Therefore, there are two ways to analyze the urban scene: The physical (visible) components that include everything appears from the city, is perceived by the eye and interacts with human sensations. It stimulates a sense of unity, place, and experience through concepts like harmony, integration, sensual and visual organization [20]. Second, the non-physical (invisible) components: such as the structure, meaning, and identity. While the image of the city emerges from the process of organizing these two parts that affect the relationships between the recipient and the building or scene as a whole [1]. The research focuses on the physical components of the urban scene, which is separated into two levels to create visual clarity, which is illustrated in Diagram (1), as follows:

1. First, the whole level, which is defined by Cullen as "organizing the edges of the shapes and creating a sense of the unified external form. As well, the consolidation of the buildings and not leaving voids between the masses and the volumetric dealing with the surrounding, in order to define the urban scale of the street. In addition to organizing the sky line, the proportional relationships between the height, the building and the width of the street in a way that contributes to achieve the spatial enclosure".
2. Second, the partial level, which is meant by the element's relationship of the part to another part within a single unit and its visual relationship with the parts of surrounding shapes [19].

3.4 Physical Characteristics of Urban Scene

The integrated urban scene is defined by a number of characteristics which act as measuring indicators and can be applied in the research, including the following points that are illustrated in Diagram (2):

1. Belonging: is not accomplished immediately, but rather through a series of steps, including sensation, identification (the link of the recipient's identity with the place), and perception. It begins with a feeling of the direction of external stimuli via the human senses, based on previous experience and association with the memory of the place, which varies from person to person. Belonging is enhanced by a variety of factors, including social, ethnic, cultural, or religious factors, as well as the presence of meanings, symbols that help an individual's sense of belonging to a place [20].
2. Enclosure: It directly affects the recipient's sense of belonging to their surroundings. "A well-defined space achieves visual unity and gives him his identity through the organization of the sky line, which gives a strong and sufficient effect to define the shape of the urban space,". For example, streets delimited by buildings provide a sense of enclosure, yet the diversity of building lines and skylines creates various types of enclosure in the street" [21]. According to Spreiregen's study, there is a proportional relationship between the size of the building and the space of vision required to achieve enclosure and visual absorption.
3. Continuity: It refers to achieving harmony and creating a

kind of connection between the old and new, or between the building and the recipient. It is considered as one of the most prominent visual treatments in the city, forming a single integrated unit within the context, in terms of continuity in color, texture, building materials, styles, or details, as well as continuity of the city's skyline and avoiding sharp contradictions between the components of the old and new urban fabric [22].

4. Visual enrichment: It is a feature that has an abundance and increase of visual characteristics and plurality in the elements of urban facades and can be achieved through the mechanisms of complexity, difference, diversity and contradiction. Visual enrichment is one of the basic conditions of facades in order to draw the recipient's attention to the entire urban scene as a whole [22].

5. Serial visions: It is a concept that involves manipulating the elements of the town, path or urban space to generate a specific emotion while moving through it. According to Cullen's study, "The human mind interacts with various elements to achieve sequential drama and scene by means of existing visual stimuli." [19]. "The sequence of vision is a drama that comes to life when the observed person walks down the street and realizes the contradiction and architectural details in it (for example the street and the square such as light and darkness)" [19].

3.5 Considerations for Successful Design Interventions

Understanding the historical fabric and its context, and considering the implications of interventions or new additions, require a high-quality, sensitive design, visual clarity and carefully selected materials. Most important of all is the relationship between old and new in terms of style and mass, and the consideration of detail, such as how junctions are designed. 'Good new design is a continuity of good past design. I don't see these things in compartments. We have always built with the materials and the techniques we have, with the services and with the memories we have; they change as history moves on, as do people's perceptions and ideas.' [23]. There are various approaches to creating successful new interventions in the historical context:

1. Proportion and hierarchy

The new design must take into consideration the surrounding size, hierarchy, and massing existing structures. Sometimes it is expected that additions should be smaller and subservient to the existing structure, however this is not always the case. The relationship between proportion and architectural form is not limited to subservience. The characteristics that contribute to an acceptable result may vary and even contradictory, depending on a hierarchy of scale and materials, whether the buildings are heavy or light, seem similar or differ [23].

2. Rhythm and juxtaposition

Accretions provide rhythm, detail, contrast, conflicts, and shape to the existing structure. They shaped our cities, towns, and villages into the diverse, characterful, and even disharmonious places they are today. They generate unique perspectives and juxtapositions, as well as light, shade, diversity, texture, and interest, while symbolizing layers of

history that tell a story, making them critical in establishing a sense of place and context [23].

3. Complementing or contrasting

The most effective structural alterations in historical buildings occur when contemporary designers take into account the original building's form and style, whether their new design is complementary, contrasting, or matching. A "successful" design may be made of a variety of elements, but massing and scale, circulation, materials, negative space, and geometry are some essential design factors to take into account [23].

4. Loose fit

Adopting loose fit principles is crucial for upgrading historic structures and offers significant benefits. Loose fit is a more difficult concept that is rarely seen nowadays, when everything is created to a precise brief and a practical final goal. Over-specification can lead to a lack of flexibility and designs that are not adaptable to future development [23].

5. Readability and honesty

A good new design with carefully selected materials should not minimize readability, but rather represent a refreshing attractive authenticity while avoiding unnecessary technical complications in structure or methods. Technical compatibility between new and old materials is required to prevent destruction or failure of the building's fabric and structure [23].

3.6 Deformation in Urban Scene

The concept of deformation, that is illustrated in Diagram 3, refers to the loss of natural proportions and harmony that characterizes a specific structure as a result of interventions that alter its original form. Disrupting its balance and moving away from its natural image due to its loss of aesthetic values and characteristics, such as the unity and harmony of parts with each other and with their surroundings, which creates a negative impression expressed by the recipient towards it [4]. Venturi (1987) argues that the deformation of a city's urban environment and streets comes from chaos in the relationships that connect its components, which might be balance, similarity, harmony, or integration. Three factors contribute to the distortion of the urban scene, as follows: disorder of the structure's elements and connections, overuse of materials and elements, and lack of laws and regulations are the three main causes. Although Arnheim's study indicates that the deformation of the urban scene results from the disconnection of the past, present, and future, it also highlights the significance of achieving harmony among the urban elements that are interconnected and form the composition of the entire scene in order to enhance harmony and create a good appearance [24]. Furthermore, Radhwan alludes to the negative consequences of adjacent contradicted architectural styles as well as the overuse of bright colors, materials, and shapes, all of which increase the distortion of visual perspective in urban structures [25]. The extracted variables are mentioned in table No.1 Due to Lomas: Balance and harmony Defined as the dynamic co-ordination of multiple "balancing acts" and as the relationship quality between two dialectically related

phenomena. While consistency discussed throughout not a primary keyword, but relates to the stability sought in the dynamic attainment of optimal balance. similarity or unifying principle) connecting the diverse works on balance and harmony. [26]

Regarding visual continuity: it is a goal of the visual sign system of a city, exemplified by Paris's consistent façade style, and is contrasted with Rupture in skyline and character.[27], Visual integration & Isolation, refers to a building becoming seamless with its context (form, material, skyline) Discussed in relation to achieving compatibility and avoiding isolation in a design, often concerning material, height, and scale.[28]

3.7 Limitations and Related Criteria of the Study

In terms of the previously indicated intervention scope, this study focuses on new exterior interventions in the historical context. The study's further limitations are determined by the following criteria, as exemplified in the case studies of Tables (2-3-4):

1. Environmental relations (Contextual relationships analysis): The fundamental physical characteristics of the surrounding structures, such as height and function, are taken into account. The criteria for analyzing a historic building after a new addition include the structure's position in the city, its perspective from major roadways, and its accessibility.
2. Building-lot relationships (Functional relationships analysis): Because the majority of the exterior extensions are built horizontally to the historic structure, whether connected or detached, they obstruct the building's relationship with its own lot. The number of buildings in the lot, building sequence, position of structures inside the lot's limits, orientation or precise location of buildings among each other, and utilization of open space are all examples of building-lot interactions.
3. Massive relations (physical analysis of the building's form): without focusing on the details, the primary components to a building's overall character are embodied in its defining physical elements. The form of the building, its height, proportions, type of structural system are all considered in the mass analysis.
4. Details of the façade and its elements (detail's relationships within the heritage building's character): The components, placement, form, proportions, divisions, units, type, material, surface, and ratio of solid and glazed surfaces are all analyzed. The character of a building is also defined by architectural details such as windows, shutters, bracket work, decoration, and porch columns.

4. The Practical Part of the Study

4.1 Case studies: Sulaimani City Center

Sulaimani city is one of the Kurdistan Region of Iraq's cities with distinct architectural features that have evolved as a result of historical, environmental, topographic, and climate factors. The Kurdish heritage has retained its features and

architectural identity for long periods. However, with the recent urban development in the Kurdistan Region, the majority of the buildings and archaeological sites in Sulaimani's city center are at risk of deformation due to a variety of factors, including misuse policies and inadequate implementation of architectural preservation policies. The case studies illustrated in Diagram (4) and the variables of the study illustrated in Table (1).

4.2 Methodology of the Practical Part

The study will depend upon the following methodology in the analysis of case studies and extracting the results.

4.3 Methods of Measurement

The methods for analyzing the practical part of the study are based on the use of a check list to analyze additional architectural interventions as independent variables and physical characteristics as dependent variables, as well as the identification and analysis of three case studies using a statistical system.

5. Results and Discussions

The findings, which are shown in the Tables (8-9-10), indicate the ratios that reflect how well each type of additional intervention satisfies each criterion; the highest possible score (most impact) is 1:1.000, while lower values indicate (less impact) with the specified criterion. The results in Table (8), indicate that the minor improvement and stabilization work such as Adjusting the color properties in fabric repairs and upgrading the shape and proportions of additive elements, have a priority in achieving the (homogeneity, balance and consistency) of the facade character, with values ranging from (1:1.0000 to 1:0.667). As shown in Figure (1). However, restoration works, remodeling process, new extensions and radical modifications that are incompatible with the original fabric, all have a moderate role in causing a partial deformation; the ratios ranged from 1:0.333 to 1:0.667. As shown in Figure (2). The study's findings in Table (9), revealed a low degree of visual clarity in the relations between buildings in the specific urban context, with ratios ranging from 10.000 to 1:0.333. It indicates a deficiency or absence of relationships between the original structure and its surroundings, as shown in Figures (3)(4). The results in Table (10) related to the new architectural interventions' negative impact on the historical values and local identity of the city center were found through an analysis of the characteristics of the surrounding buildings, as shown in Figures (5)(6).

6. Conclusion

Visual deformation affects a building's overall characteristics, including height, size, and proportions, as well as architectural details such as materials, colors, and texture. Furthermore, the level of relationships that connect original structure with its urban scene. The aforementioned case studies show the role of the following indicators in causing the visual deformation of the urban scene.

An exotic of architectural elements, constructed masses, projections, and details negatively impacted the building's integrity and caused chaos, monotony, and mental distraction.

The visual continuity of the skyline and the regularity of the urban structure were disrupted by the differences in building heights, sizes, and forms, which made it difficult for the recipient to perceive comprehend the physical elements of the urban scene. The ironic juxtaposition of structural modifications such as new rooms, floors, fences in the roofs, and fences in front of the buildings has drastically affected the original building character. Loss of natural proportions and harmony that characterizes a specific structure as a result of interventions that alter its original form. The city's visual image becomes estranged by trademarks and advertising boards of all sizes and forms, such as canvas, wall paintings, photographic boards, and others. Modern construction materials and techniques caused chaos in the relationships that connect the visual elements of urban scene. Imbalanced building types, masses, projections, and details led to a loss of sense of place. Over complicated and ambiguous shapes and details of the building's facade have caused a loss of order in the urban scene. Unharmonious and contradicted colors of the mass and architectural details have negatively affected the formation of the city's visual image. Because of the adjacent confusing old and new architectural styles, the recipients no longer feel like they belong to the urban scene. Unreadable proportions and enclosure ratio between the span of open public space and the heights of surrounding buildings caused a mental distraction. To protect the urban scene from deformation, it is necessary to adapt the concept of occupying the additional elements in the single buildings as a part for the whole urban scene since it is keeping its coherence by using the mechanisms of complexity and contradiction with attraction not ambiguity, distinction, avoid misuse of techniques, chaos, imbalance, multiplicity and fragmentation of elements in the level of parts, to keep the whole coherent.

7. Recommendation

Improving the homogeneity between old and new, whether in terms of style, patterns, details, shape, building materials, texture, height (skyline), scale, and colors, with a need to study the surrounding building fabric. Respect the local inherited context by setting the new story or new building further back from the roof edge to avoid significantly altering the original building's profile and proportions. Emphasizing the principle of visual continuity of the urban context with a harmonious contrast (element of visual enrichment) in order to stimulate perception and draw attention. Studying the international addition experiences that include strategies (expansion, rehabilitation, renovation, adaptive reuse), and attempting to benefit from them, avoid mistakes made, evaluate them, and capitalize on their advantages. The study suggests using contemporary materials and technology methods in the process of designing additions to heritage buildings that are contextually compatible. Maintaining the human scale in the relationship between mass and space attracts the recipient's visual attention and stimulates

his awareness, resulting in a sense of enclosure in the urban environment.

References

- [1] Lynch, K., "The image of the city", MIT press, pp.8-12-13, 1964.
- [2] Stone, S. "Un Doing Buildings: Adaptive Reuse and Cultural Memory" Routledge, pp. 127-183, 2019.
- [3] Yüceer, H., "An evaluation of interventions in architectural conservation: new exterior additions to historic buildings", Doctoral, dissertation, İzmir Institute of Technology, İzmir, pp. 8-9-10-11-78, 2005.
- [4] Venturi, R., Stierli, M., & Brownlee, D. B. "Complexity and contradiction in architecture", (Vol. 1). The Museum of modern art, pp. 12-106-131-147, 1987.
- [5] Adelpi Yamen, "Visual Pollution in Damascus", Buildex Forum, Damascus, May 2008.
- [6] D. Mısırlısoy, K. Günçe, "An analytical approach for evaluation of contemporary additions to historic buildings: Case of Kadir Has University", RE-COND'15: 'Re-evaluating contemporary designs in historical context' 22-24 July 2015, Istanbul, Turkey, 2015.
- [7] Torres, Z.N.G., "Historic Buildings and contemporary Additions: The Elements of a cohesive Design Relationship", A Masters Final Project, school of Architecture, University of Maryland. U.S.A., pp.6, 2009.
- [8] Al-Jumaili, "The effect of physical components on the visual unity of the urban scene", 2002.
- [9] Byard, Paul Spencer, "The Architecture of Addition: Design and Regulation", W.W.Norton & Company, New York, pp.85, 1998.
- [10] Ching, Francis D.K., "Architecture: Form, Space, & Order", pp. 61-72, 2007
- [11] Brolin, B. C., "Architecture in Context", London: Van Nostrand Reinhold Company, pp.16-17-151, 1980.
- [12] Meiss, Pierre Von; "Elements of Architecture from form to place", E & Fnspon an imprint of Chapman & Hall, London, UK, pp. 32-36, 1996.
- [13] Mısırlısoy, D., "Analysis of the Structure and Design Relationship between Contemporary Extensions and Remodeled Masonry Buildings", (Doctoral dissertation, Eastern Mediterranean University (EMU)), pp.62-63, 2011.
- [14] Abel, Chris, "Architecture and Identity: Towards a Global eco-Culture", Architectural press, An Imprint of Butterworth-Heinemann, pp. 99, 1997.
- [15] Wong, L. "Adaptive Reuse". Birkhäuser, pp.,195, 2017.
- [16] Weeks, K. D. and Grimmer, A. E., "The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings", Washington, DC: US Department of the Interior, 2017.
- [17] Al-Hinkawi, W. and Al-Qaraghoul, A.S., "Urban Addition In The Contemporary Urban Developments: Academy Project To Develop AL-Rusafa Center-Case Study", pp.17, 2013.
- [18] Douglas, J., "Building adaptation", Routledge, pp.115, 2006.
- [19] Cullen G., "Townscape", The Architect Cultural Press. London, pp.1-3-8-9-17, 1961.
- [20] Eames, Edwin, et al, "Anthropology of the City", prentice hall, New Jersey, pp.233, 1977.
- [21] Worskett, R., "The character of towns: An Approach to conservation", The Architectural press, London, 1969
- [22] Rapport, A., "Human Aspects of Urban Form: Towards A man- environment", pp.139-208-229, 1977.
- [23] Hunt, R., & Boyd, I., "New Design for Old Buildings", Routledge, pp.43-50-52-53-55-229, 2019.
- [24] Arnheim, Rudolf, "The Dynamics of Architecture form", University of California press Brekeley, 1977.
- [25] Mahgoub website. [Online]. Available, (1991), <http://kenanaonline.com/YasserMahgoub>.
- [26] Lomas, T. (2021). Life balance and harmony: Wellbeing's golden thread. International Journal of Wellbeing, 11(1), 50-68. <https://doi.org/10.5502/ijw.v11i1.1477>
- [27] (Politecnico di Milano, 2013) The phenomenon of spontaneity in urban city realm" POLITECNICO DI MILANO, Department of Architecture and Planning, DIAP
- [28] Doctoral Course in Architectural and Urban Design a. XXIV Cycle, 2013
- [29] Jones & Svejnova "The architecture of city identities" (ResearchGate, 2017) "Public Space Design of the Early 21st Century"

أثر تدخل الإضافة المعمارية في المشهد الحضري التراثي: مدينة السليمانية حالة دراسية

المستخلص

تخضع المباني التراثية لتغيرات مستمرة نتيجة للتطور السريع في مختلف الجوانب الاقتصادية والتكنولوجية والبشرية. ويتزامن هذا التطور السريع مع تشوه المشهد العمراني وفقدان خصائصه وهويته، مما يؤدي إلى فقدان الأبعاد والتناغم الطبيعي الذي يميز المبنى التراثي، وبالتالي اختلال توازنه نتيجة لفقدانه القيم والخصائص الجمالية، كوحدة وتناغم الأجزاء مع بعضها ومع محيطها، مما يُحدث انطباعاً سلبياً لدى المتلقي تجاه بيئته. ولما كان الانتظام البصري يتعلق بوضوح أو سهولة إدراك الأجزاء وتنظيمها في نمط متماسك، فإن أهم ما يمكن تحقيقه من خلال التناغم هو وحدة العناصر المضافة في واجهات المباني، وارتباطها بسياقها من خلال خلق تواصل بصري بين المباني المتجاورة. إن نطاق التدخلات داخل البيئة المبنية قد يختلف على مستويات عديدة (من الحفاظ إلى إعادة الإعمار)، وعلى مقاييس متعددة (من عناصر البناء الفردية إلى السياق العام)، وتتميز بنشاط واحد أو أكثر؛ بدءاً من الصيانة وصولاً إلى الإضافة. يُسبب هذا خللاً في خصائص المباني التراثية ومشهد المدينة ككل وأجزاءه؛ من حيث الأسلوب، والأنماط، والتفاصيل، والشكل، ومواد البناء، والملمس، والارتفاع (خط الأفق)، والمقياس البشري، والألوان. مما يؤثر على العلاقات التي تربط عناصرها ومبانيها ببعضها البعض ضمن المشهد الحضري، كالتوازن، والاستمرارية، والتناغم، والانغلاق، والتكامل. ونتيجة لذلك، تتمحور مشكلة البحث حول تحديد الحلول التصميمية للتناقضات بين السياق التقليدي والتدخلات الإضافية المعاصرة في مركز مدينة السليمانية. وبالتالي، يهدف البحث إلى توضيح آليات التصميم المناسبة لحل مشكلات التشوه البصري، بهدف وضع مؤشرات تماسك في تصميم الإضافات التي لها تأثير كبير في تحسين الصورة الذهنية للبيئة الحضرية.

الكلمات المفتاحية:

التشوه البصري، المشهد الحضري، الانتظام البصري، التدخلات الإضافية، الكل والجزء.

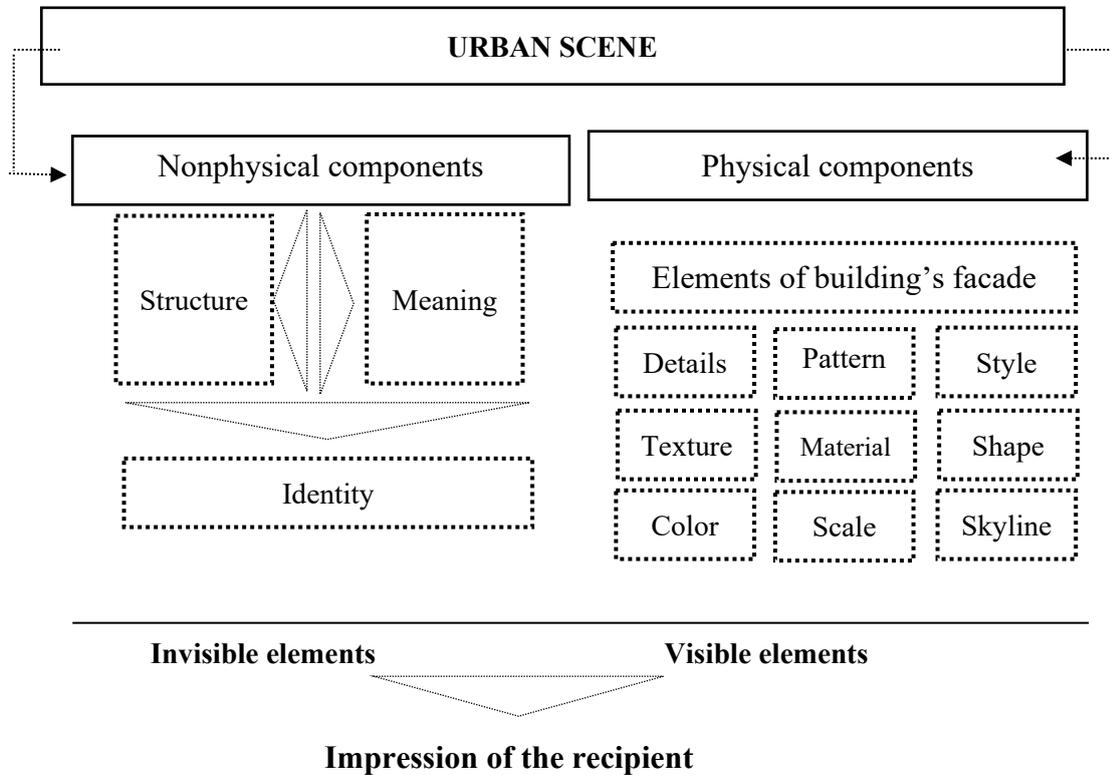


Diagram 1: illustrates the elements of urban scene (researcher)

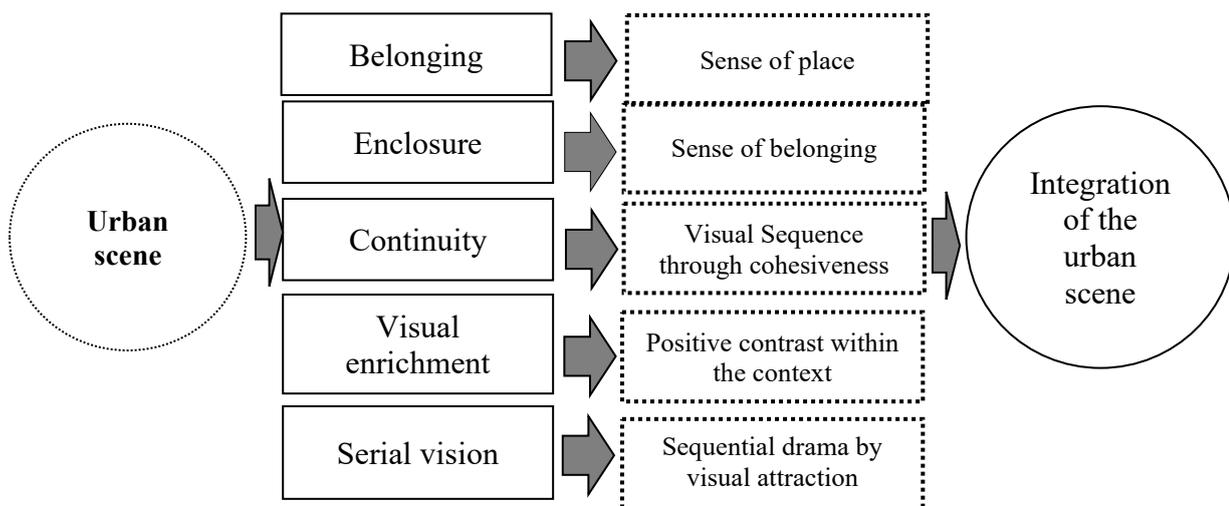


Diagram 2: Illustrates the characteristics of urban scene (researcher)

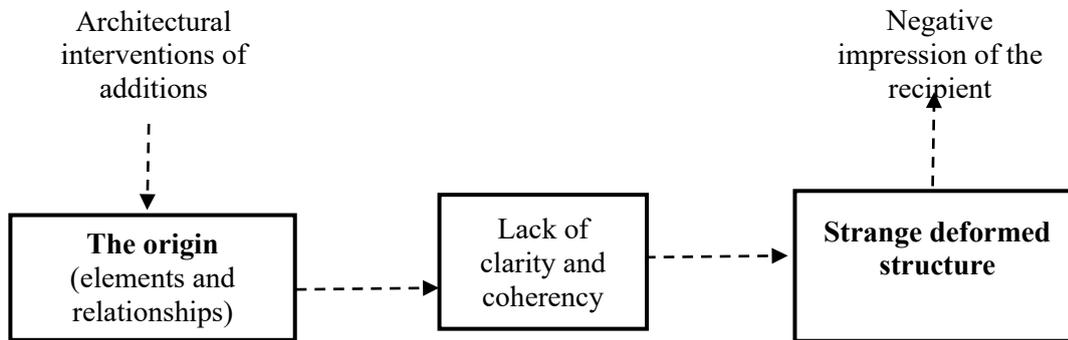


Diagram 3: illustrates the deformation in urban scene (researchers)

Table 1: Illustrates the variables of the study (researchers)

Variables of the Additional Architectural Intervention			
Main Variables	Sub-variables		Note
The Scope of Interventions	Protection and aintenance	Minor improvement	Fabric repair, installing materials and painting
	Repairing	Stabilization work	Consolidating the historical materials, upgrades of elements
	Replacement of Existing Features	Restoration work	Re-establish the feature: form or details, based on a physical evidence
	Replacement of Missing Features	Remodeling process	Retrieve the historical character with new compatible design
	Alterations	Functional adjustments	Facade renovation, reconfiguring of interior spaces
	Completion of the missing parts	Complementary works	Re-assembling the damaged parts/details into a whole
	New additions to historic buildings	New extensions	Functional change in a vertical or horizontal manner
	Destruction of ruined historic buildings	Radical modifications	Constitute an entirely new construction
Variables of the Urban Scene			
Main Variables	Sub-variables		Indicators
The Physical Characteristics of Urban Scene	Belonging	Maintaining the balance and human scale	Sense of place
	Enclosure	Consistency in the building heights and ratio of street width	Sense of belonging
	Continuity	Harmony of elements (Part and whole)	Visual Sequence through masses/elements coherence
	Visual enrichment	Diversity of elements	Positive contrast within the context
	Serial visions	Sequential drama by visual attraction	Directionality (Skyline, spatial enclosure, scale and masses or elements relations)
The Considerations for Successful Design Interventions (relations)	Proportion and hierarchy	Visual continuity	Similarity or variation in terms of scale, size, shape and etc.
	Rhythm and juxtaposition	Adapted contradiction in visual traits	Accretions of elements or masses
	Complementing or contrasting	Visual integration of façade elements	Considering the form and style of the origin
	Loose fit	Familiarity	Flexible design in terms of details, texture, color, pattern, material, scale and etc.
	Readability and honesty	Compatibility between old and new	Preventing complexities in structural fabric

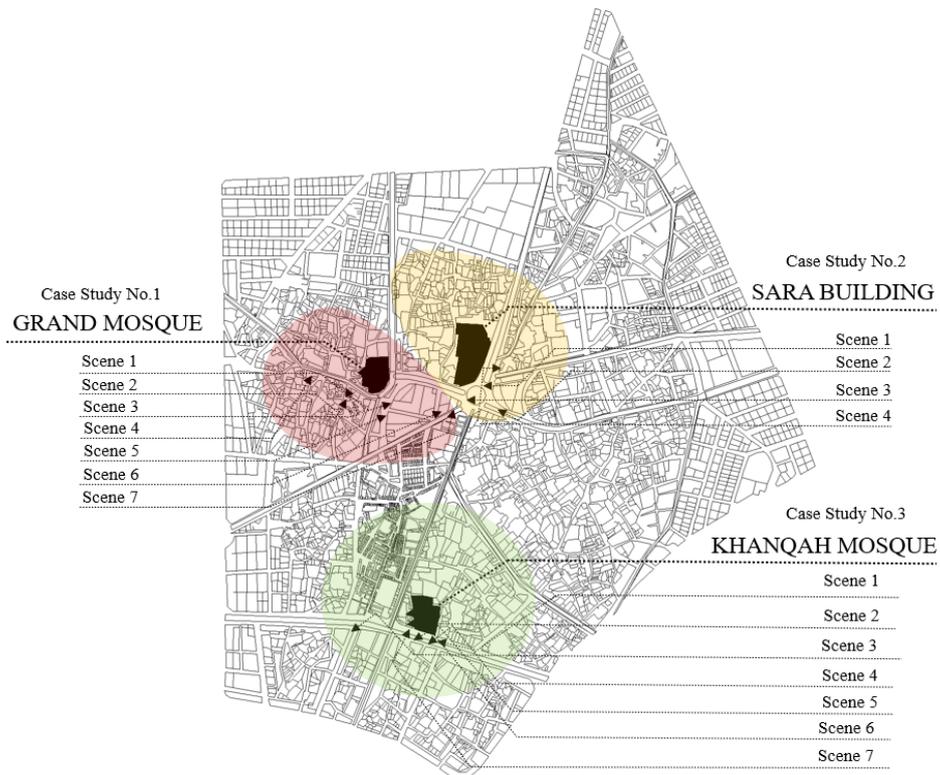


Diagram 4: Case studies in Sulaimani city center (researcher)

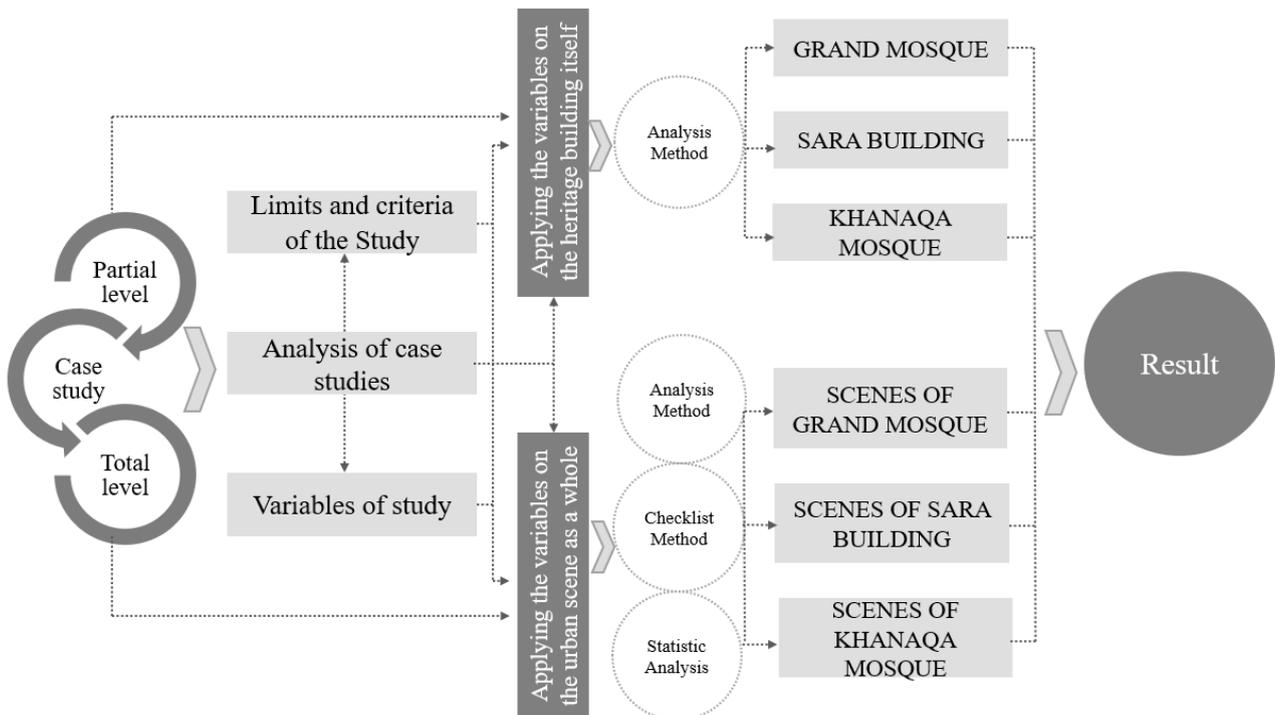


Diagram 5: Illustrates the methodology of the practical part (researcher)

Table 3: Illustrate the urban scenes of the Sara Building

<p>Characteristics of the building itself</p>	
<p>Figures illustrate the architectural elements of Sara building</p>	
<p>Relationships between the origin and its surrounding</p>	
<p>Scene 1</p>	
	<p>Characteristics of the surrounding buildings</p>
<p>Scene 2</p>	
	<p>Characteristics of the surrounding buildings</p>
<p>Scene 3</p>	
	<p>Characteristics of the surrounding buildings</p>
<p>Scene 4</p>	

Table 5: Illustrate the effect of additional architectural interventions on the physical characteristics (Partial level) of the case studies (researchers)

Additional intervention	Minor improvement			Stabilization work			Restoration work			Remodeling process			New extensions			Radical modifications		
	Physical characteristics of the building itself	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2
Balance	1	1	1	1	1	0	0	1	0	0	0	0	0	0	1	0	0	0
Imbalance	0	0	1	0	0	0	0	0	0	1	0	1	1	1	1	0	0	1
Consistency	1	1	0	1	1	0	0	1	0	0	0	0	0	0	0	1	0	0
Ambiguity	0	0	1	0	0	0	0	0	0	1	0	1	1	1	1	0	0	1
Harmony	1	1	1	1	1	0	0	1	0	1	0	0	1	1	0	1	0	0
Inharmony	0	0	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	1
Diversity	0	0	1	1	1	0	0	0	0	1	0	1	0	1	1	0	0	1
Similarity	1	1	0	0	1	0	0	1	0	0	0	0	1	1	0	1	0	0
Visual attraction	1	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0
Mental distraction	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1

Table 6: Illustrate the effect of additional architectural interventions on the visual relationships (Whole level) between the case studies and their surroundings(researchers)

Additional intervention	Minor improvement			Stabilization work			Restoration work			Remodeling process			New extensions			Radical modifications		
	Visual relations	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2
Visual continuity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rupture	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1
Adapted contradiction	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Ironic juxtaposition	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1
Visual integration	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isolation	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1
Familiarity	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Estrangement	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1
Compatibility	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0
Chaos	0	1	1	0	1	1	1	1	1	0	1	1	1	0	1	1	1	1

Table 7: Illustrate the effect of additional architectural interventions on the physical characteristics (Whole level) of the surrounding buildings (researchers)

Additional intervention	Minor improvement			Stabilization work			Restoration work			Remodeling process			New extensions			Radical modifications		
	Physical characteristics of the surroundings	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2
Balance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imbalance	1	1	1	1	0	1	1	1	0	0	1	1	1	0	1	1	1	1
Consistency	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Ambiguity	1	1	1	1	1	1	1	1	0	0	1	1	1	0	1	1	1	1
Harmony	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inharmony	1	1	1	1	1	1	1	1	0	0	1	1	1	0	1	1	1	1
Diversity	0	1	1	0	1	1	0	1	0	0	1	1	0	0	1	0	1	1
Similarity	0	1	1	0	0	1	0	0	0	0	0	1	1	0	1	0	0	1
Visual attraction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mental distraction	1	1	1	1	1	1	1	1	0	0	1	1	1	0	1	1	1	1

Table 8: Illustrate ratio of the effect of additional architectural interventions on the physical characteristics at the partial level of the selected case studies (researchers)

Additional intervention	Minor improvement	Stabilization work	Restoration work	Remodelling process	New extensions	Radical modifications
Physical characteristics						
Balance	1:1.000	1:0.667	1:0.333	1:0.000	1:0.333	1:0.000
Imbalance	1:0.333	1:0.000	1:0.000	1:0.667	1:0.000	1:0.333
Consistency	1:0.667	1:0.667	1:0.333	1:0.000	1:0.000	1:0.333
Ambiguity	1:0.333	1:0.000	1:0.000	1:0.667	1:0.000	1:0.333
Harmony	1:1.000	1:0.667	1:0.333	1:0.333	1:0.667	1:0.333
Inharmony	1:0.333	1:0.000	1:0.000	1:0.667	1:0.333	1:0.333
Diversity	1:0.333	1:0.667	1:0.000	1:0.667	1:0.667	1:0.333
Similarity	1:0.667	1:0.333	1:0.333	1:0.000	1:0.667	1:0.333
Visual attraction	1:0.333	1:0.333	1:0.333	1:0.333	1:0.333	1:0.333
Mental distraction	1:0.333	1:0.000	1:0.000	1:0.333	1:0.333	1:0.333

Table 9: Illustrate the effect of additional architectural interventions on the visual relationships at the whole level between the case studies and their surroundings (researchers)

Additional intervention	Minor improvement	Stabilization work	Restoration work	Remodelling process	New extensions	Radical modifications
Visual relations						
Visual continuity	1:0.000	1:0.000	1:0.000	1:0.000	1:0.000	1:0.000
Rupture	1:1.000	1:1.000	1:1.000	1:0.667	1:0.667	1:1.000
Adapted contradiction	1:0.333	1:0.000	1:0.000	1:0.000	1:0.000	1:0.333
Ironic juxtaposition	1:1.000	1:1.000	1:1.000	1:0.667	1:0.667	1:1.000
Visual integration	1:0.000	1:0.000	1:0.000	1:0.000	1:0.000	1:0.000
Isolation	1:1.000	1:1.000	1:1.000	1:0.667	1:0.667	1:1.000
Familiarity	1:0.333	1:0.000	1:0.000	1:0.000	1:0.000	1:0.333
Estrangement	1:1.000	1:1.000	1:1.000	1:0.667	1:0.667	1:1.000
Compatibility	1:0.333	1:0.333	1:0.000	1:0.333	1:0.000	1:0.333
Chaos	1:0.667	1:0.667	1:1.000	1:0.667	1:0.667	1:1.000

Table 10: Illustrate the effect of additional architectural interventions on the physical characteristics at the whole level of the surrounding buildings (researchers)

Additional intervention	Minor improvement	Stabilization work	Restoration work	Remodelling process	New extensions	Radical modifications
Physical characteristics						
Balance	1:0.000	1:0.000	1:0.000	1:0.000	1:0.000	1:0.000
Imbalance	1:1.000	1:0.667	1:0.667	1:0.667	1:0.667	1:1.000
Consistency	1:0.000	1:0.000	1:0.000	1:0.333	1:0.000	1:0.333
Ambiguity	1:1.000	1:1.000	1:0.667	1:0.667	1:0.667	1:1.000
Harmony	1:0.000	1:0.000	1:0.000	1:0.000	1:0.000	1:0.000
Inharmony	1:1.000	1:1.000	1:0.667	1:0.667	1:0.667	1:1.000
Diversity	1:0.667	1:0.667	1:0.333	1:0.667	1:0.333	1:0.667
Similarity	1:0.667	1:0.333	1:0.000	1:0.333	1:0.667	1:0.333
Visual attraction	1:0.000	1:0.000	1:0.000	1:0.000	1:0.000	1:0.000
Mental distraction	1:1.000	1:1.000	1:0.667	1:0.667	1:0.667	1:1.000

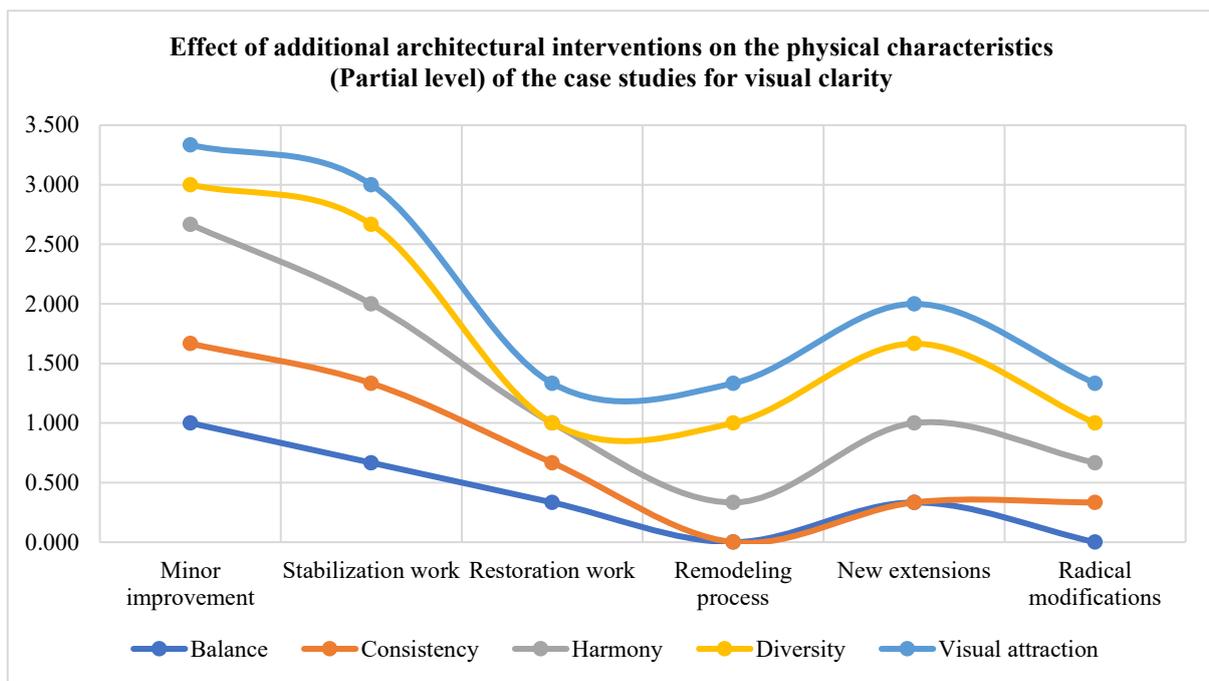


Figure 1: Shows the effect of additional architectural interventions on the physical characteristics (**clarity**) of the case studies at the partial level (researchers)

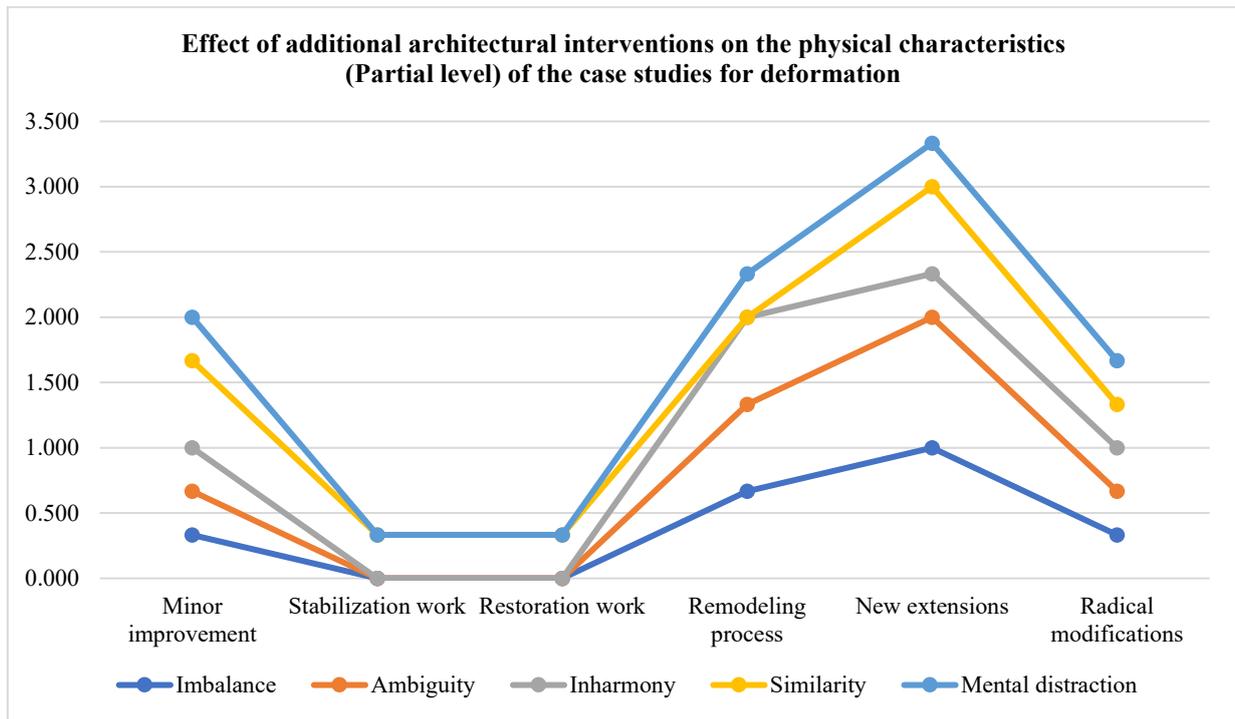


Figure 2: Shows the effect of additional architectural interventions on the physical characteristics (**deformation**) of the case studies at the partial level (researchers)

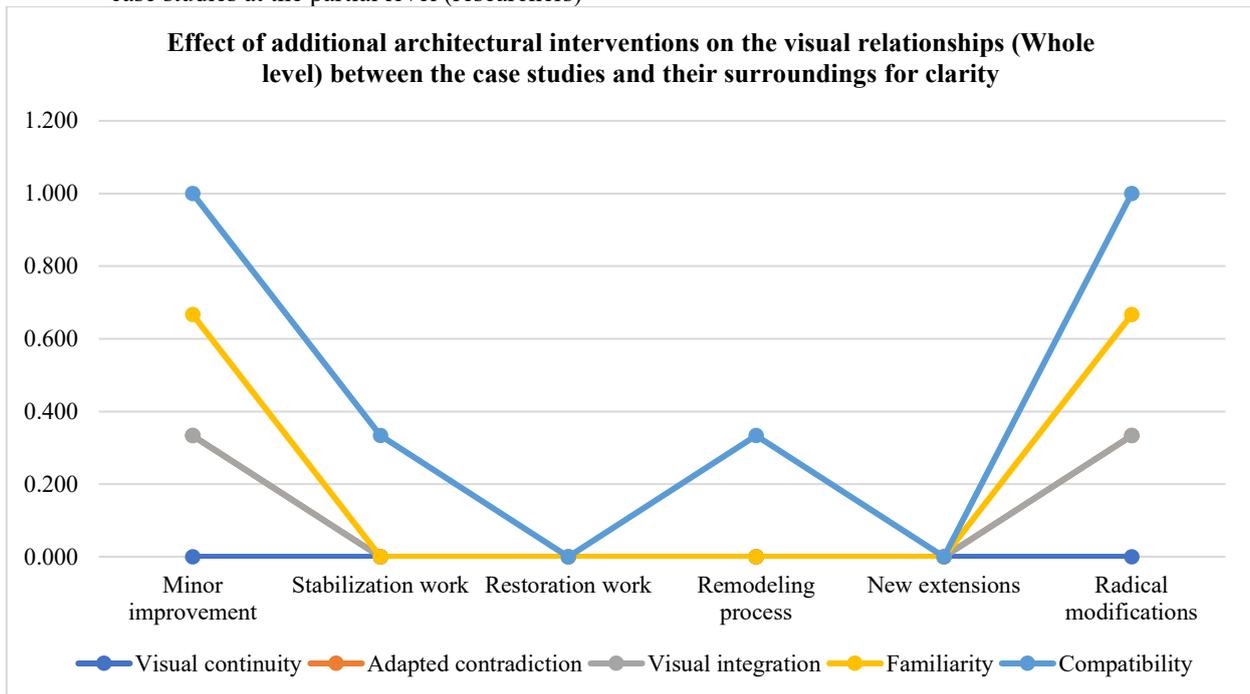


Figure 3: Shows the effect of additional architectural interventions on the visual relationships (**clarity**) between the case studies and their surroundings at the whole level (researchers)

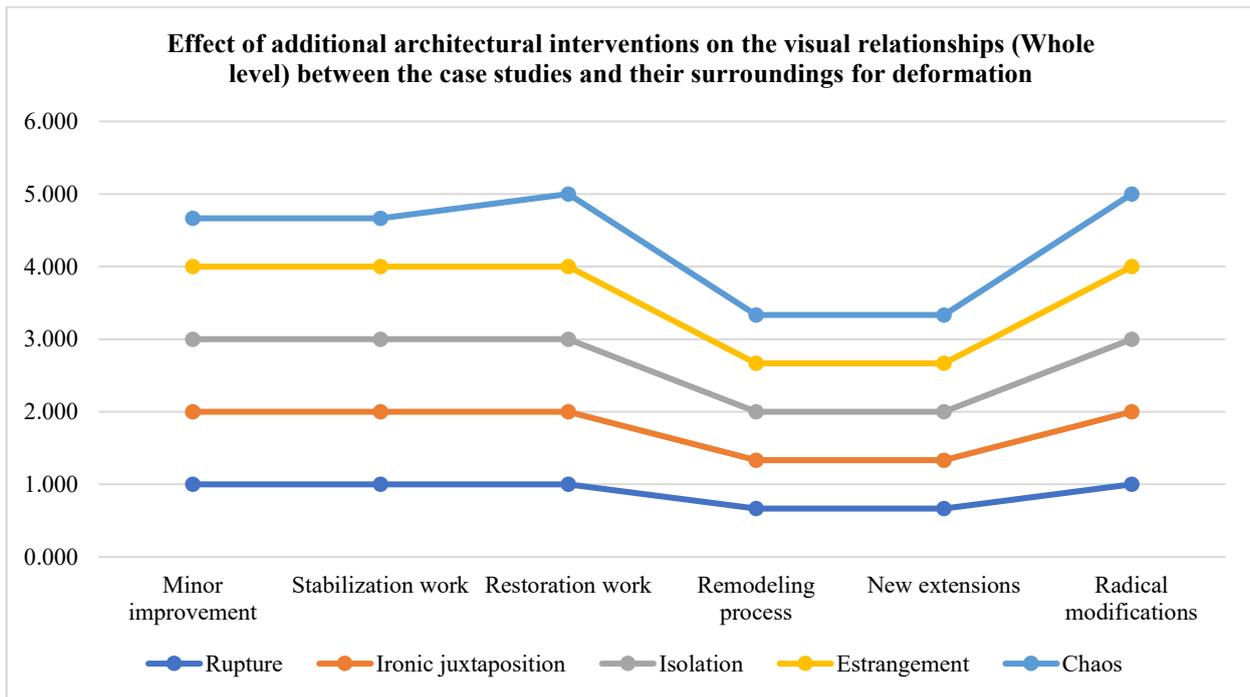


Figure 4: Shows the effect of additional architectural interventions on the visual relationships (**deformation**) between the case studies and their surroundings at the whole level (researchers)

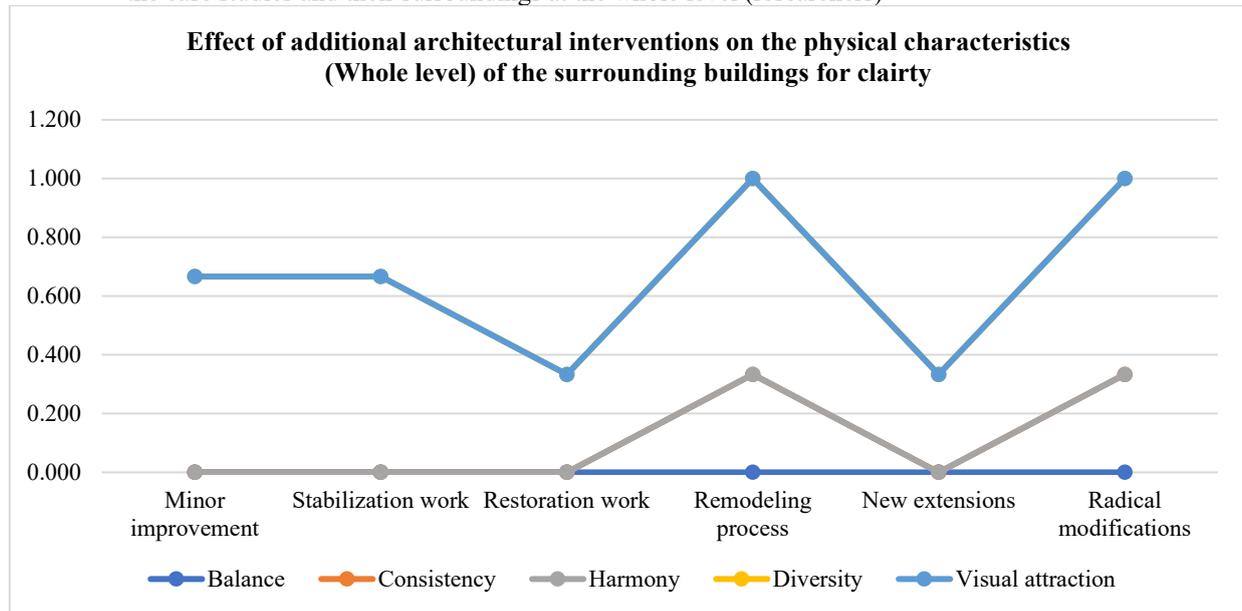


Figure 5: Shows the effect of additional architectural interventions on the physical characteristics (**clarity**) of the surrounding buildings at the whole level (researchers)

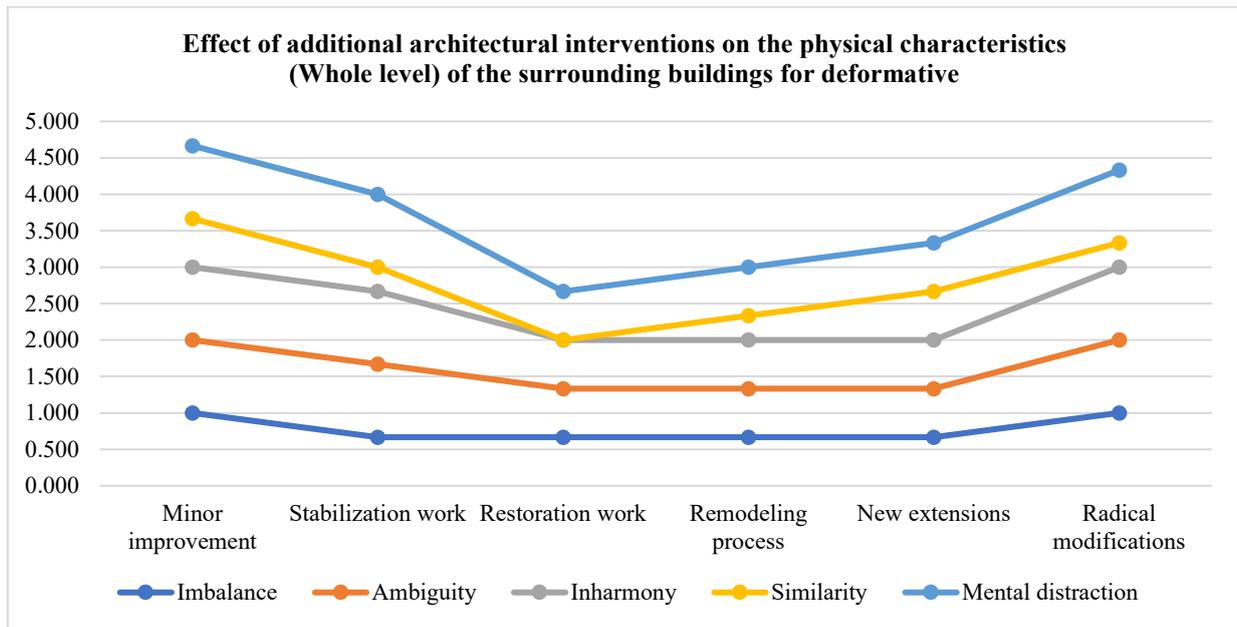


Figure 6: shows the effect of additional architectural interventions on the physical characteristics (**deformation**) of the surrounding buildings at the whole level (researchers)