Journal of Advanced Zoology

ISSN: 0253-7214
*Volume **44** Issue **S-5 Year 2023** Page **1620:1629***

Evaluation of the Compatibility between the Contemporary Additions and the Historical Buildings

Mervat A. Fathy[1*], Mohamed R. Abdalla[2]

[1]Faculty of Engineering, Beni Suef University, 62521, Beni Suef, Egypt
[2]Faculty of Engineering, Cairo University, 12613, Giza, Egypt

**Corresponding author's E-mail: mervatazab@gmail .com*

Article History

Received: 06 June 2023
Revised: 05 Sept 2023
Accepted: 01 Nov 2023

Abstract

The adaptive reuse of a historical building may require new additions to replace the demolished parts or accommodate the repurposed function. If this addition belongs to modern architecture, it is necessary to study the relationship between this new addition and the historical building in terms of its compatibility with the building without dissonance or distortion. The aim of the research is to identify recommendations for using contemporary addition. It focuses on the external formal characteristics of the addition (length, width, height, form, materials, color, open ratio and its Rhythm, and transparency). This process will be done by surveying architects who support the contrasting approach to determine the weight of external formal characteristics. It will also evaluate case studies regarding the degree of Compatibility between contemporary additions and Historical Buildings. Through analytical and comparative study, an assessment method will be developed based on points of similarity and contrast between an addition and a Historical Building.

Keywords: *Historical Buildings, Contemporary Additions, Compatibility, Adaptive Reuse.*

1. Introduction

The adaptive reuse of heritage buildings is a preservation method used to protect buildings from deterioration and sustain their value. In addition to extending the building's lifecycle. [1] Adaptation is modifying a building or place to serve a new purpose or compatible use that retains cultural heritage values. Adaptation processes include addition and alteration. Any alterations or additions should be compatible with the original form and fabric of the place, they should avoid incompatible contrasts of form, scale, mass, color, and material. [2] The role of designers is to bring the building back to life. With its modifications and additions, Contemporary architecture is an aid for the designer in the reuse process. A well-designed contemporary architecture can meet the modern demands of compatible reuse processes. It can complement historical buildings and reflect their historical character by contrasting with them. [3]. The problem is the need for clear guidelines for adding to historic buildings in a contrasting style. Research aims to identify some recommendations for using contemporary additions with a historic building and present a proposal for an assessment method for Evaluating Compatibility between contemporary Additions and Historical Buildings in terms of the external formal characteristics of the addition. Due to the nature of the research, a quantitative approach was adopted during the data collection phase. This was to help explore the weight of external formal characteristics of the addition, which will be used in the analytical and comparative study.

2. Literature Review

Projects merging new and old are not easy to execute, especially if the existing building is a historic building. There is a fear that changes might compromise the historic integrity of a traditional building. [6] One of the four main conclusions from The Resolutions of the Symposium on the Introduction of Contemporary Architecture into Ancient Groups of Buildings is that "Such contemporary architecture, making deliberate use of present-day techniques and materials, will fit itself into an ancient setting

without affecting the structural and aesthetic qualities of the latter only in so far as due allowance is made for the appropriate use of mass, scale, rhythm, and appearance." [7]

Research will focus on the external formal characteristics of the addition and their effectiveness in ensuring Compatibility between the contemporary additions and the Historical Buildings. The external formal characteristics are volume (width, height, and length), form, materials, color, open ration and its Rhythm, transparency.

Definitions

Form: "The form of a building is its overall shape and volume and the arrangement of its parts."

Massing: "The size and volume of a building."

Scale: "The size of a building and its relationship with its surrounding buildings or landscape." [8]

Rhythm: "A unifying movement characterized by a patterned repetition or alteration of formal elements or motifs in the same or modified form." [9]

Survey components

The survey consists of two parts. The first part is to determine the weight of the external formal characteristics of the addition (Height, width, length, Form, Materials, Color, transparency, and open ratio and its rhythm), and the second part is to evaluate the case studies in terms of the degree of Compatibility between the contemporary additions and the Historical Buildings. There are no case studies in Egypt that adopt this contrasting approach, so case studies were selected according to the following criteria: international examples; famous; Various and clear additions. Case studies are the Reichstag Building, the Royal Ontario Museum, Dresden's Military History Museum, Coal Drops Yard, and the Antwerp port house.

Survey Results, Part 1

On a scale of 1 to 10, Participants were asked to determine the weight of each external formal characteristic of the addition (Height, width, length, Form, Materials, Color, open ratio and its Rhythm, and transparency) in terms of its effect on the compatibility between the addition and the heritage building. The results are as follows**:**

Weight of height, width, and length Most participants found that height got 9 and 7 equally, width got 10, and length got 8 and 7 equally.

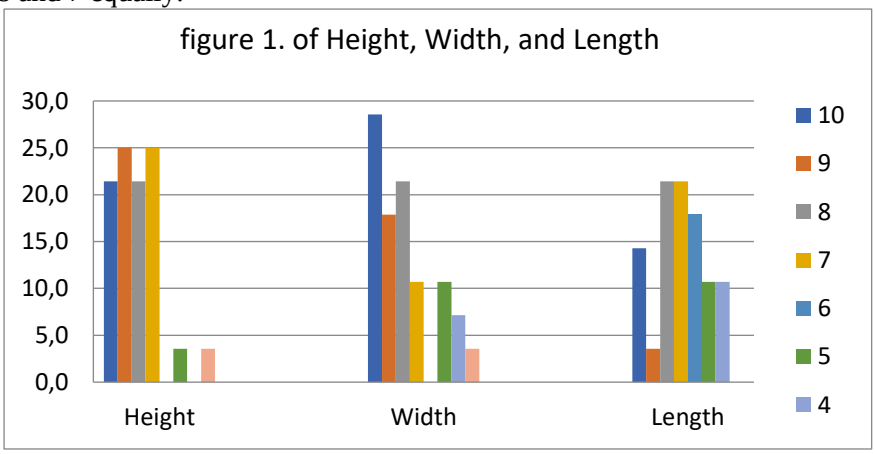


Figure 1. Weight of Height, Width, and Length

Weight of Form, Materials, and Color Most participants found that Form got 10, materials got 10, and color got 10.

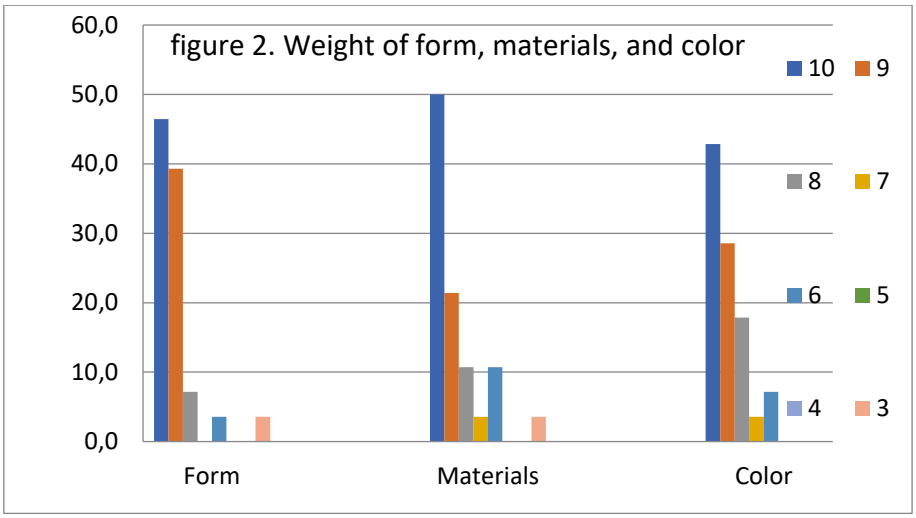


Figure 2. Weight of form, materials, and color

Weight of Open ratio, Transparency Most participants found that the open ratio got 10 and transparency got 10.

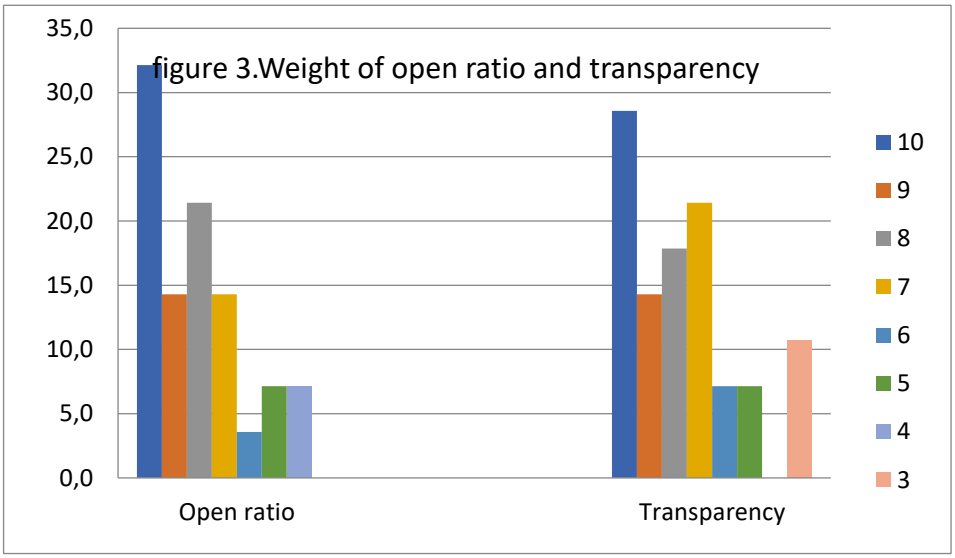


Figure 3. Weight of open ratio and transparency

Average weight of the external formal features of contemporary additions According to the survey, form and color got the highest ratings, while length and width got the lowest ratings.

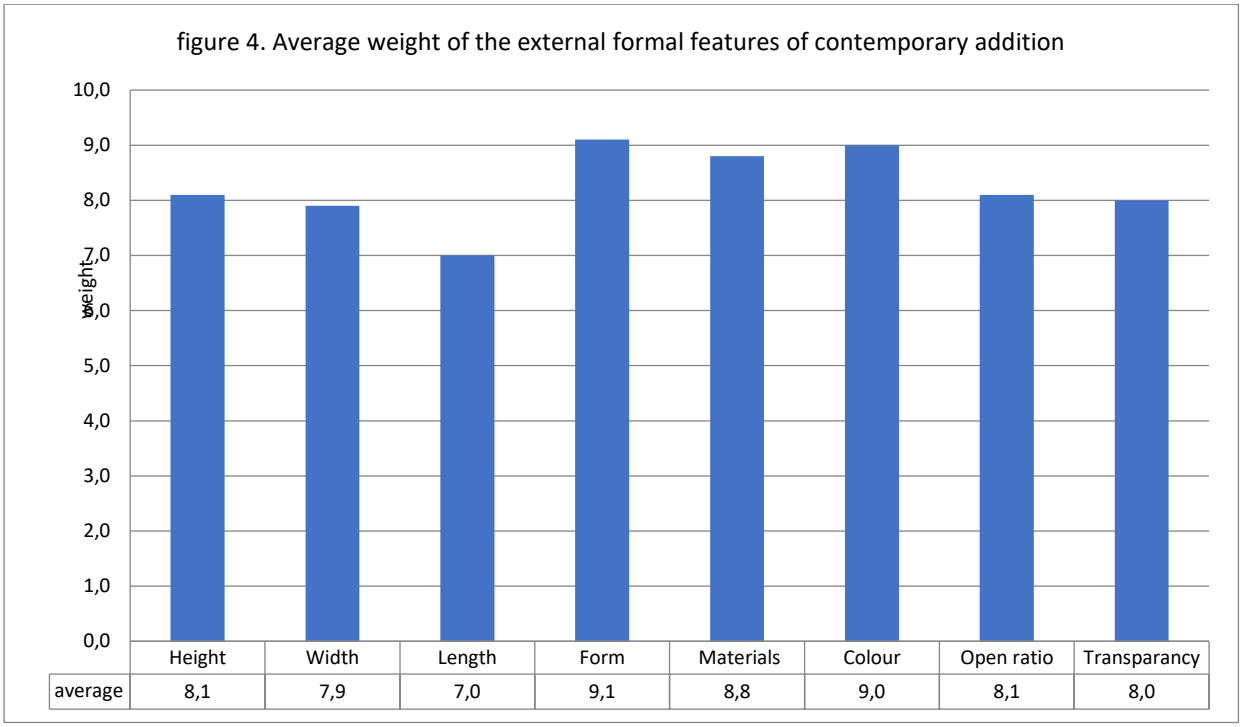


Figure 4. Average weight of the external formal features of contemporary addition

Relative rating of the weight of the external formal features of contemporary addition relative rating is calculated according to the following equation**:** relative rating = average rating/lowest Average rating. where the lowest average rating is 7.

Table 1. relative rate

features	Average rate(A)	relative rate(A/7)
Height	8.1	1.16
width	7.9	1.13
length	7	1
Form	9.1	1.3
Building materials	8.8	1.26
Color	9	1.29
Open ratio	8.1	1.16
Transparency	8	1.14

Survey Results, Part 2:

On the scale [very poor (0:29), poor (30:49), Fair poor (50:64), good (65:74), very good (75:84), excellent (85:100)] %, Participants were asked to evaluate the case studies in terms of the degree of compatibility between the addition and the heritage building. The result is as follows**:**

Building No. 1: Reichstag Building, German /Foster + Partners Most participants found the compatibility between the addition and the original building to be very good.

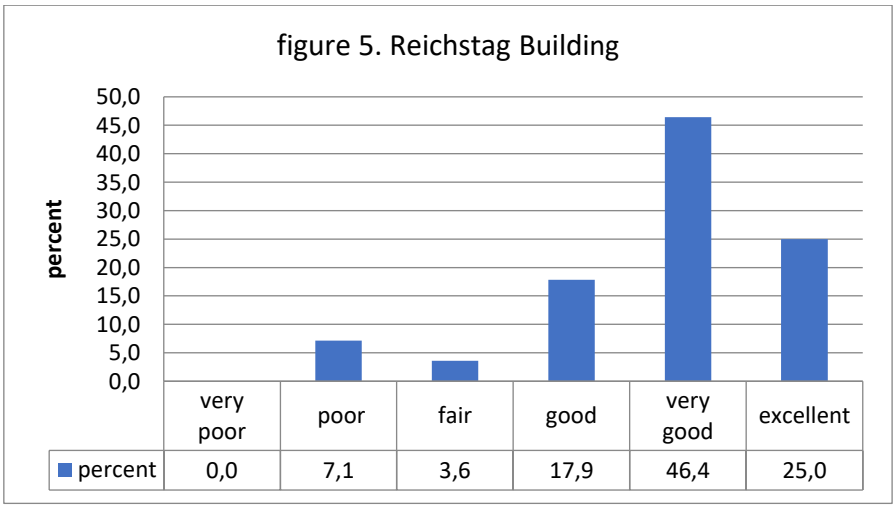


Figure 5. Reichstag Building, Results for the First Question of the Survey, Part 2

Building No. 2: Royal Ontario Museum **,**Canada/Daniel Libeskin Most participants found that the compatibility between the addition and the original building was poor.

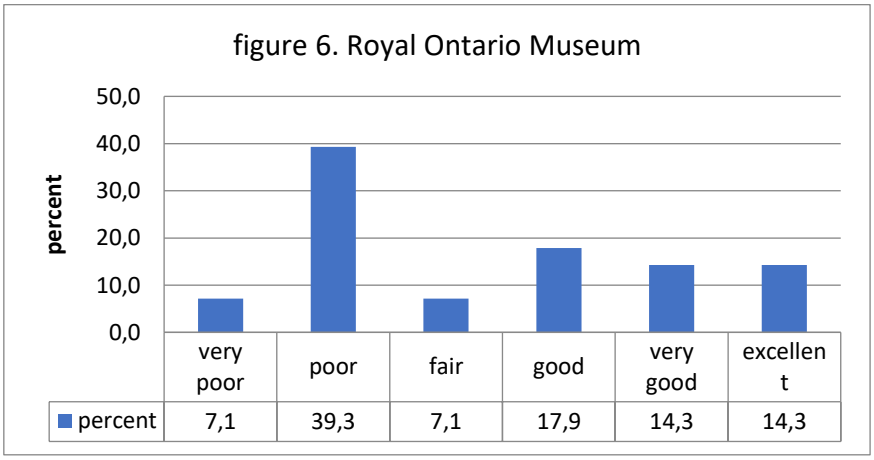


Figure 6. Royal Ontario Museum, Results for the Second Question of the Survey, Part 2

Building No. 3: Dresden's Military History Museum, German/Daniel Libeskind Most participants found that the compatibility between the addition and the original building was equally good or excellent.

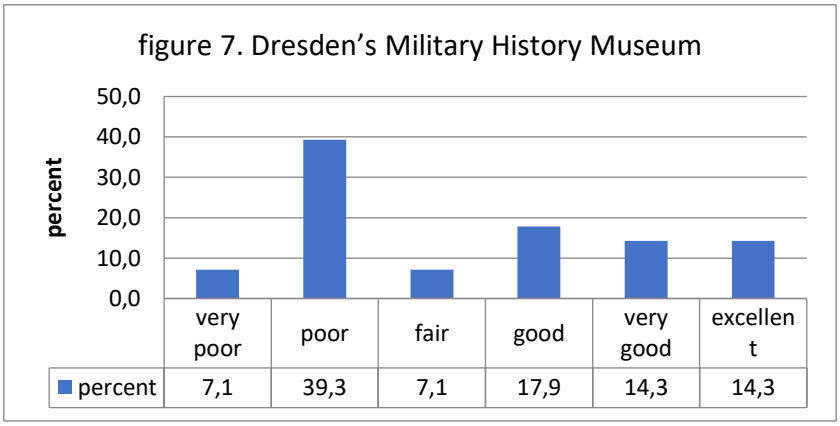


Figure 7. Dresden's Military History Museum,Results for the Third Question of the Survey, Part 2

Building No. 4: Coal Drops Yard, England/Heatherwick Studio Dresden's Most participants found that the compatibility between the addition and the original building was equally good or excellent.

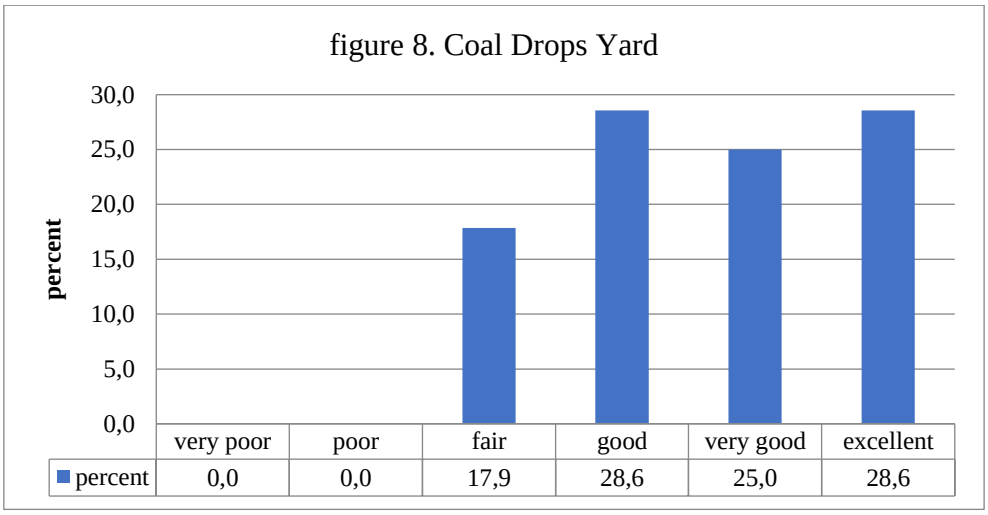


Figure 8. Coal Drops Yard, Results for the Fourth Question of the Survey, Part 2

Building No. 5: Antwerp Port House, Belgium/Zaha Hadid Most participants found that the compatibility between the addition and the original building was fair.

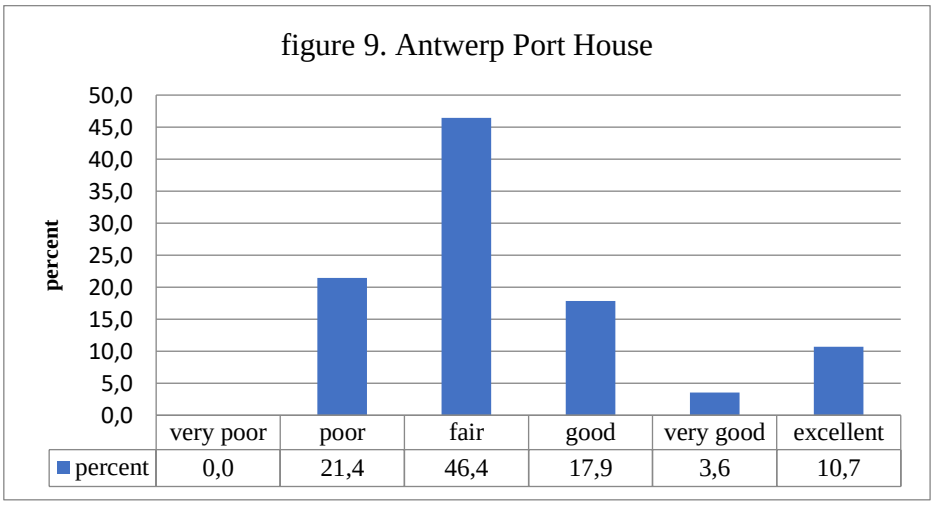


Figure 9. Antwerp Port House, Results for the Fifth Question of the Survey, Part 2

Average results for each building

According to the survey, the Reichstag Building and Coal Drops Yard Building are the highest- rated buildings. In contrast, the Antwerp Port House and Royal Ontario Museum are the lowest -rated buildings.

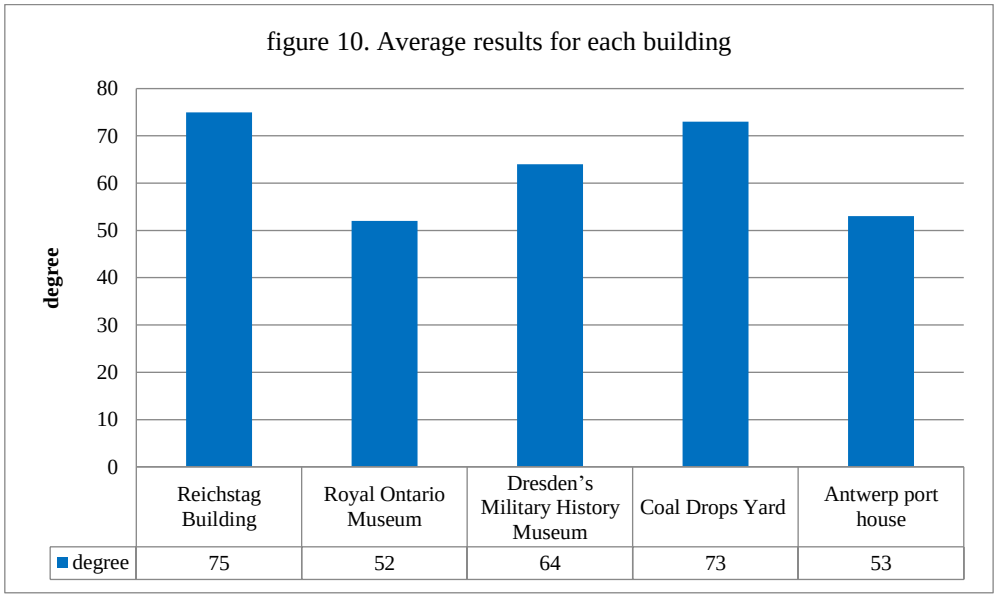


Figure 10. Average results for each building

Analytical study of case studies

Below, an assessment will be conducted about the degree of contrast or similarity between the external formal features of a contemporary addition and those of a historical building. The assessment scale consists of three degrees for both contrast and similarity, which are strong, medium, and weak, as follows: [7]

Table 2. Assessment Scale

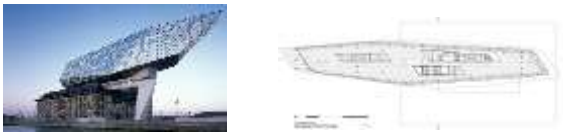
-3	-2	-1	0	1	2	3
strong	medium	weak		weak	medium	strong
Contrast			No effect	Similarity		

The following was taken into consideration in the assessment process:

1- In assessing the height, the greater the height of the contemporary addition than the height of the historical building, the higher the contrasting points are. The lower the height of the contemporary addition than the height of the historical building, the higher the similarity points are. as well as in assessing the width and length.

2- The transparency assessment has no contrast, but the more transparent the contemporary addition is, the higher the similarity points are.

Table 3. Analysis of Study Projects

Parameters	Weight (W)	degree of contrast or similarity (D)	W*D	project
Height	1.16	3	3.48	Building No. 1: Reichstag Building  **Figure 11.** Reichstag Building before and after Source. https://www.archdaily.com
Width	1.13	3	3.39	
length	1	3	3	
Form	1.3	1	1.3	
Materials	1.26	-3	-3.78	
Color	1.29	1	1.29	
Open Ratio	1.16	-3	-3. 48	
Transparency	1.14	2	2.28	
Total			7.78	
Survey result			Very good (75%)	
Hight	1.16	-1	-1.16	Building No. 2: Royal Ontario Museum  **Figure 12.** Royal Ontario Museum Source. https://www.arkitektuel.com
Width	1.13	-2	-2.26	
length	1	3	3	
Form	1.3	-3	-3.9	
Materials	1.26	-3	-3.78	
Color	1.29	-3	-3.87	
Open ratio	1.16	-3	-3.48	
Transparency	1.14	0	0	
Total			-15.45	
Survey Result			bit poor (52%)	
Height	1.16	-1	-1.16	Building No. 3: Dresden's Military History Museum  **Figure 13.** Dresden's Military History Museum Source. https://libeskind.com
Width	1.13	3	3.39	
length	1	1	1	
Form	1.3	-3	-3.9	
Materials	1.26	-3	-3.78	
Color	1.29	1	1.29	
Open ratio	1.16	-3	-3.48	
Transparency	1.14	1	1.14	
Total			-5.5	
Survey Result			bit poor (64%)	
Height	1.16	2	2.32	Building No. 4: Coal Drops Yard  **Figure 14.** Royal Ontario Museum Source. https://www.archdaily.com
Width	1.13	2	2.26	
length	1	3	3	
Form	1.3	-2	-2.6	
Materials	1.26	-1	-1.26	
Color	1.29	1	1.29	
Open ratio	1.16	-2	-2.32	
Transparency	1.14	1	1.14	
Total			3.83	
Survey Result			good (73%)	
Height	1.16	1	1.16	Building No. 5: Antwerp port house 
Width	1.13	2	2.26	
length	1	-3	-3	
Form	1.3	-3	-3.9	
Materials	1.26	-3	-3.78	
Color	1.29	-3	-3.87	

3. Materials And Methods

Research Methodology

This research paper is conducted according to the following methodology steps:

1. Conduct an extensive literature review about the addition's external formal characteristics and their Definitions.
2. Survey to determine the weight of external formal characteristics and to evaluate the case studies regarding the degree of Compatibility between the contemporary additions and the Historical Buildings.
3. Present a proposal for an assessment method for calculating points of similarity and contrast between an addition and a Historical Building applied to the case studies.

4. Discuss and compare the results of Survey Part 2 and the proposal results.
5. Conclusion and recommendation.

Data Collection

An online survey is one of the most effective data -gathering methods in Egypt and many other developing countries. Online surveys are easy to create, disseminate, and gather responses. [4-5] The research used questionnaire templates from Google Drive and Excel from Microsoft Office for statistical analysis. An Egyptian architect who supports the contrasting approach is the Target sample. The sample size is 28 participants. Duration: 10/2022 to 12/2022.

4. Result and Discussion

By comparing the results of the evaluation with the results of Survey Part 2, the following observations can be drawn:

1- Projects whose total points of contrast and similarity are greater than zero are more compatible, according to the survey results.

2- Projects whose total points of contrast and similarity are lower than zero are less compatible, according to the survey results.

3- An architect can use the above assessment method to assess the degree of compatibility of a contemporary addition with a historical building. The higher the score above zero, the more compatible the addition is, and the lower the score below zero, the less compatible the addition is.

4- If the building turns out to be incompatible, the architect should adjust the external formal features of the addition to move away from negative values.

5. Conclusion

As established earlier, there is a need to set up guidelines for adding to historic buildings using a contrasting style. The research presents a method for evaluating the compatibility of the contemporary addition with the historical building. The method is based on calculating points of contrast and similarity for the external formal characteristics (length, width, height, form, materials, color, open ratio and its Rhythm, and transparency). Depending on Egyptian architects' opinions, the higher the evaluation points are from zero, the higher the compatibility, and the lower the evaluation points are from zero, the lower the compatibility.

Further studies could focus on the relationship between the concept and degree of compatibility between an addition and a historical building. Future studies can address the relationship between the location of the addition (topping, in front of, besides, down, etc.) and the degree of its compatibility with the historical building.

Acknowledgements

We want to express our deepest gratitude to participants in the survey for their time and energy. Without them, this research would not have come out.

References:

1. Han, Yeo, Utaberta, Nangkula, Asif, Nayeem, Daud, and Norizan. Sustainability in Architectural Conservation of Heritage Building: A Qualitative Approach. 10.1007/978-981-15-3765-3_20. 2021
2. ICOMOS. the ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage, ICOMOS New Zealand (Inc.). 2010. Online available at https://www.icomos.org
3. Heritage Office, NSW Department of Planning, and the Royal Australian Institute of Architects .New uses for heritage places, State of New South Wales through the Heritage Office, NSW Department of Planning, Australia, 2008.
4. Robert M. Groves Floyd J. Fowler, Jr. Mick Couper James M. Lepkowski Eleanor Singer Roger Tourangeau. survey methodology, John Wiley & Sons, Inc., New Jersey, 2004.
5. The In Moment Team .7 Common Types of Surveys, 2022. Online available from https://inmoment.com
6. Charles Bloszies, Old Buildings New Designs, Princeton Architectural Press, New York, 2012.
7. ICOMOS. Resolutions of the Symposium on the Introduction of Contemporary Architecture into Ancient Groups of Buildings, at the 3rd ICOMOS General Assembly, 1972. Online available at https://www. icomos .org
8. the NSW Heritage Office, the Royal Australian Institute of Architects NSW. Design in Context, Crown Copyright, Australia, 2005.

9. Rudolf Arnheim. The Dynamics of Architectural Form, University of California Press, 1977 .
10. Śladowski, G., Szewczyk, B., Barnaś, K. et al. The Boyen Fortress: structural analysis of selecting complementary forms of use for a proposed adaptive reuse project. Herit Sci 9, 76, 2021. https://doi.org/10.1186/s40494-021-00550-z