Online Journal of Art and Design
volume 13, issue 4, October 2025
DOI: https://doi.org/10.30935/ojad/2513055

Determining Applicable Facade Design Decisions in the Architectural Environment Using the AHP Method After an Earthquake

Merve İLHAN[1], Prof. Dr. Mine BARAN[2], Prof. Dr. F. Demet AYKAL[3]
[1]*Dicle University, Faculty of Architecture, Diyarbakir, Turkey. merveilhan2016@gmail.com*
[2]*Dicle University, Faculty of Architecture, Diyarbakir, Turkey. mbaran40@gmail.com*
[3]*Dicle University, Faculty of Architecture, Diyarbakir, Turkey. demetaykal@gmail.com*

Abstract
In this study, priority facade design decisions were determined using expert opinions and Analytical Hierarchy Process (AHP) methods during the reconstruction process of structures following the February 6, 2023 Kahramanmaraş earthquakes. The aim of the study is to determine the priorities in facade design during the post-earthquake reconstruction process and to include them in the decision-making process. Facade design decisions of the structures to be built in Kayapınar district of Diyarbakır province, which were built after 2000 and were damaged in the earthquake, were discussed. The region was selected as the study area because it attracted attention with its rapid reconstruction process. Facade design criteria determined by literature and expert opinions were evaluated with the AHP method. The study showed that design priorities changed with the earthquake disaster and that this change could be effective in the decision-making process of designers. According to the analyzes, the criteria of "reliable", "economic", "compatible with the local texture" and "compatible with the surrounding structures" were found to be priority in the facades in the study area. Thus, it was determined that the priority value of the design criteria may differ depending on the earthquake disaster and regional needs. For example, while aesthetic and innovative approaches are preferred in normal conditions, elements such as economy and security have become priorities in the post-disaster process. The study, in which interview forms and decision support tools are used together, provides a multidisciplinary approach to the design process and provides scientific contributions to the reconstruction process. Suggestions have been developed for designers to make fast, scientific and effective decisions in reconstruction areas after earthquake disasters.
Keywords: Post-Earthquake Design, AHP, Facade Design, Reconstruction

1.INTRODUCTION
In architecture, design is the process of producing a solution that addresses a specific problem or need. Architects are expected to develop designs at structural or urban scales that respond effectively to the given context. The design process involves multiple phases and factors. In recent years, with advances in science and technology, various tools and methods have been employed in architecture to achieve more efficient designs. Changing social, environmental, and economic conditions create new opportunities while also introducing new design challenges. Events such as natural disasters and wars, in particular, result in the loss of architectural structures, placing significant responsibility on designers. In reconstruction efforts, designers must determine their priorities for the new structures to be built in place of the demolished ones. In this context, the need for tools and methods that can generate design solutions against post-disaster structural losses is increasing. While the literature contains numerous studies on post-disaster reconstruction and design processes, a balance must be struck between structural and aesthetic elements during reconstruction. Therefore, specific aspects of building design, such as facades, should not be overlooked.

The central problem addressed in this research is the difficulty designers face in making accurate and rapid decisions during in-situ or new reconstruction processes following structural and urban losses caused by an earthquake. The lack of clearly defined design priorities in these situations can lead to prolonged decision-making and delayed solutions. For the reconstruction of structures lost after a disaster, comprehensive research is needed to determine how aspects such as urban identity, user attachment, and structural safety should be incorporated into facade design.

The aim of this study is to identify the factors that influence facade design decisions in new structures that replace those lost due to natural disasters such as earthquakes. The goal is to enable designers to make accurate, swift, efficient, and scientific decisions in response to the challenges that arise during such crises.

The study focuses specifically on facade design decisions for buildings in the Kayapınar district of Diyarbakır, which was affected by the Kahramanmaraş earthquakes. Rather than addressing general design principles, the study identifies context-specific design priorities relevant to a particular region and period. Accordingly, the research is framed within the context of the structural losses experienced in 11 provinces of Türkiye after the Kahramanmaraş earthquakes and the subsequent architectural solutions. Fieldwork findings are based on data from buildings constructed after 2000 in the Kayapınar district of Diyarbakır that suffered significant damage in the earthquake and entered the reconstruction phase. The study investigates design problems and proposed solutions encountered in the facade design of these structures. It identifies which criteria and strategies should be prioritized in the facade design decisions of reconstructed buildings in the aftermath of a disaster. A combination of qualitative and quantitative data analysis methods was used through the implementation of the Analytic Hierarchy Process (AHP) method and interview forms, as opposed to other decision support methods such as ANP (Analytic Network Process) and ELECTRE (Elimination and Choice Expressing Reality). The use of multidisciplinary methods enabled designers to reach effective and comprehensive decisions. The study offers significant contributions to the literature regarding facade design decision-making in post-disaster reconstruction processes.

2. ARCHITECTURAL DESIGN AND EARTHQUAKE

Architectural design is an interdisciplinary production process that combines structural elements such as aesthetics, functionality, and safety within historical, cultural, and technological contexts (Kolarevic, 2019). This process depends on numerous variables, including user requirements, site planning, building materials, building function, construction technologies, budget, sustainability, and digital innovations (Zhao & Zhang, 2020). Design variables are influenced by technological advancements, urbanization, psychological infrastructure, and socio-cultural environmental conditions. This situation compels architectural design to evolve. As the factors influencing design change, so do architectural environments. The cities and modern metropolises shaped by architectural environments continue to develop today through concepts such as sustainability and eco-friendly solutions. This development requires planning in architectural environment design in line with innovations in materials, techniques, etc. (Balcı, 2023).

Changes in architectural environments have accelerated due to factors such as population growth, urbanization, industrialization, the development of trade networks, and global climate conditions. In rapidly growing cities, new lifestyles are supported by high-rise buildings, wide roads, and advanced infrastructure systems (Kahvecioğlu & Selçuk, 2025). Changing conditions have transformed both individuals and societies, along with their built environments. Thus, aesthetic and functional requirements have been reorganized in accordance with new conditions (Liu, 2023). At this point, it can be said that natural disasters are also among the significant factors that alter architectural conditions. The impact of natural disasters on architectural design must be examined.

Among the disasters that cause significant damage to architecture, earthquakes stand out. The post-earthquake reconstruction process can pose structural and societal challenges.

Earthquakes affect not only the physical integrity of buildings but also the social and psychological structures of communities. They require the reshaping of societal ties and urban areas (Balcı, 2023). In this context, earthquake resilience, post-disaster recovery of social structures, and concepts such as accessible and sustainable design must be addressed together in the design process. Deficiencies in architectural design aimed at earthquakes and other natural disasters highlight the importance of this issue.

In planning that considers natural disasters, factors such as structural safety, environment, and ecology are of great importance (Zhao & Zhang, 2020). Earthquake resilience is a critical factor in ensuring the stability of the structure and facilitating post-disaster reconstruction. The durability of buildings and their environmental impact must be evaluated together (Rogers et al., 2022). Today, innovations in materials used to enhance building resilience, energy efficiency, the use of renewable materials, and the design of low-carbon structures are highly significant (Li & Yang, 2018). High-performance concretes, seismic isolators, and flexible structural elements increase earthquake resistance while reducing environmental impact (Balcı, 2023). Therefore, innovative approaches to earthquake-resistant design must be followed and implemented.

In this direction, post-earthquake studies often involve numerical analyses, simulations, and ground tests. Structural performance tests and various software tools modeling the effects of earthquakes contribute to the design process (Lee & Kim, 2019). Additionally, studies on the social functionality of buildings after disasters employ qualitative research methods such as surveys, interviews with expert groups, and field observations (Rogers et al., 2022).

In these studies, factors such as urban planning, infrastructure improvements, and earthquake resilience are of great importance in the reconstruction process (Davis, 2022). Rebuilding collapsed structures can result in substantial financial costs and significant time loss. Therefore, while designing at the urban scale, not only structural safety but also urban planning and infrastructure design must be considered. In this process, current structural standards, evolving technologies, local soil properties, and climate conditions, as well as social needs, are important factors. These factors, which have become significant in buildings and architectural environments, should be evaluated together.

During the post-disaster reconstruction process, design proposals should be developed with a focus on social recovery and psychological well-being. Architectural design should incorporate elements that facilitate users' adaptation to resettlement areas and support societal healing processes. At this point, effective reconstruction requires a holistic approach that considers social recovery, infrastructure improvements, and long-term safety measures. This process involves not only the rebuilding of physical structures but also the reconstruction of the social fabric. Therefore, buildings in earthquake-prone areas must follow a design approach that considers environmental, social, and economic sustainability, in addition to safety. In this regard, the design must adopt a user-centered and socially responsive approach that offers simple and feasible solutions. In post-earthquake architecture, social sustainability is as crucial as safety (Türkmen, 2020). Earthquake-responsive designs may vary across different geographies and societies depending on local conditions.

Studies conducted in earthquake-prone regions like Turkey have shown that the design process must be shaped according to local conditions. This brings the use of local components in construction after earthquakes to the agenda. For example, architectural elements such as courtyards or the use of natural materials like stone and adobe in Anatolia should be included in post-earthquake design strategies in a controlled manner. At this point, it is essential for designers to make balanced and easily applicable decisions. Therefore, urban and architectural-scale reconstruction strategies integrated with disaster management should be developed with region-specific solutions. These design strategies can be planned under categories such as ground, planning, structure, material, roofing, and facade (Shareef, 2023). Accordingly, solution proposals supported by various design methods should be developed. Methods that enable rapid and effective decision-making after earthquakes should be researched.

In this study, design criteria that influence architectural design and change after earthquakes are examined. In the literature, facade design criteria are addressed under headings such as material selection, harmony with environmental context, social interaction, architectural aesthetics, and climatic suitability (Balcı, 2023). Various research methods found in the literature that are believed to contribute to the reconstruction process and the development of architectural design have been reviewed, and some of these methods are presented in Table 1.

Table 1: Architectural Design Development Methods After Earthquake Disasters

Method	Usage
Conceptual Design	Design processes are developed in relation to a concept or idea considered after an earthquake (Zumthor, 2010).
Typological Design	It is the use of traditional building forms, materials, or design methods either as they are or reinterpreted (Rossi, 1982).
Analytical Design	It involves the analysis of social, cultural, and technical data. Numerical data such as site conditions; climate, damaged-existing structures, digital mapping, etc. are taken into account (Zhao & Zhang, 2020).
Adaptive/Re-use Design	It is the preservation, strengthening, and reuse of the only standing structures or groups of buildings after an earthquake (Günay, Torunbalcı, and Köroğlu, 2023).
Parametric Design	It enables the optimization of building needs such as space, light, and materials using digital tools (Kolarevic, 2019).
Modular Design	Buildings are constructed from flexible, economical modules that can independently grow, shrink, or cluster according to their function (Kahvecioğlu & Selçuk, 2025). Specific structural components or collective social housing can be included in this group.
Temporary / Semi-Temporary Design	Structures are designed using temporary or semi-temporary methods to quickly respond to post-disaster needs (Kahvecioğlu & Selçuk, 2025).
Environmentally Sensitive Design	Sustainable, energy-efficient, and eco-friendly buildings are designed. The use of renewable energy sources, water-saving systems, and recyclable materials is important. The habitats of other living beings are also taken into account (Zhao & Zhang, 2020).
User-Centered Design	The design process considers users' experiences, aesthetic concerns, ergonomic elements, and problems. Users are involved in the design process (Sanoff, 2000).
Risk-Focused Design	A design approach where different disaster risks are structurally assessed and incorporated into settlement planning. The goal is to improve design by obtaining risk maps for various situations and events (Davis, 2022).
User-Involved / Experimental Design	A method tested through qualitative and quantitative statistical data analysis using surveys, interviews, experimental tools, etc., to reach verifiable findings (Rogers et al., 2022).
Cognitive Design	A design method that considers user perceptions (Rossi, 1982). Buildings that survive after earthquakes can be preserved as memory spaces, or new construction areas can be organized using social clustering methods around certain social spaces to support social cohesion and recovery.
Systematic Design	Decision support networks such as AHP (Analytic Hierarchy Process) are used (Kuyrukçu & Alkan, 2019).

In this context, it has been observed that one or more of the above methods can be used to design post-earthquake reconstructed buildings by considering the correct design criteria. These design methods can be evaluated under headings such as foundation, planning, structure, material, roof covering, and facade (Shareef, 2023). The facade design decisions applied to buildings after an earthquake play an important role in shaping the buildings in terms of site-specificity, aesthetics, and functionality (Karadeniz, 2023). It has been observed that facades not only represent the external appearance of the building but also the relationship between the buildings and their current location and condition. At this point, analyzing facade design methods has been identified as a factor that will increase the success of architectural design. Therefore, the study investigates the design decisions that vary in the facades of buildings constructed after losses experienced at the urban and building scale following the earthquake. The research was conducted over a specific area.

3. FIELD STUDY

The two major earthquakes centered in Kahramanmaraş on 06.02.2023 (Mw 7.7 and Mw 7.6) caused extensive destruction across southeastern Turkey, affecting a wide region (Köse, 2023). Due to inadequate construction standards and unsuitable ground conditions, many buildings were damaged in these earthquakes (Öztürk, 2023). The destruction caused disruptions in transportation, water, and energy networks, which increased the impact of the disaster. Loss of life and property during search and rescue and post-disaster reconstruction processes deeply affected society (Sarı, 2023). The Kahramanmaraş earthquakes brought renewed attention to the importance of earthquake resilience in buildings and urban planning. Especially in areas with insufficient structural durability, ensuring earthquake safety is imperative (İmamoğlu, 2019). In addition to physically strengthening buildings, factors such as soil investigation, material quality, and sustainable urban planning were emphasized (Arslan, 1999). Crisis management and public awareness were deemed necessary during post-disaster interventions, and national and international aid gained importance (Sarı, 2023).

Eleven provinces were affected by the earthquakes in the eastern, southeastern, and Mediterranean regions: Kahramanmaraş (epicenter), Hatay, Gaziantep, Adıyaman, Malatya, Kilis, Şanlıurfa, Adana, Osmaniye, Elâzığ, and Diyarbakır. Within the scope of this study, in Diyarbakır province, 5,494 buildings sustained severe damage and 2,645 buildings moderate damage; controlled demolition was carried out on 4,716 severely and 929 moderately damaged buildings (Chamber of Civil Engineers, 2023). Following the earthquake, significant decisions were made at the city and building scale in Turkey, and projects were developed aimed at strengthening existing buildings and reconstructing risky structures (Karadeniz, 2023). The implementation of engineering services and earthquake regulations in new constructions, conducting local soil surveys, and enhancing quality control of construction materials have become priorities. The relocation of settlements to safe areas and the construction of accessible infrastructure were recommended. Environmental and health risks were mitigated during debris removal and demolition through professional teams. State-supported in-situ transformation projects were initiated (Günay, Torunbalcı, and Köroğlu, 2023).

In the Kayapınar district of Diyarbakır, the study area, 178 buildings were demolished after the Kahramanmaraş earthquakes, and the demolition of 82 moderately damaged buildings was finalized. Although the Kayapınar area was not directly severely damaged, the structural losses in the region created the need for on-site reconstruction (Aydoğan, 2023). A reconstruction process started for buildings constructed in the 2000s that were decided to be demolished for various reasons after the earthquake. The fact that these buildings are a minority compared to surrounding structures in Kayapınar has increased the responsibility of designers to produce architectural solutions post-disaster. Therefore, new buildings constructed after the disaster have started to be evaluated not only in terms of materials and structure but also regarding compatibility with the environmental context and urban fabric. The choice of this area as the study site was influenced by the fact that the demolished buildings had not yet reached the expected lifespan of reinforced concrete structures. Particularly, the demolition of multi-story residential buildings located on the first parcel of the main street highlighted structural losses causing discontinuities in the architectural environment developed over the last twenty years. Moreover, factors such as accessibility, ease of examining the rate of destruction caused by the Maraş earthquakes, and rapid structural transformation after the demolition influenced the selection of this area. Accordingly, it was deemed necessary to investigate the emergence and development of the architectural environment in this region. Structural features of the architectural environment developed in the study area and elements considered related to the earthquake are presented chronologically in Table 2.

Table 2: Development of the Architectural Environment in Kayapınar District, Diyarbakır Province

Period	Architectural Features
Pre-2000 Period	About 100 years ago, the Kayapınar area was known as a rural settlement outside the Diyarbakır city center (Arslan, 1999). Although the ground was solid and rocky, it had been used as agricultural land for many years, which led to a decrease in the soil's load-bearing capacity and the presence of alluvial components (İmamoğlu, 2019). Construction during this period was mostly unplanned and uncontrolled, limited to single-story houses intended for agricultural use (Bağlı & Binici, 2005). This situation delayed ground surveys and urban development in the region (Yılmaz, 2019).
2000–2010 Period	During these years, with increased rural-to-urban migration, the Kayapınar area rapidly underwent urbanization, and informal settlements like squatter houses became widespread. At the same time, reinforced concrete buildings ranging between 5 and 7 stories were constructed (Özer, 2021). The planning of these buildings was generally inadequate, making them vulnerable to earthquake risks. The use of low-quality concrete and insufficient reinforcement weakened the structural integrity (İmamoğlu, 2019). Traditional elements of Diyarbakır houses such as stone textures and courtyards were not transferred to this area.
2010–Present Period	In this period, ground surveys were conducted more extensively, and improvements and reinforcement methods were applied in the reinforcement (İmamoğlu, 2019). The building heights generally ranged from 8 to 12 stories, and structural durability was increased through modern construction techniques and the use of quality materials. Efforts were made to create sustainable environments for everyone by increasing green spaces and social facilities (Demir Kayan & Biçen, 2023).

In the study area, buildings that were demolished generally exhibited errors in ground use, insufficient engineering practices, and user-related mistakes. Technical regulations developed after 2010 have reduced the extent of structural collapse in the area. This situation has made the influence of existing buildings an important factor in the facade design decisions of new constructions, placing significant responsibility on designers. Examples of facades in the study area, related design elements from the literature, and visual analyses are presented in Table 3.

Table 3: Fcaade Examples and Visual Analyses in Kayapınar District, Diyarbakır Province

Some Existing Building Examples and Visual Facade Analyses
    (İlhan Archive,2020-2021)
The rapid construction in the region has caused discontinuities and irregularities in the urban silhouette, but over time a common facade style has emerged. For example, in housing complexes, increasing social amenities and green spaces has led to a certain order and repetition in the silhouette, contributing to a sustainable and identity-rich urban fabric. Aesthetic and functional facades, detached from traditional textures, have been used with region-specific color and texture combinations that enhance the cityscape. No facade elements or cladding materials posing significant safety risks have been observed. Sloped roof systems and solar energy solutions have been preferred for roof coverings, though their use has decreased over time due to aesthetic concerns. The use of large openings and wide balconies in these buildings has reflected planning disadvantages in terms of earthquake resistance, increasing the need for materials and engineering efforts. Literature related to the region generally recommends incorporating local materials and modern interpretations of traditional architectural elements in facade designs.

DOI: https://doi.org/10.30935/ojad/2513055

Some Demolished Building Examples and Visual Facade Analyses

(İlhan Archive,2020-2021)

After the earthquake, the buildings that were decided to be demolished generally consisted of simple facades with large openings constructed in the 2000s, often lacking proper engineering services. Heavy damage was also detected in these reinforced concrete structures, which have not yet reached the end of their service life, due to misuse and other reasons. Rather than being isolated cases among existing buildings, the facade design decisions for new constructions have become an important issue. For example, architectural traces in the buildings that were not demolished—such as color and texture scales—can be design elements that might be repeated in new buildings. However, a reduction in openings or the likely use of modern cladding materials in new buildings will make them be perceived differently from existing structures. Therefore, it will still be possible to perceive the earthquake's traces years later by looking at the new constructions. At this point, ensuring a safe and aesthetic balance between existing facades and new designs has emerged as a responsibility for designers. After the earthquake, it has been observed that in addition to various facade design criteria in architecture, some criteria specific to post-disaster processes must be prioritized. In the literature, environmental harmony, material quality, user perception, and social interaction have been stated to play a decisive role in facade design (Balcı, 2023). This situation has made it mandatory to evaluate certain architectural decisions in facade design in the region.

In this context, how facade design criteria are prioritized in the architectural production after earthquakes should be sufficiently researched in a regional context. On-site observations and visual analysis studies of the facade designs of sample buildings in Kayapınar should be enhanced with user opinions and both qualitative and quantitative methods. Expert opinions related to the field have been consulted in the study methodology, and the relevant process steps are presented sequentially.

4. MATERIAL AND METHOD

In the literature, a lack of scientifically verifiable, testable, and systematic solutions in taking design decisions for post-earthquake constructions in architecture has been identified. Rapid and effective decision-making is deemed necessary for developing solutions in post-earthquake architectural design processes. This study was conducted based on buildings in the Kayapınar district of Diyarbakır that were ordered to be demolished following the Kahramanmaraş earthquakes. After a literature review in the study area, architectural design recommendations for post-earthquake demolition zones were developed using two different methods. Accordingly, two scientific methods were employed in the study. The first is the "Interview Form for Design Method Based on Statistical Data" application. Data obtained from the interview form developed through this method were analyzed using qualitative and quantitative methods (Rogers et al., 2022). The second tool used in the study is the "Analytical Hierarchy Process (AHP) Decision Support Tool for Structural Design Decisions" application.

In the first method, qualitative and quantitative data were obtained from experts through interview forms regarding spatial needs, material preferences, environmental compatibility, user requirements, and safety perception. In the second stage, the Analytical Hierarchy Process (AHP) method was applied. AHP is one of the multi-criteria decision-making (MCDM) techniques and allows for the analysis of complex decision problems through hierarchical structures (Kuyrukçu & Alkan, 2019).Thus, the importance values of criteria related to facade design (such as environmental compatibility, material quality, aesthetic integrity, structural safety, etc.) were determined based on expert opinions. An objective evaluation among alternative decisions was made using the AHP method. The process steps of the study are summarized in Table 4.

Table 4: Architectural Design Development Methods After Earthquake Disaster

Process Step	Content
Problem Identification	The study problem was the lack of proper decisions made on-site during the post-earthquake reconstruction process. Problems such as the constructed buildings damaging the existing texture, urban identity, and users' sense of belonging were identified.
Literature Review	• The impact of earthquakes on architecture both in Turkey and worldwide has been examined. • Building losses and design problems experienced during earthquakes have been analyzed. • Factors arising from the loss of buildings and design elements that need to be considered when constructing new buildings were investigated. • Literature on ground conditions, structure, planning, materials, roofing, and facade design of buildings was reviewed.
Identification of Limitations	The study was limited to multi-story residential buildings constructed in the Kayapınar district of Diyarbakır during the 2000s, which were demolished after the Kahramanmaraş earthquakes. Facade design decisions for buildings to be constructed especially on the first parcels along the main street, where losses occurred, were addressed. Thus, the study was confined to the Kahramanmaraş earthquakes, Diyarbakır province, Kayapınar district, multi-story residential buildings, and facade design decisions.
Determination of Criteria	To identify effective and necessary criteria in facade design in the study area, related literature was reviewed.
Completion of Interview Forms	Interviews were conducted with a group of 15 architects and engineers experienced in the study area to obtain expert opinions. Conducting interviews with 15 experts was effective due to five questions asked in the interview form. Statistically consistent qualitative and quantitative analyses require the number of questions to be directed to participants at 3 to 5 times the number of participants. The data obtained were analyzed using qualitative and quantitative methods, and the prominent facade design criteria in the study area were determined.
AHP Application	The facade design criteria highlighted in the interview form analyses for the study area were evaluated using the AHP scale, determining the importance levels of the criteria. Both the AHP and interview form were applied to the same expert group.
Discussion of Findings	Findings from the interview form and AHP scale analyses were discussed.
Presentation of Conclusions and Recommendations	The study concluded that using two methods together is effective in developing design decisions after an earthquake. Usable facade design decision recommendations were created for residential buildings in Diyarbakır.

In this study, by using two methods simultaneously and complementarily, user-centered analytical solutions supported by expert opinions were achieved. It can be said that the study method was tested through a field study conducted in the Kayapınar district of Diyarbakır province. The reason for selecting this region was that following the Kahramanmaraş earthquakes, it experienced a limited level of structural loss and presented an exemplary urban fabric undergoing a reconstruction process. Thus, decisions for different designs in various study areas can be developed. Accordingly, the objectives of the study's methodological steps are presented in Table 5.

Table 5: Architectural Design Development Methods After Earthquake Disaster

Stage	Method / Tool	Purpose
Review of studies related to post-earthquake architectural design	Literature analysis	Identify scientific gaps and needs
Evaluation of literature data, user needs, expert opinions, and environmental context	Interview form application	Determine important factors for design decisions
Definition of decision variables and alternatives to be considered in the design	Interview form analyses	Establish the decision scale for the AHP method
Assessment of important and alternative design factors	AHP (Analytic Hierarchy Process)	Achieve efficient design decisions through a scientific method

Presentation of an integrated model combining both methods	Combined use of qualitative and quantitative methods	Provide a scientific and holistic approach to design decisions
Field testing of the developed method	Diyarbakır/Kayapınar case field study	Implement the method and contribute to related publications in the field

When the methodological stages of the study are followed, the materials section that forms the literature of the study has been completed in order to identify scientific gaps and needs. During the phase of determining facade design criteria in post-earthquake on-site reconstruction areas, certain design criteria obtained from the materials section have come to the forefront. The effects of these criteria on facade design elements in architectural processes following earthquake-induced reconstruction were investigated. Table 6 presents the facade design criteria derived from the literature that stand out in post-earthquake building production.

Table 6: Factors Influencing Facade Design in Post-Earthquake Architecture

Factors	Importance of Facade Design Criteria
Safety-Durability	Facades must be resistant to disasters such as earthquakes, wind, and floods (Düzgün & Ünal, 2017).
Aesthetics	The general appearance of the facade and its contribution to the city are important (Liu, 2023).
Functionality	Concerns such as recognition, accessibility, and indoor light control should be reflected in facade design (Li & Yang, 2018).
Energy Efficiency	Suitability to user needs and functionality should not be overlooked (Neuman, 2020).
Environmental Compatibility	In-situ development should ensure the facade is in harmony with the surrounding built environment (Liu, 2023).
Material Quality	The structure should be earthquake-resistant and designed for longevity (Düzgün & Ünal, 2017).
Social Interaction	Independent of other factors, design effects reflecting social events and conditions should be identified on facades (Sarı, 2023).
Contextual Appropriateness	It should be compatible with the region’s historical and cultural values (Sarı, 2023).
Economic Feasibility	Cost factors and economic sustainability should be ensured (Türkmen, 2020).
Sustainability	Energy efficiency and environmental impacts must be investigated (Sönmez, 2020).

In addition to the facade design criteria obtained from the literature, interviews were conducted with 15 experts (architects and civil engineers) who have at least five years of experience in the relevant field, in order to incorporate expert opinions into the study. These experts shared their knowledge and experience regarding the factors influencing facade design in post-earthquake on-site reconstruction processes. The interview form was carefully prepared and implemented to better understand the structural analyses and design decisions made by these experts. Along with the literature-based criteria, the questions listed in Table 7 were asked to gather expert insights.

Table 7: Interview Form Stage

Interview Form Questions
1.In architectural design, how would you rank the importance of the following elements: ground, structure, planning, material, roof, and facade? Please evaluate them on a scale of 1 to 6, from the most to the least important. 2. What are the factors that should be considered in facade design in architecture? 3.After the loss of architectural elements in the built environment, what factors should be taken into account in facade design? 4.What should be considered in the facade design of new buildings to be constructed in place of those lost due to an earthquake disaster? 5.Following the February 6, 2024 Maraş Earthquakes, what should be considered in the facade design of new buildings to be constructed in place of those lost in the Kayapınar District of Diyarbakır?

The interview results played a significant role in grounding the study’s findings on a solid scientific basis. The form used during the interviews enabled the collection of both quantitative and qualitative data regarding the factors affecting facade design in post-earthquake in-situ reconstruction processes. Drawing from their field experience and current engineering practices, the experts shared important observations on facade design and contributed to strengthening the scientific foundation of design decisions.

The AHP decision support scale used in the study was developed based on data obtained from the literature and expert opinions, focusing on the prominent facade design criteria. At this stage, the most frequently mentioned criteria from the interview forms were considered to determine the priority values among facade design criteria. Thus, AHP systematically evaluated decision variables and alternatives in multi-criteria decision-making processes. The priority values among decision variables and alternatives were examined to understand the relationships between important factors in facade design decisions. The AHP scale was structured in light of expert opinions and literature findings, and it was implemented to identify which facade design criteria are more critical. This process revealed the relative importance order among criteria, offering a scientific approach to optimize design decisions. By developing the AHP scale, the study determined which facade design decisions carry more significance. The creation process and operational steps of the AHP scale used in this study are explained in Table 8.

Table 8: The Process of Developing the AHP Scale

Process Step	Process Description
Problem Definition and Goal Setting	Goals related to the resilience of reconstruction in terms of aesthetics, functionality, environment, and social aspects were determined.
Determination of Criteria	Criteria affecting facade design in the reconstruction process were identified. These criteria were established through expert opinions and literature review.
Establishment of Hierarchy Among Criteria	The hierarchical arrangement of the identified facade criteria was obtained through qualitative and quantitative analyses of the interview forms. The main goal (decision-making for facade design) was placed at the top, while decision variables and alternatives were positioned at the second level to create the AHP scale.
Collection of Expert Opinions	To determine the importance levels of the criteria, the most frequently repeated responses from experts (architects and engineers) in the interview forms were used to evaluate the scale. Experts used a scale from 1 to 9 to assign comparative weights among the criteria. At this stage, each criterion was compared against the others.
AHP Calculations	Uzman görüşlerinden elde edilen verilerle AHP hesaplamaları yapılmıştır. **Construction of the Comparison Matrix:** Comparison matrices were created based on scores given by the experts. **Construction of the Normalized Matrix:** Each criterion was normalized to calculate its eigenvalue. **Eigenvector Calculation:** The weight ratios of each criterion were calculated. **Consistency Check:** The consistency ratio (CR) was calculated to verify the consistency of the experts' ratings. The CR value must be less than 0.1; otherwise, the criteria need to be reviewed.
Evaluation of Results	Using the obtained weights, the influence of each criterion on facade design during the reconstruction process was evaluated. Criteria with greater importance were identified, leading to efficient facade design decisions.

Below, the structuring of the AHP scale and the applied scoring system are detailed. The appearance of the AHP scale as found in the literature is presented in Table 9.

Table 9: AHP Scale

AHP SCALE	
Purpose	Expected Decision to be Met by the Scale
Decision Variables	Main Criteria (evaluated on a scale from 1 to 9)
Alternatives	Sub-Criteria

Below, Table 10 presents the AHP 1-9 value scale criteria.

Table 10: Scale Criteria

	VALUE	
SCALE CRITERIA	**Equal Importance**	**1**
	Slightly More Important	**3**
	Important	**5**
	Much More Important	**7**
	Absolutely More Important	**9**
	Intermediate Values	**2,4,6,8**

The AHP scale and scoring system found in the literature is a standard method used to determine the relative importance of criteria in decision-making processes. The scoring system allows decision-makers to base their preferences on numerical values, enabling an objective and systematic analysis. This scale makes it possible to prioritize facade design decisions according to the weights assigned through pairwise comparisons of each criterion. The study methodology was developed by applying these scales, thereby reaching findings specific to the field of study.

5. FINDINGS AND DISCUSSION

This study is based on findings obtained through literature data and expert interviews. According to the study results, it was observed that design decisions may vary in post-earthquake on-site reconstruction areas. It was also revealed that facade design criteria in architecture need to be incorporated into the design with changing priorities after an earthquake. Additionally, analysis data from reports prepared following the Kahramanmaraş earthquakes and field studies have strengthened the study's findings. Field data further developed the study results. The findings, compiled from literature and on-site observations, are summarized in Table 11.

Table 11: Findings from Literature Data and Field Study

Topic	Findings/Conclusions
Architectural Trends	In the 2000s, architectural structures in Diyarbakır exhibited an approach that combined modern design concepts with traditional elements.
Developments in Facade Designs	The facade designs of residential buildings constructed in the 2000s featured widespread use of bright spaces with large facade openings. Wide windows, terraces, and balconies enhanced the use of natural light and the aesthetic value of the buildings. However, these facades were criticized for being disconnected from traditional facade design. Nonetheless, facades enriched with various color choices and surface coatings increased visual diversity and contributed positively to the city skyline.
Functional Changes	In the 2000s, housing layouts were planned to better meet user needs. Buildings were arranged rhythmically in wide, flat areas with environmental arrangements aimed at increasing social interaction.
Effects of Structural Loss	After the Maraş earthquakes, many buildings in Diyarbakır city center were heavily damaged or completely destroyed. This situation highlights the need to reassess architectural values in the design processes of new buildings. It is crucial that new housing is designed with correct aesthetic and functional decisions.
Importance of Social Participation	Increasing social participation in new housing projects should bring forward more functional and user-friendly buildings designed with public needs in mind. Buildings sensitive to community needs and aligned with sustainable urbanization goals should be designed.

When the study findings are examined in detail, the results obtained through the interview forms are presented in order. In the first question of the interview form, based on expert opinions, the relative importance of six structural components in building design was determined. In this assessment, the scores given for each component were summed, and the frequency and percentage of the component with the highest score were identified. This analysis showed that, according to experts, the facade criterion was considered less important compared to the other structural components. However, since the study aimed to investigate how the lost buildings in the study area were generally positioned within the urban silhouette relative to surrounding structures, the other questions in the interview form were developed focusing on facade design. Table 12 below presents the qualitative data analysis of the variables obtained from the first question of the interview form.

Table 12: Interview Form Findings - 1

Variable	Code	f	%
Priority order of importance for ground, structure, planning, material, roof/height, and facade features in design	Structure	80	25,4
	Ground	51	16,2
	Planning	83	26,3
	Material	45	14,3
	Roof/Height	31	9,8
	Facade	25	8
	Total	315	100

The second question of the interview form evaluated the prominent facade design criteria according to experts using qualitative analysis. The most frequently repeated three common responses were grouped together and coded under specific thematic headings. The frequency and percentage rates for each code were determined, allowing the identification of the most prominent criteria for each theme. The findings did not reveal any new elements beyond those found in the literature; however, changes were observed in the facade design criteria emphasized after the earthquake. **Table 13** below presents the prominent facade design factors according to experts, obtained from the interview form.

Table 13: Interview Form Results - 2

Theme	Code	f	%
What are the factors to be considered in facade design in architecture?	Aesthetics	14	93
	Functionality	12	80
	Material Quality	10	67
Factors to be considered in facade design after losses in the architectural environment	Suitability to the Site	12	80
	Economic Feasibility	8	53
	Sustainability and Energy Efficiency	6	40
Factors to be considered in facade design for buildings to be constructed in place of those lost after the earthquake disaster	**Safety – Durability**	**15**	**100**
	Suitability to the Site	**10**	**67**
	Economic Feasibility	**8**	**53**
Factors to be considered in facade design for buildings to be constructed in place of those lost in Kayapınar District, Diyarbakır Province, after the February 6, 2024 Maraş Earthquakes	**Safety – Durability**	**15**	**100**
	Environmental Compatibility	**12**	**80**
	Economic Feasibility	**10**	**67**

The data obtained from the interview forms were evaluated using qualitative analysis methods, and based on the most frequently repeated responses, AHP scales were prepared and sent back to the experts for further feedback. In this process, the AHP scale was administered to 15 expert participants. The procedural steps were analyzed in a table format based on AHP formulas, and the values of each decision variable and alternative were calculated. In the developed AHP scale, decision variables and alternatives were idealized by prioritizing the most frequently repeated responses and post-earthquake design criteria. Accordingly, the main criteria (decision variables) were established as Safety-Durability, Economic Feasibility, Environmental Compatibility, and Suitability to the Site, while aesthetics, functionality, material quality, sustainability, and energy efficiency

Online Journal of Art and Design
volume 13, issue 4, October 2025
DOI: https://doi.org/10.30935/ojad/2513055

were identified as sub-criteria (alternatives). The developed AHP scale, including the main and sub-criteria scales, is presented in Table 14.

Table 14: AHP Main and Sub-Criteria

<table>
<tr><td colspan="8">AHP SCALE</td></tr>
<tr><td>Purpose</td><td colspan="7">To Make Facade Design Decisions for Buildings Requiring On-Site Reconstruction After an Earthquake Disaster</td></tr>
<tr><td>Decision Variables</td><td colspan="2">Economic Feasibility</td><td>Environmental Compatibility</td><td>Site Suitability</td><td colspan="3">Safety - Durability</td></tr>
<tr><td>Alternatives</td><td>Aesthetics</td><td>Functionality</td><td colspan="2"></td><td>Material Quality</td><td>Sustainability</td><td>Energy Efficiency</td></tr>
</table>

When the AHP scale, created based on the interview form data, was re-administered to the experts, a feasible decision was reached with a consistency index below 0.5 in 60% of cases. To obtain an idealized prioritized facade design decision, a new scale was developed by combining the most frequently repeated responses from the collected AHP scales. Table 15 below presents the AHP scale created by merging the most frequently repeated design decisions through qualitative analysis.

Table 15: Common AHP Scale Derived from Interview Form Findings

<table>
<tr><td colspan="11">AHP SCALE</td></tr>
<tr><td colspan="11">Instructions: Compare the criteria below and indicate the importance of each criterion relative to the others. Use a scale from 1 to 9, where 1 means equality, 3 means slightly more important, 5 means important, 7 means much more important, and 9 means absolutely more important.</td></tr>
<tr><td></td><td>9</td><td>7</td><td>5</td><td>3</td><td>1</td><td>3</td><td>5</td><td>7</td><td>9</td><td></td></tr>
<tr><td>Economic Feasibility</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td>Environmental Compatibility</td></tr>
<tr><td>Economic Feasibility</td><td></td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td><td>Suitability to Site</td></tr>
<tr><td>Economic Feasibility</td><td></td><td></td><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td><td>Safety - Durability</td></tr>
<tr><td>Environmental Compatibility</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Suitability to Site</td></tr>
<tr><td>Environmental Compatibility</td><td></td><td></td><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td><td>Safety - Durability</td></tr>
<tr><td>Suitability to Site</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>x</td><td></td><td>Safety - Durability</td></tr>
</table>

As a result of the analyses of the idealized AHP scale obtained from the interview form findings, a feasible design decision for facade design in the study area was reached. The AHP application steps for this decision and the Comparison, Normalized, and Eigenvalue matrices determining the priorities of the design criteria are presented sequentially. By following these steps, the importance level of each element in the decision-making process for the relevant criteria and sub-criteria aligned with the study purpose was determined. Additionally, the internal consistency of the scale was evaluated and its scientific validity was examined. In the first phase, the relationships among decision variables were analyzed using the comparison matrix formula (Table 16).

Table 16: Comparison Matrix Formula and Application

Comparison Matrix Formula and Application

$$A = [a_{ij}]$$

- $a_{ij} = \frac{1}{a_{ji}}$
- $a_{ii} = 1$

(Kuyrukçu & Alkan, 2019).

	Economic Feasibility	Environmental Compatibility	Suitability to Site	Safety - Durability
Economic Feasibility	1	3	5	1/3
Environmental Compatibility	1/3	1	7	1/3
Suitability to Site	1/5	1/7	1	1/7

Safety - Durability	3	3	7	1
TOTAL	4,533	7,142	20	1,761

In the next step, the Normalized Decision Matrix formula was used to determine the weights of the decision variables. Using the data obtained from the comparison matrix, the relative importance of each criterion was calculated (Table 17).

Table 17: Normalized Decision Matrix Formula and Application

Normalized Decision Matrix Formula:

$$\tilde{a}_{ij} = \frac{a_{ij}}{\sum_{i=1}^{n} a_{ij}}$$

(Kuyrukçu & Alkan, 2019).

	Economic Feasibility	Environmental Compatibility	Suitability to Site	Safety - Durability
Economic Feasibility	0,220	0,420	0,25	0,189
Environmental Compatibility	0,073	0,140	0,35	0,189
Suitability to Site	0,044	0,020	0,05	0,081
Safety - Durability	0,661	0,420	0,35	0,567

Then, using the Eigenvalue Calculation formula, the relative importance ranking of the decision criteria was determined (Table 18).

Table 18: Calculating the Maximum Eigenvalue Formula and Application

Calculating the Maximum Eigenvalue Formula0:

$$w_i = \frac{1}{n} \sum_{j=1}^{n} \tilde{a}_{ij}$$

(Kuyrukçu & Alkan, 2019).

Economic Feasibility	1,239/0,269	4,605
Environmental Compatibility	0,779/0,188	4,143
Suitability to Site	0,199/0,048	4,145
Safety - Durability	1,755/0,499	3,517
TOTAL/4		16,410/4=4,102
Consistency Index		0,102/3=0,034
T.İ. /0,89 (Constant multiplier)		0,038
Because the consistency index is less than 0.5		

The following scale was evaluated to obtain findings related to certain alternatives based on the scale derived using the AHP method (Table 19).

Table 19: AHP Priority Facade Decision Table – Formula and Application

AHP SCALE					
Purpose	Determining Priority Facade Design Decisions for On-Site Reconstructed Buildings After the Earthquake				
Decision Variables	Economic Feasibility		Safety - Durability		
Alternatives	Aesthetics	Functionality	Material Quality	Sustainability	Energy Efficiency

Within the framework of economic suitability, the comparison matrix, normalized matrix, and eigenvalue for the sub-criteria of aesthetics and functionality factors under the Local Weight Calculation for alternatives are presented below (Table 20). According to the obtained results, among economically suitable materials, preferring aesthetic ones over functional ones is considered a more appropriate decision.

Online Journal of Art and Design
volume 13, issue 4, October 2025
DOI: https://doi.org/10.30935/ojad/2513055

Table 20: AHP Priority Facade Decision Table Formula and Application

Comparison Matrix			
	Aesthetics	Functionality	
Aesthetics	1	7	
Functionality	1/7	1	
TOTAL	1,142	8	
Normalized Decision Matrix			
	Aesthetics	Functionality	
Aesthetics	0,875	0,875	
Functionality	0,125	0,125	
Calculating the Maximum Eigenvalue			
Aesthetics	(0,877) +(0,875) /2		= 0,875 %87,5
Fonksiyonellik	(0,125) +(1,125) /2		=0,125 %12,5

Within the scope of Local Weight Calculation for the security and durability factors, the comparison matrix, normalized matrix, and eigenvalue for the sub-criteria such as material quality, sustainability, and energy efficiency are presented below (Table 21). According to the obtained findings, among the materials suitable in terms of security and durability, preferring sustainable ones is considered a more appropriate decision.

Table 21: AHP Priority Facade Decision Table Formula and Application

Comparison Matrix			
	Material Quality	Sustainability	Energy Efficiency
Material Quality	1	1/7	1/3
Sustainability	7	1	3
Dayanıklılık	3	1/3	1
TOTAL	11	4	4,333
Normalized Decision Matrix			
	Material Quality	Sustainability	Energy Efficiency
Material Quality	0,090	0,035	0,076
Sustainability	0,636	0,25	0,692
Energy Efficiency	0,272	0,83	0,230
Calculating the Maximum Eigenvalue			
Material Quality	(0,090+0,035+0,076) /3		0,172
Sustainability	(0,636+0,025+0,692) /3		0,526
Energy Efficiency	(0,272+0,083+0,230) /3		0,444

6. CONCLUSION AND RECOMMENDATION

This study found that priorities in design decisions change in post-earthquake on-site reconstruction areas. In Kayapınar district of Diyarbakır province, it was determined that identifying the priority values of design decisions for the buildings to be constructed in place of those built in the 2000s—which were either destroyed or condemned after the Kahramanmaraş earthquakes despite not having reached their expected lifespan—is important. Accordingly, the factors affecting facade design decisions in post-earthquake on-site reconstruction areas were determined using a scientific approach and a decision support tool. The factors playing a significant role in facade design after the earthquake in the study area were analyzed using expert opinions and data obtained from the AHP (Analytic Hierarchy Process) decision support tool. Based on the analyses, the research findings and recommendations are summarized in Table 22.

Tablo 22: Study Results

Study	Conclusion and Recommendations
Literature Review	Based on the data obtained from the literature, several factors affecting facade design have been identified. These factors can be expanded, but generally include: Safety-Durability, Aesthetics, Functionality, Energy Efficiency, Environmental Compatibility, Material Quality, Social Interaction, Site Appropriateness, Economic Feasibility, and Sustainability.
Qualitative and Quantitative Data	Although no additional facade design criteria beyond those highlighted in the literature emerged from the interview form data, it was observed that experts focused on the same

Analysis of Interview Forms	facade design decisions after the earthquake. Thus, an AHP scale was developed to determine the priority decision variables and alternatives in facade design.
AHP Decision Support Tool	The AHP decision support tool enabled a systematic evaluation of decision variables and alternatives related to facade design. Comparisons made using the AHP scale identified the relative importance of the decision variables, contributing to more objective and consistent decisions during the design process. This method has proven particularly valuable for post-earthquake design phases, where comprehensive assessments incorporating multiple disciplines are essential.
Importance of Multidisciplinary Approach	In addition to AHP, the use of expert opinion surveys represents a significant contribution to the literature by combining evaluation criteria from multiple disciplines. This approach facilitates more effective and sustainable design decisions through interdisciplinary collaboration.
Prominent Facade Design Criteria After the Earthquake in the Study Area	The study identified the most important factors influencing facade design in the study area. Data from expert opinions and the literature highlighted **aesthetics, functionality, safety, durability, material quality, sustainability, and energy efficiency** as prominent factors. According to the AHP scale analysis, the prioritized criteria in the study area's facades were **"economic feasibility," "compatibility with surrounding structures," "reliability," and "harmony with local texture."** It was concluded that prioritizing these criteria in future studies would lead to consistent design decisions.
Recommendations for Designers	This study demonstrated that architects can rely on expert opinions and the AHP decision support tool when making site-specific design decisions. It emphasized the need for balancing environmental and structural factors. The study offers a practical guide for architects and engineers regarding which factors to prioritize during post-earthquake facade design. These findings will enable professional designers to develop safer, more functional, and aesthetically pleasing solutions during decision-making processes.
Suggestions for Future Research	The findings provide a valuable resource for architectural facade design in areas reconstructed after natural disasters like earthquakes and raise several questions for future research. Similar studies could be conducted in different geographic regions and for various disaster types. Moreover, it is recommended that decision support tools such as AHP be tested with larger datasets and broader, multi-criteria evaluations.

In conclusion, this study introduced a scientific approach to the facade design process in post-earthquake in-situ reconstruction areas. Through evaluations using the AHP decision support tool and expert opinions, it contributed to designers making more informed and sustainable decisions. This will enable the construction of buildings that are safer, more durable, and environmentally friendly, both in terms of safety and aesthetics. The main general conclusions of the study can be summarized as follows:

- Expert opinions and the AHP decision support tool can be used to reach specific design decisions for a given region.
- In this study, for the Kayapınar area where in-situ reconstruction was decided after the Kahramanmaraş earthquakes, the prioritized design factors determined as decision variables based on interview forms and AHP scale data were: Safety-Durability, Economic Feasibility, Environmental Compatibility, and Site Appropriateness, in that order. Accordingly, alternatives were developed for the decision variables Safety-Durability and Economic Feasibility. For the Economic Feasibility variable, Aesthetic alternatives were preferred more than Functional ones. Among alternatives suitable for Safety and Durability, selections were made in the order of Sustainability, Durability, and High Material Quality. It should be noted that these criteria were ranked according to experts and locals in the area.
- The study provides a scientific resource to architects designing in the region, guiding which factors to prioritize in their design decisions.
- Supporting the multidisciplinary AHP decision support method with an additional interview form increased the significance of its inclusion in the architectural design process.

Although designers may reach similar decisions based on their professional experience, the design factors may vary depending on each case and situation. Solutions influenced solely by one designer's experience may not be as effective. Therefore, the developed method demonstrated that more comprehensive design decisions involving different disciplines and evaluation criteria can be made. Thus, the study meets the need to offer designers more practical and efficient design decisions in post-earthquake reconstruction. It was also concluded that these criteria may vary according to the type of disaster and regional needs, and that disaster conditions influence which priorities become more prominent.

7. REFERENCES

Arslan, H. (1999). The process of urban development and spatial change in Diyarbakır. Diyarbakır: Dicle University Publications.

Aydoğan, B. (2023). Post-earthquake structural analysis report of Kayapınar district. Diyarbakır: Dicle University Publications.

Bağlı, M., & Binici, B. (2005). Social problems in urban transformation: The case of Diyarbakır. Journal of Society and Democracy, 2(4), 47–65.

Balcı, A. (2023). User-centered approaches in facade design. Journal of Architecture and Environment, 18(2), 44–59.

Davis, I. (2022). Disaster risk management and planning in urban areas. Springer.

Demir Kayan, B., & Biçen, A. (2023). Structural improvement applications in post-disaster construction: The case of Diyarbakır. Journal of Architecture and Design Research, 12(1), 58–75.

Düzgün, S., & Ünal, F. (2017). The role of facade systems in disaster-resilient architecture. Journal of Disaster Management, 3(1), 44–60.

Günay, B., Torunbalcı, M., & Köroğlu, E. (2023). Post-earthquake building preservation strategies. Istanbul: Yapi Publishing.

İmamoğlu, F. (2019). Development of building stock and evaluation of ground conditions in Diyarbakır. Journal of Engineering Faculty, Dicle University, 10(2), 134–148.

Chamber of Civil Engineers. (2023). 2023 Kahramanmaraş Earthquakes Diyarbakır Report. Diyarbakır Branch.

Kahvecioğlu, P., & Selçuk, R. (2025). Temporary shelter solutions and architectural design post-disaster. Ankara: Architecture Foundation Publications.

Karadeniz, Z. (2023). Post-earthquake housing policies and reconstruction. Izmir: Architecture Research Publications.

Kolarevic, B. (2019). Architecture in the digital age: Design and manufacturing. Taylor & Francis.

Köse, H. (2023). Effects of the February 6, 2023 Kahramanmaraş earthquakes. Journal of Disaster Science and Engineering, 9(1), 13–27.

Lee, J., & Kim, H. (2019). Modeling seismic performance using BIM and structural analysis integration. Automation in Construction, 98, 132–142.

Li, Y., & Yang, Z. (2018). Urban facade design strategies for better daylight performance. Building and Environment, 145, 145–158.

Liu, W. (2023). Integrating facade design with urban context: A case study approach. Architectural Journal of Asia, 10(3), 71–85.

Neuman, M. (2020). User-centered architectural design in post-disaster housing. Journal of Housing and the Built Environment, 35(1), 91–107.

Özer, Y. (2021). The relationship between floor height and building density in the construction process of Diyarbakır. Journal of Urban Studies, 6(1), 77–89.

Öztürk, N. (2023). The relationship between ground conditions and building damage: Case study of 2023 earthquakes. Journal of Geological Engineering, 47(2), 109–124.

Rogers, K., Walker, B., & Scott, M. (2022). Community-based approaches to post-disaster reconstruction. Urban Studies, 59(4), 751–770.

Rossi, A. (1982). The architecture of the city. MIT Press.

Sanoff, H. (2000). Community participation methods in design and planning. Wiley.

Sarı, P. (2023). Public awareness and crisis management post-disaster. Journal of Disaster and Society, 2(1), 44–60.

Shareef, M. (2023). Post-earthquake architecture: A systematic review of design elements and strategies. Journal of Disaster Risk Studies, 15(1), 1–12.

Türkmen, A. (2020). Evaluation of building costs in the context of economic sustainability. Journal of Building Economics, 8(3), 77–88.

Kuyrukçu, Y., & Alkan, A. (2019). Determination of the priority order of site-specific architectural design criteria using the AHP method. Journal of the Institute of Science and Technology of Süleyman Demirel University, 23(Special Issue), 169–180.

Yılmaz, E. (2019). Effects of ground surveys on urbanization in Diyarbakır. Journal of Ground and Structure, 3(2), 21–35.

Zhao, H., & Zhang, X. (2020). Seismic resilience and ecological adaptation in modern architecture. Sustainable Cities and Society, 55, 102060.

Zumthor, P. (2010). Thinking architecture (3rd ed.). Birkhäuser.