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The divergent perspectives of civil engineers and architects in historic building restoration: A comparative analysis

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Abstract

This article delves into the distinctive viewpoints held by civil engineers and architects during the process of restoring historic buildings. The restoration of heritage structures involves complex decisions and multidisciplinary collaboration, where professionals from varying backgrounds contribute their expertise. Notably, architects and civil engineers approach restoration with different lenses, stemming from their unique educational backgrounds, professional experiences, role expectations and many various other factors. These divergent perspectives may significantly impact the overall restoration process, influencing design choices, material selection, structural interventions, and project outcomes. To shed light on this phenomenon, this study employs a comprehensive methodology. The research incorporates a meticulous literature review to elucidate existing knowledge on the subject. Subsequently, a structured questionnaire is administered to a diverse pool of practicing civil engineers and architects, aiming to capture their distinct viewpoints and perceptions regarding historic building restoration. The survey is carefully designed to explore a spectrum of factors, including project goals, design approach, project involvement, decision-making processes, and challenges. the collected data, comparing and contrasting the responses of civil engineers and architects were also presented in this research. The analysis uncovers nuanced variations in how these professionals prioritize different aspects of restoration, from historical authenticity and aesthetic considerations to structural stability and feasibility. The implications of these divergent perspectives are critically evaluated, emphasizing how they influence project outcomes and the holistic restoration process. Furthermore, the article addresses the potential benefits of bridging these perspectives, fostering enhanced interdisciplinary communication and collaboration. This article provides a comprehensive understanding of the distinct viewpoints that civil engineers and architects bring to historic building restoration. By recognizing these disparities and their implications, the restoration field can work toward more effective integration of expertise, contributing to more informed decision-making and successful restoration projects that balance both functional and aesthetic considerations.

1. Introduction

In the realm of the built environment, the distinctions between architects and engineers have long been recognized. These two professions, integral to the design and construction of structures, bring their unique perspectives, skills, and objectives to the table.

As an illustration, Davis [1] points out some differences between engineers and architects in curriculum, standards of evaluation, and allied fields in his research. Cruise [2] discusses the contested territory between architects and engineers, exploring the challenges faced in defining their roles and the increasing need for interdisciplinary collaboration. Another study by Khan and Tunçer [3] acknowledges that while boundaries within the field of engineering are blurring, architects and engineers are still viewed as distinct groups. This indicates that their approaches to architectural heritage may differ due to their unique perspectives and expertise. Holford [4] argues that while architecture and engineering share common principles, they are often seen as separate due to the growth of technology and specialization.

The division of construction history into two main areas, namely the history of structural design and the

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history of building practice, has been a subject of interest, as described by Summerson [5]. Saint [6] extends this notion by highlighting the evolution of history as it branched into art history, architectural history, and eventually engineering history, which collectively encompass a broader perspective known as construction history, a field that aims to comprehensively address the various professionals, including architects, engineers, builders, and craftsmen, involved in the complex realm of construction. Whitney [7] further expounds on this evolution by observing that the Renaissance era contributed to the separation of engineering and architecture into distinct categories, with one emphasizing structural aspects and the other focusing on aesthetics. Saint [6] states that this divide persisted through history, as exemplified by the career of Perronet, who sought to unite architecture and engineering within a social framework. Whitney [7] similarly indicates that "The development of the Ecole des Ponts et Chausses and the further need to divide and specialize the training and the labour of both the engineer and the architect, split the professions more definitively into segregated roles.". Supportingly, Argan [8] states "The one emphasizing the engineering aspect, i.e. structural analysis and calculation, and the other stressing the architectural aspect, i.e. the aesthetic appearance.". According to Straub [9], the post-enlightenment and especially the Industrial Revolution era further accentuated this division, as seen in the specialized training and distinct roles of engineers and architects. This historical context may also give rise to the differences between these two professions and the potential conflicts resulting from different approaches.

Whitney [7] thinks that "the development of the engineer created a split in the building profession"; as civil engineers bear a primary concern for the structural integrity of buildings, possessing a specialized aptitude to assess building conditions and devise interventions that ensure safety, on the other hand architects center their focus on the aesthetic and historical significance of structures, driven by a commitment to preserving architectural authenticity.

Restoration projects, operating as multidisciplinary and interdisciplinary endeavours, provide an intriguing context to explore whether such divisions and conflicts exist between architects and engineers. As suggested by Straub, this separation allows for diverse perspectives in designing structures, with one emphasizing engineering aspects and the other accentuating architectural aesthetics.

According to Whitney [7], splitting of the roles into the liberal (thinking) of a building and the mechanical (execution) of the building made the professions more definitively into segregated roles and the distance between these professions becomes a new barricade as the professions have become more expert and distinct from other aspects of building development. This barricade which may cause disparity in perspectives between civil engineers and architects may also rise to conflicts. For instance, civil engineers may advocate for structural modifications that could potentially alter a building's external appearance, while architects, recognizing the historical import of such structures, may resist these alterations to safeguard the building's inherent historical essence. Consequently, the articulation of differing viewpoints between these two professions becomes pivotal, as it influences the overall outcome of restoration projects.

Thammavijitdej and Horayangkura's [10] investigates interdisciplinary conflicts and resolutions as cultural behavior occurring between two professions, architects and engineers. In the study conducted by Genç [11], an investigation was conducted for the reasons of conflicts among architects and engineers working on construction projects. Jaffar et al. [12] in their research, considered delays in instructions from contractors, architects, or engineers as factors contributing to conflicts arising from technical issues. Furthermore, the study by Çivici [13] explored the relationship of the conflict resolution approaches architects and civil engineers involved in construction project organizations.

Marra et al. [14] states the restoration of historic buildings presents a multifaceted endeavour that necessitates the expertise of various professionals, including civil engineers and architects and it is a subject of scholarly interest whether the barricades mentioned by various scholars may be observed among architects and engineers in the field of restoration. These two separate disciplines naturally offer differing perspectives on restoration, thereby possibly contributing to a divergence in their approaches to this intricate task.

Fernandez [15] posits the conservation process is complex and not only requires a technical approach from an engineer, but may also need to address a variety of wider aspects, such as cultural and artistic qualities, or be based on a combination of scientific and humanistic values. Rabun [16] suggests that in the conservation process, engineers and architects should engage in a collaborative preliminary assessment. Di Biase and Albani [17] assert that restoration, from its inception, should function as a distinct discipline that explicitly delineates the competencies required of architects and those possessed by civil engineers. Lourenço [18] underscores that conservation engineering necessitates a unique approach and skill set distinct from those employed in the design of new constructions. While the conventional belief assigns responsibility for the restoration of historic buildings mostly to architects, D'Ayala [19] contends that structural engineers, like many participants in restoration projects, must adhere to overarching conservation guidelines.

This article undertakes a comprehensive examination of the divergent perspectives inherent in civil engineers and architects during historic building restoration. It commences by offering a concise overview of both professions and their distinct roles within the restoration domain. Subsequently, the article presents the outcomes of a survey conducted to elicit the viewpoints of practicing civil engineers and architects on a range of restoration-related issues. The analysis of survey results highlights dissimilarities in how these professionals prioritize distinct facets of restoration, including considerations of historical fidelity, aesthetic attributes, and structural robustness.

The culmination of this article involves a contemplative exploration of the implications borne by

these divergent viewpoints for the restoration process. A critical contention is posited that an enhanced recognition and understanding of these disparities could pave the way for the formulation of more efficacious strategies that amalgamate the expertise of civil engineers and architects. This effort holds the potential to foster a synergy that culminates in informed decision-making, thereby engendering successful restoration projects that judiciously balance both utilitarian and aesthetic aspects.

2. Method

Initially, a literature review was undertaken to comprehensively explore the subject. This was motivated by the recognition that the restoration of architectural heritage entails intricate interactions among diverse stakeholders, a subset of which comprises architects and civil engineers.

Primary emphasis was placed on an investigation into the historical evolution of architects and engineers, with the aim of comprehending their origins and subsequent divergence. This approach was pursued to identify potential variances in their viewpoints and methodologies. Consequently, a broadening of the research scope beyond restoration literature occurred, encompassing more extensive subjects, notably the historical development of architects and engineers. Furthermore, various stages of architectural and engineering processes were explored to examine distinctions in approaches and perspectives during design and construction activities.

The inquiry was initiated to examine the emergence and subsequent differentiation of architects and engineers in order to discern disparities in their perspectives and approaches. This encompassed not only the exploration of literature related to restoration but also the examination of interconnected subjects, such as the history of architecture and history of construction. Furthermore, an investigation into divergences in the approaches and perspectives of architects and engineers during design and construction activities was conducted. Regrettably, limited resources were available on the research topic.

Following this literature review, the subsequent phase involved the execution of interviews with experts, meticulously designed to glean insights into the distinct perspectives harboured by architects and civil engineers. These consultancies were conducted with adept professionals possessing specialized knowledge in conservation, thereby ensuring an informed foundation for formulating key thematic elements for the forthcoming questionnaire.

The decision to conduct a survey aimed at probing differences in perspectives led to the initial step of formulating a survey. This approach was considered instrumental in identifying relevant queries that could effectively capture perspective distinctions. Following the articulation of the research problem, a timeline of three weeks for the questionnaire was established. The duration of the survey was selected as three months, as according to Zheng, 95% of the responses were collected at the end of the third week [20].

Afterward, three experts in restoration field, each with diverse backgrounds, including an architect 20 years in the private sector, a civil engineer in government employment, and an architect as an academic that is researching in architectural heritage restoration, were contacted. Their contributions substantially enhanced the development of the questionnaire. This collaborative effort culminated in the creation of survey items, then the survey was adapted to an online platform, and administered.

The questionnaires are widely employed methodologies in scholarly researches to procure data and glean insights into diverse subject matters. These methodological tools furnish researchers with the capacity to amass both qualitative and quantitative data, thus affording a comprehensive comprehension of the researched domain. The questionnaires adopt a structured array of queries, to which participants respond in a standardized manner. Their aptitude lies in facilitating the compilation of quantitative data from a substantial cohort of respondents [21].

The scholarly literature indicates that questionnaires have the potential to serve as dependable and valid instruments for data collection in the realm of academic research. Wong et al. [22] elucidate the process of crafting a survey questionnaire, attesting to its possession of attributes such as sensitivity, reliability, and validity. Lefever's investigation in 2007 underscored that online surveys offer access to substantial and widely dispersed populations, enabling swift data acquisition; however, the challenge of effectively reaching the intended sample remains [23]. Additionally, Roztocki's preliminary exploration in 2001 delved into the utilization of internet-based surveys as tools for academic research and underscored the necessity for future inquiries in the realm of internet-based survey methodology [24]. Collectively, these studies advocate for the credibility of online surveys as a robust avenue for data collection in academic research. Nonetheless, researchers must remain cognizant of limitations and variables that could impact response rates [25].

Consequently, an online survey was devised to encompass the opinions and viewpoints of architects and civil engineers actively engaged in the conservation of architectural heritage. The survey questionnaire, comprising multiple-choice inquiries, was structured to encapsulate essential facets of their perspectives. The provision is of significance, wherein participants were furnished with the chance to articulate their individual viewpoints through open-ended response alternatives, thereby enabling the acquisition of their insights in an unconstrained manner alongside the structured choices. This dual approach aimed to encompass both quantitative and qualitative aspects of their perspectives, thereby fostering a comprehensive understanding of the nuances within their viewpoints.

A total of ten questions were prepared during the survey creation process. The first two questions were used to discern the respondent's professional background, whether they were an architect or a civil engineer, and to gauge their level of experience. Subsequently, in the third question, respondents were asked to rank the importance of seven project goals. The

fourth question aimed to ascertain the frequency of interdisciplinary collaboration. The fifth question sought to determine respondent preferences for modern or traditional materials and techniques. The sixth question was designed to gather information regarding the ease of communication and collaboration between the two professional groups. The seventh question was concerned with identifying whether respondents had experienced conflicts between architects and engineers during restoration processes. In the eighth question, respondents were asked if involving both civil engineers and architects in decision-making contributed to improved project outcomes. The ninth question aimed to identify the most significant challenges encountered when collaborating with professionals from the other discipline. The final question inquired about potential outcomes resulting from enhanced collaboration between civil engineers and architects. All questions were prepared in alignment with the literature review.

According to Lin [26], the universe of a research, encompassing all relevant sources, is referred to as the population of the study, and it is imperative to include everyone related to the problem to reach a comprehensive outcome. In this study, the universe was defined to consist of a total of 20 individuals, comprising 10 architects and 10 civil engineers, all actively working in the field of restoration, and the subsequent analyses were based on this number. The data collected through online survey were subjected to descriptive statistical and percentage analyses using Microsoft Excel software. The findings are elaborated upon in the Results section.

3. Results

The total number of participants comprised 20 individuals, evenly divided between architects and civil engineers, each accounting for 50% of the total. The architects' average experience spanned 15.6 years, with the most experienced individual holding 30 years of experience. Correspondingly, civil engineers possessed an average experience of 6.1 years, with the most experienced participant boasting 18 years of expertise.

Participants were tasked with ranking a series of project goals according to their perceived significance. This list of project goals was formulated subsequent to the analysis of semi-structured interviews conducted with experienced conservation experts. The delineated project goals encompassed “Preservation of Historical Authenticity”, “Enhanced Aesthetics and Visual Appeal”, “Structural Stability and Safety”, “Sustainability and Environmental Impact”, “Functional Adaptation”, “Community Engagement and Public Use”, and “Economic Viability and ROI”.

In terms of the most and second most important project goals, 90% of participants, a total of 18 individuals, singled out “Preservation of Historical Authenticity”. Simultaneously, 80% of participants, comprising 16 individuals, deemed “Structural Stability and Safety” as either the most or second most vital project goals.

In contrast, “Economic Viability and ROI” were regarded as either the least or the second least important project goals by 60% (12 participants), “Sustainability and Environmental Impact” held similar positions for 50% (10 participants), while “Community Engagement and Public Use” was ranked as the third least important project goal by 45% (9 participants). “Functional Adaptation” and “Enhanced Aesthetics and Visual Appeal” were ranked as the third and fourth most important project goals respectively (Table 1).

Within the context of architect perspectives, 6 participants opted for Preservation of Historical Authenticity as the most important project goal (60%), with 3 selecting it as the second most important. Conversely, 5 architect participants considered Economic Viability and ROI as the least important (Table 2). Similarly, among civil engineer perspectives, 6 participants designated Structural Stability and Safety as the most important (60%), with 3 marking it as the second most important. Additionally, 4 civil engineer participants identified Sustainability and Environmental Impact as the least significant (Table 3).

When considering experience, participants with more than 10 years of experience exhibited a notable inclination. Out of 8 such participants, 5 (62.5%) prioritized Preservation of Historical Authenticity among their project goals and 2 individuals (25%) deemed Structural Stability and Safety as their most important project goal. For participants with up to 10 years of experience, out of 12 individuals, 6 (50%) indicated Structural Stability and Safety as a top priority, with 5 (41.67%) selecting Preservation of Historical Authenticity in the first place.

Table 1. Project goals rankings according to the perceived significance.

	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%
Preservation of Historical Authenticity	10x	50	7x	35	1x	5	-	-	-	-	1x	5	1x	5
Enhanced Aesthetics and Visual Appeal	-	-	1x	5	5x	25	6x	30	3x	15	2x	10	3x	15
Structural Stability and Safety	8x	40	7x	35	3x	15	1x	5	-	-	1x	5	-	-
Sustainability and Environmental Impact	-	-	-	-	1x	5	5x	25	4x	20	5x	25	5x	25
Functional Adaptation	1x	5	4x	20	8x	40	1x	5	3x	15	3x	15	-	-
Community Engagement and Public Use	1x	5	-	-	-	-	4x	20	7x	35	5x	25	3x	15
Economic Viability and ROI	-	-	1x	5	2x	10	3x	15	3x	15	3x	15	8x	40

Table 2. Project goals rankings according to the perceived significance of architects.

	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%
Preservation of Historical Authenticity	7x	70	3x	30	-	-	-	-	-	-	-	-	-	-
Enhanced Aesthetics and Visual Appeal	-	-	-	-	2x	20	2x	20	3x	30	1x	10	2x	20
Structural Stability and Safety	2x	20	5x	50	2x	20	1x	10	-	-	-	-	-	-
Sustainability and Environmental Impact	-	-	-	-	-	-	4x	40	1x	10	4x	40	1x	10
Functional Adaptation	1x	10	2x	20	6x	60	-	-	1x	10	-	-	-	-
Community Engagement and Public Use	-	-	-	-	-	-	2x	20	3x	30	3x	30	2x	20
Economic Viability and ROI	-	-	-	-	-	-	1x	10	2x	20	2x	20	5x	50

Table 3. Project goals rankings according to the perceived significance of civil engineers.

	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%
Preservation of Historical Authenticity	4x	40	4x	40	1x	10	-	-	-	-	1x	10	-	-
Enhanced Aesthetics and Visual Appeal	-	-	1x	10	2x	20	4x	40	1x	10	1x	10	1x	10
Structural Stability and Safety	6x	60	3x	30	1x	10	-	-	-	-	-	-	-	-
Sustainability and Environmental Impact	-	-	-	-	1x	10	1x	10	3x	30	1x	10	4x	40
Functional Adaptation	-	-	2x	20	3x	30	1x	10	1x	10	3x	30	-	-
Community Engagement and Public Use	-	-	-	-	-	-	2x	20	4x	40	2x	20	2x	20
Economic Viability and ROI	-	-	-	-	2x	20	2x	20	1x	10	2x	20	3x	30

Regarding collaboration across disciplines during project design, all participants concurred with occasional or more frequent collaborative efforts. The distribution indicates 45% (9 participants) for "Very frequently" 25% (5 participants) for "Frequently" and 30% (6 participants) for "Occasionally"(Figure 1).

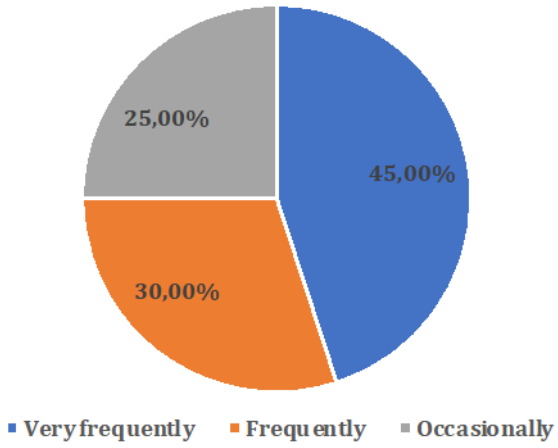

Figure 1. Distribution of frequency of collaboration with professionals from the other discipline during project design

In response to the query concerning material and technique preferences for restoration, 55% (11 participants) favoured traditional materials and/or techniques for historical accuracy, while 45% (9 participants) opted for modern materials and/or techniques for enhanced durability (Figure 2).

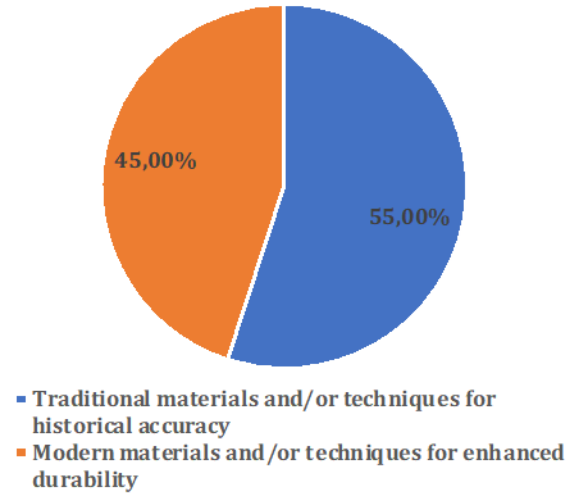

Figure 2. Distribution of prioritization of traditional materials and techniques over modern materials and techniques

This preference demonstrated a 70% inclination among architects towards traditional choices and a 60% inclination among civil engineers towards modern options.

Considering ease of communication and collaboration across disciplines, 15% (3 participants) strongly agreed, 30% (6 participants) agreed, 40% (8 participants) remained neutral, and 15% (3 participants) disagreed (Figure 3).

In relation to conflicts between architects and civil engineers arising during project execution, 10% (2

participants) strongly agreed, 45% (9 participants) agreed, 40% (8 participants) were neutral, and 5% (1 participant) disagreed (Figure 4).

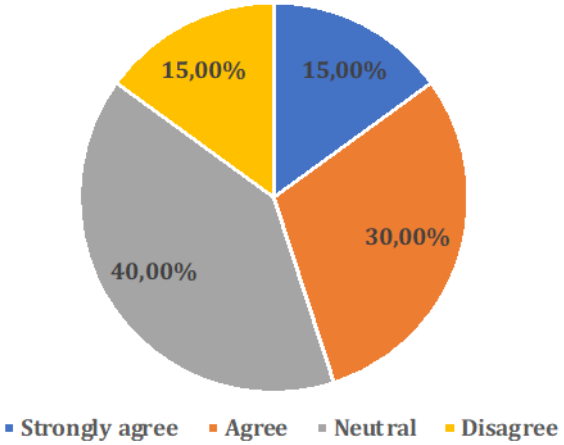

Figure 3. Distribution of collaboration ease with professionals from other disciplines

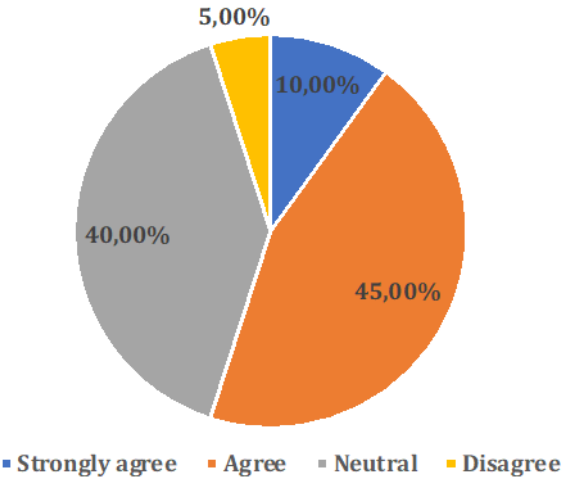

Figure 4. Distribution of frequency of conflicts between civil engineers and architects during project execution

In terms of involving both civil engineers and architects in decision-making and its impact on better project outcomes, 17 participants (85%) have generally agreed or strongly agreed on involving both parties during restoration, better project outcomes would be reached. On this matter, 50% (10 participants) strongly agreed, 35% (7 participants) agreed, 10% (2 participants) were neutral, and 5% (1 participant) disagreed (Figure 5).

Regarding challenges encountered in interdisciplinary collaboration, 35% (7 participants) cited "Differing philosophies," 25% (5 participants) mentioned "Lack of interdisciplinary understanding," 15% (3 participants) identified "Disagreements on materials and/or techniques selection," another 15% (3 participants) noted "Balancing aesthetics with functionality," 5% (1 participant) referred to "Lack of education, knowledge, perspective, or experience in historic building conservation," and a similar 5% (1 participant) highlighted the challenge specific to Türkiye, where professionals beyond architects lack education in conservation principles and apply standards designed for new structures (Figure 6).

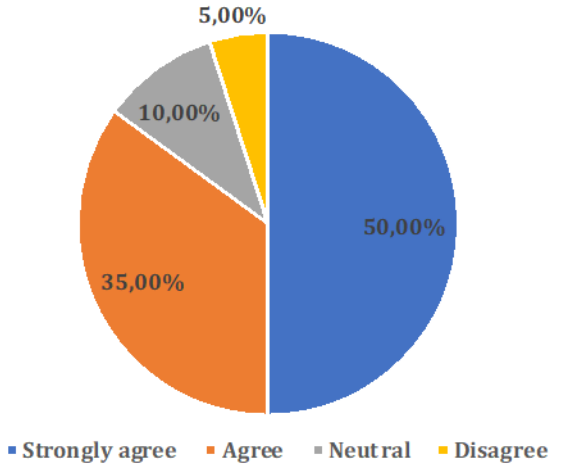

Figure 5. Distribution of perceptions of collaborative decision-making in restoration works

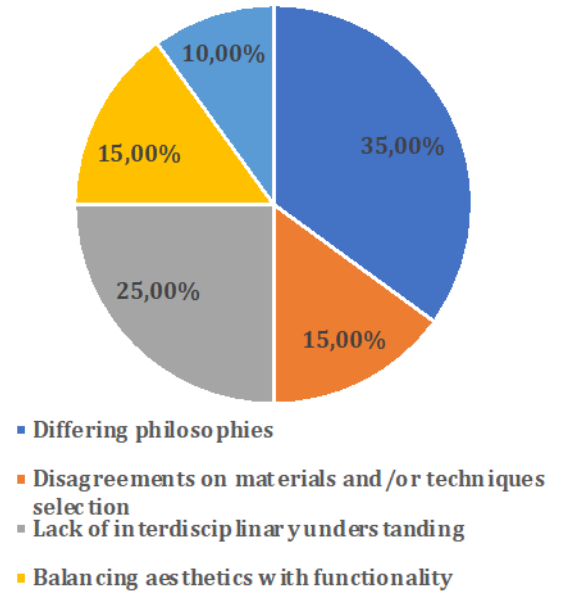

Figure 6. Distribution of challenges in collaboration with professionals from the other discipline

As for the anticipated outcomes of improved collaboration between civil engineers and architects, 50% (10 participants) opted for "Enhanced preservation of cultural heritage," 25% (5 participants) favoured "More sustainable restoration practices," 10% (2 participants) chose "Greater innovation in restoration techniques," and 5% (1 participant) each selected "Accelerated project approvals" "Increased stakeholder satisfaction" and "Consistent adherence to heritage guidelines" (Figure 7).

4. Discussion

The analysis of participants' rankings unveils distinct trends in their perceptions and preferences. The assessment of the importance of project goals in architectural heritage restoration reveals discernible patterns. The emphasis on historical authenticity and

structural stability signifies the importance attributed to preserving the integrity and safety of historic structures. Conversely, the relatively lower ranking of "Economic Viability and ROI" and "Sustainability and Environmental Impact", may imply a reduced focus on immediate financial returns and environmental concerns. This could be attributed to specific contextual factors or participant priorities.

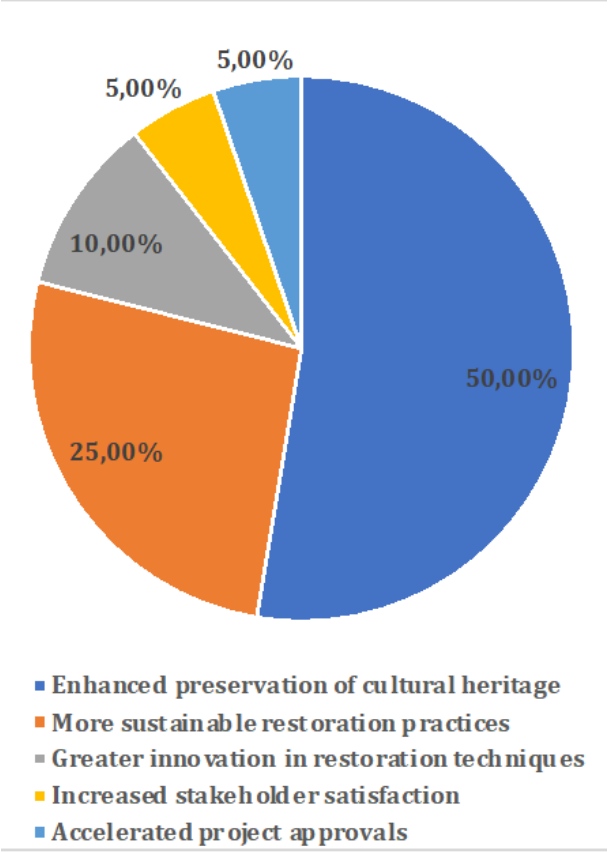

Figure 7. Distribution of anticipated outcomes of improved collaboration between civil engineers and architects

The findings underscore consistent patterns in the priorities of architects and civil engineers. Architects prioritize historical authenticity (with an average score of 1.3) and civil engineers selects structural stability (with an average score of 1.5) as the most important. This difference basically reflects the divergent perspectives of the parties. They also diverge in their perspectives on economic viability and ROI, with architects deeming it less significant (with an average score of 6.1). Sustainability and environmental impact may also hold less importance for civil engineers (with an average score of 5.6), contrasting with their counterparts' perspectives. These findings highlight architects' and civil engineers' distinct viewpoints and their divergent emphasis on the most and the least important project goals.

Upon examining the data concerning participants' experience, it is evident that those with over ten years of experience exhibit a noticeable tendency towards "Preservation of Historical Authenticity" (with an average score of 1.38). This observation implies that individuals possessing experience place significant importance on conserving historical authenticity, likely stemming from their profound grasp of the cultural and historical significance inherent to architectural heritage. Furthermore, within this subset of participants, there was also a consensus in identifying "Structural Stability and Safety" as a paramount project goal (with an average score of 2.00). This underscores the notion that seasoned professionals hold a strong commitment to ensuring the structural soundness and safety of historical structures, possibly influenced by their exposure to a spectrum of structural challenges and complexities over the course of their careers.

For participants with up to ten years of experience, the findings underscore the prioritizing Structural Stability and Safety (with an average score of 1.75). Moreover, within this same group, there was unanimous agreement in designating Preservation of Historical Authenticity as a top priority (with an average of 1.92). This suggests that while these participants may slightly favour structural stability, their devotion to upholding historical authenticity remains prominent as well.

Collaboration emerges as a prevailing theme, with unanimous agreement among all participants on their engagement in collaborative efforts to varying degrees. The data underscores the significance of interdisciplinary cooperation for successful restoration outcomes. Collaborative frequency distributions reveal extensive engagement, particularly in the "very frequent" and "frequent" categories, suggesting the prevalence of consistent interdisciplinary collaboration. A smaller yet notable portion acknowledges occasional collaboration, indicating recognition of cross-disciplinary contributions even among those who collaborate less frequently.

The data underscores different preferences between architects and civil engineers on the query concerning material and technique preferences for restoration. A strong inclination towards traditional choices among architects aligns with their emphasis on historical authenticity, while civil engineers' preference for modern options indicates a focus on structural integrity. The varying preferences underscore architects' commitment to preserving historical character and civil engineers' dedication to structural resilience.

The findings also portray a varied perspective regarding the effectiveness of communication and collaboration between architects and civil engineers during project design. This indicates that, while certain participants view collaboration as seamless and productive, others encounter hurdles or difficulties in their cross-disciplinary interactions. The outcomes also suggest that a notable portion of participants acknowledge the likelihood of conflicts arising during project execution due to disparities between civil engineers and architects. Nevertheless, the presence of neutral and dissenting responses implies that conflicts may not be universally perceived as a pervasive concern.

The findings also reveal a diverse viewpoint on the effectiveness of communication and collaboration between architects and civil engineers during project design. This indicates that while certain participants perceive collaboration as efficient and productive, others may encounter difficulties or challenges in their interdisciplinary interactions.

The outcomes also infer that a notable portion of participants acknowledge the likelihood of conflicts arising during project execution due to disparities between civil engineers and architects. However, the presence of neutral and dissenting responses also indicates that not all participants universally regard conflicts as a widespread issue.

Furthermore, the results indicate a generally positive perspective among participants regarding the advantages of collaborative decision-making involving both civil engineers and architects. The prevalent agreement suggests that the majority of participants recognize the value of interdisciplinary collaboration and its potential to enhance project outcomes.

The range of responses provided by participants concerning the most significant challenge in collaborating with professionals from different disciplines illustrates a diverse spectrum of perceived hindrances. Predominantly, cited by 35% of participants, the challenge of "Differing philosophies" underscores instances where civil engineers and architects might hold contrasting perspectives in the domain of historic building restoration. This underscores participants' recognition of the potential impediments posed by disparities in viewpoints and approaches between these two disciplines to the effectiveness of collaborative efforts. Another salient challenge that emerges is "Lack of interdisciplinary understanding," cited by 25% of participants. This pertains to difficulties stemming from the incomplete grasp of each other's roles by civil engineers and architects, leading to miscommunication or underestimation of each other's contributions. This response implies that a significant portion of participants believe that the absence of a shared understanding and comprehension across disciplines can hinder the progress of collaborative endeavours.

Moreover, "Disagreements on materials and/or techniques selection" and "Balancing aesthetics with functionality" were each identified by 15% of participants. This indicates participants' awareness of potential conflicts arising from differing preferences in materials and techniques, along with the challenge of striking a harmonious equilibrium between the aesthetic considerations and functional necessities of restoration projects.

A smaller faction, constituting 5% for each category, raised the issue of "Lack of education, knowledge, perspective, or experience in historic building conservation." Additionally, a distinctive challenge specific to Turkey was brought to light by a participant, where professionals other than architects might lack education in conservation principles and might employ standards designed for new structures. These responses emphasize the pivotal role of proper education and shared comprehension of conservation principles within interdisciplinary collaborative efforts.

In the last query, the distribution of responses unveils several distinct patterns in participants' anticipations. The foremost envisioned outcome is the "Enhanced preservation of cultural heritage," which stands out prominently, chosen by 50% of participants. Notably, upon closer examination, a majority of both architects and civil engineers also cited this outcome. This underscores a substantial belief among participants that enhanced collaboration would bolster the emphasis on safeguarding the historical and cultural importance of heritage structures. This response conveys a shared acknowledgment of the significance of upholding the authenticity and cultural value inherent in these edifices. The preference for "More sustainable restoration practices" garnered support from 25% of participants. This implies that a quarter of the participants foresee collaborative efforts between civil engineers and architects culminating in an intensified focus on sustainable and environmentally conscientious approaches to restoration. This response reflects the emphasis on environmental considerations within restoration projects. Selected by 10% of participants, greater innovation in restoration techniques signifies a subset of participants who suggest that collaborative activities have the potential to produce innovative restoration methods. This outcome could potentially lead to the inception of novel techniques and methodologies that synergize the strengths of both disciplines. Several other outcomes garnered individual mentions among participants: "Accelerated project approvals," "Increased stakeholder satisfaction," and "Consistent adherence to heritage guidelines." These responses underscore the diverse spectrum of expectations held by participants regarding enhanced collaboration. The notion of accelerated approvals hints at an anticipation of expedited project processes, while the focus on increased stakeholder satisfaction stresses the potential to meet the varied needs of stakeholders. Similarly, the aspiration for consistent adherence to heritage guidelines reiterates a desire for more cohesive and standardized practices in the restoration of architectural heritage.

5. Conclusion

This article embarked on extensive research of the distinct perspectives of civil engineers and architects in the realm of historic building restoration. It started by outlining the contrast between these two disciplines, which supports their divergent approaches to this intricate task. The study's main objective was to unravel the nuances of these contrasting viewpoints and assess their repercussions for the restoration process.

The methodology embraced a multifaceted approach, starting with a literature review, followed by the execution of a survey. The survey results and subsequent analysis shed light on discernible patterns in perceptions and preferences of participants. The prioritization of historical authenticity by the architects and of structural stability by the civil engineers evinces the different perspectives of the parties. The relatively lower ranking of Economic Viability and ROI, as well as Sustainability and Environmental Impact, is also evinces reduced emphasis on financial gains and environmental concerns. The outcomes also unveiled disparities in perspectives between architects and civil engineers, further emphasized by their varying prioritization of project goals. While architects prioritize historical authenticity, civil engineers prioritize the structural stability. This difference reflects their divergent inclinations.

Collaboration emerged as a foundational cornerstone, with unanimous agreement among participants on its importance. Collaborative frequency distributions showcased a prevalence of interdisciplinary engagement, further highlighting its significance.

Survey results also illuminated disparities in material and technique preferences, underscoring architects' dedication to historical accuracy and civil engineers' focus on structural resilience.

The data on communication and collaboration efficacy within interdisciplinary teams demonstrated a range of perspectives, with varying levels of collaboration smoothness and challenges. Similarly, participants had diverse expectations regarding potential conflicts. However, a consensus emerged regarding the benefits of collaborative decision-making.

Challenges in interdisciplinary collaboration revealed a diverse array of perceived obstacles, underscoring the importance of shared understanding and education within collaborative efforts.

Lastly, participants' anticipated outcomes of enhanced collaboration unveiled a range of expectations, highlighting the potential benefits of more integrated approaches. The widespread aspiration for enhanced preservation of cultural heritage and the emphasis on sustainability underscore the transformative potential of improved collaboration. The collaborative efforts of both architects and civil engineers are instrumental in achieving this delicate equilibrium between safety and durability, all the while preserving the building's original design and historical significance [27].

Engineering field is initially oriented towards training engineers for new construction, now emphasizes heritage preservation, strategic interventions in historical buildings, and sustainable future uses for these structures. This approach not only promotes sustainability but also enhances the field of structural engineering as a whole [28].

In conclusion, this research examined the multi-disciplinary world of historic building restoration, revealing the distinct perspectives of civil engineers and architects. The findings illuminate the complexities inherent in this collaborative process and underscore the need for effective interdisciplinary communication and collaboration. By recognizing and reconciling these differences, restoration projects can achieve a harmonious synthesis of structural integrity, and historical authenticity. The joint effort of architects and civil engineers with other restoration experts promises holistic and well-informed restoration outcomes that honours the past while shaping the future.

While this study has made progresses in understanding the perspectives of architects and civil engineers, there remain avenues for further exploration. Future studies could delve deeper into the specific mechanisms of interdisciplinary communication and cooperation that facilitate the resolution of conflicting viewpoints. Additionally, comparative analyses of restoration projects, particularly those characterized by seamless collaboration, could provide valuable insights into best practices. Such inquiries might offer a more comprehensive understanding of how these two disciplines can cohesively work together for enhanced restoration outcomes.

It is also essential to acknowledge the limitations of this study. The research scope is based on a specific sample size, and the findings may not be entirely generalizable to all contexts. Furthermore, the study's focus on the perspectives of architects and civil engineers does not encompass the entire spectrum of professionals involved in restoration projects. As with any survey-based research, there may be inherent biases in the responses collected. These limitations underscore the necessity of further research to broaden our understanding of interdisciplinary dynamics in historic building restoration.

Last of all, the author believes that this research contributes to both the academic field and vocational practice. The study's findings have significant implications for the education and training of architects and civil engineers, emphasizing the need for a more comprehensive understanding of the roles and viewpoints of their counterparts. Moreover, it may also provide a foundation for academic institutions to develop integrated programs that promote effective interdisciplinary collaboration. Ultimately, practitioners in restoration of architectural heritage may utilize these insights to inform their approach to restoration projects, fostering enhanced communication and cooperation for more successful outcomes.

Conflicts of interest

There is no conflict of interest between the authors.

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