FACTORS CAUSING THE DELAYS IN CONSTRUCTION PROJECTS IN BOSNIA AND HERZEGOVINA

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ABSTRACT:

Construction project delays are a global issue, as evidenced by extensive literature on the subject. This study focuses on Bosnia and Herzegovina, with the aim of identifying the primary factors of construction project delays in the region. The research used a qualitative methodology, which includes conducting in-depth semi-structured interviews with construction industry experts. These interviews with consultants, designers, contractors and investors provided thorough insights into the causes of delays. According to the findings, the primary causes of delays include inadequate project planning, inadequate financing, bureaucratic obstacles, a lack of communication among participants, and labor shortages. Furthermore, the study emphasizes the importance of a proactive approach to risk management, timely completion of the design and planning phases, and effective communication among participants as essential strategies for preventing delays. The findings of this study are useful for construction professionals, administrators, and other participants seeking to improve the efficiency and effectiveness of construction projects in Bosnia and Herzegovina.

KEYWORDS:

delay factors, delay effects, construction projects, expert interviews, Bosnia and Herzegovina

1 INTRODUCTION

In construction, a delay occurs when a project exceeds its completion timeline or the agreed-upon delivery date [1]. Deviation from an established schedule is one of the most common construction-related issues in nations that are both developing and advanced [2]. These delays have serious consequences for the efficiency, cost, and overall success of construction projects. This study focuses primarily on Bosnia and Herzegovina, with the goal of identifying the primary factors causing construction projects delays in the country.

To achieve this objective, the qualitative methodology was used in this research, conducting in-depth semi-structured interviews with a wide range of construction industry experts. The experts included consultants, designers, contractors, and investors, who provided in-depth and comprehensive insights into the many causes of construction project delays.

These interviews indicated numerous expected primary factors that contribute to construction project delays. These include inadequate project planning, which frequently leads to unforeseen complications and inefficiencies; insufficient financing, which causes interruptions and delays in project progress; bureaucratic obstacles, such as complex regulatory requirements and slow approval processes; a lack of effective communication among project participants, leading to misunderstandings and miscoordination; and labour shortages, which affect the availability of skilled workers needed. This study's insights could be helpful to construction professionals, administrators, and other participants to improve the performance of construction projects in Bosnia and Herzegovina.

2 BACKGROUND AND METHODS

2.1 LITERATURE BACKGROUND

Construction projects in Bosnia and Herzegovina are often delayed, compromising their efficiency and success. The goal of this literature background is to examine the existing research into the causes of these delays. Inadequate planning, financial limits, regulatory challenges, poor project management, labour shortages, unforeseen site conditions, and environmental concerns all play a key role in project delays. Understanding these elements and their implications for stakeholders can help policymakers, practitioners, and researchers improve the timing and outcomes of projects in Bosnia and Herzegovina.

2.1.1 Consultant related delay factors

The widespread delays in building construction projects within Uganda's construction industry was analysed in [3]. With a focus on consultant-related factors among other contributors and their resultant influence on project delivery, this study aims to thoroughly identify and examine the underlying delay reasons influencing such projects in Uganda. 81 project delay characteristics that are relevant to building construction projects were carefully defined in a thorough literature assessment. In order to gain an understanding of

the reasons behind these delays, questionnaire surveys and structured interviews with consultants, contractors, and clients involved in four specific building projects were carried out. These reasons for delays were methodically divided into four main categories: variables relating to consultants, contractors, clients, and external parties. Based on the Relative Importance Index (RII) as the analytical framework, the study rated these characteristics according to their respective categories and assessed their influence. Significant delay factors were identified by the findings, which included inadequate site investigation by consultants, financial dishonesty or indiscipline by contractors, inadequate contractor experience, and design errors made by designers. The research revealed that consultant-related factors had the highest influence (RII = 0,745), followed by contractor- and client-related factors (RII = 0,697 and 0,698, respectively), while external-related factors had the lowest impact (RII = 0,615). This study highlights the critical role that consultant-related factors play in Ugandan construction delays, emphasizing the need for preventive measures to reduce these factors and ensure on-time project completion while preventing disagreements and additional costs among construction process stakeholders [3].

The significant issue of construction project delays in Malaysia, with a specific focus on identifying the major contributing factors was analysed in [4].This is a crucial topic for the nation's construction sector. The objective is to determine, analyse, and rank the various factors behind delays, with special focus on the unique functions and impacts of consultants, owners, contractors, and outside parties on project schedules. Through the use of a well designed questionnaire survey, which covers 31 different criteria divided into four main categories (contractor, owner, consultant, and external factors), the study carefully assesses and balances the importance of each category in contributing to project delays. The Klang Valley area, which includes major Malaysian cities like Kuala Lumpur, Putrajaya, Petaling Jaya, Shah Alam, and Seremban, is strategically chosen to serve as the study's geographical framework for data collection. The primary method of data collection used in this study is the careful administration of a comprehensive questionnaire survey among stakeholders involved in ongoing construction projects. The results obtained from this comprehensive investigation highlight the financial obstacles' dominant role as the primary cause causing delays in building projects throughout Malaysia. Moreover, it finds that among the construction industry in Malaysia, coordination issues rank as the second most significant factor that negatively impacts project deadlines. The factors connected to consultants are also carefully examined, providing important insights into the types, degrees, and effects of delays in building projects that can be linked to consultant participation [4].

The delay factors in building construction projects in Hong Kong was analysed in [5].This research explores the reasons behind building delays in Hong Kong, emphasizing the complex relationship between delay factors and project outcomes. The study aims to distinguish the different points of view that customers, consultants, and contractors have about the relative importance of delay issues. Specifically, the study focuses on delay factors that are related to consultants. The research builds a questionnaire based on 83 delay reasons that have been previously discovered and asks stakeholders in Hong Kong's construction projects to respond. The comments are analysed to identify areas of agreement and disagreement among the participating groups. Unexpected ground conditions are identified as a component that generally garners agreement regarding its

impact on delays. The study is significant for defining a prioritized list of variables and factor categories as viewed by various participant groups, highlighting the necessity of increased management focus on high-ranking factors, especially in project-related categories such unanticipated ground conditions. The differences that have been noted between clients, consultants, and contractors highlight how different experiences, opinions, and communication breakdowns may have an impact on how differently they perceive things. In order to more fully address and eliminate delays within construction projects, the study also calls for an extended evaluation of productivity and efficient communication alongside project scope considerations in construction time prediction models [5].

The widespread delays in building construction projects within Saudi Arabia 's construction industry was analysed in [1].This investigation's main goal was to gain a thorough understanding of the root causes of the delays that continue to occur in various construction projects across Saudi Arabia. It also was to determine the opinions and perceptions of key project stakeholders, namely owners, consultants, and contractors, regarding the importance and frequency of these delay factors. In order to do this, a large-scale study was conducted in which 23 contractors, 19 consultants, and 15 owners actively participated. These parties are involved in a variety of building projects throughout Saudi Arabia. The extensive field survey carefully examined these projects' time performance with the goal of identifying and recording the various factors that lead to project delays. A remarkable total of 73 unique delay causes was found and carefully documented through this comprehensive data gathering process, offering an extensive summary of the difficulties observed in these construction projects. Significant occurrences of time overruns were found in the examined projects, according to the survey's findings. Of the contractors and consultants surveyed, 76% and 56%, respectively, reported typical time overruns of between 10% and 30% of the project's original duration. Of particular interest was the general agreement reached by owners, consultants, and contractors about the most common reason for delay, which they all agreed was "change orders" by owners and consultants. It also emphasizes how important "change orders" are as the most frequent and significant cause of project delays in these various construction projects. This extensive study's conclusion demonstrated the frequency of time overruns, with around 70% of the projects examined encountering delays; 45 out of 76 projects, in particular, had significant delays in their timetables. Together, these results highlight the constant challenges with time management and project scheduling that exist in Saudi Arabian construction projects, highlighting the general consensus among project participants about the critical role that "change orders" play in greatly impacting project timelines and schedules [1].

2.1.2 Designer related delay factors

The widespread delays in building construction projects within Pakistan 's construction industry was analysed in [6].Large investments have contributed to the construction industry's explosive growth in Pakistan, but there is still a persistent problem with construction delays, which causes serious difficulties for stakeholders and project managers. The purpose of this research project was to investigate in more depth the particular causes of project delays in the contexts of Rawalpindi and Islamabad. A detailed recognize of the topic was achieved by using a comprehensive approach that included a

thorough literature analysis, discussions with industry experts, and a quantitative survey using a standardized questionnaire. The categorization of 29 identified threats into separate groups, including financial, technical, design, labour, and external risks, offered a comprehensive understanding of the diverse difficulties affecting construction activities in this field. After applying statistical methods such as SPSS and the Relative Importance Index (RII) to analyse the data, an essential finding was made: risks linked to design were found to be the most important factor affecting project delays, which in effect had a major effect on project deadlines. This was closely followed by external risks, signifying the intricate network of challenges stemming from factors beyond the immediate project scope. Furthermore, technical and labour-related risks were identified as holding subsequent importance, shaping the complexity of construction delays in these regions. The findings of this study highlight how important it is to address design-related obstacles as the main issue in building projects in Pakistan, requiring concentrated attention and planned intervention to reduce delays and increase project efficiency [6].

The significant issue of construction project delays in New Zealand was analysed in [7].Large-scale projects face a constant challenge from construction delays, which affect project costs, duration, and quality in addition to affecting timely delivery to clients. The main objective of this study is to identify the main elements that cause delays in major construction projects in Auckland and compare the results with those from different countries. To collect detailed quantitative and qualitative data on delay factors, a mixed-method approach using questionnaires and in-person interviews was applied, involving construction and site managers with a minimum of ten years' experience in large projects. Of the frequent problems, "unforeseen ground conditions" showed up as a major cause of delays, frequently related to mistakes in site condition prediction. However, the key finding was the significant influence of the design group on project delays, which were mostly related to problems like inadequate drawing details, delayed instructions, and delayed supply of design documentation. In view of the small sample size's limitations, the study advocates for larger-scale empirical research and the use of a variety of project team members, including clients, in order to obtain a deeper knowledge of the factors that contribute to delays in large-scale construction projects across a range of contexts [7].

The widespread delays in building construction projects within Gulf 's construction industry was analysed in [8].Gulf-region construction projects provide particular difficulties for consultants, involving careful planning at every stage of the design process to ensure completion on time. Unrealistic project timelines, the use of foreign designers and consultants, the expansion of the sector quickly, complicated architectural designs, and the existence of global consulting firms are just a few of the factors that have a big influence on the project design phases. This study examines the roles and duties of project designers and consultants to promote on-time project delivery, focusing on the main reasons for delays that are attributed to them. In order to identify the primary reasons for delays from the perspective of the designers, standardized surveys and interviews with a large number of consultants and designers were done as part of the data collection process. Additionally, the study looks into preventive measures that designers can take to minimize delays and external factors that could affect consultant performance from the perspective of the client, contractor, and authorized project manager. The findings highlighted specific challenges faced by designers and consultants, including unrealistic project durations and architectural complexities, focusing on potential proactive measures

to avoid delays and offering insights into external influences impacting consultant performance in the Gulf region's construction projects [8].

Delay factors in construction projects was analysed in [9].Construction projects that divide the design and construction phases frequently result in unexpected design changes, which are demonstrated in the literature to have a negative impact on project performance. However, the comprehensive understanding of their impact and underlying causes remains divided, either addressed separately or confined to specific projects, lacking a unified view across the broader construction context. This paper addresses this gap by investigating the impact of design changes on project costs and identifying the responsible actions leading to these modifications. This study used a systematic assessment of previous research published in respectable journals to investigate content in-depth in order to get insight into how design changes affect project costs and to pinpoint the different components that contribute to these changes. The findings of the study show that design changes had an important effect on cost overruns in construction projects, with possible overruns ranging from 5% to 40% of the project's overall budget. The study examined the reasons for modifications to design that result in cost overruns from the viewpoints of consultants, contractors, and project owners. It also noted rare cases of project closures brought on by owner-induced design modifications. On the other hand, even more common, design modifications made by contractors and consultants had relatively less effects. Throughout these considerations, the study emphasized the critical role of improving communication and coordination among stakeholders as a crucial strategy to mitigate events leading to design changes, contributing a unified platform for effective management of the design process in construction projects [9].

The existing literature in [10] provides a complete analysis of the inevitability of design changes and rework in construction projects, which are acknowledged as significant restricting factors impacting project performance. Although design modifications are acknowledged as important in prestigious journals, there are few studies that comprehensively evaluate their connection to rework later on and their particular effects on project performance, particularly in the context of Malaysian construction. This research conducted a comprehensive literature review of construction management conference proceedings and peer-reviewed journals in order to fill this gap. The primary aims of this study were to explore the relationship between design modifications and following rework, assess the impact of these changes on project performance, and establish a framework for future research that is specific to Malaysian construction. The results showed that design modifications were crucial elements that greatly contributed to project delays and cost overruns; this was generally seen worldwide in construction projects of all sizes, independent of stage of development. However, prior research conducted in Malaysia, published in prominent construction management journals, failed to recognize design changes as primary causes of project delays and cost overruns. Consequently, this study suggests future research priorities cantered on acknowledging the significance of design changes in impacting project timelines and budgets within Malaysia, urging the identification of factors triggering these changes and the development of predictive models to anticipate their effects on project performance [10].

2.1.3 Contractor related delay factors

The persistent problem of construction delays in Jordan's private construction projects analysed in [11] has raised serious concerns, resulting in significant losses in terms of both time and money. The goal of this research is to have a thorough understanding of the fundamental reasons behind these delays. Through interviews with owners, consultants, and contractors—important stakeholders in this industry—the study used structured questions to learn about different points of view on what causes construction delays. The results revealed a number of crucial factors, including labour shortages of trained, semi-skilled, and unskilled labour; delays caused by the engineering process of approving contractor submissions; inadequate materials; and complications resulting from the interaction of several subcontractors' schedules. These factors emerged as primary contributors to the persistent delays experienced in Jordan's private construction projects. Moreover, employing one-way ANOVA analysis enabled the identification of factors that shared unanimous agreement among the three stakeholder groups. Using statistical methods, consultants, contractors, and owners came to an agreement regarding the importance of certain factors, such as labour shortages, delays in approvals, and difficult subcontractor scheduling, as major causes of construction delays. These comprehensive findings not only offer a detailed understanding of the numerous delay-inducing factors but also lay the fundamental groundwork for formulating targeted strategies aimed at successfully reducing these delays within Jordan's private construction projects [11].

The widespread delays in building construction projects within Algeria 's construction industry was analysed in [12].In Algeria, where time is a critical performance factor for building projects along with cost and quality, delays have emerged as a common problem affecting these projects' success. Despite its importance, delays still present significant challenges, resulting in the need for a concentrated research into their causes. In order to identify the fundamental causes of these delays, a thorough questionnaire survey was conducted among construction industry specialists in Algeria. The results of this investigation revealed an unexpected finding: the main causes of project delays in Algerian construction are managerial factors, which include features related to planning, organization, and management. This important realization emphasizes how urgently the industry needs to support project management methods. The study strongly promotes the improvement and broader implementation of project management methods and tools, emphasizing their critical importance. With the help of this strategic emphasis, different project stakeholders will be empowered to optimize activities, simplify the use of resources, and create an atmosphere that will allow the project to be completed on schedule. The construction industry in Algeria has the potential to enhance project delivery and guarantee overall success and efficiency by supporting such initiatives [12].

The significant issue of construction project delays in Jordan, with a specific focus on identifying the major contributing factors was analysed in [13]. The construction sector, which is essential to supporting the economy by generating jobs and money, is challenged by persistent delays that cause project schedules to go over budget. In order to classify and identify delay issues specifically inside residential projects, this study uses Drewin's Open Conversion System. A survey of contractors, project owners, and consulting engineers working on residential projects was done in order to fully understand these reasons for delays. Furthermore, senior professionals in the construction industry were

interviewed to enhance the understanding of delay factors. These interviews provided valuable qualitative perspectives, improving the understanding of delay factors common in residential construction. The survey and interview results showed an agreement among participants, identifying contractors' financial limitations and owners' excessive modification orders as the main causes of construction delays in residential projects. On the other hand, elements like extreme weather and adjustments to laws were thought to be among the least important reasons. This thorough analysis gives priority to delay issues, highlighting the crucial role that financial constraints and modification orders play in obstructing development in the residential building industry [13].

Construction delays analysed in [14] have a big impact on project budgets and schedules, and they frequently cause conflict amongst stakeholders. Within this framework, the current research attempted to conduct a thorough analysis with the goal of identifying the primary causes of delays in the construction industries of Southeast Asian countries—that is, Indonesia, Malaysia, Thailand, and Vietnam—while also investigating possible regional variations. Through an extensive literature review specifically cantered on these countries, the study revealed that the primary causes of delays were rooted in issues associated with contractors, notably encompassing material shortages, ineffective planning, inadequate site management and supervision, and deficiencies in equipment availability and functionality. Additionally, owner-related factors, including financial/payment hurdles and design changes or variations, emerged as prominent contributors to project delays in these developing Southeast Asian nations. In addition, the study's comparative comparison with established economies in Europe and North America identified unique difficulties faced by Southeast Asian contractors, which were mostly caused by shortages, inefficiencies, and problems arising from client-related problems. This comparative analysis emphasizes the different delay factors are in Southeast Asian construction environments and emphasizes how important it is to understand these regional differences in order to successfully manage barriers, reduce delays, and resolve conflicts between stakeholders in the construction industry [14].

In [15], construction project delays are a widespread problem that the construction sector faces, despite its critical role in improving modern living through the development of physical infrastructure. The construction industry's construction professionals as well as project outcomes are negatively impacted by these delays. In order address this issue, the research team conducted an extensive analysis of relevant literature from reliable databases such as Springer, Emerald, ASCE, Scopus, Taylor and Francis online, and others. The study specifically concentrated on conference proceedings and journals within the construction industry. Through the use of thematic analysis, the study was able to identify constant causes that lead to project delays. These causes included inadequate site management, a shortage of skilled labour, unrealistic project scheduling, labour absences, design changes generated by construction errors, and accidents caused by insufficient site safety measures. The combination of these factors culminated in a crucial concept that supports more cooperation and coordination between consultants, contractors, and clients in order to promote quick project completion. The study's conclusions and recommendations are meant to serve as a reference for academics and professionals in the construction industry, highlighting the critical role that effective teamwork plays in ensuring the timely completion of projects [15].

2.1.4 Investor related delay factors

The significant issue of construction project delays in Turkey, with a specific focus on identifying the major contributing factors was analysed in [2]. The research paper discusses the common problem of construction timetable deviation, focusing on how it affects both developed and developing countries and how it causes distractions to the systematic workflow that is necessary for building. Considering how important the construction sector is to the macroeconomic structure of a nation, meeting budgetary targets for projects on schedule is critical. With a particular emphasis on the crucial variables affecting project duration, this study attempts to examine the reasons behind time extensions in Turkey's construction industry. Conducting a comprehensive analysis of 34 factors affecting project timelines, a questionnaire survey was distributed among 71 construction companies in Turkey. The purpose of the survey was to determine how important people thought these characteristics were in relation to how much longer building projects took to complete. After conducting thorough statistical analysis, the results showed that "design and material changes" had the greatest impact on project time, followed by "cash flow problems" and "payment delay." In contrast to environmental factors which had the least influence, financial elements were found to be the most influential group. his study underscores the prominence of owner-related delay factors, particularly financial constraints, in influencing time extensions within Turkey's construction industry, highlighting the importance of addressing these factors for enhanced project efficiency and respect for the money that was provided [2].

The worldwide construction sector faces widespread delays, which is what this study by [16] is looking into ongoing projects to find out what variables are causing delays and how they affect project completion. The research attempted to discover, assess, and provide solutions for decreasing these delays through an in-depth case analysis. The investigation covered a wide range of important variables that caused delays, including problems with clients, contractors, and environmental concerns like bad weather. Various factors were found to be responsible for the delays, such as untimely contractor payments, shortages or modifications in materials, unfavourable weather conditions, insufficient workforce, employee turnover, poor site supervision, and mishandled engineering. In addition, delays related to space limitations, client payment delays, problems in the supply of materials, and regional problems such as strikes were examined. The study found that these delays had important implications on labour distribution, reduced labour productivity, job postponements, and cost impacts. Notably, even if there are situations when delays cannot be avoided, increasing management accountability has been suggested as a tactic to reduce some delay causes and boost overall project management effectiveness in order to finish on schedule [16].

The widespread delays in building construction projects within Malaysia 's construction industry was analysed in [17]. This study addresses the persistent challenge of construction delays by delving into the fundamental causes affecting construction project timelines. The research classifies 20 often reported delay causes within the categories of client, contractor, consultant, labour and equipment, material, and other associated elements after conducting a meta-analysis of 52 common delay causes found in the body of existing literature. To get their opinions on these determined causes, 148 Malaysian construction professionals from the client, consultant, and contractor sectors participated

in a field survey that followed. The survey data was used to prioritize the top five delay causes: lack of proper planning and scheduling, excessive client change orders, inadequate site management, lack of competent subcontractors, and financial constraints faced by contractors. Spearman's rank correlation tests confirmed strong consensus among respondent groups regarding these primary causes. Furthermore, a factor analysis identified competency, communication, financial, risk, and site management as critical skills for managers influencing delays. These results provide useful advice for improving construction project planning and production management, enabling more efficient methods to guarantee project delivery on schedule [17].

Delay factors in construction projects was analysed in [18] . Schedule disruptions resulting from delays in construction projects are common and often begin even in the design phase. However, there is still a lack of research on an in-depth investigation of these delays in Public Works Department (PWD) project planning and design. In order to fill this gap, the study set out to evaluate the full scope of delay problems, identify the main causes, and suggest practical approaches for reducing delays, particularly in the planning and design stages of PWD building projects. The study adopted a multifaceted approach, leveraging data from SKALA JKR to conduct an in-depth analysis of delay issues within PWD projects. Additionally, structured questionnaires were methodically distributed among two essential participant groups: PWD officers and private consultants actively engaged in these projects. Relative Importance Index (RII) and Mean Index are two accurate evaluation methodologies that were used to systematically examine respondents' perceptions of the severity of delay reasons. The results showed that there were major delays, especially during the planning and design phases. Important reasons that contributed to these delays included changing client needs, poor scope definition, and poor communication. This study emphasizes how critical it is to address difficulties with communication as a key strategy to reduce these delays throughout the whole construction lifecycle, not just in the planning and design stages [18].

2.2 METHODS

This chapter discusses the methodological principles used in this particular research, with a focus on the qualitative model. This paper aims to discuss interviewing as a qualitative method, firstly by reviewing the literature [19]. In terms of the interview design process, there are many decisions that must be carefully considered, such as who to interview, how many interviews will be required, what type of interview to conduct, and how the interview data will be analysed [20]. The qualitative research methodology used in this research will be based on in-depth interviews that will be run with the consultants, designers, contractors and investors.

2.2.1 Interview evaluation methods

After conducting interviews with participants, it is crucial to determine an appropriate evaluation method to assess the collected data effectively. Based on the collected data , Advanced Multi-Criteria Analysis enables the comparison of different options by identifying possibilities, establishing criteria, evaluating these criteria and their relative significance, and calculating weighted and total scores [21]. One of the methods based on Advanced Multi-Criteria Analysis is the Multi Criteria Decision Making method, which was used to analyse data from interviews.

2.2.2 The criteria/weight factors

A set of criteria or weight factors was developed based on the findings of a comprehensive literature review and data collected by interviews. Since an interview was conducted, the criteria were primarily determined based on the participants. These 10 criteria were established to determine which participant and which delay factor have the highest factor coefficient.

The criteria (weight factors) selected are as follows:

1. Years of experience
2. Size of completed projects (budget)
3. Relevance of projects
4. Education and professional qualifications
5. Projects completed on time
6. Number of current projects
7. Roles in the project
8. Team capacity
9. Client retention rate
10. Certifications and licenses

3 RESULTS AND DISCUSSION

3.1 RESULTS

Here the findings of qualitative design approach, that was used in this research, will be shown and discussed. Semi-structured interviews are used to collect the necessary data. The interviews were conducted with 8 participants from Bosnia and Herzegovina, from 4 different categories or professions defined at the beginning of this study.

The multi criteria decision making (MCDM) analysis

In this this section the method by which we arrived at the results by evaluating the interviews of the participants and setting certain criteria will be presented. The first step in processing the results was to establish criteria, which were represented as a weight factor for each response. These 10 criteria were established to determine which participant and which delay factor have the highest factor coefficient. A weight coefficient is determined for each criterion. The coefficients were defined in a range from a maximum 2 to a minimum 0,5. The total sum of all coefficients assigned to each criterion is 10. The criterion "years of experience" has the highest coefficient of 2. The criterion "years of experience" has the highest coefficient of 2 because extended experience is often associated with a deeper understanding and higher expertise in the topic. On the other hand, three criteria - team capacity, client retention rate, and certifications and licenses - have the lowest coefficient, which is 0,5. Compared to other criteria, they are thought to have less direct influence on determining the level of knowledge and quality of interview responses. In the table below, the MCDM analysis with the results, criteria and coefficient values is shown.

Table 9 : MCDM analysis results

Multi Criteria Decision Making - Matrix									
Weight factor	Criteria	P1	P2	P3	P4	P5	P6	P7	P8
2	C1	0,16	0,20	0,07	0,1	0,14	0,08	0,15	0,14
1,5	C2	0,06	0,03	0,01	0,01	0,08	0,1	0,15	0,13
1	C3	0,06	0,1	0,1	0,09	0,05	0,07	0,08	0,08
1	C4	0,05	0,05	0,05	0,05	0,075	0,05	0,025	0,025
1	C5	0,06	0,1	0,03	0,04	0,08	0,05	0,04	0,03
1	C6	0,02	0,03	0,02	0,02	0,06	0,08	0,1	0,03
1	C7	0,1	0,1	0,1	0,06	0,1	0,08	0,1	0,1
0,5	C8	0,002	0,008	0,002	0,002	0,025	0,017	0,050	0,042
0,5	C9	0,04	0,04	0,05	0,02	0,04	0,05	0,02	0,03
0,5	C10	0,05	0,05	0,02	0,01	0,05	0,03	0,04	0,01
Score		0,61	0,71	0,45	0,40	0,69	0,59	0,76	0,60

Table 10 : MCDM analysis score rank

Participant	Score	Rank
P1	0,61	4
P2	0,71	2
P3	0,45	7
P4	0,40	8
P5	0,69	3
P6	0,59	6
P7	0,76	1
P8	0,60	5

This table shows that P7 has the highest score, which means that his responses have the greatest "weight" and significance. On the other hand, P4 has the lowest score among all participants, which means that his words and responses have the least "weight".

3.2 DISCUSSION

This section focuses on the analysis of the causes of delays in construction projects, based on data collected through interviews. The qualitative methodology allowed us to investigate further into the perspectives and experiences of important participants in the construction sector, providing insight into the complex issues that lead to delays.

The discussion begins by addressing the first research question, which is stated as follows: What are the most prevalent delay factors in building construction projects in Bosnia and Herzegovina? This research question aims to identify the main causes of delays in building construction projects in Bosnia and Herzegovina. Based on the literature, financial obstacles are regularly identified as a major factor contributing to delays in construction projects. Inadequate funding frequently reduces the availability of resources required for timely completion. Furthermore, ineffective planning and scheduling processes contribute significantly to project delays. According to literature findings confirmed by [3], [4], [17], [13], [15], [14] and [12] financial constraints and inadequate planning and scheduling are consistently identified as primary contributors to construction project delays. As part of the interviews, several participants (P2, P3, P6) stated that financial obstacles and ineffective planning and scheduling are among the key causes of project delays in Bosnia

and Herzegovina. On the other hand, other participants (P5, P7, P8) pointed out that unrealistic deadlines is significant causes of project delays. This insight highlights the importance of developing realistic and solid timeframes that are appropriate for the project's scope, resources, and complexities. According to [8] and [15] unrealistic project deadlines is frequently identified as the primary causes of construction project delays. In addition to the factors indicated above, several participants (P1, P4) recognized "lack of coordination among participants" as the primary cause for project delays in Bosnia and Herzegovina. This subject highlights communication, collaboration, and effort alignment issues among construction project stakeholders. According to literature findings by [5] and [18] lack of coordination among participants is similarly identified as one of the primary factor of delays in construction projects.

The second research question of this study is stated as follows: What are the most severe delay factors specific to Bosnia and Herzegovina's construction industry? This research question aims to identify the most significant delay factors in Bosnia and Herzegovina's construction industry. According to the literature, changes in design and inadequate project documentation are the main causes of project delays. Multiple studies have consistently identified these two elements as important causes to project failures. According to literature findings confirmed by [3], [7], [9] and [10] changes in design and inadequate project documentation have been identified as the most significant factors contributing to project delays. As part of the interviews, several participants (P3,P4,P7,P8)) stated that changes in design and inadequate project documentation are among the key factors of project delays in Bosnia and Herzegovina. On the other hand, other participants (P1, P2, P5, P6) pointed out that labour shortages and the presence of unskilled workers are significant causes of project delays. According to [11], [15] and [16] labour shortages and a majority of unskilled workers are frequently identified as the primary causes of construction project delays. The research emphasizes the importance of effective worker management practices in addressing these concerns completely.

The discussion ends by addressing the last research question, which is stated as follows: What technologies and methodologies can be proposed to effectively prevent delays in construction projects in Bosnia and Herzegovina? This research question aims to suggest technologies and methodologies to prevent delays in construction projects in Bosnia and Herzegovina. The present research question seeks to find and propose methods and technologies that can effectively prevent project delays, shifting the emphasis away from a review of existing literature on the causes of delays and toward a more practical investigation of potential solutions. As a result, the related analysis will not rely solely on literature findings; rather, it will draw on the insights and recommended approaches offered by interview participants. Notably, the literature on project delays has extensively investigated the different variables that lead to these problems, such as inadequate planning, poor communication, and inadequate finances, among others. This study's analysis of interview data intends to provide significant insights into the most effective techniques to preventing project delays, which can help project managers and stakeholders optimize project outcomes. The approaches and technologies described in this research study can be used as guidelines for professionals seeking to develop practical solutions to this widespread problem. In the following section, there are mentioned technologies and methods that can potentially prevent construction project delays in Bosnia and Herzegovina.

4 CONCLUSIONS

The constant problem of construction project delays, which has been well documented in international literature, is also present in Bosnia and Herzegovina. This study aimed to identify the primary factors contributing to such delays in the region, using a qualitative methodology that includes in-depth semi-structured interviews with construction industry experts. These experts, which included consultants, designers, contractors, and investors, provided extensive insights into the fundamental causes of delays.

The findings show that inadequate project planning, inadequate financing, bureaucratic obstacles poor communication among participants, and labour shortages are the primary causes of construction delays. Inadequate project planning frequently leads to unexpected problems and inefficiencies, while inadequate financing can cause major delays in project completion. Bureaucratic obstacles such as complex regulatory requirements and extensive approval processes, increase delays. Furthermore, a lack of good communication among project participants can result in misunderstandings and miscoordination, preventing projects from operating effectively. Labour shortages are also an important problem, influencing the availability of competent workers required for satisfying project deadlines.

The study defines several strategies for reducing these delays. A proactive approach to risk management is essential because it allows potential problems to be spotted and handled before they develop. Ensuring that the design and planning phases are completed on time is also essential as detailed and exact planning can avoid many of the issues that cause construction delays. Effective communication among all participants is essential for ensuring that everyone involved in the project stays consistent and informed, limiting the possibility of misunderstandings and errors.

4.1 RECOMMENDATIONS

4.1.1 Consultant Related Recommendations

1. Careful planning and detailed analysis of project requirements and specifications at the beginning.
2. Creating a complete plan of action that covers every stage of the construction process, from design to the end.
3. Regular communication with other project participants.
4. To avoid delays in work progress, consultants' design faults must be addressed immediately.

4.1.2 Designer Related Recommendations

1. Create a clear and precise project brief with the client to ensure that all requirements and expectations are understood from the beginning.
2. Create complete and precise drawings and specifications to reduce complexity and misunderstandings.
3. Provide regular updates to the client and other stakeholders on design progress and potential difficulties.

4. Build emergency strategies into the project schedule to account for any design modifications.

4.1.3 Contractor Related Recommendations

1. Establish strong connections with reliable suppliers to ensure material delivery on time.
2. Create a realistic and precise project timeline that includes all possible delays and limits.
3. Ensure that the project has enough skilled employees to satisfy the demands of the schedule.
4. Investing in quality equipment and machinery.
5. Introduction of ISO standards for process quality management.

4.1.4 Investor Related Recommendations

1. Engaging good and proven contractors is crucial for minimizing delays in construction projects and ensuring high-quality outcomes
2. Ensure that all necessary permits and approvals are obtained in a timely manner to avoid regulatory delays.
3. Invest in quality and proven designers and project documentation.
4. Create down a system for the project team to provide regular progress reports so that everyone keeps up informed about the project.
5. Create an accurate budget that includes all components of the project, including potential delays and unexpected expenses.

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