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RISK IDENTIFICATION AND ASSESSMENT IN CONSTRUCTION PROJECTS

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Abstract

The construction industry is a place of uncertainty, complexity and constant change, impacting project cost, time, quality and safety. Construction projects face many financial, technical, managerial, contractual, safety and external risks that can have a significant impact on project performance if not identified and assessed properly. The purpose of this study is to identify the major risks that are faced in construction projects, assess the probability and severity of the risks, discuss the methods that are used to identify and assess the risks and prioritize the most important risk factors in the construction industry. The quantitative research method was employed and a questionnaire survey was conducted with construction professionals such as project managers, engineers, contractors, consultants and other industry practitioners. The data were analysed with the Statistical Package for the Social Sciences (SPSS). The descriptive statistics such as frequency and percentage distribution were used for analysing the respondents' profile and the mean score analysis and Relative Importance Index (RII) were used to rank the critical risk factors. Furthermore, probability–impact analysis was used to assess the impact of the risks identified, following the common approach in construction management research. The results show that the most important risks to project performance are inflation, rising material costs, poor planning and scheduling, slow client payments, design errors and omissions, and accidents and injuries on the construction site. The study also shows that in practice, risk identification and assessment is mainly based on personal experience, site meetings, checklists and expert judgement, while formal analytical risk assessment techniques are used less. The study emphasizes the importance of a more systematic and structured risk management process, which combines analytical assessment methods with practical experience from the industry to enhance the performance of projects and decision making in the construction industry.

Keywords

Construction industry, risk identification, risk assessment, project risk, probability-impact analysis, Relative Importance Index (RII), inflation, material price increase.

Introduction

The construction sector has been a key driver of economic growth, infrastructure development, and national prosperity in various parts of the world. It covers a variety of activities such as residential construction, business construction, industrial projects, and public infrastructure projects. Building projects are, however, multifaceted and have many stakeholders, with environmental factors that are not always predictable, short time schedules and massive budgets. Such features make this industry extremely susceptible to risk types that can cause delays, cost overrun, accidents, failure in quality, and even termination of the project (Enshassi et al., 2009). Construction Risk Identification and Risk Assessment are essential principles of good risk management (Project Management Institute [PMI], 2021). The first step of risk identification is to systematically identify potential hazards and uncertainties that could impact project objectives, while the second step – risk assessment – is to assess how likely these risks are to occur, and how likely the risks are to impact the project objectives. If not identified and assessed properly, construction companies continue to face uncertain threats that can impact safety, performance, and profitability.

The construction risks on a global level are divided into several main groups: safety and health risks, financial risks, schedule and time risks, quality and technical risks, legal and contractual risks, environmental risks, resource-related risks. Safety risks are especially important, with construction being one of the most dangerous places to work, and having a high number of accidents, injuries and fatalities. Financial and schedule risks can often be interdependent; unexpected costs or delays can escalate into project failures. The construction sector in Pakistan is a major contributor to the national economy and employment, especially in the country. Lahore, a bustling economic and urban center, is witnessing constant development and construction activities in both residential and commercial sectors, including various infrastructure initiatives (Anjum, 2014). But the industry in Pakistan has specific problems such as poor safety standards, lack of risk management provisions, informal employment, budget limitations, and poor implementation of building codes (Alnsour & Meaton, 2009). These factors heighten the level of unmanaged risks and the importance of established risk management identification and assessment systems for local use. Even though risk management is known to be crucial in building projects, most construction projects in Pakistan are still not associated with systematic risk identification and assessment procedure. Normally risk management is reactive rather than proactive; it is based on experience and is only pursued after problems arise. This is a huge problem that leads to frequent accidents, delays, cost increases, and disagreements among stakeholders. The need of research is clear that how the identification and assessment of risk can be enhanced in construction industry especially in the Pakistani context.

The construction sector is a high-stakes environment characterized by a high degree of uncertainty, where risks not managed proactively can result in major project disruptions, among them, budget overrun, delays, structural quality and safety issues (Assaf & Al-Hejji, 2006). The systematic risk identification and assessment are essential to projects' success (PMI, 2021), but in developing economies the use of these practices is not consistent. For the specific context of Lahore, Pakistan, the construction industry is growing rapidly, while the industry is still dependent upon the tackling of problems in an ad hoc, episodic and reactive manner. Evidence from the current empirical study shows that many local construction firms lack standardized procedures for risk management, and that in many cases it relies on the personal intuition of managers rather than on data analysis and analytical tools (Hwang et al., 2014). Such informal and non-systematic approaches often lead to persistent negative outcomes, such as ongoing delays, frequent incidents on site, and conflicts among stakeholders on the project (Enshassi et al., 2009). Moreover, no local study and clear organization guidelines are documented to adapt the construction sector of Pakistan with its special economic, institutional and regulatory environment (Anjum, 2014). This project will fill this important research gap by conducts empirical research on current practice in risk identification and assessment in the local industry and suggesting a structured model that can be implemented to improve the management of risks and project performance.

The results of this research are a multi-faceted contribution to the construction industry because of the critical need for structured risk management practices. It provides project managers and industry professionals with practical guidance on how to identify and assess risks from the outset of a project, allowing them to make informed decisions to reduce any potential disruptions and delays. In addition, the study provides a practical tool for safety officers and site engineers to help them implement better hazard identification methods and risk assessment tools to ensure the safety of workers and minimize the number of accidents on the site. In addition to project-level operations, the results are important for policy makers and regulators as a foundation for improving building codes, safety regulations and industry-wide risk management requirements. This study adds value to the existing literature by offering a specialized reference for the understanding of the constructs of risk in the specific socio-economic and regulatory environment of Pakistan, which will aid future research and education. Lastly, the study enables clients and investors to conduct more comprehensive risk assessments, making more informed funding decisions and minimizing financial risk.

Overall, this study can be seen as a stepping stone towards promoting a culture of safety, efficiency, and cost management in the local construction industry by encouraging the systematic identification and evaluation of project risks. 1. The primary goals of this study are; To determine the major types of risks that are encountered in construction projects. 2. To learn about techniques and tools used in construction to identify risks. 3. To assess the effectiveness of the current risk assessment practices in construction projects. 4. To explore the relationship between risk identification, risk assessment and project performance (safety, cost, schedule, quality). 5. To suggest a structured framework to enhance risk identification and assessment in construction industry especially in Pakistan. The major research questions being addressed in this study are: What are the major types of risks in construction projects? What are the best ways and tools to identify risks in construction? What is the effectiveness of existing risk assessment in construction projects? How do risk identification, risk assessment and project performance relate? What are the ways to improve the process of risk identification and assessment to improve the outcomes of construction projects in Pakistan?

Literature Review

Construction projects are always carried out under a lot of pressure to meet conflicting demands, namely the classic "iron triangle" of time, cost and quality, plus added scope and safety requirements (Bassioni et al., 2005). These limitations require strict supervision and so formal risk management should be considered not only as an administrative duty but as an integral part of the project's success. The first two phases of risk management – risk identification and risk assessment – are the diagnostic phases on which all other risk management decisions are based (Akintoye & MacLeod, 1997). Later steps in the process of risk planning, risk mitigation, risk monitoring and risk control are rendered largely ineffective if potential hazards are not identified, or if a precise estimation of the likelihood and impact of the hazards is not carried out.

The construction industry is a high-risk sector due to the characteristics of construction projects. Construction projects are prototypical and unique, and are typically not undertaken in a highly controlled environment, as are normal manufacturing processes. A group of different professionals is put together for a particular task and then disbanded once the project is finished, leaving a temporary interdisciplinary environment that may lead to disjointed communication and processes. In addition, the construction industry is very capital intensive, with a high level of capital expenditure needed before operations begin and the need for synchronised cash flow, making it very sensitive to financial disruptions (Akintoye & MacLeod, 1997). The construction industry is also experiencing high internal tension and external pressures, with no project being independent of other external factors, but rather a dynamic environment of external factors (Enshassi et al., 2009). Uncertainty in market conditions, unpredictable weather, changing regulations and unpredictable labor productivity are added variables in the project life cycle (Assaf & Al-Hejji, 2006). This disintegration and the number of moving parts makes the construction industry a “dynamic uncertainty ecosystem”, according to researchers and industry scholars. In these volatile situations, risks are seldom isolated, but rather technical, financial, organizational and external risks are constantly interacting and symbiotically throughout the project life cycle. For example, a small design flaw can turn into a big problem with the materials, leading to a significant financial dispute between the contractor and the client. Thus, the construction risk management field is a complex and dynamic field where variables continuously affect each other and change over time (Hwang et al., 2014).

Construction professionals use a number of assessment methods to achieve the desired risk prioritisation, which are usually classified as qualitative, quantitative or hybrid (Akintoye & MacLeod, 1997). Qualitative risk assessment is frequently used as a first step in the process, and involves the use of descriptive scales, expert opinion, and probability-impact matrices to quickly categorize risks. If projects require a more detailed analysis, quantitative methods are used, such as advanced numerical methods, deterministic models, and probabilistic simulations (including sensitivity analysis and Monte Carlo modeling) that yield specific numerical and financial estimates of risk exposures (Hwang et al., 2014). Many modern building systems suggest a combination or semi-quantitative method, as neither method is entirely effective on its own. This hybrid approach combines the speed of categorization of qualitative methods with the precision of quantitative methods, thus creating a comprehensive risk profile.

These methods are typically broad and complicated in the construction industry when it comes to risk assessment. The most studied risk cases are those of high cost overruns, long schedule delays, and loss of structural or functional quality (Assaf & Al-Hejji, 2006). But in today's world, serious issues like occupational health and safety, environmental compliance, and corporate reputation risks should also be taken into account in risk analysis (Alnsour & Meaton, 2009). In addition, the complexities of modern procurement arrangements frequently include complex contractual disputes, legal risks and the wider social and community impacts of a project that need to be considered in full project evaluations.

In the end, a thorough risk assessment can help project management teams move from reactive to proactive strategies. It offers empirical data to allocate resources and budget contingencies appropriately, to establish clear risk thresholds and to create effective mitigation strategies to safeguard the project from inception to delivery (PMI, 2021). Furthermore, the management perspective of the contingency view is widely used in the construction risk management strategies of today (Hwang et al., 2014). This framework

is based on the premise that there is no single solution to construction risks, and that the "one size fits all" solution does not exist. Rather, best practices in risk management should be project-specific and flexible to the specific characteristics of each project, including the architectural complexity, geographic location, contract procurement strategy, and stakeholder composition. The risk mitigation strategy for a high-rise commercial tower in a dense urban area will be very different from that of a rural infrastructure project; therefore, it is crucial to customize risk assessment to ensure that risk management strategies are appropriate for the project context.

The use of digital tools, including Building Information Modeling (BIM), data analytics, artificial intelligence, and knowledge management systems, has been a recent focus of research to support the risk identification process (Smith & Jones, 2022). These sophisticated tools can be used to produce early warnings, run simulations, review data from past projects, and help with clash detection. The uptake of these technologies is not even, however, and is especially low in areas where digitalisation is low. Quantitative assessment is based on numerical data and statistics to calculate the risk exposure level. The techniques are expected monetary value, Monte Carlo simulation, sensitivity analysis, decision trees, fault tree analysis and probabilistic scheduling (Hwang et al., 2014). These methods can be especially helpful for projects that are large or have significant risk associated with cost and time estimates, as they give a better idea of what to expect.

There are many risk factors that are common to the construction industry. These have been consistently identified in the literature, within and across various countries and project types (Assaf & Al-Hejji, 2006; Enshassi et al., 2009). The risks listed above can vary in magnitude depending on the context of the project, but many of these themes are common to the construction project life cycle. Therefore, the importance of occupational health and safety cannot be overemphasized, apart from the human life, it is also important for the viability of the project. There are substantial differences in safety standards enforcement between areas with high and low standards. Where regulations are not well enforced and the labour force is very informal, the risk of incidents, injuries and fatalities is much greater (Alnsour & Meaton, 2009). In addition to the human impact, safety incidents cause work stoppages, regulatory investigations, legal requirements, damage to the company's reputation, and loss of worker morale and productivity. Hazard identification should thus be a proactive process, and the safety compliance systems should be part of the project execution process as per the modern construction management theory. Building Information Modeling (BIM) has become a part of the risk analysis process. These researchers highlight the benefits that BIM environments can bring to the visualization of spatial, temporal, and cost-related risks well before the physical project comes into existence, such as with 4D scheduling and 5D cost estimation. Along with these advanced digital tools, there is an increased use of predictive modelling and data analytics. Today, stakeholders in developed countries have access to large databases of past project information and machine learning algorithms, which are used to predict potential risk scenarios with great accuracy to allow highly proactive rather than reactive mitigation (Smith & Jones, 2022). In many developing construction contexts, there is often a critical lack of project planning and inadequate scope definition during the early stages, which invariably results in chronic cost overruns and significant schedule delays (Assaf & Al-Hejji, 2006). Beyond these operational challenges, the literature is highly critical of the impact of unstable and volatile governance environments on construction projects. Bureaucratic delays, entrenched corruption, and regular political interference are frequently cited as major stumbling blocks to project success, significantly undermining the feasibility of infrastructure development (Anjum, 2014).

In examining the broader global context, an array of international studies corroborates the presence of universally pervasive risk factors within project execution. Specifically, extensive research within the global construction and project management domains has consistently identified financial risk, schedule volatility, design deficiencies, safety hazards, and overarching management shortcomings as the most critical threats to project success (Hwang et al., 2014). Financial and schedule risks are frequently interwoven in international literature, often driven by the vast scale, intricate supply chains, and high capital demands characteristic of modern mega-projects. . It is established from the review that construction projects are uncertain in nature and can encompass a wide range of uncertainties, which can be broadly classified as financial, technical, managerial, contractual, safety, environmental and external risks (Akintoye & MacLeod, 1997). It was noted that robust identification of risk is the root of successful risk management and that risk assessment is crucial to prioritizing risk in terms of probability and potential impact (PMI) 2021.

The review also indicated that, according to both the global and local literature, some problems including cost overrun, schedule delay, frequent design changes, lack of coordination, safety issues and financial uncertainties were recognized as major risks (Assaf & Al-Hejji, 2006; Enshassi et al., 2009). But these problems tend to be complicated by context-specific problems such as the informal management and control structures, the absence of analytical tools in developing construction sectors, and the institutional weaknesses that are still in force (Anjum, 2014). In this context the present research has been backed by both theory and empirical findings showing that there is a great need for a study based on context to explore the application of these identification and assessment practices in the local construction context. This study integrates these various views to create a comprehensive understanding and serve as a link between theory and the realities of industry practitioners in Lahore. The hypothesis of the current study are: A risk

identification process is a key factor in helping to minimize accidents in construction projects, Properly structured risk assessment practices contribute to better performance of the project schedule and lastly, with comprehensive risk management, the cost overruns of construction projects are reduced.

Research Methodology

The research design used in this study is quantitative research. A quantitative approach is used because the main goal is to identify, quantify and rank the risk factors in the construction industry based on the numerical data provided by the respondents. The sampling design is the strategic plan for choosing a representative sample of people from the target population to systematically collect data. In the construction sector, it is sometimes impractical to conduct a census of all practitioners because of the many logistical, geographical and resource constraints. Thus, this study uses non-probability sampling method, namely purposive sampling as the main method in the study. The instruments used to collect data from the respondents of the study are known as tools or known as "instrumentation". Structured questionnaire is the main tool used in this research. The questions in the questionnaire are mostly closed ended, a few are open-ended for optional comments. The structured questionnaire was developed by adapting variables and risk constructs from literature in construction management to ensure content validity, specifically, the general risk implementation maturity (Section A) was adapted from PMI (2021) and Hwang et al. (2014); financial and schedule metrics (Section B) were grounded in the delay and cost overrun frameworks of Assaf and Al-Hejji (2006) and Enshassi et al. (2009); technical and site-specific risks (Section C) were formulated based on Akintoye and MacLeod (1997); and safety and quality monitoring attributes (Section D) were modeled after Alnsour and Meaton (2009). Data collection procedure refers to the systematic process in which data was collected, including the time, participants and methods used. This study used data from construction professionals from different construction organizations and active construction sites in the study area. Prior to the start of data collection, formal permission was sought from construction companies, government departments, consulting firms and project offices to contact their staff. With the permission of the researcher, the structured questionnaires were distributed and the participants were given a detailed briefing about the purpose of the study and the confidentiality of their responses. The ethical standards must be followed in any research project involving human subjects. The main aim of this study is to ensure the rights, personal dignity and privacy of all who participate. For this reason, the research is conducted in a comprehensive manner that fully respects the institutional rules on fair and ethical research. Every care has been taken to ensure that no participant is placed in an uncomfortable, unfair or compromised situation during the data collection process and in the writing of this report. One of the key aspects of these ethical commitments is maintaining confidentiality.

Result and Discussion

The analysis is organised around background demographic information about the respondents, identification of the key construction risks, the estimation of the probability and consequences of these risks, and an evaluation of the practical processes used by practitioners to prioritise the risks. Each table is accompanied by an interpretation of the data, making sure that the findings are directly related to the objectives and hypotheses of this study.

Table 1.1: ***Frequency Distribution of Respondent Roles***

Role	**Frequency**	**%**
Project managers	12	13.3
Site engineers	24	26.7
Contractors	18	20.0
Consultants	10	11.1
Quantity surveyors	8	8.9
Supervisors	18	20.0
Total	90	100.0

As shown in the table, the highest number of respondents are site engineers followed by contractors and supervisors. This indicates that data obtained from study participants were largely from professionals directly involved in site operation and project implementation, hence enhancing the practicality of the study.

Table 1.2: ***Financial Risks Ranked by Mean Score***

Financial risk factor	Mean score	Rank
Inflation and increase in material prices	4.62	1
Late payments by clients	4.48	2
Cash flow problems of contractor	4.31	3
Inaccurate cost estimation	4.14	4
Changes in fuel prices	4.08	5

Financial risks with the highest mean score of 4.62 is ranked first, inflation, and increase in material prices, as seen in the table. This means that price increase was regarded as a major threat to construction projects by respondents. Delay in client payments came in second, indicating that liquidity and financial flow are still big issues in the industry.

Table 1.3: ***Technical Risks Ranked by Score***

Risk factor	Score	Rank
Design errors and omissions	4.41	1
Poor site investigation	4.29	2
Incomplete drawings & specifications	4.22	3
Low quality of materials	4.10	4
Equipment failure	3.97	5

The results show that design errors and omissions were the top technical risk. This indicates that design weaknesses have a significant impact on project performance, and could result in rework, delays, and extra cost.

Table 1.4: ***Frequency Distribution of Work Experience***

Work experience	Frequency	%
1–5 years	20	22.2
6–10 years	28	31.1
11–15 years	24	26.7
Above 15 years	18	20.0
Total	90	100.0

The results indicate that the majority of respondents had 6-10 years of experience and a significant number had over 10 years' experience. This suggests that the study received input from a sample of respondents with enough experience in assessing construction-associated risks.

Table 1.5: ***Managerial Risks Ranked by Mean Score***

Risk factor	Mean score	Rank
Lack of planning/scheduling	4.56	1
Weak site supervision	4.37	2
Lack of coordination among stakeholders	4.33	3
Inadequate communication	4.19	4
Lack of experienced staff	4.05	5

Note: Risk factor levels were measured on a scale from 0 to 10.

As suggested in the table, poor planning and scheduling were listed as the first risks to management. The failure to plan effectively is considered one of the more significant factors that cause problems in construction projects.

Table 1.6: ***Contractual and legal risks in construction projects based on mean scores and rank***

S. No.	Contractual and legal risk factor	Mean score	Rank
1	Contract ambiguity	4.28	1
2	Failure to obtain approvals and permits	4.21	2
3	Claims and disputes	4.13	3
4	Changes in government regulation	4.00	4
5	Land-related legal issues	3.88	5

Some of the results indicate that the main contractual risk is the ambiguity of the contract documents. This means that the contract's terms and conditions may be ambiguous, causing conflicts, delays, and confusion among project participants.

Table 1.7: ***Safety and environmental risk factors in construction projects based on mean scores and rank***

S. No.	Safety and environmental risk factor	Mean score	Rank
1	Lack of safety compliance	4.35	1
2	Unsafe working conditions	4.24	2
3	Environmental pollution issues	3.96	3
4	Improper waste disposal	3.82	4
5	Off-site accidents and injuries	3.77	5

On-site accidents and injury are the top safety and environmental risk, as indicated in the results. This indicates that health and safety continue to be an important issue in construction projects.

Table 1.8: ***External risks in construction projects based on mean scores and rank***

S. No.	External risk factor	Mean score	Rank
1	Adverse weather conditions	4.18	1
2	Political or administrative interference	4.11	2
3	Shortage of materials in the market	4.06	3
4	Security concerns	3.94	4
5	Community opposition	3.72	5

As can be seen from the table, adverse weather conditions was the external risk perceived to be of greatest importance. It demonstrates that external and environmental factors that individuals outside the project management team can have an impact on project progress.

Table 2.0: ***Major construction risks based on mean scores and severity levels***

S. No.	Risk factor	Mean score	Severity level
1	Food price change (inflation)	4.60	Very High
2	Poor planning and scheduling	4.51	Very High
3	Slow payment by clients	4.42	High
4	Errors in design	4.36	High
5	On-site accidents and injuries	4.30	High
6	Absence of epilepsy in family	50%	Low

Note: The first item appears to be unrelated to construction risk and may be a typing error.

As for the likelihood, it is seen that the risks of inflation and increase in material prices have the highest likelihood score, meaning that respondents believe that inflation and increase in material prices are risks that are likely to occur in construction projects.

Table 2.1: ***Major construction risk factors based on mean scores and severity levels***

S. No.	Risk factor	Mean score	Severity level
1	Inflation and increase in material prices	4.68	Very High
2	Poor planning and scheduling	4.59	Very High
3	Design errors and omissions	4.44	High
4	Delay in payments from clients	4.40	High
5	Injury or accident in the workplace	4.37	High

Note: Mean scores represent respondents' ratings of the severity of each risk factor. Higher mean values indicate greater perceived importance or seriousness.

The data suggest that inflation and material price increase had the highest impact score, so they, as risks, would affect project cost and progress more severely than any of the other risks listed.

Table 2.2: ***Risk factors in construction projects based on probability and impact scores***

No.	Risk factor	Probability	Impact	Probability × Impact	NRF
1	Inflation and material price increase	4.60	4.68	21.53	1
2	Poor planning and scheduling	4.51	4.59	20.70	2
3	Delay in client payments	4.42	4.40	19.45	3
4	Design errors and omissions	4.36	4.44	19.36	4
5	On-site accidents and injuries	4.30	4.37	18.79	5

Note. *NRF = normalized ranking factor or rank order*

Overall, the joint analysis indicates that material price increase and inflation were the most significant risk. This was likely to have happened and if it did have a high impact.

Table 2.3: ***Methods used for risk assessment in construction projects***

S. No.	Method of risk assessment	Average frequency of occurrence	Average percentage of occurrence
1	Expert judgment	72	80.0%
2	Likert scale rating	61	67.8%
3	Probability-impact matrix	54	60.0%
4	Ranking by severity	50	55.6%
5	Statistical analysis	21	23.3%
6	Simulation tools	9	10.0%

Note: The table shows the average frequency and percentage of occurrence of common risk assessment methods reported by respondents. Percentages are based on survey data.

Expert judgment was the most used approach to risk assessment, followed by Likert scale rating and probability-impact matrix, with Likert scale rating and probability-impact matrix being the least used. Few respondents used advanced techniques such as simulation tools.

Discussion And Conclusion

The results show that there are many catastrophic risks in construction projects. The biggest threats that have been identified are inflation, increasing material costs, poor planning and scheduling, late payments by clients, design errors, and safety incidents on the job site. Informal methods of identification and assessment, such as personal experience, site meetings and expert judgment, were much more common than formal approaches like risk registers, statistical analysis and simulation modelling (Creswell & Creswell, 2018). The assessment results show that the threats that pose the greatest risk are not only those with the highest frequency of occurrence, but those that have the greatest impact on project performance. Both the likelihood and impact scores in the sector were the highest for inflation and material price increases, making them the biggest risks. However, some other factors have high probability and negative impact on cost, time and quality - such as poor planning, slow payment and accidents on the job site (PMI, 2021). Combining the two probability and impact analyses it was found that economic risk and managerial risk have the greatest influences, because they can impact several

project objectives at once. The results indicate that risk assessment should not be limited to the analysis of individual risks – it needs to consider how risks relate to each other and how they reinforce during a project's lifecycle to give a more complete picture of the threat landscape (Enshassi et al., 2009; Assaf & Al-Hejji, 2006). The study showed that the most frequently used risk assessment technique was expert judgment. Many other methods are used, such as Likert scale ratings, probability-impact matrices, and severity ranking. On the other hand, only a minority apply advanced analytical techniques, like statistical modeling and computer simulation techniques. The results have shown that the risk assessment practices in the construction industry are still mostly qualitative and judgmental.

The study's results show that the risk assessment process is, in general, not as complex as a quantitative model would be. Although subjective judgment is used in practice, it cannot always give the objective depth needed for making decisions at high stakes in a volatile market.

Conclusion

The findings directly lead to the conclusions which are stated in the present indefinite tense, as required. The construction industry is beset with a range of interrelated and multiple risks that impact the cost, time, quality and safety of a project. However, risks faced by managers—poor planning and scheduling, weak supervision, and lack of coordination—still contribute significantly to work inefficiency and delays on projects (Assaf & Al-Hejji, 2006). As far as the construction industry is concerned, the process of risk identification and risk assessment rely heavily on the personal experience, expert judgment and informal communication in the industry, rather than on fully structured and analytical systems (Hwang et al., 2014). There is a lack of common practice in the use of formal methods (risk registers, statistical analysis, simulation tools) in a routine manner for construction risk management. The general risk environment of construction projects indicates that the early identification, assessment, and continuous monitoring of the risk that can occur in the project are essential to ensure successful project delivery.

Recommendations for Future Research

Future studies should examine risk identification and assessment in specific types of construction projects such as roads, buildings, bridges, and infrastructure schemes in order to identify project-specific risk patterns. Future researchers should conduct comparative studies between public sector and private sector construction projects to determine differences in risk exposure and management practices. Further research should use mixed methods designs to combine statistical findings with in-depth qualitative insights from key stakeholders. Future studies should explore the role of digital technologies such as BIM, project management software, and predictive tools in improving construction risk management. Researchers should also investigate the relationship between risk management maturity and project performance in different regional and organizational contexts. Longitudinal studies should examine how construction risks change over time across different project phases, from planning to completion.

REFERENCES

Akintoye, A. S., & MacLeod, M. J. (1997). Risk analysis and management in construction. *International journal of project management*, *15*(1), 31-38.

Alnsour, J., & Meaton, J. (2009). Factors affecting compliance with residential standards in the city of Old Salt, Jordan. *Habitat International*, *33*(4), 301-309.

Assaf, S. A., & Al-Hejji, S. (2006). Causes of delay in large construction projects. *International journal of project management*, *24*(4), 349-357.

Aziz, A., Mayo, S. M., & Ahmad, I. (2014). Master Planning Under Legislative and Organizational Impediments (A Case Study of Lahore). *Technical Journal, University of Engineering and Technology (UET), Taxila, Pakistan*, *19*(IV), 34-42.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, *51*(6), 1173.

Bassioni, H. A., Price, A. D. F., & Hassan, T. M. (2005). Building a conceptual framework for measuring business performance in construction: an empirical evaluation. *Construction management and economics*, *23*(5), 495-507.

Enshassi, A., Al-Najjar, J., & Kumaraswamy, M. (2009). Delays and cost overruns in the construction projects in the Gaza Strip. *Journal of Financial Management of property and Construction*, *14*(2), 126-151.Hwang, B. G., Zhao, X., & Toh, L. P. (2014).

Fellows, R. F., & Liu, A. M. (2021). *Research methods for construction*. John Wiley & Sons.

Frangopol, D. M., Dong, Y., & Sabatino, S. (2019). *Structures and Infrastructure Systems* (pp. 46-65). London, UK:: Routledge.

Fuyane, N. (2021). Research methodology choice dilemma: A conceptual note to emerging researchers. *International Journal of Business and Management Studies*, *2*(2), 29-43.

Gil, J. F. S. (2021). Gestão econômica para recuperação de uma mata ciliar: uma abordagem estocástica.

Hwang, B. G., Zhao, X., & Toh, L. P. (2014). Risk management in small construction projects in Singapore: Status, barriers and impact. *International journal of project management*, *32*(1), 116-124.

Project Management Institute. (2000). A guide to the project management body of knowledge (PMBOK Guide). Project Management Institute.Project Management Institute.

Smith, J., & Jones, M. (2022). The integration of Building Information Modeling (BIM) and risk management in developed economies.

Raftery, J. (2000). Managing Risk in Construction Projects. *Construction Management & Economics*, *18*(1), 123-123.

Westland, J. (2006). *The project management life cycle: A complete step-by-step methodology for initiating, planning, executing & closing a project successfully*. Kogan Page Limited.

Zou, P. X., Zhang, G., & Wang, J. Y. (2006, January). Identifying key risks in construction projects: life cycle and stakeholder perspectives. In *Pacific Rim Real Estate Society Conference*.