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Assessment of Key Risk Factors Impacting Construction Project Performance

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Abstract
Risk management is essential for achieving project objectives, particularly in construction projects, which involve complex processes and multiple stakeholders. This study examines the key risk factors affecting construction projects in developing countries, based on a review of various studies. Price inflation identified as the most significant risk, consistently ranked as the top factor due to its impact on material costs and project budgets. Design changes and errors are also prominent, contributing to project delays, rework, and cost escalations. Poor construction management ranks fourth, as it often leads to inefficiencies and delays. Financial difficulties faced by owners or contractors rank fifth. Unrealistic project schedules and shortages of construction materials also pose critical risks, highlighting the need for effective planning and resource management. Other notable risks include delays in payments, poor project planning, and low labor productivity, all of which impact project timelines and performance. In Nepal, additional risks such as safety concerns, technological limitations, and equipment shortages emerge. Addressing these risks through effective risk management strategies to address both common and local context-specific risks is essential to improving project efficiency and ensuring successful outcomes, particularly in developing countries such as Nepal. Comprehensive mitigation approaches are needed to navigate these challenges, reduce the likelihood of adverse events, and promote timely project delivery.

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1. Introduction

The construction industry is vital to a country's infrastructure development and economic growth, supporting population expansion and long-term stability (Santoso & Gallage, 2020) [29]. Time, cost, and quality are the primary performance measures that determine the success and efficiency of construction projects (Hwang *et al*., 2020) [18]. However, risks and uncertainties arise at every stage, from investment appraisal to construction, which can adversely affect stakeholders and overall project success (Szymański, 2017) [36]. Critical risks such as poor labor and equipment productivity, tight schedules, and inadequate scope definition can significantly affect project outcomes due to the inherent uncertainties involved (Qazi *et al*., 2021) [26].

The complexity and uncertainty inherent in the construction industry stem from various factors, such as the performance of contractors and stakeholders, resource availability, and the nature of contractual relationships. These elements significantly affect project outcomes, making risk management a critical factor in ensuring the success and smooth execution of construction projects (Abd El-Karim *et al*., 2017) [2]. Implementing effective risk management strategies helps mitigate uncertainties and promotes project success, contributing to overall industry growth.

Construction projects face inherent uncertainties due to factors such as project variability, resource constraints, and external influences (Hijazi, 2021) [17]. These challenges often fail to meet predetermined goals, with many projects falling short of intended success (Alvand *et al*., 2023) [5]. Additionally, the unique nature of construction projects, combined with intense competition and sector-specific challenges, leads to delays, conflicts, and the absence of an effective quality assessment system,

complicating project management and overall performance (Bitamba & An, 2020) [8].

Issues such as project overruns, time extensions, and conflicts among stakeholders are common in the construction industry, stemming from the fragmented and highly competitive nature of the sector (Bitamba & An, 2020) [8]. As a result, risk identification and management become critical for the survival and success of construction projects (Rahimi *et al*., 2018) [27]. Addressing these challenges through robust risk management strategies is essential to improving project outcomes and ensuring that construction projects meet their goals.

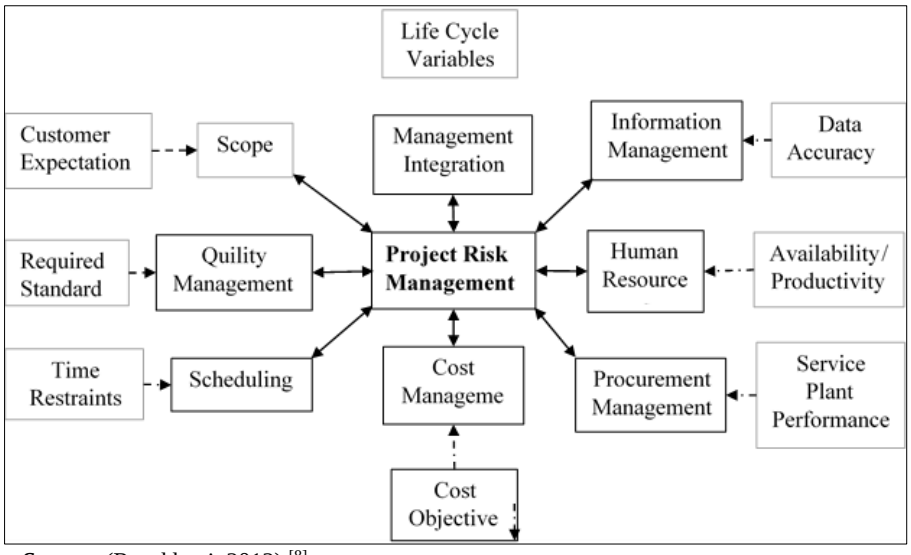
The main objective of this research is to identify and analyze critical risk factors affecting construction project performance. By reviewing academic literature, the study aims to determine the frequency and significance of these risks and provide insights into effective risk management to improve project outcomes.

2. Overview of risks in construction projects

Various studies have explored factors affecting construction project performance. Some identified key factors across different countries and project types, while others examined their impact on project success and failure. Additionally, research has proposed strategies to improve outcomes and mitigate negative influences on construction projects. Critical risks in construction projects include schedule changes, delayed financial support, equipment failures, license issuance delays, poor contractor planning, inflation, changes in government policies, substandard equipment quality, alterations in project components, lack of expertise, and project manager's responsibilities (Tavakolan & Mohammadi, 2018) [37]. Identifying these risks is crucial for effective project management and can significantly benefit the organization by enabling proactive measures and improving overall project outcomes. Similarly, key factors affecting construction project performance in Gaza include material shortages, resource unavailability, low leadership skills, rising material prices, lack of experienced personnel, and poor-quality equipment (Chileshe & Boadua Yirenkyi-Fianko, 2012) [9]. In Jordan, financial difficulties, manpower shortages, and frequent order changes are identified as primary factors impacting contractor performance on construction projects (Bari *et al*., 2012) [7].

Risk management is crucial in construction projects, encompassing hazard identification, risk assessment, and control through both qualitative and quantitative methods. It systematically identifies, analyzes, and responds to risks to maximize positive outcomes and minimize negative impacts on project objectives. By assessing potential dangers, risk management helps prevent negative effects while ensuring an organization can progress toward its goals with minimized harm (Akçakanat, 2012) [4]. Although risk management seeks to mitigate or eliminate these negative impacts and promote positive ones, accurately measuring risks is challenging, increasing difficulties in controlling them effectively. Despite these challenges, risk management remains essential for ensuring the successful delivery and performance of construction projects.

A construction project is considered successful when it is completed on time, within budget, and meets all specified requirements and quality standards. The construction industry plays a vital role in generating jobs, developing infrastructure, and fostering collaboration with other sectors. However, the industry faces numerous challenges, including the absence of key progress factors, leading to delays, financial setbacks, and a potential negative impact on overall economic growth (Mishmish & El-Sayegh, 2018) [23]. Effective risk management is essential in construction, involving the identification, assessment, and control of hazards through strategic planning and mitigation techniques (Abd El-Karim *et al*., 2017) [2]. Effective risk management is crucial for identifying threats, ensuring resilience, and driving sustainable success beyond compliance requirements (Aung *et al*., 2024) [6]. Effective project risk management, when integrated with other project elements, enhances decision-making and significantly improves the likelihood of achieving project scope and objectives through proactive risk mitigation.



***Source*:** (Rezakhani, 2012) [8]

Fig 1: Structured Approach to Project Risk Management

Figure 1 presents a structured approach to **Project Risk Management**, illustrating how various interconnected components contribute to managing risks in a project. At the core, **Project Risk Management** integrates multiple factors, starting with **Management Integration**, which is influenced by **Life Cycle Variables**, ensuring alignment with the project's life cycle. **The scope** is shaped by **Customer Expectations**, which directly impact **Quality Management**, driven by the **Required Standard**. Similarly, **Scheduling** is determined by **Time Restraints**, reflecting the importance of adhering to deadlines. **Cost Management** is linked to achieving the **Cost Objective**, ensuring the financial aspects are controlled. Additionally, **Procurement Management** is influenced by **Service Plant Performance**, underscoring the role of suppliers and operational facilities. The diagram also highlights the significance of **Human Resources**, connecting availability and **Productivity** to workforce efficiency. Lastly, **Information Management** is emphasized, with a focus on **Data Accuracy**, ensuring that reliable and precise information is available for decision-making. This interconnected framework shows that effective risk management in projects requires addressing various dimensions, including quality, time, cost, resources, procurement, and data management, all of which contribute to the successful mitigation of potential risks. Key aspects of risk management include risk identification, risk assessment, risk response, and risk control.

Risk Identification

Risk identification is the foundational phase in risk management, essential for capturing potential risks throughout a project (Nnadi *et al*., 2018) [25]. It sets the groundwork for risk assessment and control by revealing inherent risk areas, allowing organizations to understand and address them. Accurate identification helps prevent hidden risks from escalating into major issues with unforeseen consequences. Failure to identify both positive and adverse risks can have significant repercussions, leading to challenges in managing risks effectively and potentially impacting project success (Ghasemi *et al*., 2018) [14].

Risk Assessment

Risk assessment follows identification and involves evaluating the frequency and consequences of identified risks (Kumar *et al*., 2018). This process uses information to estimate the likelihood and impact of each risk. Qualitative risk assessment entails analyzing these risks further to understand their effects on project objectives and how they can be managed (Nnadi *et al*., 2018) [25].

Risk Response

Risk response is a critical component of risk management that determines the actions to be taken based on risks identified, analyzed, and quantified. It involves generating and evaluating options to mitigate or eliminate risks and selecting the most effective response (Ghasemi *et al*., 2018) [14]. The process focuses on developing alternative strategies to manage risks, addressing opportunities, and minimizing pressures, ultimately aiming to support the project's objectives and ensure successful outcomes (Nnadi *et al*., 2018) [25].

Risk Control

Risk control involves executing and supervising risk management plans developed after the identification, assessment, and response stages. This process is crucial for effective project management and faces two main challenges: implementing risk plans effectively and creating comprehensive documentation to support the process. A proactive approach is essential, focusing on implementing and continuously refining measures to manage risks, rather than merely reacting to issues as they arise, ensuring project objectives are met efficiently (Ugwu *et al*., 2019) [39].

Some key risk factors

political risk

Political risk definitions are categorized into two approaches. The first approach focuses on the causes, including negative consequences from political events (such as wars, regime changes, and terrorism) and government actions (like expropriations, unfair compensations, and legal changes). The second approach addresses the repercussions, defining political risk as the adverse effects on projects resulting from a deteriorating political environment. Both perspectives highlight the significant impact of political instability on business operations and project success (Tessema *et al*., 2022) [38].

Design Risk

Design risk involves defects that lead to a project failing to meet specified standards, legal requirements, or environmental constraints. This can result in project revisions, delays, and increased costs. Key design risks include design flaws or omissions, longer-than-expected design processes, late revisions requested by stakeholders, and failure to align with contract requirements, potentially causing the project to fall short of service standards or increase operation and maintenance (O&M) expenses (Tessema *et al*., 2022) [38].

Finance Risk

Finance risk pertains to challenges in managing a project's funding throughout its lifecycle, including execution periods, operations, and equity financing. Successfully addressing financial risk is crucial for ensuring the project's completion and operational stability (Tessema *et al*., 2022) [38].

Technical Risk

Technical risks arise when obstacles prevent the creation of a product that meets customer requirements. These include inadequate funding, material shortages, site assessment issues, design flaws, project scope changes, poor-quality materials, obsolete equipment, unknown site conditions, and material wastage during construction, all affecting project outcomes (Ugwu *et al*., 2019) [39].

Management Risk

Construction management risks encompass incorrect project team selection, inadequate project manuals and procedures, excessive project complexity relative to available resources, delayed remedial actions, poor quality control, ineffective status reviews, inexperienced team members, and inadequate communication infrastructure. Additional risks include short

tendering periods, improper feasibility studies, time constraints, and lack of experience with similar projects (Tessema *et al*., 2022) [38].

Construction materials and machinery factors

The construction industry in developing countries faces a critical challenge with the depletion of construction materials and limited access to advanced technology and machinery. Limited machinery and insufficient material supply are key factors impacting the construction industry, affecting its ability to meet demand effectively. The shortage of raw materials often arises from difficult geographical conditions and limited local market availability, impacting the construction industry (Tessema *et al*., 2022) [38].

Human resource-related factors

In developing countries like Nepal, human resources in the construction industry face challenges due to insufficient research on sector declines and impediments. Low salaries for construction workers, driven by poor economic management and low budg*et al*location, are significant issues impacting industry progress (Tessema *et al*., 2022) [38].

Iqbal *et al*.,(2015) [19] investigated risk management in Pakistan's construction industry using a survey of 37 risk factors. The study aimed to determine the significance and responsibility of various risks, calculating an age score similar to the relative importance index. Risks were categorized by responsibility of contractor, client, or shared and addressed using preventive and remedial techniques. The top five risks identified were payment delays, defective design, lack of funds, construction accidents, and low performance. Ugwu *et al*., (2019) [39] explored risk management practices in Nigeria's construction industry, emphasizing its role in economic growth. Their findings indicate that effective risk management involves proper identification, management, and control of risks. Soewin & Chinda, (2018) [34] identified ten key factors influencing construction performance: time, cost, quality, safety and health, internal stakeholders, external stakeholders, client satisfaction, financial performance, environment, information, technology, and innovation. Safety and health considerations are crucial for ensuring worker well-being, while both internal and external stakeholders play significant roles in project outcomes. Client satisfaction is essential for measuring success, and financial performance impacts overall project viability. Environmental factors and advancements in information, technology, and innovation also contribute to the effectiveness and efficiency of construction projects.

3. Methodology

To carry out this research, a structured comparative analysis methodology was adopted, focusing on evaluating risk factors in construction projects across various developing countries. The research began with a thorough literature review, examining studies from Egypt, Yemen, Iran, Ethiopia, and other relevant countries. Data was systematically collected from these studies to ensure comprehensive coverage of the identified risks. This review identified and categorized the top ten risk factors. The collected data was then organized into a comparative framework, allowing for the extraction and ranking of risk factors across different countries. This framework facilitated a detailed comparative analysis, revealing patterns and trends in the prevalence and ranking of risks. The analysis focused on identifying both country-specific and common risks. Findings were synthesized to common trends and country-specific factors, providing a nuanced understanding of how various risks impact construction projects. The research concluded with a set of recommendations for enhancing risk management strategies, emphasizing the need for tailored approaches that address both widespread common risks and country-specific risk factors.

4. Result and discussion

Table 1 presents a comparative analysis of risk factors in construction projects across different countries. It identifies key risks based on research conducted in Egypt, Yemen, Iran, and other countries. The data focuses on financial difficulties, project management issues, design errors, price inflation, and unrealistic project schedules, highlighting their ranking and common occurrence in different regions. Financial difficulties are consistently ranked as one of the highest risks, particularly in Egypt (Yousri *et al*., 2023) [41], Yemen (Gamil & Abdul Rahman, 2020) [13], and Ethiopia (Sinesilassie *et al*., 2018) [32]. This risk appears frequently across studies, often caused by contractors' or owners' financial instability, affecting project execution and leading to delays or project failures. Price inflation is another common and critical issue, particularly in Iran (Alvand *et al*., 2023) [5] and Tanzania (Msomba, 2018) [12]. It ranks as the top risk in studies across various regions, reflecting how rising material costs can significantly disrupt budgets and schedules. For instance, it ranks 1st in Egypt and Tanzania, illustrating how inflationary pressures can hinder construction progress. Project management challenges such as poor construction management and unrealistic project schedules are widely noted as significant risks. Poor project planning is especially critical in Egypt, Ethiopia, and Tanzania, where it consistently ranks among the top factors (Eng. Philemon, Z. Msomba, 2018; Yousri *et al*., 2023) [12, 41]. This emphasizes the role of effective planning and coordination to ensure the successful delivery of construction projects. Unrealistic project schedules, often stemming from poor planning, rank highly across multiple countries, contributing to project delays and cost overruns. Design changes and errors also present a significant risk. In Yemen, Iran, and Ethiopia, design changes are ranked second (Gamil & Abdul Rahman, 2020; Tessema *et al*., 2022) [13, 38], and design errors are frequently ranked third. Design-related risks cause rework, delays, and additional costs, highlighting the need for accurate and thorough planning during the design phase.

Table 1: Key risk factors across different developing countries

Title and Country	Authors	Factors	Rank
Risk identification of building construction projects in Egypt	(Yousri *et al*., 2023) [41]	Financial difficulty faced by the contractor	1
		Price Inflation	2
		Shortage of construction materials	3
		Unrealistic project schedule	4
		Complicated administration process	5
		Changing specification	6
		Exchange rate	7
		Changing laws related to importing and exporting construction materials	8
		Changing of the scope of the project	9
		Design error	10
Critical factors contributing to construction failure in Yemen	(Gamil & Abdul Rahman, 2020) [13]	Poor construction management	1
		Design changes	2
		Continuous suspension of work	3
		Shortage of construction materials	4
		Hiring an uneducated contractor	5
		Low salaries	6
		Poor financial control and management	7
		Delay of progress payment	8
		Financial difficulty faced by owners	9
		Poor financial control and management	10
Risk in Construction Projects in Iran	(Alvand *et al*., 2023) [5]	Low performance of human resources	1
		Ineffective communication and cooperation of contractor	2
		Ineffective financial management of contractor	3
		Lack of coordination of project-related human resources	4
		Claims of contractors and contracting companies	5
		Uncertainty in estimating project quality requirements	6
		Inappropriate contractual terms and conditions	7
		Unclear duties and responsibilities	8
		Lack of both skill and upskill human resources	9
		Price Inflation	10
Risk Identification and Management in Construction Projects	(Sharma & Gupta, 2019) [30]	Financial difficulty faced by the owner	1
		Design error	2
		Poor construction management	3
		Contractual risks	4
		Laws and regulations changes	5
		Adverse weather conditions	6
		Price Inflation	7
		Natural disaster	8
		Less concern over the health and safety of workers	9
		Change in project scope	10
Identifying Key Risks in Construction Projects: Life Cycle and Stakeholder Perspectives	(Zou & Zhang, 2009) [42]	Unrealistic project schedule	1
		Design changes	2
		Ineffective administrative procedure of the work	3
		High performance/quality expectations	4
		Unrealistic project schedule	5
		Unsuitable construction program planning	6
		Variations of construction programs	7
		Low management competency of subcontractors	8
		Variations by the client	9
		Incomplete approval and other documents	10
Assessment of risk factors on construction projects in Gondar City, Ethiopia	(Tessema *et al*., 2022) [38]	Design changes	1
		Design error	2
		Quality problems of material	3
		Contractors' incompetence	4

		Lack of coordination with subcontractors	5
		Poor quality of work	6
		Change order negotiations	7
		Labor strikes and disputes	8
		Availability of resources	9
		Low productivity of equipment and labor	10
Critical risks in construction projects in Ethiopia	(Endris Yadeta, 2019) [11]	Unrealistic project schedule	1
		Low productivity of equipment and labor	2
		Delay in payment	3
		Delay in submittals and approvals of construction documents	4
		Price Inflation	5
		Bribe and corruption	6
		Substandard quality of work	7
		Authority of engineer	8
		Substandard quality of work	9
		Unsatisfactory subcontractors' performance	10
Risk Factors for Construction Projects	(Jahan *et al*., 2022) [20]	Price Inflation	1
		Interrupted supply chain process	2
		Poor construction management	3
		Delay payment	4
		Unrealistic project schedule	5
		Poor financial control and management	6
		Unexpected situations during project execution	7
		Increase in project durations	8
		Scope variations and scope changes	9
		Inclement weather conditions	10
Risks Affecting the Delivery of Construction Projects in Egypt	(Abdelalim, 2019) [41]	Ineffective planning of the project	1
		Poor project planning	2
		Financial management	3
		Price Inflation	4
		Delay in material delivery	5
		Delays in payment	6
		Less concern over the health and safety of workers	7
		Poor construction management	8
		Financial difficulty faced by the contractor	9
		Delay in approval of completed work by client	10
		Delay in the consultant's response	10
Risk factors affecting the implementation of construction projects in Iraq	(Kim *et al*., 2020) [21]	Design error	1
		Design changes	2
		Late delivery of materials and equipment	3
		Poor coordination between client and contractor	4
		Lack of clarity in contractual obligations	5
		The problem between the project team	6
		Delay in payment	7
		Delay release of mobilization fund	8
		Political instability	9
		Insufficient funds allocations	10
Revisiting the critical factors causing the failure of construction projects in Vietnam	(Nguyen & Chileshe, 2013) [24]	Poor project planning	1
		Lack of experience in executing complicated projects	2
		Design Changes	3
		Lack of knowledge and ability to manage construction projects	4
		Financial difficulty faced by the owner	5
		Poor performance of contractors/sub-contractors	6
		Poor construction management	7
		Bribe and corruption	8
		Delays in payment	9
		Price Inflation	10
Identification of Crucial Risks Categories in Construction Projects in Tanzania	(Eng. Philemon, Z. Msomba, 2018) [12]	Poor project planning	1
		Financial difficulty faced by the owner	2
		Inappropriate pricing by the contractor	3

		Poor construction management	4
		Low productivity of equipment and labor	5
		Delay payments by the clients	6
		Poor performance of contractors	7
		Delay in land acquisition (compassion)	8
		Ineffective project delivery system	9
		Untimely inspection and testing	10
Common Risks in Construction	(Siraj & Fayek, 2019) [33]	Price Inflation	1
		Design errors	2
		Changes in government regulations, and policies	3
		Adverse weather conditions	4
		Unpredicted adverse site condition	5
		Shortage of labor	6
		Force majeure	7
		Poor workmanship and construction errors	8
		Design changes	9
		Unrealistic project schedule	10
Prioritizing risks in sustainable construction projects using a risk matrix-based Monte Carlo Simulation approach	(Qazi *et al*., 2021) [26]	Shortage of construction material	1
		Poor project planning	2
		Financial difficulty faced by the owners	3
		Inaccuracy in cost estimation	4
		Poor project manager skills and experience	5
		Price Inflation	6
		Sub-standard construction quality	7
		Design changes	8
		Design error	9
		Improper or incomplete specifications	10
Critical factors Affecting cost performance: a case of Ethiopian public Construction projects	(Sinesilassie *et al*., 2018) [32]	Poor project planning	1
		Conflict between project management and top management	2
		Reluctance in timely decisions by top management	3
		Low performance of human resources	4
		Design error	5
		Reluctance in timely decisions by the project manager	6
		Tendency to pass on the blame to others	7
		Conflict among team members	8
		Hostile social and economic environment	9
		Size of the project	10

Table 2 presents the overall ranking of risk factors affecting construction projects in developing countries, compiled from various studies. **Price inflation** consistently ranks as the top risk, reflecting its widespread impact on project budgets due to fluctuating material costs (Yousri *et al*., 2023; Jahan *et al*., 2022) [41, 20]. It is followed by **design changes**, which often result in delays and increased costs (Gamil & Abdul Rahman, 2020; Zou & Zhang, 2009) [13, 42]. **Design errors** are another prominent risk, ranking third, as they often lead to rework and inefficiencies in project execution (Yousri *et al*., 2023) [41]. **Poor construction management** ranks fourth, with multiple studies highlighting its critical role in project delays and cost overruns (Gamil & Abdul Rahman, 2020; Sharma & Gupta, 2019) [13, 30]. **Financial difficulties** faced by owners or contractors also emerge as a major risk, ranking fifth, particularly in regions with unstable economic conditions (Yousri *et al*., 2023) [41]. **Unrealistic project schedules** and **shortages of construction materials** rank sixth and seventh, respectively, further underscoring the importance of planning and resource management. Delays in payment by owners rank eighth, while **poor project planning** comes in ninth, indicating the critical need for well-structured planning frameworks. Lastly, **low labor productivity** is ranked tenth, emphasizing the need for better workforce management in construction projects (Alvand *et al*., 2023; Genc, 2021) [5]. Together, these risks highlight the complex challenges faced by construction projects in developing countries.

Table 2: Overall rank of Risk Factors between developing countries

SN	Factor	Authors	Rank
1	Price inflection	Yousri *et al*., 2023; Jahan *et al*., 2022; Siraj & Fayek, 2019; Qazi *et al*., 2021; Nguyen & Chileshe, 2013 [41, 20, 33, 26, 24]	1
2	Design Changes	Gamil & Abdul Rahman, 2020; Zou & Zhang, 2009; Tessema *et al*., 2022; Kim *et al*., 2020; Nguyen & Chileshe, 2013 [13, 42, 38, 21, 24]	2
3	Design error	Yousri *et al*., 2023; Sharma & Gupta, 2019; Kim *et al*., 2020; Tessema *et al*., 2022; Sinesilassie *et al*., 2018 [41, 30, 21, 38, 32]	3
4	Poor construction management	Gamil & Abdul Rahman, 2020; Sharma & Gupta, 2019; Jahan *et al*., 2022; Nguyen &	4

		Chileshe, 2013; Eng. Philemon, Z. Msomba, 2018 [13, 30, 20, 24, 12]	
5	Financial Difficulty (Owner/Contractor)	Yousri *et al*., 2023; Gamil & Abdul Rahman, 2020; Sharma & Gupta, 2019; Nguyen & Chileshe, 2013; Abdelalim, 2019 [41, 13, 30, 24, 3]	5
6	Unrealistic Project Schedule	Yousri *et al*., 2023; Zou & Zhang, 2009; Endris Yadeta, 2019; Jahan *et al*., 2022 [41, 42, 11, 20]	6
7	Shortage of Construction Materials	Yousri *et al*., 2023; Gamil & Abdul Rahman, 2020; Jahan *et al*., 2022; Qazi *et al*., 2021 [41, 13, 20, 26]	7
8	Delay in Payment by the owner	Gamil & Abdul Rahman, 2020; Jahan *et al*., 2022; Kim *et al*., 2020; Nguyen & Chileshe, 2013 [13, 20, 21, 24]	8
9	Poor Project Planning	Sharma & Gupta, 2019; Eng. Philemon, Z. Msomba, 2018; Sinesilassie *et al*., 2018 [30, 12, 32]	9
10	Low Productivity of Labor	Alvand *et al*., 2023; Genc, 2021; Tessema *et al*., 2022 [5, 38]	10

Santoso and Gallage, (2020) [29] identified the top 10 critical factors affecting the performance of large construction projects in Sri Lanka, including large project scope, poor site management, project complications, inadequate planning, contractor inexperience, schedule suspensions, unstable government policies, inaccurate cost and time estimates, construction errors, and quality issues. Similarly, Dorcas *et al*., (2019) [10] identified factors affecting project quality in Nigeria, including construction mistakes, unskilled labor, poor inspection, lack of motivation, weak management commitment and leadership, inadequate construction materials, financial constraints, and insufficient timely supervision as the most significant contributors to poor project outcomes. The most influential factors in project failures as per Hijazi are managerial, cultural, environmental, and contractor-related issues, which play a critical role in determining project outcomes (Hijazi, 2021) [17]. The study conducted in Nepal Sukamani, (2021) [35] shares several key similarities with the broader risk factors affecting construction projects in developing countries, as reflected in Table 3.

Table 3: Comparision of risk factors in the context of Nepal with the global context

SN.	Global Context	Local Context (Nepal)	Rank
1	Price Inflation	Payment delay	1
2	Design Changes	Project funding problem	2
3	Design Error	Design error	3
4	Poor Construction Management	Safety issues during construction	4
5	Financial difficulty faced by Owner/Contractor	Unrealistic project schedule	5
6	Unrealistic project schedule	Poor quality of material and equipment	6
7	Shortage of construction materials	Delay in material supply	7
8	Delay in payment	Poor performance of sub-contractor	8
9	Poor project planning	Insufficient technology	9
10	Low productivity of labor	Change in scope of work	10

One prominent similarity is the issue of payment delays, which is a critical factor in both cases. In Nepal, payment delays are attributed to project funding problems, leading to financial strain on contractors. This aligns with the broader studies, where delays in payment by the owner rank as the eighth most significant risk (Gamil & Abdul Rahman, 2020; Jahan *et al*., 2022) [13, 20]. Both studies indicate that delayed payments hinder project progress and can cause substantial delays. Design-related issues are another shared risk. In Nepal, defective designs contribute to project delays and rework, reflecting the risks of design errors and design changes in the broader analysis, which rank third and second respectively (Yousri *et al*., 2023; Gamil & Abdul Rahman, 2020) [13, 41]. This highlights the global challenge of design issues, which frequently lead to inefficiencies and increased costs in construction projects across developing nations. The challenges around material quality and supply are also evident in both cases. In Nepal, poor material quality and delays in the supply of materials are noted, paralleling the broader issues of price inflation and shortage of construction materials that rank as the first and seventh most critical risks globally (Yousri *et al*., 2023; Qazi *et al*., 2021) [41, 26]. Both contexts demonstrate how disruptions in the supply chain can negatively affect project timelines and budgets. Nepal study introduces additional risks for example, concerns over accidents and safety during construction, which are not prominently ranked in the overall studies. Moreover, Nepal faces risks related to insufficient technology and a shortage of plant and equipment, reflecting local infrastructural and technological challenges that are not as prevalent in other countries. These differences underscore the importance of addressing country-specific risks in construction projects, even while acknowledging common global trends like financial and design issues.

Project performance is evaluated by time, cost, quality, and customer satisfaction to measure success and overall effectiveness (Giri, 2023) [16]. Key failure factors in the construction industry include cost and time overruns, conflicts among parties, and project failures, impacting overall project success and efficiency. The failure factors and decline in the construction industry vary by country, influenced by each nation's development level and economic stability (Gamil & Abdul Rahman, 2020) [13]. Effective risk management is essential for construction project success, directly impacting decision-making quality and enhancing overall efficiency throughout the project's lifecycle (Shokri *et al*., 2016) [31]. Uncontrolled uncertainty in construction projects causes negative disruptions, potentially leading to crises or project failures. It hinders project management effectiveness, making it a key factor that jeopardizes project success and overall operational efficiency (Xia *et al*., 2018) [40].

Effective risk management involves identifying, assessing, and prioritizing risks, followed by efficient resource

allocation to monitor, control, and reduce the impact of adverse events while maximizing project success (Rezakhani, 2012) [28]. A project should be completed in line with specific objectives, ensuring efficient utilization of resources to achieve desired outcomes (Giri, 2019) [15]. Effective risk management in construction projects is vital for achieving project goals. It aims to enhance positive outcomes while minimizing negative impacts, ensuring that objectives are met and potential benefits are maximized throughout the project's lifecycle. Risk management aims to reduce or eliminate negative impacts and enhance positive outcomes in construction projects. As project risks increase, managing them becomes more complex, often leading to failures (Kassem *et al*., 2020) [1]. Effective risk management strategies in construction projects involve identifying, assessing, and prioritizing risks, followed by effective financial management, and allocating resources to mitigate their impacts. Regular monitoring, communication, and contingency planning are essential to address uncertainties. Risk transfer through contracts, stakeholder collaboration, and technological innovations also help minimize disruptions, ensuring project success by enhancing decision-making and reducing the likelihood of costly delays or failures.

5. Conclusion

The analysis of risk factors in construction projects across various developing countries, including Nepal, highlights several common challenges that impact project performance. **Payment delays**, **design errors**, and **price inflation** emerge as critical risks universally, significantly affecting project timelines, budgets, and execution quality. Both in Nepal and across other countries like Egypt, Yemen, and Iran, delayed payments due to financial instability are a recurring issue, underscoring the need for better financial management. **Design-related issues**, such as errors and changes often lead to rework and increased costs. However, the Nepal study also reveals unique risks such as **accidents, safety concerns, technological limitations,** and **shortage of plant and equipment**, which are not as prominently discussed in the broader context. These country-specific risks reflect the varying infrastructural and technological challenges faced by different regions. Ultimately, while there are international trends in construction risks, it is essential to tailor risk management strategies to address both **common risks** and **local challenges**. To address specific risks in construction projects, prioritize early identification and assessment of risks. Allocate resources strategically for mitigation, integrate contract risk transfer clauses, and ensure stakeholder collaboration. Leverage technology for monitoring, enhance communication channels, and establish strong contingency plans to handle uncertainties effectively, minimizing disruptions and maximizing project success in developing countries.

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