




## Article

# The Current Risk Management Practices and Knowledge in the Construction Industry

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**Abstract:** Construction is a critical sector of any economy in terms of value production, labor, and contributing to the gross national product. Managing risk is a relatively young area in Yemen's construction sector, but it is gaining traction as building activity and competition rise. Construction firms mitigate risk by using a variety of risk management methods. Therefore, there is a need to assess these procedures in order to detect shortcomings. This research aims to establish the existing risk management strategies used in Yemeni building projects. Survey questionnaires were used to collect data. Respondents were drawn from Yemeni construction businesses. Risk management is not executed systematically, intentionally, or continuously, and most firms' risk management procedures are reactive, semipermanent, informal, and unstructured, with no or few dedicated resources to address risks. This strategy is inconsistent with generally accepted risk management principles. Nonetheless, the findings suggest a general understanding of risk management and a willingness to learn from previous errors. The study of the findings suggests that risk identification approaches such as judgment and historical data are employed for risk analysis, and that the industry typically attempts to avoid or transfer risks in Yemeni building projects. The results shed light on the shortcomings of Yemen's project management practices. To guarantee that construction projects obtain maximum value for money, project managers of big construction businesses in Yemen need a strong understanding of and training in globally accepted systematic risk management procedures. Finally, this study can help future stakeholders determine how to work together to manage risk.

**Keywords:** risk management; risk management techniques; construction projects; systematic risk management; Yemen



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## 1. Introduction

The construction sector contributes significantly to the growth of any nation's economy by creating value, labor, and contributing to the gross national product (GDP) [1–5]. Risk management is critical to attaining project goals owing to the complexity of construction projects, which include a plethora of hazards affecting a variety of stakeholders [6]. Since risk management is a new concept in Yemen's construction sector, it has received little investigation. The aims of project risk management are to exploit the possibility and effect of good occurrences and to reduce the probability and influence of negative events [7]. Thus, project risk management would enhance project performance by ensuring that project objectives are met and by seeking chances to maximize positive effects on goals. Risk is a random incidence or condition that, if it occurs, has an influence on one or more project

goals either positively or negatively [8]. Risk management is the procedure of evaluating and managing these risk occurrences to reduce or eliminate the incidence and effect of negative impacts and promote positive benefits. As project risk grows, management and control become more challenging [9]. Numerous failures occur over the course of the project as a result of the risk and unpredictability inherent in the environment and in the project structure. However, because the risk is hard to measure, a full and complete definition has yet to be developed [10].

Owoo et al. [2] defined construction as the process of constructing, repairing, maintaining, altering, and deconstructing structures, highways, streets, bridges, roads, sewers, trains, and communication networks. The industry's significance stems from its close ties to other sectors of the economy since it generates considerably more significant effects through strong linkages with other industries [2,9,11]. However, no construction activity is risk-free due to the industry's demanding, dynamic, and complicated character. According to research, both practitioners and scholars in the sector believe that construction projects face higher risks than other industries due to their complexity [12–15].

Crispim et al. [16] said that an incapability to manage risk is the primary reason for project budgets, timelines, and other project goals being exceeded. Numerous scholars have examined underperformance in construction projects, including cost overruns, schedule delays, and lengthy and expensive conflicts that result in unnecessary claims [17–19]. Construction industries in developing countries handle risk management in construction by relying on a collection of often inadequate techniques resulting in substandard outcomes and restricting project performance [13,20]. Crispim et al. [16] carried out research to ascertain in what way project managers handle risk in a business; 6.8% of the respondents queried in the research worked in civil construction, while the remainder worked in information technology (IT), finance, telecommunications, and manufacturing. As a result, their conclusions were not customized for the construction sector in particular. Serpell et al. [13] also examined how to assess the ability of construction companies to manage risk effectively and how to assist them in improving. Their research did not examine whether the methodical processes advocated by effective risk management methods were being followed but rather examined organizational maturity. As a result, this article tries to examine existing risk management procedures in the construction sector via sequential steps, thus systematizing the process.

Yemen and other developing nations must develop and build further development projects to boost economic growth and create more sophistication and employment possibilities since these projects need significant investment. Therefore, in this scenario, any expenditures (delays, assets, and budget) will result in a significant financial loss, despite the fact that the numerous risk factors connected with these projects will have a considerable influence on the project's completion time, without outweighing the expenses [21,22]. Yemen's construction projects are the fourth most significant source of employment, employing roughly 9–10% of the workforce and growing at an annual average pace of approximately 5.4 percent, effectively contributing to Yemen's economic development. Yemen's construction industry continues to be a critical component of the country's development process and an income source for all organizations and individuals, including the construction sector, which has a significant influence on domestic earnings and average employee wages [21,23]. Yemen, similar to other developing nations, faces grave hazards in the building business [5,18,24–27].

Additionally, based on [23], statistics indicate that 47% of finished projects in Yemen were late, while 40% of overall projects ran over budget. Construction risk has emerged as a significant problem for investors, requiring careful analysis and thorough study to manage. To identify gaps in the adoption of a formal risk management process, the primary goal of this study is to assess the existing risk management techniques and their implementation in the Yemeni construction sector. The objective is to assist stakeholders in assessing their current and prospective projects, emphasizing risk management strategies. This research

investigated these topics and adds to the field of risk management by outlining essential risk management strategies.

## 2. Literature Review

In the context of construction management, risk management refers to a detailed and systematic method for determining, assessing, and mitigating risks to accomplish project objectives [28]. El-Karim et al. [29] described risk management as the systematic method of recognizing, assessing, and reacting to project risk, which involves increasing and decreasing the likelihood and effects of positive and negative qualities, respectively. Serpell et al. [13] also described risk management as a planned and proactive approach aimed at minimizing the chance for unsatisfactory outcomes throughout the many phases of a construction project, including design, construction, and operation. According to Taofeed et al. [15], Risk management is a process that entails identifying hazards, assessing them qualitatively and quantitatively, and reacting with an effective strategy for control and treatment. Banaitiene and Banaitis [28] discovered that to ensure effective and efficient risk management, it is essential to have a sound and systematic methodology in place and breadth of knowledge and expertise. Nevertheless, how risks are addressed on the majority of building projects in Yemen, which reflect the environment of impoverished nations, is unknown. Risk management throughout the project delivery value chain has the potential to help the industry. This may have a cascading impact on a construction project's performance, productivity, budget, and quality [30]. Enshassi and Mosa [31] also said that in order to accomplish a company's goals and expectations, it is important to build a system of time management, cost, safety, and quality to manage a project well.

In order to best position it to satisfy customers' expectations, the growth of the construction industry requires an understanding of risk management procedures [32]. The industry has a bad reputation for risk management since it is burdened with several uncertainties as a result of expert assessment's subjective opinion, resulting in projects missing their cost and schedule objectives [27,33,34]. To ensure that both project customers and contractors receive value for money, project managers must use sound risk management procedures [13]. Identifying the risk is the first and most important and dangerous step in risk management processes, as indicated by many researchers [28,35,36]; nevertheless, according to [8], the entire risk management process must be planned, and thus the risk management plan must begin before identifying and classifying risks and their sources. Risk identification attempts to classify responsibilities [28]; identify potential risks for any project, including sources and potential consequences [37,38]; document characteristics that help in analyzing those risks; formulate appropriate responses to them [8]; and thus build an understanding of the circumstances and events that lead to risks [39].

Risk analysis is a process that occurs between risk identification and risk management [40]. This approach assigns a value to recognized sources of risk and uncertainty about the project's objectives and is often accompanied by an evaluation of the likelihood of occurrence and severity of risk consequences [38,41,42]. A qualitative and/or quantitative analysis of the identified hazards is performed. Qualitative risk analysis quantifies the likelihood of hazards occurring and the severity of their associated repercussions in a project [37]. Banaitiene and Banaitis [28] noted that qualitative risk analysis enables the identification of critical risk elements. It is not necessary to quantify all the dangers that have been identified qualitatively. As Project Management Institute PMI [8] explains, it is not even essential for all projects. The body of knowledge is broadly in agreement over what defines quantitative risk analysis. According to Banaitiene and Banaitis [28], quantitative risk management entails the use of increasingly advanced tools and procedures for investigating and analyzing risk, including predicting the likelihood of occurrence of identified risk factors and their possible effects on projects.

Risk response is the process through which plans are developed to address hazards that have been recognized and evaluated as they happen [37]. According to PMI [8], these expressed approaches are chosen among produced alternatives and actions addressing

the total project risk exposure and the treatment of agreed-upon project hazards. This agreement is founded on PMI's belief that the plan must be agreed upon by all members of the project team and important stakeholders. This is the stage at which a purchasing strategy for reacting to recognized and evaluated hazards when they arise is executed. According to Hansen-Addy and Fekpe [37], this is the ultimate procedure in systematic risk management. They continue to assess and react to present and new threats throughout this period. Residual risks, that is, risks that persist after risk measures are implemented, are monitored, as are secondary risks, which occur directly due to risk remedies being implemented [8]. Rezakhain [35] also mentioned that this stage is responsible for implementing the risk mitigation plan, which PIM [8] classified as risk response, as well as tracking identified risks, monitoring residual risks, identifying new risks, and evaluating the overall risk management process effectiveness. This notion is also strongly supported by PIM [8]. Prudent risk management does not mean avoiding it, but rather recognizing it and making decisions concerning all the opportunities and risks that come with it [38,42].

Risks in the construction industry have been identified by numerous studies in different countries [9,43–52]. While there are several books on risk management, there is scant data available on its use in practice [53]. Additionally, risk management is significantly impacted by the distinctiveness of a country's building sector [46]. The implementation of project risk management varies significantly by industrial area [54,55]. Moreover, [8,9,49,50,56–58] have examined a number of risk management techniques. Nevertheless, most of these techniques may not be appropriate in local environments. Zou et al. [59] identified significant risks in construction projects in Australia and measured their possibility of occurrence. In addition, various risks that cause delays in construction projects have been identified in Malaysia, Libya, and Ghana [18,60,61]. Perera et al. [62] implemented the Delphi method in Sri Lanka to classify serious risks on a lifecycle basis and clarify how such risks were shared and controlled by the parties involved in the projects. Pawar and Pagey [63] identified risks, examined severity, and surveyed risk management actions in India, while El-Karim et al. [29] measured the consequence of factors affecting time and cost contingencies. These earlier studies only considered risk identification, apportionment, and effects, but not how contractors handle risk.

It is important to note that many types of research, including those reported in [32,64–68], have examined risk management in construction project management. However, the majority of these studies place a premium on risk management from the standpoint of the project client, with slight consideration given to the viewpoint of contractors. Expanding risk management by including other viewpoints from contractors is required to provide a fair picture of the construction risk literature. Furthermore, because construction projects are country- and sector-specific [69], and risk management practices differ significantly across sectors and nations [70], attempting to apply tactics from one economic system to another would be futile.

Within organizations, the project management technique now in use does not effectively support the growing need for risk management [71]. As a consequence, many projects lack risk management procedures [7,72,73]. A risk management system that is effective must be more dynamic than the risk itself. Otherwise, it is likely that it will struggle to integrate with the corporate culture and other business procedures. Regardless of the effort and care with which a system is prepared and deployed, it may fail to fulfill its aim upon the first installation and will need continual calibration. This demands management's leadership, patience, direction, time, and resources.

### 3. Materials and Methods

The first stage was to identify the critical activities involved in the construction risk management process. This was accomplished mostly through a survey of the literature. A questionnaire was developed based on the literature study, and a pilot study was performed to determine the questionnaire's applicability in the Yemeni context. The study questionnaire was developed specifically for the Yemeni construction sector and was

adapted from those used previously [9,49,50,74]. Two parts comprised the questionnaire. The first portion was designed to elicit information about the respondents' demographic characteristics. Section 2 was designed to elicit impressions of existing risk management procedures and expertise in Yemeni building projects. A five-point Likert-type scale was integrated into the questionnaire, allowing for statistical analysis of the data. To elicit replies, questionnaire survey forms were delivered to construction experts affiliated with Yemen's building sector. The profile of the responders is shown in Table 1.

**Table 1.** Respondents profile.

Item	Frequency	Percent
Profession of Respondents		
Engineer	80	46.00
Quantity surveyor	25	14.40
Architect	49	28.20
Others	20	11.50
Total	174	100
Role of Respondents		
Chairman/director	7	4.00
Project manager	39	22.40
Project consultant	27	15.50
Site engineer/Architects	65	37.40
Site supervisor	17	9.80
Others	19	10.90
Total	174	100
Years of experience		
1–5 years	36	20.70
6–10 years	52	29.90
11–15 years	49	28.20
16–20 years	17	9.80
Above 20 years	20	11.50
Total	174	100

The study sampled reputable companies registered with Yemen's Ministry of Public Works and Highways. Although statistics were obtained from just four major cities in Yemen (Sana'a, Aden, Taiz, and Hadramout) due to the current situation and war in Yemen, these areas account for a significant portion of the country's construction sector owing to the current crisis and conflict in Yemen. A total of 400 questionnaires were distributed, and 174 (43.5 percent) of the responses were analyzed. The respondents were distributed geographically as follows: 27 in Sana'a, 47 in Aden, 39 in Taiz, and 61 in Hadramout. Because of the respondents' geographical dispersion, their size variances, their contribution to industrial growth, and their broad expertise in a range of building projects, the data gathered were comprehensive and assumed to be representative of the construction industry. The majority of the respondents are engineers (46 percent) who are there for guiding projects in the structural and stability aspects of the construction venture; architects (28.20 percent), who are focused more on the aesthetics and visual aspects of a project; quantity surveyors (14.40 percent), who are there from the start of the project and using their expertise to evaluate the value and space of a project; and other respondents (11.50 present). Most of the respondents are site engineers/architects and project managers (50 percent). The gathered data were analyzed using the Statistical Package for Social Science (SPSS) software, produced by IBM in USA.

#### 4. Results and Discussions

This section is divided into subheadings. It provides a concise and precise description of the experimental results, their interpretation, and the experimental conclusions that can be drawn.

#### 4.1. Current State of Risk Management Practices

To ascertain respondents' knowledge and practice of risk management in construction projects in Yemen, participants were asked to react to questions using a Likert scale ranging from 1 to 5, with 1 indicating strong disagreement and 5 indicating strong agreement [9,66,75,76]. These questions were added to ascertain the current state of an organization's risk management system by eliciting broad views regarding the formality of their risk management processes (see Table 2). Risk management is not often used in Yemeni building projects. The Yemeni construction professionals agree that they encounter risks in their projects (mean of 4.01), but when they were asked to evaluate their knowledge and the implementation of risk management, most of them do not implement risk management in their projects—the mean score was 2.34, although almost all participants recognize the necessity of its implement (mean 3.99). Assigning reasons for these results have been answered in the following question, which over half of the respondents do not have knowledge of risk management (mean of 2.70). Moreover, the findings indicate that many respondents believe that risks in Yemen's construction projects are not allocated to the most appropriate party and other many allocations, which implies that risk needs to be allocated to the most appropriate party, either the owner or the contractors (mean 2.68). The majority of assessed firms' risk management systems and practices are responsive, semipermanent, unplanned, and unorganized, with few to none committing assets to control the risks. Nonetheless, there is an awareness of potential dangers and a willingness to learn from previous errors. These outcomes contradict those of [37], who found that construction experts consider risk management earnestly and are proactive instead of reactive in their approach. The study's results indicate that the scenario is much different in Yemen's building sector.

**Table 2.** Current practices and knowledge of risk management in Yemen.

Questions	Overall	
Risk management is generally implemented in your projects	2.34	Disagree
It is necessary to implement risk management in construction projects	3.99	Agree
Risks in Yemen construction are allocated to the most appropriate party	2.68	Disagree
You have knowledge of risk management in construction projects	2.70	Disagree
You encounter risks in your projects (e.g., war and political instability, etc.)	4.01	Agree
Risk Identification is implemented in a systematic manner throughout the project	2.58	Disagree
Risk Analysis is implemented in a systematic manner throughout the project	2.48	Disagree
Risk Response is implemented in a systematic manner throughout the project	2.72	Disagree

To assess current risk management methods in Yemen's construction sector, respondents were asked to identify whether risk identification, risk analysis, and risk response are carried out in a systematic way throughout the project (Table 2). From the results, respondents claimed that the risk management process does not apply systematically in their projects, with a mean of 2.58 for risk identification, 2.48 for risk assessment, and 2.72 for risk response. The findings show that most construction projects in Yemen do not apply systematic risk management identification, assessment, or response. As a result of this, it is reasonable to infer that risk management was not conducted in a continuous, deliberate, and systematic way. Risk management practices were not given sufficient attention, time, or resources, and their execution might best be described as chaotic and ad hoc. The aspect of risk management does not end at the identification phase—it continues through the subsequent steps of analysis and reaction. These findings contradict those of [77], who concluded that medium- to large-sized businesses in the United States of America primarily practice all the risk management process components in their projects. This is substantiated by [64], who argue that formal risk management is practiced in Malaysia by

firms with strong reputations, unwavering financial standing, and involvement in large construction projects.

Notably, this research examined individuals in the Yemeni construction business as well as seasoned specialists at the top echelon. If they show that systematic risk management is not practiced, it is reasonable to assume that the construction sector in Yemen has missed the critical nature of systematic risk management and so pushed it to the sidelines. As a result, it is not surprising that building projects in underdeveloped nations, such as Yemen, face delays, cost overruns, substandard quality, and, in some cases, full abandonment. Consequently, project goals are not met [78,79].

#### 4.2. Current State of Risk Management Practices

The preceding section discussed construction businesses' risk management techniques. This section discusses the tools and procedures that are currently being used in building projects. These methods and procedures are classified into three categories: risk identification, risk analysis, and risk response. On a scale of 1–5, respondents were asked to rate their frequency of use of risk management approaches, with 1 being never used and 5 representing always used.

##### 4.2.1. Risk Identification Techniques

Risk identification is a critical step in the risk management process for construction projects. Unidentified hazards cannot be effectively controlled. Identification of risks is highly dependent on the expertise and insight of key project workers. Risk identification is a demanding undertaking, made more difficult by the increasing complexity of projects and the rapid rate of technological progress [54]. Table 3 shows many ways and strategies for detecting risks, along with how often they are used. According to the results in Table 2, intuition/judgment (mean = 3.30) is the frequently used method for identifying risk in Yemeni construction projects, followed by historical data (mean = 3.14), consulting experts (mean = 2.79), checklists (mean = 2.46), brainstorming (mean = 2.17), and interviewing (mean = 2.10).

**Table 3.** Ranking of risk identification techniques.

Risk Identification Techniques	Mean	Ranking
Historical Data	3.14	2
Checklists	2.46	4
Brainstorming	2.17	5
Intuition/judgment	3.30	1
Interviewing	2.10	6
Consulting expert	2.79	3

The findings indicated that the various techniques are used improperly. The majority of respondents rely on personal experience, and they were unfamiliar with reactive and proactive risk identification methods and their use in proper risk management process or system, despite it being the most significant (Mills, 2001). Moreover, the use of these tools are contingent upon the project's nature, the policy of the organization, the project management approach, the availability of resources, and the risk tolerance of project team members. This may reflect the fact that there is no one-size-fits-all strategy to risk identification methods. The findings indicate that the different strategies are used in an ad hoc manner. The majority of parties depend on personal experience and knowledge. Although interviewing is a primary strategy for identifying risks [80], it is placed sixth (mean 2.10). These findings reveal that the primary approaches to identifying risks in Yemen are based on prior experiences, personal knowledge, and information rather than extensive project analysis. This indicates that risk identification does not take place in accordance with the results of [37,53,81], which recognized consulting experts and brainstorming as effective techniques for risk identification. This study's conclusion elucidates the main

reasons for building project failure. It is worth noting that building projects continue to fall short of their cost, schedule, and quality expectations [79].

#### 4.2.2. Risk Analysis Techniques

Qualitative and quantitative risk assessments are both used in risk analysis. Risk analysis is possibly the most challenging aspect of project risk management [82]. Numerous frequently used qualitative and quantitative risk assessment methodologies and approaches have been found via a survey of relevant literature [7,80,83–85]. The participants were asked to rate the frequency with which they used three risk analysis methods. Table 4 summarizes the total rank of risk analysis methods using means: qualitative (mean = 2.20), quantitative (mean = 1.11), and semiquantitative (mean = 1.23). The low mean values show that analysis is rarely used to identify previously identified risks. The findings indicated that there are few documents of risks analyzed by any method, which is best viewed as a casual and trivial effort. Regardless of the fact that some project managers identify their risk analysis software, computers and utility are rarely used in combination with project management software. Advanced quantitative risk analysis techniques are rarely used. An additional matter is the lack of dependable data for quantitative risk analysis as the majority of organizations lack the necessary capacity, expertise, and system to track completed and ongoing construction projects.

**Table 4.** Risk analysis techniques ranking.

Risk Analysis Techniques	Mean	Ranking
Qualitative analysis	2.72	1
Quantitative analysis	1.10	3
Semiquantitative analysis	1.56	2

The low mean values indicate that analysis is rarely used to identify previously known dangers and that these groups are unfamiliar with their usefulness. Advanced quantitative risk analysis approaches are seldom used. Another further difficulty is the lack of trustworthy data for quantitative risk assessments since the majority of businesses lack the necessary infrastructure, skills, and capability to track current and finished construction projects. Additionally, the results indicated that risk analysis was not conducted in a systematic way throughout the project. However, it was discovered that the whole risk analysis procedure is not methodical. This additionally establishes the notion that risk management in construction is an ad hoc endeavor [86]. While [37,87,88] identified collaborative risk analysis among major project stakeholders as the most frequently employed risk analysis practice, this study's results imply otherwise. This indicates that, although this risk management approach was carried out in certain circumstances, it was not carried out consistently [89]. This makes sense since if the risk is not detected in a systematic manner, it cannot be assessed in a systematic manner. This is addressed by the absence of instruments for qualitative and/or quantitative risk analysis. As a result, risks are not evaluated for their likelihood and effect, priorities are not identified, and the whole influence of projects is not determined [8,28].

#### 4.2.3. Risk Response Techniques

The overall mean rankings of response methods follow: avoid the risk (mean = 4.47), reduce the likelihood of occurrence (mean = 3.76), minimize the consequences (mean = 3.64), transfer the risk (mean = 3.46), risk-sharing (mean = 3.17), and retain the risk (mean = 2.80), as shown in Table 5. Avoiding risks, at the top of the ranking, implies missing out on significant business opportunities as a result of an overall cautious attitude. By taking risks, organizations earn money and increase their value. It is advisable to make enlightened decisions and to grip the advantage of opportunities that can be controlled efficiently while avoiding risks that are beyond the capabilities of the organization. Making enlightened decisions requires not only experience and sound judgment, but also familiarity with the



risk management processes. Nonetheless, risk management is viewed as a function of the decision's quality. The decision maker's ability to make a bad or good decision is mostly determined by the quality of information he or she obtains. Information is the primary source of information during the risk identification and analysis steps. The ranking of risk response methods indicates that the construction industry has progressed far beyond risk-sharing and relies heavily on risk transfer. The findings indicate that no principles are followed when risk is transferred to a business partner; additionally, they lack the appropriate attitude toward risk, which results in conflicts and is frequently detrimental to the project objectives. The preceding findings demonstrate that there is no one-size-fits-all method to risk management and that a combination of techniques would be appropriate.

**Table 5.** Ranking of risk response techniques.

Risk Response Techniques	Mean	Ranking
Reduce the possibility of occurrence (probability)	3.76	2
Reduce the consequences (impact)	3.64	3
Avoid the risk	4.47	1
Transfer risk	3.46	4
Interviewing	2.10	6
Consulting expert	2.79	3

## 5. Conclusions and Recommendations

In the majority of developing nations, risk management research has concentrated on the identification of risk variables, allocation of risk, whether or not project teams possess the competence to appropriately evaluate risk and employ risk management assessment techniques. However, this article is intended to analyze the present risk management procedures in Yemen's construction sector. The techniques of project risk management in Yemen's construction sector were discussed. Because the majority of businesses do not conduct risk management, there is a need to enhance specific procedures and raise their frequency of usage.

The construction sector often depends on intuition and judgment to identify risks (mean = 3.30) and seldom does quantitative risk analysis (mean = 1.10). Risk is often avoided in the construction business (mean = 4.47). The majority of firms' risk management systems and practices are reactive, semipermanent, informal, and unstructured, with little or no committed resources to address risks. There is little recording of the risk management process, which is viewed as an informal and insignificant effort by all stakeholders. The research discovered that risk management is not conducted in a systematic manner due to a lack of risk identification, analysis, reaction, and monitoring tools. Generally, risk management procedures focus only on discovering, assessing, and reacting to hazards as they occur.

In the construction sector, a systematic risk management method must be used to limit the unfavorable effects of these risks, both collectively and individually, on the building project. The application and implementation of risk management approaches must be tailored to the local situation. Systematic development in the risk maturity level of local firms is required, particularly as risk management knowledge increases. Risk management rules for the country's industry must be created. International donor organizations interested in funding building projects across the country will indeed be educated on the industry's risk management techniques. Similarly, when foreign construction corporations decide to enter into a joint venture agreement with local contractors, they will be considerably assisted in their appraisal and risk assessment. Additionally, the results produce academic and professional dialogue that might be used to develop strategies for encouraging members to practice risk management in a systematic manner. Additionally, the government would be pushed to provide legislative support for risk management as a qualifying criterion for building project tendering. The findings indicate that throughout the nation, project management practitioners have put systematic risk management

approaches in the background. The lack of adequate risk management methods results in substandard performance across several areas of the Yemeni construction industry. To address the low-performance phenomenon, the country's regular and scheduled periodic training of construction professionals has to be improved and made more frequent. This will improve and raise the bar for project managers' systematic risk management methods. The outcomes of this study paint a dismal picture for the business, implying the need for more research on how to pique practitioners' and stakeholders' interest in risk management implementation for the advantage of the sector. Recently, advocacy has shifted toward enterprise-level risk management. However, little information is available on enterprise risk management in Yemen's construction business.

The research findings enable designers, construction managers, and supervisors, together with other important project participants, to evaluate their current and prospective projects in light of the risk management approaches discussed in the study. The results contribute to a greater understanding of risk management in the Yemeni construction sector, hence adding to hitherto untapped information. Risk management assessment using stepwise techniques is new in Yemen's building business. Owing to the war and current situation in Yemen, the data were collected only from four cities in Yemen; for future research, a larger sample size should be obtained. Additional studies should concentrate on identifying the impediments to enterprise risk management adoption in poor countries such as Yemen. Further study will need to include the creation of a decision support system to facilitate enterprise risk management adoption. Finally, a quantitative study is proposed to identify the financial and other losses sustained by the construction sector as a consequence of contractors' poor risk management.

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