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ENGLISH VERSION

Risk Management in Construction Projects in Palestine: Contractors' Perspective

Gestión de Riesgos en Proyectos de Construcción en Palestina: Perspectiva de los Contratistas

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Abstract
This study is conducted to identify the main risks in construction projects in Palestine from the contractors' perspective. A questionnaire survey is the tool used to achieve the objectives of the study. 41 critical risk factors in projects associated with project duration were identified and classified as external and internal factors. The risk map for the investigated causes is created based on their perceived severity and frequency of occurrence. The findings revealed 29 causes in the red zone of the risk map, 11 in the yellow zone and 1 in the green zone. The top severe risk factors are: delayed payments by the owner, closure by the authorities, poor site supervision, segmentation of the Palestinian governorates, late payments to subcontractors, change orders by frequent adjustments of the owner, lack of qualified labors, unrealistic completion date of projects, weather conditions, and rework due to noncompliance with contract documents.
Keywords: *contractors; risks; delay; construction; map.*

Resumen
Este estudio se lleva a cabo para identificar los principales riesgos en los proyectos de construcción en Palestina desde la perspectiva de los contratistas. Una encuesta con cuestionario es la herramienta utilizada para lograr los objetivos del estudio. Se identificaron y clasificaron como factores externos e internos, 41 factores de riesgo críticos en los proyectos asociados con la duración del proyecto. Un mapa de riesgos para las causas investigadas se creó en base a su gravedad percibida y frecuencia de ocurrencia. Los hallazgos revelaron 29 causas en la zona roja del mapa de riesgos, 11 en la zona amarilla y 1 en la zona verde. Los factores de riesgo más graves son: pagos atrasados por parte del propietario, cierre por parte de las autoridades, mala supervisión del sitio, segmentación de las gobernaciones palestinas, pagos tardíos a subcontratistas, órdenes de cambio por ajustes frecuentes del propietario, falta de mano de obra calificada, fecha de finalización irrealista de los proyectos, condiciones climáticas y rehacer el trabajo debido a incumplimiento de los documentos del contrato.

Palabras clave: contratistas; riesgos; retraso; construcción; mapa.

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1. Introduction

The construction sector is the core of the Palestinian economy, and it is fraught with risk. Many challenges and constraints affect the construction sector and make it complex (Dmaidi et al., 2016). The sustainable relationship between construction parties; owners, consultants, and owners, remains a serious issue (Suprapto et al., 2015). The construction industry, and value-added (% of GDP) in Palestine were reported at 16.78 % in 2022, according to PCBS. The construction sector contributed by 7.4% to job creation in 2009, and increased by 3% in 2018, reaching 10.4% in the Palestinian Territory (9.3% in the West Bank and 1.1% in the Gaza Strip), (PCBS, 2018).

Depending on how they are created, planned, implemented, and managed, this shows the difference in projects. These stages can be used to identify potential risks, allowing for a closer examination of project-specific and known issues. One of the nine knowledge areas promoted by the Project Management Institute is risk management (PMI, 2008). Additionally, risk management in the context of construction project management is a thorough and organized method of recognizing, analyzing, and addressing hazards to attain project objectives (Petrovic,2017).

As is common in construction projects, contractors play a significant role in carrying out construction tasks and are directly engaged in the project's physical activities (Karim et al.,2012). To ensure the effective completion of the projects, they must manage the risks that arise during the construction process (Tang et al., 2007). The construction sector compared to other sectors has one of the highest rates of yearly business failures and associated liabilities. This is because management must deal with a risky industry that has a lot of unknowns. The availability of resources, the environment, money issues, political unrest, low productivity, and contractual relationships are just a few of the many unforeseen factors that can affect the construction process. These factors may result in issues during project construction, which could extend the time needed to complete the project. Delay is simply the amount of time spent beyond the completion date set in the contract or the date agreed upon by the parties, (Zaini et al., 2011).

The risk could affect the project's performance, cost, schedule, and scope objectives, (Lewis, 2011). According to (Fadhili, 2011), managing risks is one of the most crucial things someone can do to guarantee a project's success. He mentioned that risks are almost always unavoidable in construction projects regardless of the type of construction; buildings, heavy infrastructure projects, or industrial projects. Risk management for construction projects is critical to project success as construction activities involve some level of risk, and these risks can take various forms.

Risk management is an important aspect of project management and plays a significant role in project success. Therefore, it is crucial to comprehend how construction industry professionals see risk management for them to practice it when managing their projects (Karim et. al.,2012). One of the nine knowledge areas promoted by the Project Management Institute is risk management (Banaitis et. al.,2012). Risk management enables the project's main participants (the owner, contractor or developer, engineer, and material supplier) to achieve the targeted goals and meet their obligations while mitigating the adverse impacts on the budget, time, and quality of construction projects. The three factors of time, money, and quality results have historically been linked to the success of building projects by practitioners (Banaitis et. al., 2012).

The literature review showed little attention paid to this important area in Palestinian Construction projects, especially in the West Bank. Therefore, research is being conducted. This study is significant locally since it pinpointed the risk factors in the construction sector that cause a delay from the contractors' perception, ranking the risk factors according to severity and frequency, establishing the risk matrix, and suggesting a response to mitigate and avoid the risk of the highest risk factors. Unfortunately, it seems that the local construction industry is unable to recognize, evaluate, and rank business risks. Therefore, this study's objective is to identify and assess significant risk factors, as well as their avoidance and mitigation measures, as defined by local contractors. Additionally, it examines each identified risk factor's importance and distribution from the viewpoints of the contractors (Enshassi and Mosa, 2008).

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2. Literature Review

Risk can be defined as the possibility of unwanted risks or the absence of the desired results that disrupt the project (Hamzah et al., 2011). He also mentioned project's level of uncertainty can be managed using a collection of strategies called risk management. The contractor typically fails to complete projects on time or faces price overruns as a result of poor, ad-hoc risk management, which can be handled if they are internal, or external and may not be controlled (Aljassasi and Dawood, 2021). According to (Pai and Bharath, 2013), and (Kikwasi, 2012), the delay is simply the amount of time spent beyond the completion date set in the contract or the date agreed upon by the parties. This time overrun frequently leads to work interruptions, low productivity, delayed projects, cost increases, claims from third parties, and contract termination.

(Amu and Adesanya, 2011) revealed that factors such as funding and payment, contractor, and client factors are the main contributors to project delays in their study of the Nigerian construction industry. (Aziz, 2013) classified the risk factors that contribute to delays in the Egyptian building project into four groups. The most critical factors for each group were as the following; (1) Contractor category: bad project planning and scheduling, (2) External category: a variety of bribery patterns, an act of unexpected failure, and the extreme stress in global financial markets and banking systems. (3) Material category: a lack of building materials, delayed deliveries of materials, and a delay in the production of materials (4) labor category: lack of experience for workers, unavailability of labor, and low labor productivity.

(Gündüz et al., 2013) noted that change orders, late material deliveries, unreliable subcontractors, delays in performing inspection and testing, unqualified workers, inadequate contractor experience, ineffective project planning and scheduling, poor site management and supervision, delays in approving design documents, and delays in progress payments are the main causes of delays in the Turkish construction industry. (Sambasiva and Soon, 2007) studied factors that cause the extension of time in Malaysian construction projects. The researchers found the contractors' weak planning, the deficit in managing the site by the contractors, the poor financial stability of the owners, and the issues of the subcontractors, are the most critical risks of the delay.

(Salem and Suleiman, 2020) investigated 38 risk factors causing a delay in the Jordanian construction sector. The factors identified were classified into four categories: reasoning and environment, managerial, advisory and financial. The study of these factors concluded the most critical risks located in the red zones are soil instability, owners' incapability to meet financial obligations, poor ground conditions, and fiscal standing of the owner.

(Paz et al., 2018) mentioned that the environment must be considered while determining the risks of construction projects, which vary according to the geographical context. He proposed a methodology that uses the Monte Carlo Simulation (MCS) model with a new mathematical formulation, to show the impacts of the 55 risk factors of delay in the duration of the schedule. The study used three simulation models to identify the most critical risk factors which are the delays in stuck disputes with the stakeholders, owners' inability to act quickly, and unexpected technical difficulties during construction. (Doloi et. al., 2012) identified 45 delay risk factors divided into six main groups; project, site, process, human, authority, and technical issues. Insufficient commitment, poor management, weak corporation between crews on the site, inadequate scheduling and planning, and ambiguity in the project scope are the top 5 critical risk factors in Indian construction projects.

(Enshassi and Mosa, 2008) identified and evaluated risk factors that contributed to the delay of construction projects in Palestine and proposed responses to the critical risk factors. The study determined the severity and allocation of each risk factor from the contractors' perspective. Fourty-four key risk variables were discovered using a questionnaire survey and divided into nine groups. According to research findings, the most three significant risk factor was the contractor's financial collapse, the projects implemented in a dangerous area, and border closure.

(Marzouk and El-Rasas, 2014) presented a list of construction delay causes from the detailed literature review. The risk factors were tabulated in a questionnaire survey and discussed with thirty-three construction experts through interviews. The study made a roadmap to prioritize the delay causes group, and it found that owners are more responsible for risk factors, the contractor is placed on the second level, and the external related factors are classified in the third level in causing the delay. The five critical risk factors are improper planning, the cash flow of the contractors, change orders, the type of procurement process, and the uncertainty of the work under surface.

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3. Research methods

The quantitative approach was used in this article to identify contractors' perspectives and judgments in identifying risk factors that cause a delay in construction projects as well as ranking the factors based on severity and frequency index. Forty-one delay risk factors in construction projects were summarized from the detailed literature review and tabulated into a questionnaire form.

The questionnaire consists of two main parts; Part I consisted of 7 questions and is related to general information about the company. Respondents were requested to answer questions about their experience in the construction industry, the experience of delay while implementing projects, determining where the most governate they mostly worked, the percentage average delay in construction projects they have faced, the owners for the delayed projects, and the using of the risk management practice in their projects. Part II includes the list of the risk factors of the delay in construction projects that contractors have experienced, which were classified into two main categories in terms of control; (1) the internal risks, which are considered within the control of the construction parties and were classified into five groups: clients, consultants, contractor, project management practices, and contract administration. (2) the external risks, which include risk factors that are beyond the control of construction parties.

Then the draft questionnaire was reviewed by two experts in the construction industry to evaluate the content of the questionnaire and checked that survey meets the objectives of the study. Modifications and changes have been done by adding two factors; the closure on the Palestinian Districts, and the conflict in the contract documents.

The target respondent is all contractors who have valid registration by the Palestinian Contractors Union (PCU; personal communication, 2021) in Palestine. 55 questionnaires were sent to the respondents and collected personally. 50 questionnaires were received back and three of them were neglected. The valid respondents were 47 with a percentage of 85%. The contractors were asked to rank the risk factors based on the degree of severity and frequency of occurrence by using a five-point Likert scale as follows: 1-Not Significant, 2-Slightly Significant, 3-Moderate, 4-Very Significant, and 5-Extremely Significant.

The frequency index and severity index were used to analyze the data collected from the questionnaire survey statistically by using the following:

$$\text{Index } (\%) = \sum a(n/N) * 100/5 \quad (1)$$

Where; a is the constant expressing weighting given to each response (ranges from 1 for Not Significant up to 5 for Extremely Significant), n is the frequency of the responses, and N is the total number of responses. Accordingly, the severity and frequency levels are identified based on their index using (Table 1).

Table 1. *Levels of Frequency and Severity*

Index Value (%)	Frequency	Severity
≤20	Not Significant (N.S.)	Not Significant (N.S.)
20-40	Slightly Significant (S.S.)	Slightly Significant (S.S.)
40-60	Moderate (M)	Moderate (M)
60-80	Very Significant (V.S.)	Very Significant (V.S.)
80-100	Extremely Significant (E.S)	Extremely Significant (E.S)

The risk map of identified risk factors was established using (Figure 1) (Mahamid, 2011). The location of each factor in the risk map is defined using frequency and severity levels. Three zones are shown in the risk map: red, yellow, and green, which have the following characteristics:

o The Green zone is located in the bottom left corner (low impact/low likelihood). Risks in this zone are acceptable, minor, and can be ignored.

o The Yellow zone extends down the middle of the matrix. Risks in this zone are defined as moderate and should be controlled, and they need the introduction of risk-reducing measures.

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o The red zone has high severity and high frequency and is located in the top right corner of the matrix. Risks in this zone are major and not acceptable. The risk-reducing measures must be taken immediately.

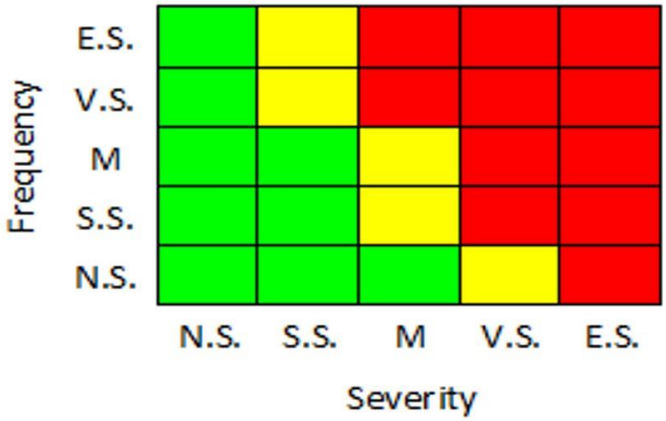

Figure 1. *Risk Map*

4. Results and discussion

4.1 Demographic Characteristic

The 47 respondents answered the survey with a respondent rate of over 85%. The collected data showed that most of the respondents have an experience with more than 5 years. (Figure 2) shows the rate of respondents who have an experience between 5 to 10 years is 34%. Furthermore, over 60% of contractors in the sample have an experience more than 15 years.

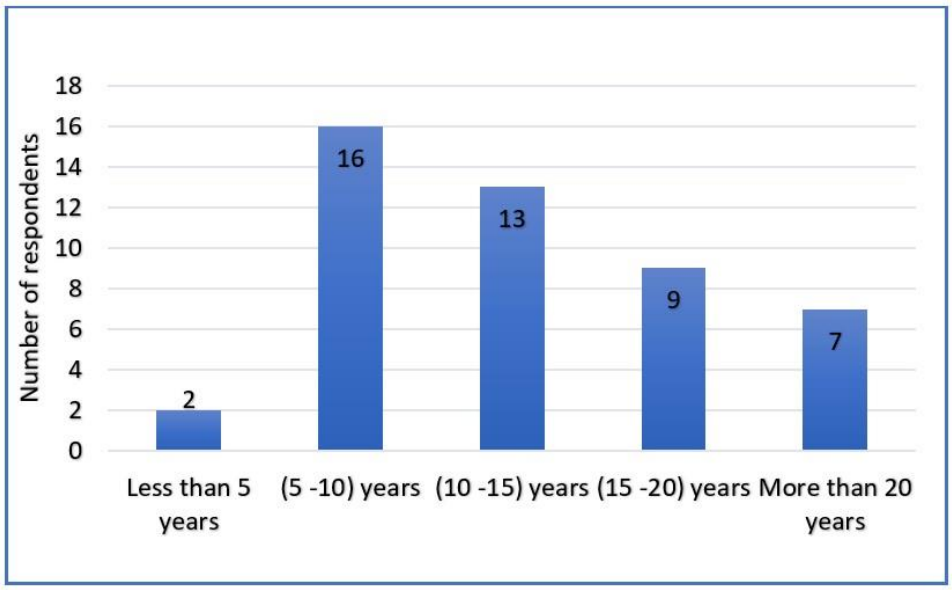

Figure 2. *Respondents' Experience*

(Figure 3) indicates the percentage of delayed projects that respondents have experienced, 62% of the contractors were not able to deliver projects within schedule in 25% to 50% of implemented projects. The 30% of respondents need to extend the original completion time mentioned in the contract in less than or equal to 25% of their projects. The data also illustrate that more than 50% of respondents faced delays in projects in which the owners were public organizations such as ministries and municipalities.

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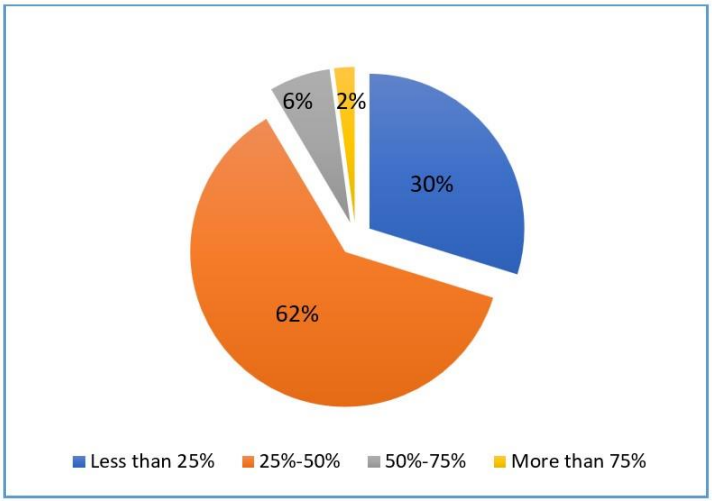

Figure 3. *Percentage of Delayed Projects*

4.2 Reliability Test

From the results of the analysis, Cronbach's Alpha α is 92.4% which is higher than 70% as mentioned in D. G. (2003). Cronbach's Alpha α which was calculated using SPSS, indicates that data is reliable and it is an indication of the stability and consistency of risk factors that caused the delay.

4.3 Risk Factors

The risk factors causing a delay in the construction projects were collected and assessed based on the severity and frequency index. The results of each factor and its zone under each category were ranked and discussed as follows:

A. External Risk factors

(Table 2) indicates the results of the risk map for external factors causing delays in construction projects in Palestine which are out of the control of construction parties. It shows that 7 factors were located in the red zone, and 2 factors were located in the yellow zone. The most three critical factors were closure by the authorities, segmentation of the Palestinian governorates, and political obstacles. These factors restricted the right of movement and access to the site for the construction parties which would not carry out the activities as planned.

Table 2. *External Risk Factors*

Risk Factors	Frequency Index	Scale	Severity Index	Scale	Risk Zone
Political obstacles	69.79	V.S.	82.55	E.S.	Red
Segmentation of the Palestinian governorates	75.32	V.S.	85.11	E.S.	Red
Change of exchange rate	58.72	M	58.3	M	Yellow
Fluctuations in prices of construction material	69.79	V.S.	74.47	V.S.	Red
Custom clearance delay	59.57	M	68.94	V.S.	Red
Issued new regulations and policies by the government	33.19	S.S.	42.55	M	Yellow
Inflation in the construction industry	63.4	V.S.	77.45	V.S.	Red
Closure by the authorities	78.3	V.S.	91.91	E.S.	Red
Weather conditions	71.91	V.S.	82.13	E.S.	Red

B. Internal Risk Factors Related to the Contractor

(Table 3) shows the results of the risk zone for internal factors which were resulted by contractors. It indicates that 3 factors were located in the red zone, and 3 factors were located in the yellow zone. The most critical factors under this group were delayed payments to the subcontractors, rework due to not complying with contract documents, and poor construction documents.

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Table 3. *Internal Risk Factors Related to the Contractor*

Risk Factors	Frequency Index	Scale	Severity Index	Scale	Risk Zone
Liquidity management	46.81	M	56.6	M	Yellow
Poor site management	38.72	S.S.	54.04	M	Yellow
Lack of contractors' experience	37.45	S.S.	52.77	M	Yellow
Rework due to noncompliance with contract documents	68.09	V.S.	85.11	E.S.	Red
Delayed payments to subcontractors	77.87	V.S.	88.94	E.S.	Red
Poor construction document	62.98	V.S.	77.02	V.S.	Red

C. Internal Risk Factors Related to the Owner

(Table 4) indicates the results of the risk zone for internal factors which were resulted by owners who play a significant role during the entire project cycle and affect the progress of work. It indicates 4 factors were placed in the red zone, whereas 2 factors were located in the yellow zone. The most critical factors under this group were change orders by frequent adjustments of the owner, delayed payments by the owner, and unrealistic completion dates of projects.

Table 4. *Internal Risk Factors Related to the Owner*

Risk Factors	Frequency Index	Scale	Severity Index	Scale	Risk Zone
Delayed payments by the owner	86.38	E.S.	95.74	E.S.	Red
Unrealistic completion dates of projects	68.94	V.S.	86.81	E.S.	Red
Procurement process and awarding the bidder	48.94	M	59.57	M	Yellow
Unclear scope of work by the owner	55.32	M	78.72	V.S.	Red
Change orders by frequent adjustments of owner	70.21	V.S.	87.66	E.S.	Red
The unreasonable timeframe between the announcement date and execution of work	56.17	M	57.87	M	Yellow

D. Internal Risk Factors Related to the Consultant

(Table 5) shows the results of the risk zone for internal factors which were resulted by the consultant, who called the engineer, is responsible for the design, preparing tenders, and supervision of work according to the contract documents. The table indicates 5 factors were placed in the red zone, one factor was located in the yellow zone, and one factor was located in the green zone. The most critical factors ranked under this group were poor site supervision, design errors, and frequent changes in design.

Table 5. *Internal Risk Factors Related to the Consultant*

Risk Factors	Frequency Index	Scale	Severity Index	Scale	Risk Zone
Design errors	67.66	V.S.	85.11	E.S.	Red
Frequent changes in design	59.57	M	83.83	E.S.	Red
Poor site supervision	71.06	V.S.	90.64	E.S.	Red
Complexity in construction projects	30.64	S.S.	42.55	M	Green
Disputes with contractors	64.26	V.S.	75.74	V.S.	Red
Unclear technical specification	49.36	M	62.13	V.S.	Red
Lack of social and environmental sustainability reports in contract documents	41.7	M	53.62	M	Yellow

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E. Internal Risk Factors Related to the Resource Management

(Table 6) shows the results of the risk zone for internal factors related to Resource Management. The resources for construction projects include money, labor, equipment, and material. The table indicates 5 factors were placed in the red zone, whereas 2 factors were located in the yellow zone. The most critical factors ranked under this group were price manipulation from material suppliers, lack of qualified labor, and the use of obsolete equipment.

Table 6. *Internal Risk Factors Related to the Resource Management*

Risk Factors	Frequency Index	Scale	Severity Index	Scale	Risk Zone
Unavailability of construction materials in the market	57.45	M	73.19	V.S.	Red
Low productivity of labors	59.57	M	59.15	M	Yellow
Lack of qualified labors	77.02	V.S.	79.57	V.S.	Red
The procedure for importing construction material	62.98	V.S.	77.87	V.S.	Red
Use of obsolete equipment	71.91	V.S.	80.43	E.S.	Red
Inadequate material management	55.32	M	59.15	M	Yellow
Price manipulation from material suppliers	67.23	V.S.	81.28	E.S.	Red

F. Internal Risk Factors Related to the Contract Administration

(Table 7) shows the results of the risk zone for internal factors related to Contract Administration.
The contract is defined as a mutual or legally binding agreement between the construction parties based on conditions mentioned in document forms. The table indicates 5 factors were placed in the red zone, whereas only one factor was located in the yellow zone. The most critical factors ranked under this group wereconflict in contract document, inaccurate quantities in projects, unclear of drawings, lack of details in contract documents and the contract includes information unrelated to the project.

Table 7. *Internal Risk Factors Related to the Contract Administration*

Risk Factors	Frequency Index	Scale	Severity Index	Scale	Risk Zone
Conflict in contract document	54.89	M	64.68	V.S.	Red
Inaccurate quantities in projects	55.74	M	80.85	E.S.	Red
Unclear of drawings	52.77	M	67.23	V.S.	Red
Contract ambiguity	48.94	M	59.57	M	Yellow
Lack of details in contract documents	54.04	M	65.11	V.S.	Red
The contract includes information unrelated to the project (copied from the previous contracts)	68.09	V.S.	74.89	V.S.	Red

G. Top Five Critical Risk Factors

(Table 8) shows the results of the top critical risk factors that contribute to the delay in construction projects in Palestine from contractors' perspective as follows.

Table 8. *Top Five Critical Risk Factors and Related Groups*

Related to (Groups)	Critical Risk Factors	Frequency Index	Scale	Severity Index	Scale	Risk Zone
Owner	Delayed payments by the owner	86.38	E.S.	95.74	E.S.	Red
External	Closure and siege by the authorities	78.3	V.S.	91.91	E.S.	Red
Consultant	Poor site supervision	71.06	V.S.	90.64	E.S.	Red
External	Segmentation of the Palestinian governorates	75.32	V.S.	85.11	E.S.	Red
Contractor	Late payments to subcontractors	77.87	V.S.	88.94	E.S.	Red

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i. Delayed Payments by the owner

The project cost management and cash flow analysis are largely affected by the interim payments. The unstable economic situation due to the political situations make owners, especially public organizations have a financial deficit, and this makes owners incapable meeting their financial obligations to pay for contractors. The contractors will face a lack of financial liquidity which means the construction works would be behind the schedule. The factor is concluded by (Sambasiva and Soon, 2007) and (Salem and Suleiman, 2020).

ii. Closure by the authorities

The unstable condition in the Palestinian context stress the construction industry and puts many obstacles to construction parties. The red zone of siege factor shows that contractors could not predict the effect of political situations due to the high uncertainties. The siege banned construction materials from being shipped to enter Palestinian districts, which lead to the monopoly of the material suppliers and disturbed the delivery chain of material to the site, causing a delay achieving the targeted goals within their time. The finding is supported by the study of (Enshassi and Mosa, 2008).

iii. Poor site supervision

The findings revealed the inability of the site management team to control the quality of implemented projects is considered a significant risk and is located in the red zone. The poor supervision results from the inexperienced consultant team and ineffective coordination between parties of the site management team. This could lead to improper scheduling and planning, rework practices, and a delay due to lost time to take immediate action on site. This factor was pointed out by Gündüz et al. in 2013.

iv. Segmentation of the Palestinian governorates

The segmentation and obstacles such as checkpoints have restricted the access and movement of construction material, labor, and equipment between governorates which lead to a slowdown in the progress of construction projects. According to (Weide et. al., 2018), the economic outcomes are highly affected by the market access due to slow and arbitrary closure as controlling the traffic within the West Bank. The people are not able to carry out activities and connect with their projects which leads to the delay.

v. Late payments to subcontractors

The subcontractors play a significant role delivering the projects within the target time. For subcontractors that have fewer resources, Subcontractors frequently have significantly shorter payment periods than the main contractor and cannot afford to pay their labor as contractors. The impacts of late payments are subcontractors' competence, fiscal situation, and quality of construction work which cause time. This factor is supported by the study of (Haron and Arazmi, 2020).

5. Conclusion and Recommendations

The construction industry differs from other industries in several ways. Because of the abundance of firms and the simplicity of entering the construction market, the construction industry is fragmented, economically cycle-sensitive, and highly competitive. It is considered risky due to these characteristics. The frame time of the implementation project is one of the major concerns for the owner, engineer, and contractor. The construction dispute may occur due to claims by parties due to the delay and inability to deliver the construction projects within the planned time. In this study, 41 critical risk factors in projects associated with project duration were identified and classified as external factors, which are beyond the control of the various parties in construction projects, and internal factors, which were in control and divided according to their relationship with the parties, namely contractor, owner, consultant, resource management, and contract administration. The risk map for the investigated causes was created based on their perceived severity and frequency of occurrence.

According to the findings, 29 causes were placed in the red zone of the risk map, 11 were in the yellow zone, and 1 was in the green zone. The top ten severe risk factors located in the red zone and causing the delay in Palestinian industry from contractors' perception are; delayed Payments by the owner, closure by the authorities, poor site supervision, segmentation of the Palestinian governorates, delayed payments to subcontractors, change orders by frequent adjustments of the owner, lack of qualified labors, unrealistic completion date of projects, weather conditions, and rework due to noncompliance with contract documents.

Integrated risk management should be implemented in the entire project life cycle. Therefore, the construction parties should work to deal with risk by defining the risk factors, assessing the risk based on its frequency and severity, and proposing

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adaptation or mitigation measures to face them. Furthermore, effective risk management needs collaborative actions between construction parties to deliver the project successfully.

It is recommended that contracting companies or owners calculate and consider delay factors and commit to payments as specified in the contract. Maintaining accurate records, billing promptly, and the usage of contract management software and technology like blockchains and smart contracts may make it possible to speed up payments (Nanayakkara et. al., 2021).

Training courses on how to merge the risk management practices in managing projects and develop the required response to mitigate the impacts on project success should be provided for engineers, project managers, and contract administrators, in addition to the presence of good experience for project designers and that these designs can be worked on, and the contractor should be also consulted in these designs to reduce the errors that may occur.

Competence project management practices should be included in the planning and design stages in coordination with the owner to define the scope of work from the owner clearly and define the actual time needed to implement the projects considering the risk management recommendations from previous similar assignments.

Contractors must make every effort to avoid and, if possible, minimize delays by exercising strict cash flow management for subcontractors. Contractors must learn how to share and divert various risks by hiring specialized personnel or specialized subcontractors. Subcontractors should hire experienced workers, and when purchasing materials, it is preferable to know market prices and trusted people, and if possible, to work with the government to import materials from abroad if the prices are reasonable, and the contractor must work with good machines, changing them as needed and not exceeding their capacity.

For the external risk factors such as closure and siege by the authorities, segmentation of the Palestinian governorates, and weather conditions, the Dispute Adjudication Review Board (DAAB) should be assigned in the early stage of construction as a third party to assess the risk that falls outside the control of construction parties as mentioned in clause 21 of general conditions of FIDIC 2017, the Red Book. DAAB would work with the involved parties in the responses to mitigate the adverse impacts of risk on the project and reach conciliation solutions before affecting largely the progress of projects.

However, further studies could be implemented to identify the impacts of the delay caused by the critical risk factors and develop a model to deal with these factors as general provisions added in the contract documents. The model will be used as a basis to face risk factors and establish a response mechanism in the project's case by case.

6. Referencias

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