Risk factors affecting the implementation of construction projects in Iraq

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Abstract. The construction industry of Iraq is widely associated with multiple influencing
factors that due to their specific lead to increased uncertainty and multiple risks during the
construction phase. The main objective of this article is to identify and evaluate key risk
factors and their impact on the formation of car parks and the realisation of
construction projects in Baghdad (Iraq). In this study the risks associated with construction projects identified with
the help of open questionnaire and interview with construction project specialists. In total,
factors of risks were identified and categorized into five groups: financial, political,
organizational, technical and legal. The study revealed that the top ten important risk factor
are: inconsistency structure specifications(76.89%), changes in design(75.97%), late arrival
of equipment and materials from the country of origin(75.74%), poor coordination between
the client and the contractor(72.29%), lack of clarity in contractual obligations(71.17%), the
occurrence of internal problems between the project parties(71.17%), dues payment delay
not according to contract (68.09%), insufficient financial allocations to complete the
project(66.37%), war (47.75%) and receipt of operational advances delay due to legal
proceedings(46.58%).

1. Introduction
Construction in Iraq involves the issue of mechanization and the risks of reserving machines.
Construction projects face multiple and severe risks throughout their lifecycle starting from decision-
making stages to final project delivery. Risks are generally seen as events that affect project
objectives, that leads to delayed delivery of the project or increase in cost and sometimes even affect
the quality of work. As far as the construction industry is inherently risky, some of these risks are
rather predictable or easily identifiable. Others may not be entirely foreseen. Over the past two
decades, attention to the issue of risk has been widespread [5]. There have been many studies on risk
management and the strategies of avoiding the risks, limiting their effects or transferring risks to another party. Construction companies in Iraq face complicated types of risks during the project implementation phase. The existence of these risks is time-wasting and results in resource depletion. It is necessary to identify the types of these risks and their impact on the project objectives to predict how they can be addressed and responded.

Risk is defined as an uncertain event potentially having a negative or positive effect [7-10] at least on one of the project objectives. The risk is also defined as the prospect of any future event that may affect plans of the project[12-14], including financial and temporal and therefore a deviation from what has been planned. There are several ways to classify the risks involved in the project. Risks can be classified internally or externally [11] or based on their primary sources [1-2,4] such as financial, legal, political and management. Internal risks are related to all types of projects, regardless of project size. External risks are directly linked to economic and political changes[15,17], changes in prevailing laws and unforeseen circumstances[16,18].

2. Methodology

The overall methodology of this study is largely based on a survey that took place based on the responses given on the questionnaire collected from construction companies of different sizes in Baghdad by mail and personal interviews with project managers and engineers employed in construction companies. The questionnaire covered two types of information. The first part of the questionnaire focused on obtaining general information about respondents such as company type, organization, experience, etc. The second part of the questions about construction risks was based on their primary sources. The risk factors for this study have been classified into five types of risk associated with construction projects: 1. Financial risks, 2. Political risks 3. Organizational risks 4. Technical risks 5. Legal risks. The questionnaire was submitted to 77 participants, 50 of whom fully responded to the questionnaire, all responses were analyzed afterwards.

Data processing and analysis were conducted with the use of Excel software, and the results showed that more than half of the sample size of respondents have more than 10 years of experience, which says for reliability of the information provided by respondents to portray the reality in the construction industry. The study adopted the following criterion for assessing the importance of risk according to risk categories: [6, 3]

Frequency indicator (F.I.) = \( \sum \frac{a \times (n/N)}{5} \) \( \% \) \( (1) \)

Severity index (S.I) = \( \sum \frac{a \times (n/N)}{5} \) \( \% \) \( (2) \)

Where (a) is the constant expressing weighting given to each response (range from 1 for very low to 5 for very high)

(n) is the frequency of the response

(N) is the total number of responses.

Combine these two criteria into the following equation to find the importance of each risk factor as the function:

Importance Index (I.I) (%) = \( \frac{F.I. \times S.I. \times 100}{100} \) \( (3) \)

3. Results and discussion.

3.1 Financial risks.

As shown in the table (1), the financial risks are faced by all parties involved in the implementation of construction projects. The highest risk rating is in dues payment delay not according to contract 68.09 %. It sometimes causes lengthy negotiations between the contractor and the owner that results in bringing in design changes and may cause delays in payments by the owner to win the negotiations in his favor.
Table 1. Financial risks associated with construction projects.

| Type of risk                                      | F.I  | S.I  | L.I  | Rink |
|--------------------------------------------------|------|------|------|------|
| Dues delay payment not according to contract     | 78.13| 87.19| 68.09| 1    |
| Insufficient financial allocations to complete the project | 74.34| 89.26| 66.37| 2    |
| High prices of materials and reinforcing steel   | 48.44| 62.06| 30.08| 3    |
| Inflation and price volatility                   | 45.28| 40.82| 18.48| 4    |
| Unexpected funding cuts                          | 42   | 43.58| 18.30| 5    |

3.2 Political risks.
The table (2) shows that war is the most important factor affecting the political risks associated with construction projects ranked at 47.75 % because of its negative impact on the national economy in general.

Table 2. Political risks associated with construction projects.

| Type of risk                                      | F.I  | S.I  | L.I  | Rink |
|--------------------------------------------------|------|------|------|------|
| War                                              | 68.08| 69.83| 47.75| 1    |
| Delayed arrival of equipment and materials due to deteriorating conditions | 48.84| 52.14| 22.33| 2    |
| Project damage due to war conditions             | 50.12| 41.66| 20.87| 3    |
| Insecurity and thefts                            | 37.60| 41.58| 15.63| 4    |

3.3 Organizational risk.
Table (3) shows that the stable coordination between the client and the contractor is the most important factor affecting the organizational risks associated with construction projects ranked at 72.29 % due to the absence of the client or his representative during the implementation period.
Table 3. Organizational risk associated with construction projects.

| Type of risk                                      | F.I   | S.I   | Total risk |
|--------------------------------------------------|-------|-------|------------|
| Poor coordination between the client and the contractor | 86.57 | 85.82 | 72.29      |
| Lack of clarity in contractual obligations        | 85.81 | 82.95 | 71.17      |
| Delay in starting work                            | 48.52 | 50.56 | 24.53      |
| Events and holidays                               | 51.10 | 47.13 | 24.08      |

3.4 Technical risks

Table (4) shows that inconsistency structure specifications are the most important factor affecting the technical risks associated with construction projects classified at 76.89% due to the absence of the consultant for monitoring of the preparation of designs and at the construction stage. This results in a mismatch of approved designs with technical specifications.

Table 4. Technical risks associated with construction projects.

| Type of risk                                      | F.I   | S.I   | Total risk |
|--------------------------------------------------|-------|-------|------------|
| Changes in design                                | 87.13 | 87.20 | 75.97      |
| Inconsistency structure specifications           | 85.74 | 89.68 | 76.89      |
| Late arrival of equipment and materials          | 88.04 | 86.04 | 75.74      |
| Inaccurate scheduling                            | 75.10 | 75.33 | 56.57      |
| Inaccurate surveys                               | 75.11 | 74.97 | 56.30      |

3.5 Legal risks

Regarding the legal risks associated with construction projects, the study showed that legal disputes during the construction phase between the project parties topped the highest proportion of legal risk ranked at 46.58% as showed in the table (5). It should be noted that these risks are of medium importance because all parties recognize the necessity of solving problems between the parties before reaching the judiciary, and the consequent access to time consuming justice for the high costs.
Table 5. Legal risks associated with construction projects.

| Type of risk                                             | F.I  | S.I  | LI   | Rink |
|---------------------------------------------------------|------|------|------|------|
| Receipt of operational advances delay due to legal proceedings | 60.09| 76.05| 46.58| 1    |
| Legal disputes between the construction project parties  | 48.88| 45.28| 22.13| 2    |
| Difficulty with obtaining licenses and work permits      | 43.71| 46.91| 20.50| 3    |

4. Conclusion.
The key point identified by this research is to explore key risk factors and identify those factors that can be encountered in construction projects in Iraq. The determinants for each type were shown in tables (1to 5). The study suggested that factors that have the highest impact on risk in construction sites are those that have a higher indication, technical risks, organizational risks, financial risks, political risks and legal risks. The ten most important factors are: inconsistency structure specifications, changes in design, late arrival of equipment and materials from the country of origin, poor coordination between the client and the contractor, lack of clarity in contractual obligations, the occurrence of internal problems between the project parties, payment delay in disagreement with a contract, receipt of operational advances delays due to legal proceedings, war and insufficient funds allocations.

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