Causes of Abandoned Construction Projects: A case study in Iraq

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Abstract. Recently, many construction projects in Iraq have been either incomplete or abandoned, with negative implications for stakeholders, the economy, and the environment. The research methodology in this study adopts to Identify the reasons for the abandonment of construction projects in Iraq and arranging them corresponding to the viewpoint of three superiors (owners, consultants, contractors) of the construction project. A literature review on abandoned construction projects was carried out and interviews were conducted for a range of experts in the sector of the building environment in Iraq. As a result, the questionnaire consisted of 41 causes of abandoned construction projects in Iraq. the causes are grouped into six-item. A field survey was conducted using the Relative Importance Index (RII) to rate these causes from the perspective of the owner, contractor, and consultant. 85 forms are the total number of questionnaires distributed, representing 30 for owners, 20 for contractors, and 35 for consultants. The results concluded that the causes of abandoned projects related to time, finance, and resources are in the first, second, and third places, with a total RII equal to 78, 76.3, and 75.8, respectively.

Keywords. Construction Projects abandoned; Relative importance index(RII); Projects Management

1. Introduction
Iraq is a developed country that is suffering from many building issues. The abandonment of projects is considered to be one of the most important problems obstructing the construction in Iraq, more attention is needed to mitigate and resolve the causes that might lead to this problem [1]. There are many challenges in managing abandoned buildings through their lifecycle, often due to a lack of technical information. The rework is a major factor contributing to unnecessary overtime and cost [2]. The success of the construction project depends mainly on finishing the project in terms of budget cost, schedule time, without defects, and corresponding to customer requirements and specifications. Construction projects, therefore, require effective management and efficient strategies over the life cycle of the project [3].

Many researchers concentrated on the causes of abandoned projects in the different areas of the construction industry. For example, Abdul-Rahman et al. (2013) [4] studied the causes of abandoned construction projects that may be classified as Factors relating to economic, financial, legal, Poor working conditions, delays, and unexpected risk factors. Yap et al. (2010), Ayodele (2011) [5,6] mentioned that the causes of abandoned projects are corruption, unavailability of skilled personnel, communication gap among personnel, poor risk management, improper estimation, inadequate planning, misinterpretation of work requirements, inconsistent government policies, and poor quality
control by governing organizations. According to Dahlan (2011) [7] Specified some of the reasons for the abandonment of the project as follows; financial problems of developers, problems correlated to the clearing of the site, mismanagement, conflicts, and disputes between project investors, also that inadequate legal requirement to protect clients' interests may be an important reason for Project Abandonment. Abdul-Rahman et al. (2015) [8] showed that the causes of abandoned construction projects can be classified into risks related to environmental impacts, law, management, finance, materials, construction, politics, economy, change orders and poor decision making, poor technical performance and the probability of risks from the contractual disputes between developer and landlord. Damoah et al. (2019) [9] studied that the causes of projects abandoned can be classified as political leadership, poor administrative/institutional practices, poor resources/funding, unsafe work environment, cultural factors, and external forces. According to Atamewan (2020), Carrero et al. (2009) [10,11] showed the abandoned housing projects can cause environmental and socio-economic effects. Environmental impacts include distortions, visual effects, landscape, environmental pollution, increase health problems, and loss of biodiversity and those of socio-economic effect is the loss of importance of the area and loss of jobs. Adil et al. (2019), Abidali and Ali (2018) [1,12] investigated the factors causes of unfinished projects in the Iraqi construction industry include economic crisis, mismanagement, Ineffective design, financial corruption, Inadequate contractors experience, Ineffective scheduling, changes in legislation and government regulations, weak of applying modern technologies, bad working conditions, delay, shortage of planning and poor project safety planning. [13]. After the occupation of Iraq in 2003, the Iraqi economy has also been impacted by several crises, and the Iraqi economy has been controlled by incorrect policies, which have led to a worsening of the economic situation in the country after the civil war in 2006 and the financial crisis in 2008, causing oil prices to fluctuate, that has a negative effect in the environment of building projects. [14] The most important factors affecting construction projects in Iraq, terrorism which in turn influence the safety of workers and equipment has become a fundamental problem for world politics and threatens construction, especially in some countries like Iraq that suffer from fighting and wars, these problems will significantly affect the performance of building projects.

In recent years, the construction industry in Iraq has faced many problems related to the increase in abandoned construction projects because of different reasons that have affected the performance of construction projects. The goal of the study is to identify the Causes of Abandoned Construction Projects in Iraq and arrange them by their importance focusing on the viewpoint of the three parties (owners, contractors, consultants) to the construction project.

2. Research Methodology and Experimental study

In this section, the authors will describe the methodology for this study and also illustrate the case study.

2.1 Research Methodology

The research methodology chosen to achieve the study's goals is shown in figure (1). This methodology of research for the study is structured as follows:

1. **Part one (theoretical study):** Review of literature in different fields related to this research, including abandoned construction domains and causes for Abandoned Projects. To identify the most important factors leading to the project abandonment in Iraq.

2. **Part two (practical study):** The Practical study included:
   1. Formulation and design of the questionnaire; and expert interviews to obtain data from owners, contractors, and consultants.
   2. The statistical analysis was carried out using SPSS data analysis to evaluate and rank factors according to their importance and to observe the accuracy of collected data using Cronbach's alpha.
   3. Finally, clarify the conclusions that the authors have reached.
2.2 Experimental study
The experimental study involves collecting data from the Governorate of Diyala as a case study in order to achieve the objective of the research.

3. Data Collection
The researcher collects data using the questionnaire required to achieve the study goal, which in the field of the survey is considered to be a significant instrument. six items are included in the questionnaire; each item is split into a number of factors. owners, consultants, and contractors were asked, on the basis of their experience, to identify the degree of significance of 43 causes affecting the performance of Iraqi construction projects. Using the Likert scale the distribution of 85 questionnaire forms was as follows: 30 forms for owners, 35 forms for consultants, and 20 forms for contractors. The sample of the study is selected to be more experienced and skilled in the area of the Iraqi construction sector, as illustrated in Table (1). The following formula can also be used to measure RII [15].

\[
RII = \frac{\sum_{i=1}^{n} W}{AxN} \tag{1}
\]

\[
RII = \frac{5(n5) + 4(n4) + 3(n3) + 2(n2) + 1(n1)}{5(n5 + n4 + n3 + n2 + n1)} \tag{2}
\]

Where W: is the weight that the respondents give to each factor (ranging from 1 to 5); A: represents maximum weight (that equal 5); N: sample size.
### Table 1. Participant demographic data

|                | Owner | Contractor | Consultant |
|----------------|-------|------------|------------|
| **Number**     |       |            |            |
| Gender         |       |            |            |
| Female         | 10    | 8          | 12         |
| Male           | 20    | 12         | 23         |
| **Percentage** | 33.3% | 40%        | 34.3%      |
| **Academic Qualification** |       |            |            |
| Ph.D.          | 8     | 8          | 8          |
| Master         | 18    | 17         | 6          |
| Bachelor       | 4     | 3          | 15         |
| Diploma        |       |            |            |
| **Percentage** |       |            |            |
| **Specialization** |       |            |            |
| Civil Eng.     | 20    | 15         | 18         |
| Mechanical Eng.| 4     | 1          | 4          |
| Architectural Eng. | 3     | -          | 8          |
| Electrical Eng.| 2     | 2          | 2          |
| Materials Eng. | -     | -          | -          |
| Survey Eng.    | 1     | 2          | 3          |
| **Percentage** |       |            |            |
| **Experience Years** |       |            |            |
| Less Than 5 Years | 13   | 8          | 10         |
| 5-10 Years     | 10    | 5          | 15         |
| 11-15 Years    | 8     | 7          | 10         |
| **Percentage** | 43.3% | 25%        | 28.6%      |

### 4. Results and Discussion

#### 4.1 Causes related to management

The RII value for every item was determined to obtain the rank of a single item in the rest of the items. Table (2) illustrates, nine factors have been listed related to Project Management and cause the project abandoned. Unsuitable project management is arranged first by consultants and owners and second by contractors with RII equal to 84.5, 78.6, and 82, respectively. The owners and consultants and contractors agreed to the assignment of work to companies with little expertise in the field of construction is a more important factor ranked first, due to the success of the building project depends primarily on the expertise of the project manager. Weak quality assurance and quality management ranked third place owners and contractors, while consultants ranked the fourth with RII equal to 74.75 and 71.4, as well as Inaccessibility of sites has been ranked in the second place by owners and consultants and in the fourth position by contractors with RII equal to 76.6, 77.7 and 74 respectively. Inadequate risk management ranked in the lowest important place with a total RII equal to 64.5.

### Table 2. Rank and the RII of causes related to management

| No. | 1. Causes related to management | Owner | Contractor | Consultant | Total |
|-----|---------------------------------|-------|------------|------------|-------|
|     |                                 | RII   | Rank      | RII        | Rank  | RII   | Rank  | RII    | Rank |
| 1.1 | Unsuitable project management   | 78.6  | 1         | 82         | 2     | 84.5  | 1     | 81.7   | 1    |
| 1.2 | Inaccessibility of sites        | 76.6  | 3         | 74         | 3     | 77.7  | 3     | 76.1   | 3    |
| 1.3 | Number of conflicts between project parties | 73.3  | 5         | 68         | 5     | 66.2  | 6     | 69.8   | 6    |
| 1.4 | Assignment of work to companies with little expertise in the field of construction | 78.6  | 2         | 91         | 1     | 84.5  | 2     | 84.7   | 2    |
| 1.5 | Weak quality assurance and quality management | 74    | 4         | 75         | 4     | 71.4  | 4     | 73.5   | 4    |
| 1.6 | Inadequate risk management      | 62    | 6         | 65         | 7     | 63.4  | 7     | 64.5   | 7    |
1.7 Poor communications between project parties

| No. | Causes related to finance | Owner RII | Owner Rank | Contractor RII | Contractor Rank | Consultant RII | Consultant Rank | Total RII | Total Rank |
|-----|----------------------------|-----------|------------|----------------|----------------|----------------|----------------|----------|------------|
| 2.1 | Corruption in financial    | 84        | 1          | 82             | 2              | 77.7           | 2              | 81.3     | 2          |
| 2.2 | Unexpected poor economic conditions | 79.3 | 2 | 74 | 3 | 75.4 | 3 | 76.2 | 3 |
| 2.3 | The owner faces financial difficulties | 70 | 4 | 70 | 6 | 73.1 | 4 | 71.3 | 6 |
| 2.4 | Lack of adequate financial analysis | 73.3 | 5 | 72 | 5 | 69.7 | 6 | 71.6 | 5 |
| 2.5 | Contractor's administrative mishandling | 74 | 3 | 69 | 7 | 72.5 | 5 | 72 | 4 |
| 2.6 | Payment delay              | 84        | 1          | 89             | 1              | 84.6           | 1              | 85.9     | 1          |
| 2.7 | Lack of Implementation the PPP approach | 73.3 | 5 | 73 | 4 | 69.1 | 6 | 72.2 | 4 |
| Overall |                           | 76.8      |            | 75.6           |                | 74.6           |                | 76.3     |            |

4.2 Causes related to Finance

According to owners, contractors, and consultants, payment Delay rank in the first place with RII equal to 84, 89, 84.6, respectively. The most important factor since it affects the contractor's wages and the owner's liquidity Which contributed to the abandonment of certain projects at the now. Corruption in financial was ranked in the first place by Owner and ranked in the second place by Contractor and Consultant with a total RII equal to 81.3. Unexpected poor economic conditions ranked second place by the owner and rank in third place by Contractor and Consultant with total RII equal to 76.2. Lack of adequate financial analysis ranked fifth by owner and contractor while ranked sixth by Consultant with RII equal to 73.3, 72, and 69.7, respectively. This led to a clear delay in project completion, shown in Table (3).

| Table 3. Rank and the RII of causes related to finance |
| No. | Causes related to finance | Owner RII | Owner Rank | Contractor RII | Contractor Rank | Consultant RII | Consultant Rank | Total RII | Total Rank |
|-----|----------------------------|-----------|------------|----------------|----------------|----------------|----------------|----------|------------|
| 3.1 | Poor estimation of the budget | 82.6 | 1 | 85 | 1 | 83.4 | 1 | 83.5 | 1 |
| 3.2 | Cost of high security measure | 73.3 | 4 | 76 | 3 | 74.8 | 3 | 74.1 | 3 |
| 3.3 | Absence of regular update of the budget | 71.3 | 6 | 69 | 6 | 71.4 | 6 | 70.8 | 7 |
| 3.4 | Cost of excess claims | 72.6 | 5 | 70 | 4 | 71.4 | 6 | 71.5 | 6 |
| 3.5 | Organizational liquidity | 75.2 | 2 | 81 | 2 | 80.5 | 2 | 78.8 | 2 |
| 3.6 | Cost of excessive reworking | 74 | 3 | 76 | 3 | 72 | 5 | 73.6 | 4 |
| 3.7 | Cost of high material waste rate | 66 | 8 | 71 | 5 | 68.5 | 7 | 68 | 8 |
| 3.8 | Increased material price | 70.6 | 7 | 69 | 7 | 73.7 | 4 | 72 | 5 |
| Overall |                         | 73.2      |            | 74.3           |                | 74.4           |                | 74       |            |

4.3 Causes related to cost

The RII and Rank of factors related to cost as shown in Table (4). Poor estimation of the budget, Organizational liquidity, they were rank in the first, and second places, with the a total RII equal to 83.5 and 78.8. Cost of High-Security Measure, ranked in third place by Contractor and Consultant, then fourth place by the owner with RII equal to 76,74.8, and 73.3, respectively. Cost of Excessive reworking ranked in third place by owner and Contractor while rank in fifth place by Consultant with the total RII equal to 73.6. This caused a major delay in project completion in Iraq.

| Table 4. Rank and the RII of causes related to cost |
| No. | Causes related to cost | Owner RII | Owner Rank | Contractor RII | Contractor Rank | Consultant RII | Consultant Rank | Total RII | Total Rank |
|-----|------------------------|-----------|------------|----------------|----------------|----------------|----------------|----------|------------|
| 3.1 | Poor estimation of the budget | 82.6 | 1 | 85 | 1 | 83.4 | 1 | 83.5 | 1 |
| 3.2 | Cost of high security measure | 73.3 | 4 | 76 | 3 | 74.8 | 3 | 74.1 | 3 |
| 3.3 | Absence of regular update of the budget | 71.3 | 6 | 69 | 6 | 71.4 | 6 | 70.8 | 7 |
| 3.4 | Cost of excess claims | 72.6 | 5 | 70 | 4 | 71.4 | 6 | 71.5 | 6 |
| 3.5 | Organizational liquidity | 75.2 | 2 | 81 | 2 | 80.5 | 2 | 78.8 | 2 |
| 3.6 | Cost of excessive reworking | 74 | 3 | 76 | 3 | 72 | 5 | 73.6 | 4 |
| 3.7 | Cost of high material waste rate | 66 | 8 | 71 | 5 | 68.5 | 7 | 68 | 8 |
| 3.8 | Increased material price | 70.6 | 7 | 69 | 7 | 73.7 | 4 | 72 | 5 |
| Overall |                         | 73.2      |            | 74.3           |                | 74.4           |                | 74       |            |
4.4 Causes related to time
Challenging security conditions are the most important factor, according to owners, consultants, and contractors, as they have the first rank with a total RII equal to 86.1. Poor scheduling and delay due to lack of materials were rated in second place with a total RII equal to 80.7. Delay in decision-making was rated in third place by owners, contractors, and consultants with RII equal to 74.6, 76, and 77.1, respectively. For three parties (owner, Contractor, and Consultant), this aspect can be seen as imperative because they think it will affect project efficiency, such as time, all sides want their projects done as early as possible. As illustrated in Table (5).

Table 5. Rank and the RII of causes related to time

| No. | 4. Causes related to time | Owner | Contractor | Consultant | Total |
|-----|---------------------------|-------|------------|------------|-------|
|     |                           | RII   | Rank       | RII        | Rank  | RII   | Rank  | RII   | Rank |
| 4.1 | Delay in decision making  | 74.6  | 3          | 76         | 3     | 77.1  | 3     | 76    | 3    |
| 4.2 | Poor scheduling           | 77.3  | 2          | 82         | 2     | 82.8  | 2     | 80.7  | 2    |
| 4.3 | Challenging security conditions | 85.3 | 1          | 87         | 1     | 86.2  | 1     | 86.1  | 1    |
| 4.4 | Changes orders            | 72.6  | 4          | 73         | 4     | 70.3  | 5     | 71.7  | 5    |
| 4.5 | Time needed to correct defects | 73.3 | 5          | 72         | 5     | 72.5  | 4     | 72.8  | 4    |
| 4.6 | Delay due to lack of materials | 77.3 | 2          | 82         | 2     | 82.8  | 2     | 80.7  | 2    |
|     | Overall                   | 76.7  |            | 78.6       |       | 78.6  |       | 78    |      |

4.5 Causes related to resources
Table 6 illustrates the owners and consultants ranked the shortage of qualified staff and supervisors in the first place, and ranked in third place by contractors with the RII was equal to 82.9. Materials unavailability ranked in the second place with the a total RII equal to 77.4, no compliance to the specification ranked in the third place by contractors, consultants and owners with RII equal to 74.6, 73, and 76, respectively. Project time and efficiency are affected by the unavailability of materials and The absence of sufficient plants.

Table 6. Rank and the RII of causes related to resources

| No. | 5. Causes related to resources | Owner | Contractor | Consultant | Total |
|-----|--------------------------------|-------|------------|------------|-------|
|     |                                | RII   | Rank       | RII        | Rank  | RII   | Rank  | RII   | Rank |
| 5.1 | Low quality materials          | 71.3  | 4          | 80         | 1     | 77.1  | 4     | 76    | 3    |
| 5.2 | Materials unavailability       | 75.3  | 2          | 79         | 2     | 78.2  | 2     | 77.4  | 2    |
| 5.3 | Shortage of qualified staff and supervisors | 85.6 | 1          | 73         | 3     | 84    | 1     | 82.9  | 1    |
| 5.4 | Absence and turnover of labor  | 69.3  | 5          | 72         | 4     | 71.4  | 6     | 71    | 5    |
| 5.5 | Lack of programs of training   | 71.3  | 4          | 69         | 5     | 72.5  | 5     | 71.2  | 4    |
| 5.6 | No compliance to the specification | 74.6 | 3          | 73         | 3     | 79.4  | 3     | 76    | 3    |
|     | Overall                        | 74.6  |            | 74.3       |       | 77.1  |       | 75.8  |      |

4.6 Causes related to external
Corruption was the most important factor for owners, consultants, and contractors, as it ranks first with a total RII of 82.3. Political war ranked second with a total RII of 80.7. Changes in government laws and regulations were placed in third place, with an RII equal to 76.74, and 78.8, respectively, all sides agree that the key problem preventing the completion of the project in Iraq is that corruption and political war can destroy the economy of a country and transform it from developed counties to underdeveloped, these problems will significantly affect the performance of building projects. As illustrated in Table (7).
Table 7. Rank and the RII of causes related to external

| No. | Causes related to external                          | Owner RII | Owner Rank | Contractor RII | Contractor Rank | Consultant RII | Consultant Rank | Total RII | Total Rank |
|-----|-----------------------------------------------------|-----------|------------|---------------|-----------------|----------------|-----------------|-----------|------------|
| 6.1 | Unstable economic conditions                        | 70        | 5          | 73            | 4               | 77.1           | 4               | 74.1      | 4          |
| 6.2 | Changes in the laws and regulations of the government| 76        | 3          | 74            | 3               | 78.8           | 3               | 76.6      | 3          |
| 6.3 | Political war                                       | 84.6      | 2          | 77            | 2               | 79.4           | 2               | 80.7      | 2          |
| 6.4 | Corruption                                          | 86        | 1          | 79            | 1               | 81.1           | 1               | 82.3      | 1          |
| 6.5 | Poor weather situations                             | 73.3      | 4          | 71            | 6               | 72.5           | 6               | 71.7      | 6          |
| 6.6 | Strong level of competition                          | 66        | 7          | 72            | 5               | 76.5           | 5               | 74.3      | 5          |
| 6.7 | The oil price fluctuation                           | 68        | 6          | 69            | 7               | 65.1           | 7               | 69.6      | 7          |
|     | Overall                                              | 74.8      |            | 73.5          |                 | 66.4           |                 | 75.6      |            |

4.7 Discussion of overall results

As shown in Figure 2 and Table 8 describe the overall results of the causes of abandoned construction projects in Iraqi; Time-related causes were ranked in the first place with a total RII of 78; this means that time has the most important effect on the success of projects. Finance-related factors were ranked in second place, with a total RII equal to 75.6; Corruption in financial, Unexpected poor economic conditions, the owner faces financial difficulties, Lack of adequate financial payment Delay, and Poor project cash flow this may cause severe problems in construction projects. Figure 3 illustrates the relative importance index of causes of Abandoned Projects.

Table 8. Describe the overall results of causes of Abandoned Projects

| No. | Causes of abandoned projects | Owner RII | Owner Rank | Contractor RII | Contractor Rank | Consultant RII | Consultant Rank | Total RII | Total Rank |
|-----|-------------------------------|-----------|------------|---------------|-----------------|----------------|-----------------|-----------|------------|
| 1   | Causes related to Management  | 74.2      | 5          | 74.1          | 4               | 73.9           | 5               | 74.7      | 5          |
| 2   | Causes related to finance     | 76.8      | 1          | 75.6          | 2               | 74.6           | 3               | 76.3      | 2          |
| 3   | Causes related to cost        | 73.2      | 6          | 74.3          | 4               | 74.4           | 4               | 74        | 5          |
| 4   | Causes related to time        | 76.7      | 2          | 78.6          | 1               | 78.6           | 1               | 78        | 1          |
| 5   | Causes related to resources   | 74.6      | 4          | 74.3          | 6               | 77.1           | 2               | 75.8      | 3          |
| 6   | Causes related to external    | 74.8      | 3          | 73.5          | 5               | 66.4           | 6               | 75.6      | 4          |

Figure 2. Total relative importance index of causes of Abandoned Projects
5. Measuring the Reliability of Research Tool Using SPSS

In this study, questionnaire reliability was measured by SPSS, Cronbach's alpha (Cα) test was used. For the six groups and overall variables, Table (9) demonstrated Cronbach's alpha. For all factors, the alpha values of Cronbach are 0.793, so the test questionnaire is considered accurate. The criteria for interpreting the results have been used by [16] as: α ≥ 0.9 excellent, 0.9 > α ≥ 0.8 good, 0.8 > α ≥ 0.7 acceptable, 0.7 > α ≥ 0.6 satisfactory, 0.6 > α ≥ 0.5 poor, 0.5 > α unacceptable.

Table 9. Cronbach alpha values

| Causes                      | Cronbach alpha | Results      |
|-----------------------------|----------------|--------------|
| Causes related to Management| 0.77           | Acceptable   |
| Causes related to finance   | 0.92           | Excellent    |
| Causes related to cost      | 0.84           | Good         |
| Causes related to time      | 0.77           | Acceptable   |
| Causes related to resources | 0.83           | Good         |
| Causes related to external  | 0.63           | Satisfactory |
| All of the Causes           | 0.793          | Acceptable   |

6. Conclusions

In this study, focusing on unfinished projects is one of the major challenges facing the construction industry in developing countries like Iraq. Therefore, the authors try to find the important factors that cause abandoned construction projects in Iraq through this study and organize them by their importance to reduce and solve the causes that can lead to this problem. It also helps to reduce construction waste and to improve the safety of the environment. The authors conclude as follows, based on the results:

1. The important factors of Abandoned Projects were evaluated by different experts, including researchers, owners, consultants, architects, designers, contractors, and engineers.
2. The causes of abandoned Projects related to time, finance, and resources are rank in the first, second, and third positions with a total RII equal to 78, 76.3, and 75.8, respectively.
3. Inappropriate project management, delay in decision making, poor scheduling, challenging security conditions, delay due to lack of materials, corruption in financial, unexpected poor economic conditions, the owner faces financial difficulties, lack of adequate financial analysis, low quality materials, changes in the laws and regulations of the government, political war, corruption. The most important causes favored by consultants, contractors and owners as the key factors in the abandonment of construction projects in Iraq.
4. The lack of professionally in most of the strategy management departments of Iraqi bodies, especially with regard to the financial allocation of resources, as well as the spread of corruption, and lack of transparency and justice.

5. Iraq needs modern and efficient administrative systems and national bodies need to improve the reality of many construction Projects for Iraq are suffering from weakness in the planning and preparation phase.

6. In the future, they recommend the use of smart portfolio management to evaluate abandoned building projects.

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