

## Identify and Diagnose the Causes of Financial Funding using the Root Cause Analysis Technique

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### ABSTRACT

The analysis of the root cause techniques is a reasonable option to be made to assess the root causes of the funding of construction projects. There are a variety of issues related to financing in construction industries in Iraq. The root cause analysis is the impact of security and social conditions on financial funding. Variety tools of root cause analysis have originated from literature, as common methods for the detection of root causes. The purpose of this study was to identify and diagnose causes that lead to obstruction of financial funding in the construction projects in the republic of Iraq from the contractors' point of view and their interaction with a number of variables. The study diagnosed nine causes of financial funding in construction projects in Iraq. They are Pareto Diagram (PD), and the Five Why Analysis. It is found that the reasons (the organization's or the contracting company's reputation, the effect of expertise and skill of the organization or contracting company in obtaining finance & the impact of security and social conditions on the financial funding), came of degree important. In comparison, other reasons came of degree, average important.

**Keywords:** Financial causes · Root cause analysis techniques · Pareto diagram · 5-Why analysis.

### تحديد وتشخيص أسباب التمويل المالي باستخدام تقنية تحليل السبب الجذري

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### الخلاصة

تعتبر تقنيات تحليل السبب الجذري إختيار جيد لاعتماده في تشخيص الأسباب الجذرية للتمويل المالي في المشاريع الانشائية. هناك أنواع مختلفة من المشاكل المتعلقة بالتمويل في قطاع التشييد العراقي. السبب الجذري هو تأثير الظروف الأمنية والاجتماعية على التمويل المالي. ظهرت العديد من أدوات تحليل السبب الجذري من الأدبيات كمقاييس عامة لتحديد الأسباب الجذرية. كشفت هذه الدراسة عن تسعة أسباب للتمويل المالي في مشاريع البناء في جمهورية العراق. التقنيات التي تم استخدامها هي مخطط باريتو، وتقنية 5 لماذا، وقد تم الاستنتاج الى ان الأسباب (سمعة المنظمة أو الشركة المتعاقدة ، وتأثير خبرة ومهارة المنظمة أو الشركة المتعاقدة

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في الحصول على التمويل وتأثير الظروف الامنية والاجتماعية على التمويل المالي) قد جاءت درجة مهم وهي الاكثر اهمية ، في حين جاءت أسباب أخرى بدرجة متوسط الأهمية.  
**الكلمات الرئيسية:** الأسباب المالية · تقنيات تحليل السبب الجذري · مخطط باريتو · تحليل 5-لماذا.

## 1. INTRODUCTION

The construction sector in Iraq is facing a variety of challenges problems in financial funding of construction projects. A number of construction projects have collapsed because of a lot of financial factors and exceeded the expected period of the implementation, As well as a low budget estimate, poor quality of project execution, and other factors (**Al-ageeli and Alzobae, 2016**). The purpose of this study was to identify and diagnose causes that lead to obstruction of financial funding in the construction projects in the republic of Iraq from the contractors' point of view and their interaction with a number of variables. The researcher is trying to use a range of innovative methods in this paper to diagnose problems or obstacles in financial funds and then put forward plans to promote funding for projects. The goals of this study can be summarized, as well as the following:

- (1) Recognizing the financing causes in the construction project.
- (2) Finding the relative importance of the factors of the construction project financing causes.
- (3) Providing logical solutions that help to provide financing supports in construction projects in Iraq.
- (4) Finally, the significance could be summarized in this research, as follows:
  - (1) Providing a true perspective for stakeholders (project managers, contractors, vendors, and owners) that are facing a problem in the application of funding support for contract companies and construction projects and;
  - (2) Attempting to resolve the obstacles and reduce the problem,
  - (3) Allowing the decision-makers in the contract companies to receive maximum funding help.
  - (4) Enabling researchers to carry out additional studies and to align them with the results of the present study.

## 2. RESEARCH PROBLEM

The following points are summarized based on the literature review and some interviews, with experts:

- (1) Most causes of contractor failure are financial factors. If the financing cost exceeds the credit limit, the profit of the project may be reducing.
- (2) To make sure that the contractor performed the project properly, financing required by contractors throughout the project because, in many projects, the owner withholds retainage. Therefore, the contractor will face financial problems and encounter deficits.
- (3) Financial factors not only affect cash flow but also may influence the interactions among the participant of the project.
- (4) It is very important to properly estimate the financing cost based on the project's cash flow forecast in place of assuming the percentage of the construction cost.
- (5) The construction sector in Iraq faces many problems related to financing funding and a lack of knowing the optimal funding methods for projects.



### **3. DIAGNOSIS OF THE ROOT CAUSES FOR OBSTACLES OF FINANCIAL FUNDING IN IRAQ**

For the purpose of defining and evaluating the Root Causes for obstacles of financial funding in Iraq, and discuss the problems that prevent alternative funding from being used in the public institution's projects (Ministry, of Construction, Housing, and public municipalities) in Iraq, a study survey methodology has been introduced. This method has been used because of its benefits of a fast approach to collect data.

Collecting information and data related to financing problems is a complicated task, such as the property of a construction company information. In this study in order to investigate the relationship between the funding of the construction project and the obstacles to implementation, the researcher adopted an approach of brainstorming and selected five experts who were chosen based on their expertise and interest in the field of finance and economics. Approach to brainstorm, it deduced that the major financing obstacles in the Iraqi construction sector are shown in **Table1**.

### **4. RESEARCH IMPORTANCE**

The value of this research can be summarized as follows:

- (1) When financing construction projects, some obstacles and problems occur during financial funding. This research highlights to determine and overcome these problems and obstacles and reduce them.
- (2) Allow lecturers, authors, and educators to collaborate with other researchers and to align them with the findings of the present study.
- (3) The limited amount of research in the financial funding area for construction projects and the need for a better method of financing the construction project is the impetus for the study.

### **5. RESEARCH LIMITS**

This work was limited to the following limits:

- (1) The limits of time: data collection was introduced in 2019.
- (2) Limits of spatial: the study was carried out on a construction project in Iraq.

### **6. DIAGNOSIS OF THE ROOT CAUSES FOR OBSTACLES OF FINANCIAL FUNDING IN IRAQ**

For the purpose of recognition, the root causes of challenges of financial funding in Iraq are evaluated, and the issues that prohibit alternative financing from being used by public institutions in building projects (Ministry of Construction, Housing, and municipalities) in Iraq were discussed, a study survey methodology has been introduced. This method has been used as a result of its advantages of a fast approach to data collection.

Collecting information and data related to funding problems is a complicated task. Such information is the property of each construction company. In this study, To investigate the relationship between the funding of the construction project and the obstacles to implementation, the researcher followed an approach of brainstorm and selected five experts who were chosen on the basis of their expertise and interest in the field of financing and economics. By the



brainstorming approach, it deduced that the major financing Obstacles in the Iraqi construction sector are illustrated in Table1.

To measure the analysis of data and determine the arithmetic mean, each of the five groups of available responses was followed by a hypothetical Weight, Value (WV). The mid-range of each class in the five classes was the weight value (WV) in the decimal scale, as shown in **Table 2**.

**Table 1.** Financing obstacles in the construction sector in Iraq.

Causes	Symbols
1- Different sources of financial funding used by the organization leads to the deviation of financing costs.	P1
2- The organization's or the contracting company's reputation.	P2
3- The impact of indirect cost on project's main funding source.	P3
4- Method of Financing the construction project on the organization's profits.	P4
5- The impact of the organization's demand for bank loans weakens its competitive power compared to other organizations or contracting companies to win the tender.	P5
6- The impact of financial risks on construction projects financed by bank loan.	P6
7- Effect of expertise and skill of the organization or contracting company in obtaining finance.	P7
8- Advisory role in obtaining financial funding for construction projects in organization or contracting company.	P8
9- The impact of security and social conditions on the financial funding.	P9



Table 2. Descriptive Frequencies Weight Value.

Descriptive Frequency	Class Interval	Weight Value (WV)
Non Important	0-20	10
Rarely Important	20-40	30
Average importance	40-60	50
Important	60-80	70
Very Important	80-100	90

The Arithmetic Mean (AM) is:

$$AM = \frac{\sum (\text{Number of frequencies} * \text{Weighted Value for the particular choice})}{\text{Total number of the answers}} \dots (1)$$

The last step is to evaluate the results obtained by comparing them in the expected intervals. In this way, it is inferred from the example that most of the findings are within the range (40 – 60) (i.e., average importance), except for variable 2,7, and 9 within the interval (60-80) (i.e. Important).

The number of frequencies, the arithmetic mean (AM), and the degree of effect are shown in **Table 3**.

Upon gathering the opinions of the study sample, all the reasons for this came from the degree (Average Importance) except variable no. 2,7 and 9 (the organization's or the contracting company's reputation, the effect of expertise and skill of the organization or contracting company in obtaining finance and the impact of security and social conditions on the financial funding), which is important. The obstacles that might affect the financing in Iraq are shown in **Fig. 1**, Where variables are grouped on the basis of the value of each variable.

### 7. ROOT CAUSE ANALYSIS TECHNIQUE

Recognizing the root causes of the problem is important too. Root causes have been established if there is a clear understanding of the process, together with the expert use of advanced tools and techniques. This research attempts to bridge the gap and using innovative tools and techniques to illustrate how to issue solving can be achieved more efficiently. This analysis is very useful and perhaps even more effective. The methodology applies not only to engineering but also to other disciplines (**Williams, 2001**).

There are a lot of creative thought tools. The researcher will focus on two of these: " Pareto diagrams and 5 Whys technique" (**Al-Zwainy and Mezher, 2018**).



**Table3.** The frequencies number and Arithmetic Mean for Obstacles

Variable	Observed Frequency					AM	The degree of effect
	10	30	50	70	90		
1	6	6	18	34	6	58	Average Importance
2	15	0	15	15	25	60	Important
3	6	28	7	29	0	47	Average Importance
4	17	3	18	25	7	51	Average Importance
5	15	0	33	16	6	49	Average Importance
6	7	19	11	20	13	54	Average Importance
7	9	3	9	37	15	65	Important
8	23	0	17	12	18	51	Average Importance
9	0	3	3	38	26	75	Important

### 7.1 "Pareto Diagram"

- (1) Pareto is a method used to focus attention on the major problem areas (**Kassir, 2015**). The Pareto principle was named after the Vilfredo Pareto Italian economist in the 19th-century. It is that very few causes normally account for a large percentage of total cases (e.g., injuries, faults, and problems). The aim is to identify cases related to importance degree, and to highlight the resolution of the most important, leaving the less relevant (**Stevenson, 2005**).
- (2) A Pareto analysis basic concept includes the data ranking in descending order. A cumulative curve could be used in a diagram with or without a cumulative curve that defines the proportion of bars that is vertical in the Pareto diagram. (**Abdelhamid and Everett, 2000**).
- (3) Pareto analysis is a systematic method used to classify improvements that result in the most significant benefit (**Vorley, 2008**).

In the area of construction project financing, the researcher first used the Pareto diagram to determine the causes of the difference in nine factors. **Table3** indicates the relative importance (RI percent) of the main causes of the funding of Iraqi construction projects, where the cause no.9 (The impact of security and social conditions on the financial funding) has the highest relative importance 14.7%. In comparison, cause no.3 (The impact of indirect cost on the project's main funding source) has lower relative importance 9.21%. **Fig. 2** explain the diagram of Pareto that was prepared on the basis of the details in **Table 5**.

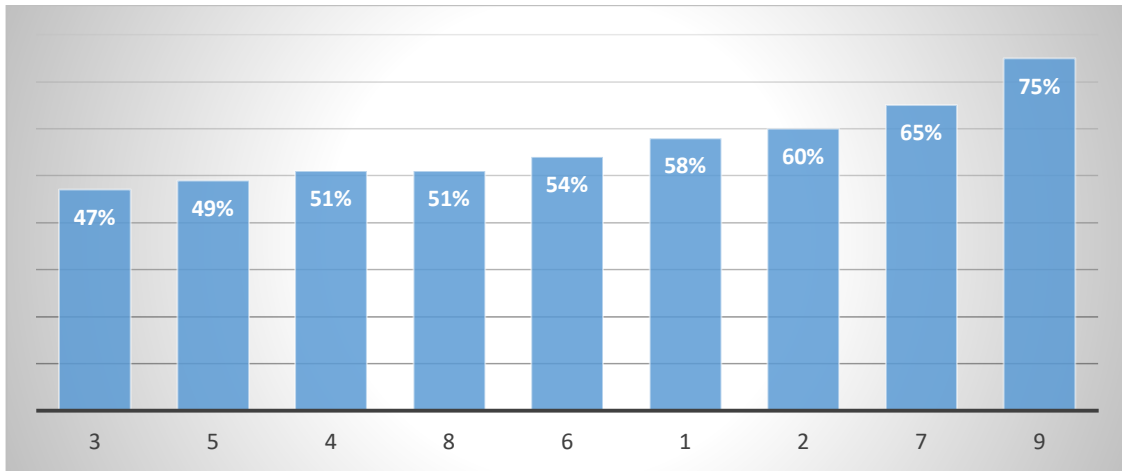


Figure 1. Obstacles that might affect construction project financing in Iraq (Researcher).

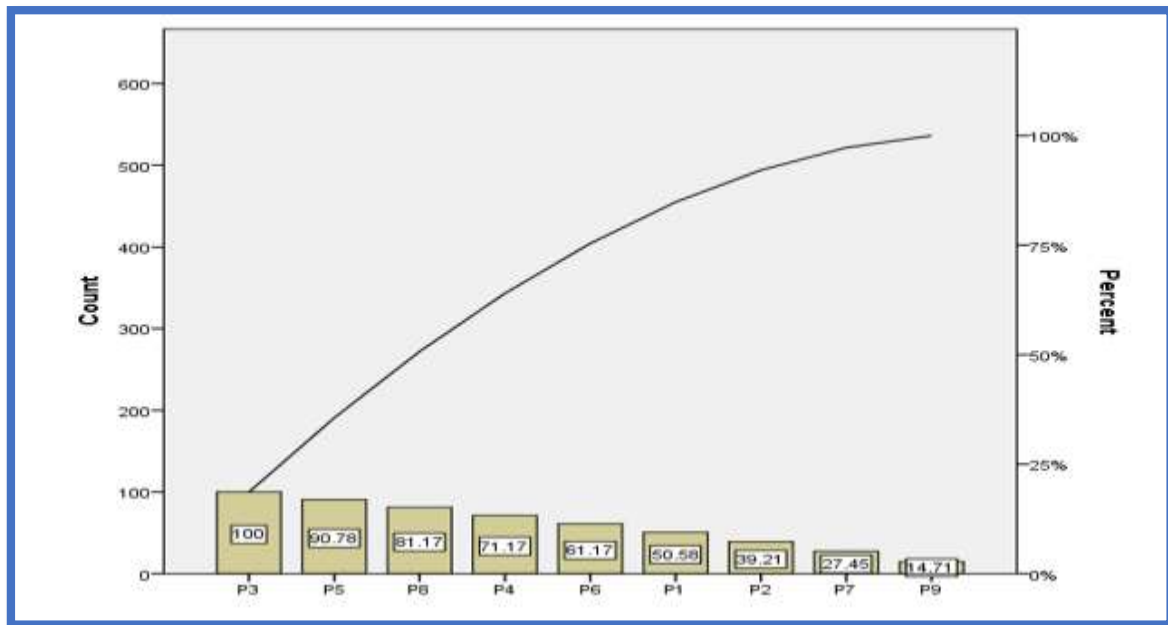


Figure 2. Pareto Diagram (Researcher).



**Table 4.** "Main Causes Weights and Relative Importance and Rank".

No.	Main Causes	Average Weight of Main Causes	Relative Importance RI%	Rank
1	P1	58	11.37	4 <sup>th</sup>
2	P2	60	11.76	3 <sup>rd</sup>
3	P3	47	9.22	9 <sup>th</sup>
4	P4	51	10	6 <sup>th</sup>
5	P5	49	9.61	8 <sup>th</sup>
6	P6	54	10.59	5 <sup>th</sup>
7	P7	65	12.74	2 <sup>nd</sup>
8	P8	51	10	7 <sup>th</sup>
9	P9	75	14.71	1 <sup>st</sup>
		510	100%	

**7.2 Five whys technique**

"Root Cause Analysis" (RCA); is the approach used to classify causal factors. By means of designing a coordinated approach with techniques to provide consent to the identification and resolution of problems. Root cause analysis is a tool that helps determine the root causes of problems by groups or individuals. It is a step-by-step process that leads to the discovery of faults or root causes. The RCA inquiry follows the cause and effect path back to the root cause of the end failure (**Abdelhamid and Everett, 2000**).

It's one of a lot of brainstorming strategies asked why "5 times repeatedly " to assist in identifying the root cause of the problem. An alternative solution, which is related to the root cause, comes out every time if the problem is continuously discussed, then ask why it can be continued to find an acceptable solution. Five is a kind of arbitrary figure. The theory means, after asking "Why" five times, one is likely to come to the root cause (**Oberlender Garold, 2000**).

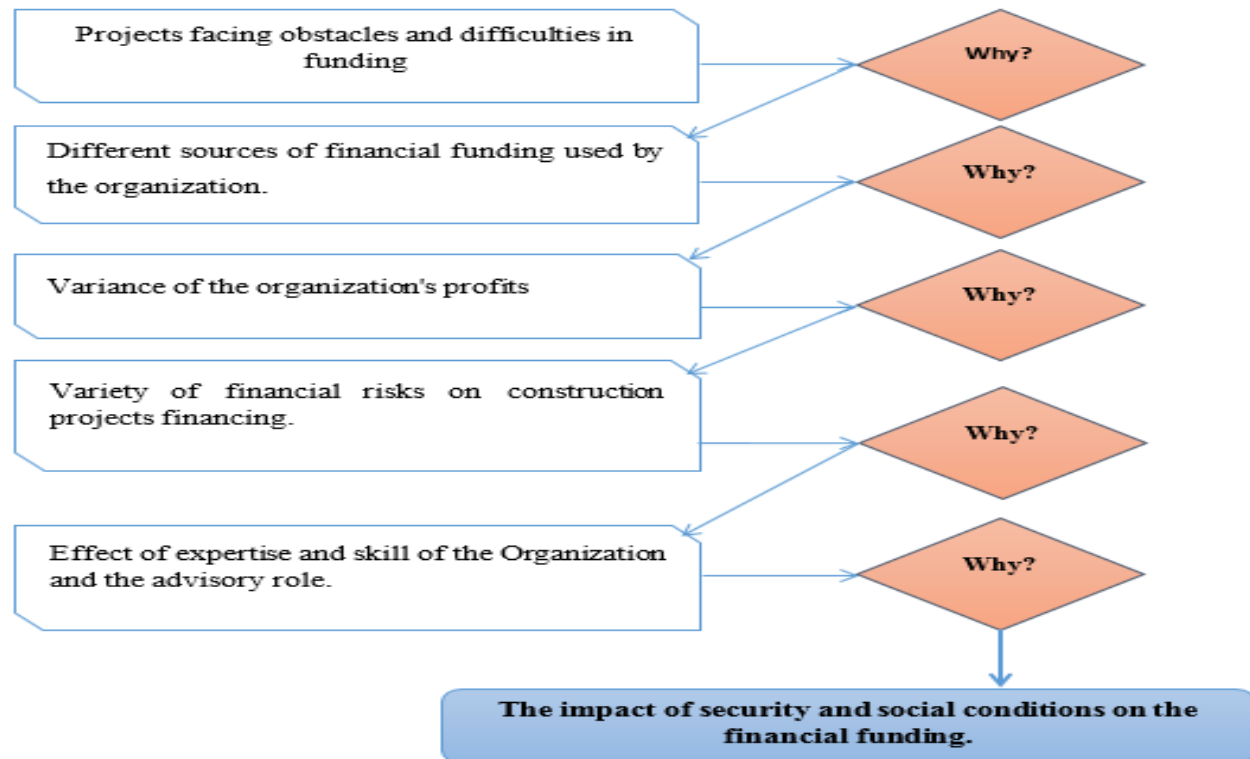
"5 Why research methodology could be used independently or as part of the fishbone diagram. The fishbone Diagram help to analyze all possible or actual factors that result in a failure of the construction projects in the Iraqi construction sector. Once all inputs have been set up on the fishbone, the 5 Whys strategy can be used for drilling down to the root cause. The researcher used the five Why s method because it helps to establish the relationship between the root causes of the problem and define the root cause of the problem. However, this method is simple and very easy to complete with no need for statistical analysis.

In this study, the researcher used 5 Whys technique to define the root causes of financing problems in the Iraqi construction sector, and to solve the problems as follows:

- (1) The specific problem is written down, formalized the problem, and described it completely. The impact of security and social conditions on financial funding.



- (2) Ask Why there is a problem (Projects facing obstacles and difficulties in funding) and write down the answer below the problem. The reasons that led to financing obstacles in the Iraqi construction sector and the most important of these causes are the different sources of financial funding used by the organization.
- (3) If the root cause of the problem that was written in step1, does not explain by the answer given, ask Why again and write down the answer, as shown in Figure3.
- (4) Go back to Step 3 until the team decides that the root cause of the problem is found. Once, this may take less or more than five Whys. Finally, the Root Cause is the impact of security and social conditions on financial funding.



**Figure 3.** Root Cause Analysis Technique (Researcher).

## 8. CONCLUSIONS

Major findings can be summarized as follows:

- (1) To diagnose the causes of the financing of construction projects in Iraq, the root cause was used in this study. Root cause identification is a necessary step in the improvement and control of financial funding. "Pareto diagram (PD), and the 5-Why analysis" used in this study to diagnose the causes of financial funding in a construction project in Iraq.
- (2) There are nine causes related to financing in the construction sector.



- (3) The Pareto analysis showed that the reasons (the organization's or the contracting company's reputation, the effect of expertise and skill of the organization or contracting company in obtaining finance and the impact of security and social conditions on the financial funding), came of degree important. In contrast, other reasons came of degree average important.
- (4) The findings of Pareto were further filtered by applying five Why research. This study concluded that the effect of security and social conditions on financial financing is a root cause.

## NOMENCLATURE

<b>RCA</b>	Root causes analysis
<b>PD</b>	Pareto Diagram

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