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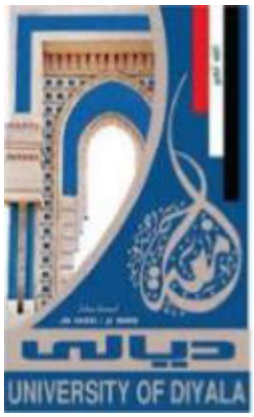


# Managing the Completion of Abandoned Construction Projects

**A Thesis Submitted to the Council of Engineering University of Diyala in Partial Fulfillment of the Requirements for the Degree of Master of Science in Civil Engineering**

**By**
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**BSC.Civil Engineering, 2016**

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**2021 A.D** **IRAQ** **1442 A.H**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿ قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ ﴾

صدق الله العلي العظيم

سورة البقرة، الآية: 32

## SUPERVISOR CERTIFICATION

We certify that the thesis entitled "**Managing the Completion of Abandoned Construction Projects"** presented by **"Huda yaseen khudhair**" was prepared under our supervision in the Civil Engineering Department, The University of Diyala, in partial fulfillment of the Requirement for the Degree of Master of Science in Civil Engineering

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**According to (1448/ 30/5/2021)**
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In view of the available recommendation, we forward this thesis for debate by the Examining Committee.

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**Date: / /2021**

## SCIENTIFIC AMENDMENT

I certify that this thesis entitled **"Managing the Completion of Abandoned Construction Projects'' presented by "Huda yaseen khudhaire"** has been evaluated scientifically, therefore, it is suitable for debate by examining committee.

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# COMMITTEE CERTIFICATION

We certify that we have read the thesis titled **(Managing the Completion of Abandoned Construction Projects)** and we have examined the student **(Huda yaseen khudhair)** in its content and what is related with it, and in our opinion, it is adequate as a thesis for the degree of Master of Science in Civil Engineering.

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**Prof. Dr. Hafeth Ibrahim Naji, (Supervisor)** **……**

**Asst. Prof. Nidal A.Jasim** **……**

**According to (1448/ 30/5/2021)**

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**Prof. Dr. Khattab S. Abdul Razzaq…… (Head of Department)**

**The thesis was ratified at the Council of College of Engineering / University of Diyala.**

**Signature……...**

**Name: Prof. Dr. Anees A.Khadom**

**Dean of College of Engineering / University of Diyala**

**Date:**

# DEDICATION

**Modestly, This Work is Dedicated to;**

**My guardian angel in life, who is the meaning of love, tenderness, and dedication, who is the secret of my existence, who was her prayer the secret of my success**

**My Dear Mother's;**

**Dewy flowers on which I depend, and with their presence, I have acquired boundless strength and love,**

**My Brothers and Sisters;**

**In conclusion, I do not forget the one who proudly carried his name and missed his presence with me, and I miss him with all my emotions, my father (may God have mercy on him)**

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First and foremost, all sincere thanks are to Almighty Allah for his generosity and kindness without which this work could not have seen.

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In this opportunity, I would like to thanks are also extended to the Dean of the College of Engineering as well as the teaching staff of the College of Engineering, University of Diyala, Dept. of civil engineering.

I would like to thanks Engr. Maan Hattem for his help me by providing the information required for the study to be performed. Also, I owe a very special thanks to my friends and colleagues Engr. Balqees Mohi Nsaif for their sincere encouragement and help.

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# ABSTRACT

## Managing the Completion of Abandoned Construction Projects

**By**

**Huda yaseen khudhaire**

**Supervised by: Prof. Dr. Hafeth Ibrahim Naji**

Completing abandoned projects is an important pillar of supporting the national economy by taking advantage of the basic services provided by these projects to citizens. Despite the interest of the countries of the world in completing the abandoned projects, this issue did not receive the required attention by the higher administrations in most ministries, as the completion of these projects is still limited and ineffective.

This study aims to identify the most important factors that led to the abandonment of construction projects in Iraq and then determine the most important ones represented by financial, technical, and administrative reasons, and then proposing an administrative system that adopts decision-making techniques (MCDM) with Building Information Modeling (BIM) in its construction concerned with updating the administrative, financing and technical aspects of abandoned projects in a manner that suits the period of time in which the project will be completed., by determining the optimal alternative to Public-Private Partnership (PPP) contracts to finance them by making marital comparisons between standards and alternatives depending on the analytical network process (ANP ) technology and then updating the bill of quantities for abandoned projects by choosing The perfect alternative to its paragraphs based on the use of analytical hierarchy process (AHP) with BIM.

In order to achieve the objectives of the study, its data were collected from literature and previous studies related to the topic of abandoned projects and from personal interviews with specialists and then depended on a methodology that consists of two parts from the questionnaire and the case study. The results of the questionnaire were analyzed and evaluated using the Statistical Package for Social Sciences (IBM SPSSv.26) as well as the relative importance index.

The results of the data analysis showed that one of the most important factors that lead to the abandonment of projects in Iraq is related to the financial aspect, the administrative aspect, and the technical aspect, and it obtained relative importance of 81.6, 79.4, and 78.2, respectively. As for updating the financing side of abandoned projects, it turns out, depending on the

application of ANP technology, that The best type of contract that meets all the criteria for the case study and according to the percentage of completion, the nature of the project and its type is a Build-Own-Operate (BOO) contract with a weight equal to 0.445. Finally, with regard to updating the bill of quantities for abandoned projects, by choosing the best alternative for them, based on the techniques of AHP and BIM, the criteria for availability of material and modernity were of the greatest importance compared to other standards.

The results of the evaluation questionnaire of the proposed system showed that it achieves the purpose for which it was set, has efficiency and ease when used, and contributes to giving appropriate alternative solutions in addressing the causes of project abandonment as well as updating them.

Finally, the researcher reached a set of conclusions for various aspects of the topic, including the lack of a clear administrative system to manage the completion of abandoned projects, in addition to the weakness of the data update system used in various aspects. The methods of decision-making and decision-making are among the important methods in making decisions regarding the selection of optimal alternatives, based on criteria that have been defined scientifically and in the financing and technical sides.

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## List of Abbreviation and Symbols

| Abbreviations | Explanation |
|---|---|
| SPSS | Statistical Package for Social Sciences |
| PPP | public-private partnerships |
| BOT | Build-Operate-Transfer |
| BOOT | Build-Own-Operate-Transfer |
| DBFO | Design-Build-Finance-Operate |
| BOO | Build-Own-Operate |
| MCDM | The Concept of Multi-Criteria Decision Making |
| AHP | Analytical Hierarchy Process |
| ANP | Analytical Network Process |
| BIM | Building Information Modeling |
| AEC | Architecture, engineering and construction |
| CAD | Computer aided design |
| BN | Bayesian Network |
| RII | Relative Importance Index |
| CR | consistency ratio |
| GBS | Green Building Studio |

# Chapter One

# Introduction

## 1.1General

This chapter provides a general introduction to the research background, the research problem, and justifications, with an explanation of the research aim and objectives. In addition, research limitations and scope, research methodology, and previous studies are discussed.

The construction sector plays a fundamental role in the renaissance and advancement of nations, as the outputs of this sector are an important means for the advancement and civilization of states, and see this clearly through the great importance of the governments of countries giving this sector the great importance in their political programs and the high percentages they allocate in their countries' budgets. Therefore, governments are keen to complete projects, especially abandoned ones, as they require effort and small sums compared to new projects.

The commitment of the governments of the countries of the world towards their citizens in terms of providing basic services makes them in a great challenge to complete abandoned projects to get benefit from them in this aspect, so there is a need for a scientific methodology in managing the completion of these projects that is keen on updating the financial, technical and administrative aspects of them in line with the requirements of the time period that the projects there in, the state of the economy and the material capabilities of the state will be completed in a manner consistent with the changes taking place in the construction industry.

## 1.2 Research Problem and Justifications

The Problem and justifications for the research can be summarized as follows:

1. The construction sector in Iraq has faced a number of problems associated with the high number of incomplete construction projects that have negatively affected the performance of the construction project environment, which requires an engineering administrative system that deals with these problems.
2. There is a weakness in the optimal selection of financing methods for abandoned projects through partnership contracts between the public and private sectors, which leads to an inappropriate option for the contract and thus not making the best use of the financing process for these projects.
3. To reach the best methods and the latest alternatives for abandoned projects by updating the financing, technical and administrative aspects of them, based on modern administrative and engineering techniques that give accurate results

**1.3 Research Hypothesis**

Based on the justification for the study, the research hypothesis emerged as follows:

There is a need to find an appropriate method based on scientific techniques that aid in decision-making to manage the completion of abandoned construction projects based on multiple decision-making criteria and BIM technology in line with the requirements and strategy of the business owner and considering projects.

H0: There is the need for a scientific methodology that adopts decision-making and BIM technique to advance the reality of completing abandoned projects

H1: There is no need for a scientific methodology that relies on decision-making and BIM technique to advance the reality of completing abandoned projects.

## 1.4 Research Aim and Objective

This research aims to study the possibility of treating the problems of abandonment of construction projects in Iraq by using effective management techniques through research objectives as follows:

1. Determine the causes for abandoning construction projects for the purpose of proposing criteria and alternatives to address the most important of them.
2. Adopting decision-making techniques with the BIM in proposing the engineering administrative system, which is concerned with updating the administrative, financing, and technical aspects of abandoned projects through:

a) Updating the financing aspect of abandoned projects by determining the optimal alternative to partnership contracts between the public and private sectors to finance them by making marital comparisons between standards and alternatives depending on the ANP technique.

b) Updating the bill of quantities for abandoned projects by choosing the best alternative for their activities, depending on the use of the AHP technique with BIM.

## 1.5 Research limitations and scope

The scope of this study and its limitations include:

1. case study: selecting AL- Razi complex in Governorate of Diyala as a case study, AL- Razi complex consists of a variety of buildings.
2. This study applied in the construction stage
3. Temporal limitation: the research period is only for one year from 2019 to 2020.

## 1.6 Research Methodology

The research methodology consists of two stages, as shown in Figure (1.2):

### A-Theoretical study

A literature review is performed for previous studies on the scope of the study, including books, journals, websites, and thesis. The number of projects abandoned in Iraq was also calculated on the basis of statistics from the Ministry of Planning.

### B-Practical Study

The practical part of the research includes:

1. A case study is selected and data collection that includes (CAD Drawings and bill of quantity).
2. Design of the questionnaire, which involves the planning of the key sections and the items and questions of each section, following the completion of the draft questionnaire as a primary form through the following steps:
3. Pilot Study: Includes a miniature version of a comprehensive study verify the reliability and validity of the questionnaire through statistical analysis of pilot study data
   a) The questionnaire was distributed to the whole sample.
   b) After that, the data of the questionnaire was prepared and arranged for the statistical analysis, included several tests using (IBM SPSSv.26).
4. Proposed management model for the completion of abandoned construction projects that are keen to update the financial, technical, and administrative aspects (using ANP technology to evaluate the appropriate type of PPP contract and using AHP and BIM Technology by using Revit 2018 to retrofitting abandoned projects).
5. Prepare a questionnaire for the model evaluation.

6. Finally, conclusions and recommendations reached by the researcher are discussed.

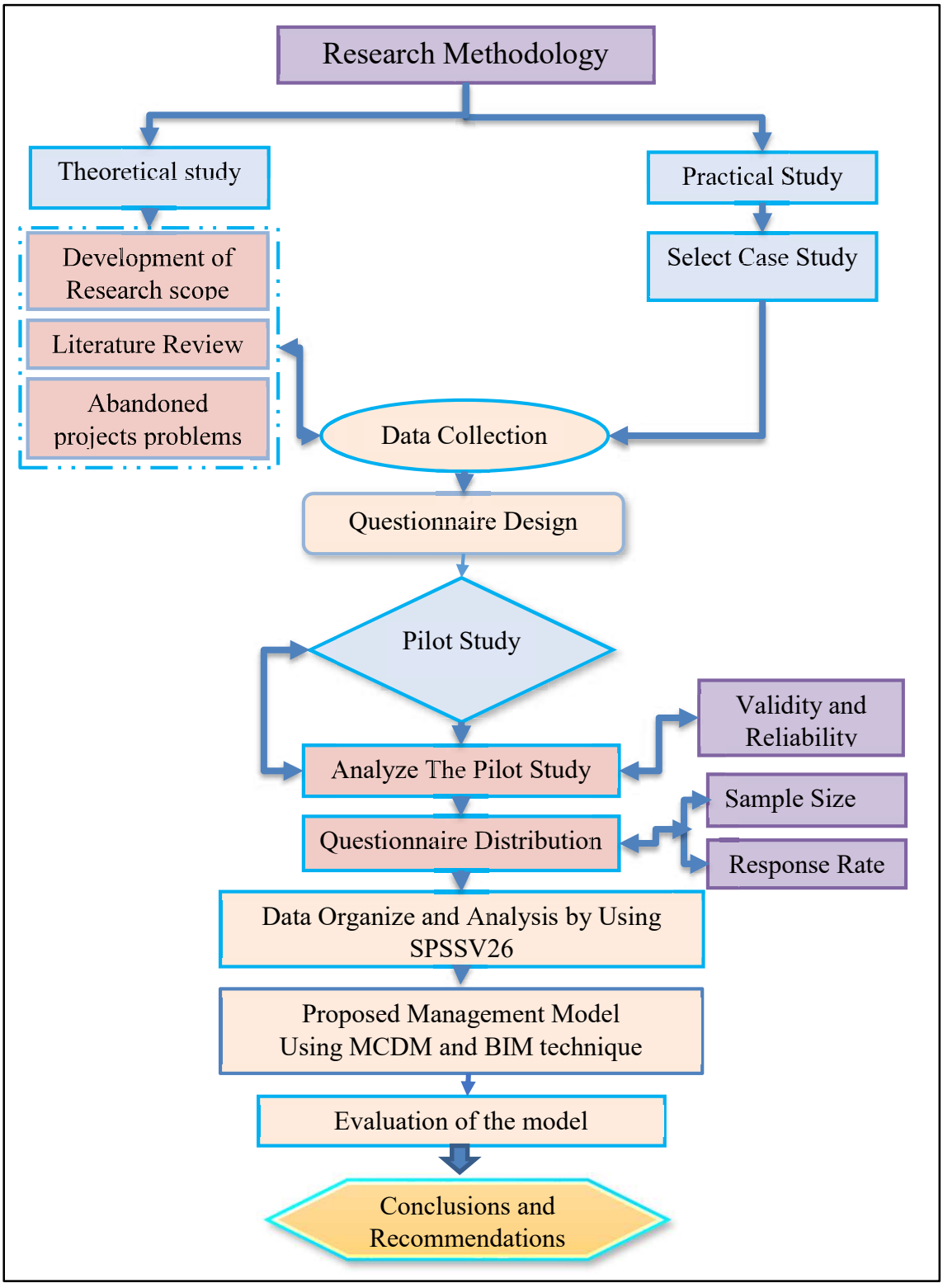


Figure (1-1): Research Methodology (Researcher).

## 1.7 Research Structure

The research is divided into six chapters: a brief explanation of each chapter is below.

### Chapter One: Introduction

It clarifies the background of the research, research problem and justifications, research aim, and objectives, research hypothesis, research limitation, and scope, explanation of the research methodology as well as explain previous studies

### Chapter Two: literature Review

This chapter introduces the three parts. The general overview of the first part (abandoned projects) in terms of (definition of the abandoned projects and explaining the causes of projects abandoned, as well as discusses the negative effects and challenges of abandoned projects). The second part (strategies and methods) to overcome the problems faced abandoned projects includes the concept of PPP, types of PPP contracts, as well as PPP advantages and disadvantages, barriers of Implementation PPP approach, effective criteria for choosing PPP contracts, and government actions to encourage the use of PPP, in addition, the concept of MCDM, techniques of MCDM, and finally its management and technical problems. The third part is the (retrofit projects and BIM) include its retrofitting of abandoned Projects, BIM definition according to each researcher, as well as utilizing BIM in retrofitting Projects, in addition, integration BIM techniques, and MCDM method, and finally selection criteria for retrofitting abandoned projects.

### Chapter Three: Research Methodology

This chapter focuses on several points, namely, introduction, data collection, sample size, population, questionnaire design and distribution, analysis of the questionnaire using the IBM SPSS-V26 program, finding the reliability of the questionnaire, and finding weights using the relative important index method

**Chapter Four: Proposed Management Model**

It discusses in detail the components of the proposed management model for the completion of abandoned construction projects. It covers organizing of specialized questionnaire from identity the priorities of criteria and alternatives. also cover using analytical network process(ANP) in selecting the best PPP model to fund abandoned projects and also using the multi-criteria decision-making (MCDM) and BIM techniques for the purpose of retrofitting the bill of quantities for an abandoned project.

**Chapter Five: Conclusions & Recommendations**

This chapter illustrates the major conclusions and important recommendations, in addition to suggested future studies.

## 1.8 Previous Studies

The previous studies are summarized in the table (1-1)

Table (1.1): Review of previous research

| No. | Researcher and Country | The Work |
|---|---|---|
| **Abandoned Construction Project** | | |
| **1** | Dahlan (2011) **Malaysia** | In this study, the researcher aims to investigate the causes of abandoned projects. The results of this research showed that are many causes for the abandonment of the project as follows; financial problems of developers, Site related problems, mismanagement, disagreements, and disputes among project investors, as well as the lack of legal provisions to protect the interests of customers, can be an important reason for project abandonment. Financial problems may happen due to poor management or unfavorable economic conditions and lack of proper feasibility study leading to the financial problem. |
| **2** | Lundin et al., (2015) Ghana | In this study, the researcher aims to study the causes and effects of abandoned housing projects in Ghana by conducting questionnaires and personal interviews with experts. The results indicate that the most significant factors that cause abandoned housing are the delays in the payments equal to 30%, inflation equal to 25%, increased costs for materials equal to 23%, changes orders, and poor finance equal to 22%, due to inefficiency of some companies professionally and their insufficient finance to complete the work. |
| **3** | Amade et al., (2015) | The goal of this study was to identify possible elements that could mitigate or avoid construction project's failure |

| | | |
|---|---|---|
| | Nigeria | and abandonment. The findings of the study indicate that 9 out of 35 factors were key to the failure and abandonment of Nigeria's construction projects. Factors include comprehensive and detailed design by contractors, efficient control, knowing the project mission, project manager's technical expertise, top management support, political risks, successful procurement process, provision of appropriate customer financing, and effective contact and information management by the design team. Poor planning is one of the causes of abandoned projects and it may happen due to the lack of experience of Project personnel |
| **4** | Tijan & Ajagbe, ( 2016) **Malaysia** | The aim of this study was to investigate the causes and effects of abandonment of construction projects. A structured questionnaire was administered with a Likert Scale design approach. A total of 49 responses were obtained to provide a return rate of 70%. Data analysis was carried out using a statistical formula to calculate the relative importance index (RII). The results show that the most significant factors leading to the abandonment of construction include: inadequate allocation of the budget, payment delays, loss of investment/customer/owner, inaccurate project planning and designs, etc. Therefore the key effects of building projects were identified: loss of structural integrity, visual defect in the surroundings/project site, pollution, population marginalization |
| **5** | | In this study, the researcher aims to investigate the risks of abandonment in construction projects caused by Sub- |

| | | |
|---|---|---|
| | Ayudhya and Kunishima (2017)<br><br>(Thailand) | contractors by conducting questionnaires and personal interviews with experts. The results indicate that the most significant factors causing abandonment in construction are the delays in the payments, the financial challenges the owner faces, financial difficulties the contractor faces, incompetent contractors or subcontractors, and political instability. |
| **6** | Adil, Abdulmajid, and Mahdi (2019)<br><br>(Iraq ) | In this study, the researcher aims to classify the most important causes of project abandonment in Iraq by using a questionnaire and personal interviews with experts. SPSS program was used to analyze the questionnaire, where the results of the study of the questionnaire shown that financial corruption, the assigning of work to companies without expertise in this area, the inexperienced contractor, and the absence of legal responsibility are of the highest importance. |
| **7** | Damoah et al. (2019)<br><br>(Ghana) | In this study, the researcher studies the most important problems causing the abandonment of construction projects by administering a questionnaire distributed to construction and implementation industry professionals. The results showed that the most important factors that are political leadership, Poor management, insufficient resources, insufficient documentation, financial, cultural, and external factors. |

In addition, Table (1-2) explains a comparison between the current study and previous studies in terms of (location, software used, brief description about research).

Table (1-2): comparison between current study and previous studies

| | |
|---|---|
| Current study | This study objective to study the cause of abandoned construction projects in Iraq and organize them by their importance to treating the causes that can lead to this problem. In addition to studying the possibility of using effective management techniques in managing the completion of these projects that are keen to update the financial, technical, and administrative aspects of them in line with the requirements of the time stage in which the projects will be completed and the state of the economy and the material capabilities of the state and in line with the changes occurring in the construction industry using MCDM and BIM techniques. |
| previous studies | Previous studies in abandonment construction projects. many researchers in various countries have studied the causes and effects of abandoned projects by conducting questionnaires and personal interviews with experts. In addition, to the lack of studies adopted in conducting Address the problems of abandonment of construction projects. |

## 1.9 Summary

This chapter shows a brief background on abandoned projects and the model of partnership between the public and private sectors, explaining the research problem and its justifications, clarifying the aim and objectives of the research, the research hypothesis, research limits and scope, research methodology, and research guidelines. Finally, a review of previous studies was discussed.