



Republic of Iraq

Ministry of Higher Education and Scientific Research

University of Kerbala

College of Engineering

Civil Engineering Department

**DEVELOPMENT OF MANAGEMENT SYSTEM TO
FEASIBILITY STUDY OF INFRASTRUCTURE PROJECTS**

A Thesis Submitted to the Council of the College of the Engineering/University of
Kerbala in Partial Fulfillment of the Requirements for the Master Degree in
Infrastructure Engineering

Written By:

Zahraa AbdulRidha Joudah

Supervised By:

Assist. Prof. Dr. Mohammed Neamah Ahmed

Assist. Prof. Dr. Hussein Ali Mohammed

December 2022

Jamadi Al-Oula 1444



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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

مِنْ عَمَلٍ صَالِحٍ مَنْ لَبَّ وَأَقْبَلَ وَهُوَ يُؤْمِنُ فَالْحَرِيمَةُ حَمِيمَةٌ ط

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صدق الله العلي العظيم


سورة النحل

الآية (٩٧)

EXAMINATION COMMITTEE CERTIFICATION

We certify that we have read the thesis entitled "Development of Management System to Feasibility Study of Infrastructure Projects" and as an examining committee, we examined the student "Zahraa AbdulRidha Joudah" in its content and in what is connected with it and that in our opinion it is adequate as a thesis for the degree of Master of Science in Civil Engineering.

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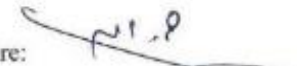
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Linguistic Certificate

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Date 28/12/2022

Abstract

Civil and municipal infrastructure are all projects that are linked to society and the economy. Investment in them is very important, whether they are feasible or not. It is necessary to conduct accurate and intensive studies for these vital projects. This study aims to facilitate the feasibility study process and ease of access to information. It contains a series of detailed studies depending on the literature review in addition to conducting interviews with experts and specialists to propose a detailed framework for infrastructure projects. After that, a questionnaire was designed to determine the relative importance of each variable in the study to support the results by using the SPSS program. Then the development of the computer program depends on the results of the management system steps and supportive questionnaire by using visual basic.Net language and Access database. The program was tested by applying a case study for a private university, where data was used and commissioned to establish the university and find out the feasibility of the project by using the computer program. It was found through the field survey and personal interviews of the departments concerned with infrastructure projects that feasibility studies are sometimes overlooked in infrastructure projects in Iraq. There is abuse in use, as it is ignored misuse of feasibility studies .This in turn leads to cost and time overruns and environmental impact. Negatively impact the time and cost of the project, resulting in increasing the time and the cost of the project. If a feasibility study is prepared for the project, it will be preliminary only, without addressing the detailed studies. Through a field survey and a questionnaire that relied entirely on experienced engineers in the design, and follow-up divisions in the departments of infrastructure projects, the efficiency of the proposed administrative system was deduced in

terms of the importance of the proposed steps in it for all types of the feasibility study. The researcher recommends paying attention to the subject of the feasibility study, especially for infrastructure projects, as they are giant projects that require a thorough study before their establishment. Moreover, knowledge of the advantages and disadvantages of the project in all respects, and the necessity of conducting detailed studies for them. In such projects it is not sufficient to conduct a preliminary study of the project, but rather extensive detailed studies. Work on developing a project evaluation and selection system by raising the efficiency of evaluation and selection methods and improving information systems associated with it and interest in providing expertise and specialists in this field.

Undertaking

I certify that research work titled “**Development of Management System to Feasibility Study of Infrastructure Projects**” is my own work. The work has not been presented elsewhere for assessment. Where material has been used from other sources it has been properly acknowledged / referred.

Signature: 

Zahraa AbdulRidha Joudah

Date: 29 / 12 / 2022

Dedication

To my parents..... in honor and respect

To my husband..... faithfulness and loyalty

To my brother and sisters..... With love and
appreciation

To my dear daughter (Amina)..... Wishing her a
prosperous future

To my little baby (Malk) who was next to my heart while
writing my thesis and now she is in my hands...

To everyone who stood by my side, my colleagues.....

In acknowledgment of all of them

To Dr. Muhammad Neamah and Dr. Hussein Ali.... our
gratitude and pride

I dedicate this modest effort

Signature:



Zahraa AbdulRidha Joudah

Date: 29 / 12 / 2022

Acknowledgments

God praise and thanks are due to you as it should be to the majesty of your face and the greatness of your authority and the weight of your throne for what you have bestowed upon me, and prayers and peace be upon our master and our honorable messenger Muhammad (peace be upon him) and his family and companions all and after...

As I finish this thesis, I cannot help but extend my sincere thanks and appreciation to Dr. (Mohamed Neamah Ahmed) and to Dr. (Hussien Ali Al-Hammami) who supervised this research, praising them for their great humility and scientific method in dealing with the researcher, and for their loyalty to what helped me with their scientific effort, sincere guidance and valuable observations for me throughout the period of preparing the research. They have all my respect and appreciation.

I also would like to thank and my gratitude's extend to the honorable professors, chairman and members of the discussion committee, for accepting to discuss my thesis and the recommendations, advice and scientific observations they gave that would support this thesis, evaluate it, put it on the right track and show it appropriately.

Furthermore, I would like to thank the administration of the College of Engineering and the Civil Department at the University of Karbala.

My family deserves a big thank and respect for their support and help in my study period, my loving husband, and my precious daughter.

My special thanks extends to all my colleagues in master's course in general and particularly to my partner (Ilham Ibrahim Abdel Rasoul , Howaiyda Faiz Kadhem, Huda Mohammad Hassan) for their support during the writing of my thesis.

In the end, I ask God Almighty to protect everyone and those who helped me show my thesis as it is.

To God be the glory

Signature: 

Zahraa AbdulRidha Joudah

Date: 29 / 12 / 2022

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List of Abbreviations

BOT	Building, Operating , Transferring
IRR	Internal Rate of Return
LERD	Local and Regional Economic Development
LED	Local Economic Development
NPV	Net Present Value
POV	Point of vulnerability
PPP	Public-Private Partnership
ROI	Return On Investment
UNIDO	United Nations Industrial Development Organization

List of Symbols

C_0	Total initial investment costs
CF_t	Net cash inflow-outflows during a single period t .
i	Discount rate or return that could be earned in an alternative investment
t	Number of time periods.
W	Weighting that is assigned to each variable by the respondent.
A	The highest weight.
N	Total number of respondents.

Chapter One: Introduction

1.1 Background

Organizations today, of all sizes and types, operate in an environment characterized by rapid and continuous changes and tending to increase complexity.

The role of the feasibility study is to provide support and bear the risks and obstacles that would help him achieve his desired goals for the project owner from all strategic angles.(Bin Sha'a Walid et al., 2020)

The feasibility study is based on two basic criteria, the first is the criterion of initial feasibility and the second is the detailed feasibility.(Bin Sha'a Walid et al., 2020) .The first gives an introductory picture of the project on the ground, that is, the drawing and design of the project in all aspects that the investor needs.If the idea of the project is embodied and needs a subtraction of costs, then from here it is possible to move to the detailed study that needs careful detailing of all the steps and stages that the investment project can pass through, as it calculates the costs of the project and because the establishment and preparation of investment projects constitutes an important entry point for economic development.

One of the most prominent problems facing institutions in their economic environment is the problem of how to choose investments and projects that achieve their goals in the light of the available opportunities and expected risks. For this reason, the subject of evaluation and selection of projects has received great attention in economic and administrative thought on both the theoretical and applied levels, as an essential input in the investment and financing decision-making process and its close connection with economic development.

These studies are of great relevance, especially in developing nations since they experience a shortage of resources in particular. They serve as the

scientific basis for evaluating projects and convey the aims taken by both the private investor and the government. The capital component, which necessitates giving priority to business ventures that generate the highest level of revenue.(Liaquat, A. M., Kalam, M. A., Masjuki, H. H., & Jayed, 2010)

1.2 Aim of the Study

The aims of this study are:

1. Develop a management system to assist institutions in preparing a detailed model feasibility study to evaluate infrastructure projects in Karbala governorate.
2. Highlighting the role of each of the initial and detailed feasibility in making investment decisions.

1.3 Problem Statement

Feasibility studies are considered as one of the most important criteria upon which every project is based. They are also a pillar for it in all aspects or destinations, whether they are marketing, financial, engineering...etc. The stages of feasibility studies present an important and accurate details for each project that can be done by highlighting the imbalances and risks that projects can face investment, and accordingly the researcher poses the following problem:

The lack of a reliable, model integrated feasibility study steps.

1.4 Importance of the Study

1. The importance of the topic is reflected in the importance of feasibility studies in the success of investment projects and infrastructure projects.

2. Assisting project owners in clarifying the economic feasibility parameters for making strategic decisions
3. Helping decision makers to know the most important details of each initial feasibility and detailed feasibility before embarking on projects.
4. Enable project owners to understand the most important risks and slippages that can face their projects
5. The need for a model automated feasibility study electronically for decision-makers to review and ensure that the project is feasible or not feasible quickly.

1.5 Methodology of the Study

Several steps of a scientific research process are used, the secondary and main sources of data collection are the two sources used to gather data. Administration of surveys.

Theses stages are:

1. First stage included reviewing of the previous literature, which are books, magazines and published research related to the feasibility study and helped in writing the theoretical part of the thesis.
2. A stage is to develop a proposed framework to feasibility study for infrastructure projects depending on the literature reviews.
3. Conducting interviews with experts and specialists in infrastructure projects to find out the types of studies that are being conducted and the most important in these projects.
4. Supporting and evaluating the proposed administrative system. A survey of specialists and engineering experts was conducted.
5. Finally, the steps of the administrative system were programmed into a computer program for a feasibility study that included the most important

studies conducted in infrastructure projects, testing it on a case study, and evaluating the program by conducting an evaluation questionnaire for the work of the program, whether it achieved the goal for which it was designed or not.

1.6 Limits of the Study

The limits of this study are:

1. Objective limits: This study is limited to proposing an administrative system that includes exemplary steps for preparing a feasibility study for infrastructure projects.

2. Spatial limits: This study includes infrastructure projects directories in the holy province of Karbala, which are water, sewage, roads, bridges, and the municipality. In addition to the Investment and Engineering Affairs Commission at the University of Karbala.

3. Time limits: The field study will be applied in the academic year 2021-2022.

1.7 Structure of the Thesis

This thesis is divided into several chapters:

Chapter One: The thesis is presented in the first chapter. It opens by describing the issue's context and the study's aims and importance are discussed after that.

Chapter Two: of the thesis discusses the literature review. First, the concept of feasibility study briefly explained, types, significance, problems, and its importance to infrastructure projects. Finally discussed considerations of feasibility in infrastructure.

Chapter Three: consists of the practical part of thesis represented by the proposed administrative system for the preliminary and detailed feasibility

study of all kinds through flow charts of the necessary steps to conduct the study.

Chapter Four: covers the field study of the thesis, including the evaluation questionnaire for the proposed administrative system, its analysis, and the extraction of an indicator of the relative importance of all the steps included in the administrative system in the third chapter.

Chapter Five: This chapter includes the development of a computer program to evaluate projects through project data and to find the feasibility of the project by showing a final report for the details of the feasibility study. In addition to the case study to test the program work.

Chapter Six: This chapter reviews the most prominent conclusions reached by the researcher during the study and recommendations for future studies.

1.8 Previous Studies

Table (1-1) summarizes an extensive analysis of previous studies related to the subject of **Feasibility Study (2009 – 2020)**:

Table 1-1: Previous Studies

No.	Authors, Year and region	Methodology	The study
1.	(Hyari et al., 2009) <i>Jordan</i>	-Case study	This article analyzes a prior feasibility study for a highway building project with a focus on the estimates and predictions provided in that research. The comparison shows a significant discrepancy between the estimated and real figures. Decision-makers are encouraged to use extreme caution when interpreting the findings of feasibility studies for infrastructure projects since some studies may present inaccurate and deceptive information.
2.	(Oprea, 2010), <i>Italy</i>	-Literature Review	This essay's aim is to examine the value of an investment feasibility analysis. The article tackles the issue of whether a planned course of action, given the available resources and particular restrictions, is likely to meet individual or business objectives. The project proposal's physical, financial, and legal viability are important considerations. The investing industry continuously coming out with new and appealing investment techniques.

3.	<i>(Jónsson, 2012)), Island</i>	-Literature Review -Case study	This thesis establishes and defines the elements that must be examined during the feasibility analysis process as well as the procedures that fall under the category of best practices when feasibility analysis is carried out during the conceptualization stage of public projects in Iceland. This thesis' main goal is to compare Iceland's official sector's current practices to best practices and, where necessary, suggest changes. The outcome demonstrates that there are significant differences in Iceland's present methods for carrying out feasibility analyses at the conceptual stage of public projects.
4.	<i>(D.AngelinMichael, 2013), India</i>	-Literature Review	The study's goals include determining the projects' financial viability, comparing them, and ranking them according to their ability to produce money and be cost-effective. The main goal of this research is to identify the most feasible and financially successful project out of the available possibilities.
5.	<i>(Mohammed Alhaji Audu, 2014), Nigeria</i>	-Literature Review	The major goal of this research is to evaluate how feasibility studies might help commercial organizations in Nigeria grow and flourish. It has been demonstrated that a well-planned feasibility study gives the business owner the ability to comprehend the

			venture's conceptual framework and increases confidence in dealing with challenges that may arise in the business life cycle because the target, through feasibility study has been attained, however intangible.
6.	<i>(Ionut, 2015), Romania</i>	-Literature Review	In this study, the researcher suggest highlighting the significance of the paperwork supporting the implementation of an investment project.
7.	<i>(Roy & Mukherjee, 2017), India</i>	-Questionnaire	The authors of this paper aim to step-by-step explain why various studies are crucial to plant design and layout. It discussed many advantages of performing feasibility studies. The survey is also expanded to include more information about various factors.
8.	<i>(Mukhtar, 2017) Saudi Arabia</i>	-Literature Review	The goal of the current study was to examine the real estate market's viability and its role in analyzing investment prospects in the residential sector in Riyadh, Saudi Arabia, in 2015 and 2016. The market feasibility study's idea, significance, and objectives were all discussed in the report. The market analysis is crucial since it establishes the investment potential present in Riyadh's residential market. Such studies required accurate and trustworthy data that could be utilized to carry out exact research for the real estate industry.

9.	<i>(Ali Hadi Jebrin, 2017), Jordan</i>	<ul style="list-style-type: none"> - Literature Review -Questionnaire 	<p>The purpose of the study is to determine how feasibility studies and a strategic strategy interact. This significance stems from the crucial part played by organizations in the field of project management's strategic decision-making. The purpose of the materials in this attempt was to create a new understanding of the significance of the concepts of fit feasibility research to the approach of strategic performance and competitiveness in project management (Espoused Theory). Based on the aforementioned, the goals of the feasibility study are determined by analyzing the project's environmental factors in both the internal and external environments, so they must be aware of the technical viability of the project's organizational structure, business plan, project costs, and financial analysis.</p>
10.	<i>(Mohammed et al., 2019), Iraq</i>	-Questionnaire	<p>The purpose of this essay Identify the reasons for the misuse of feasibility studies in the construction sector, as well as the amount of awareness that exists about the usage of feasibility studies in building projects. The approach of the article involves questionnaire development and survey creation to pinpoint the reasons why a feasibility study failed, followed by system dynamic analysis of these components' effects.</p>

11.	(Mohammed Neamah Ahmed et al., 2019), <i>Iraq</i>	-AHP	<p>The purpose of this article is to look into how some of the previously listed issues may affect feasibility studies, as well as the goals and priorities of various feasibility studies. This study focused on the key elements affecting the early feasibility study sequences and related research throughout a building project (legal, environment, marketing, technical, managerial, schedule, financial and economic).</p> <p>To evaluate the relative importance of each component, the Analytical Hierarchy Process (AHP) was used as a multi-criteria decision support tool. The AHP findings indicated that the lack of regional databases linked to the feasibility study was the most important factor.</p>
12.	(Bin Sha'a Walid et al., 2020), <i>Algeria</i>	-Literature Review	<p>This study's goal is to create the picture of the investment project, hence it comprises a number of thorough investigations. The availability of information and data from feasibility studies, as well as the qualifications and experience of the person who prepared them, are the two fundamental components that determine the success of an investment project before it is launched. A detailed feasibility study also helps to create a comprehensive picture that includes all relevant information.</p>

Looking at Table (1-1) and noting previous studies, where multiple methods were used to study and analyze the feasibility of them manually or by using programs. As for this study, it differed from the rest of the studies by proposing an administrative system for the preliminary and detailed feasibility study and aimed as much as possible to reach an administrative system that includes most of the steps The most important of them that must be taken into account when conducting the study, and then through this study, this system was converted into a computer program that facilitates obtaining the result of the project and the use of technology, its speed and capabilities to help decision-makers make their investment decisions easily.

Chapter Two: Literature Review

2.1 Introduction

This chapter is divided into eleven sections demonstrate the concept of feasibility study, types, objective, significance and problems. In addition, it reveals the importance of feasibility study in investment projects, role of infrastructure and feasibility considerations of infrastructure.

2.2 Feasibility Study Concept

According to the Merriam-Webster online dictionary the word “feasible” means “capable of being done or carried out”.

A feasibility study or analysis may thus be interpreted as an assessment of what may (or may not) be effective at the conceptual stage of a project, such as the start-up and maintenance of a new project. (Jónsson, 2012)

According to (Arvanitis & Estevez, 2018), “As the name implies, a feasibility study is an analysis of the viability of an idea”. Feasibility studies are used in project management to discover potential positive and negative consequences of a project before committing considerable time and money.

A feasibility study is an examination and evaluation of a complicated nature at the level of future investment objectives, over a set time frame, taking risks and uncertainties into consideration.(Ionut, 2015)

A project feasibility report is a comprehensive study that examines the five analytical frameworks for a given project in detail, taking into account the four Ps (Price, Product, Promotion, Place) , the risks, the (POV), and the constraints (time, cost, and quality criteria) to determine whether to move forward, transform, or completely abandon it.(Mesly, 2017)

A feasibility study is a technique for predicting the outcome of an inquiry or evaluation of a proposed project, as well as potential gains. (Krieger et al., 2016)

This demonstrates that feasibility analysis is the most common way for gathering thorough and transparent data and outcomes in order to assess an investment proposal's viability. (Jónsson, 2012)

2.3 Types of Feasibility Study

There are two main types of feasibility study, which are differentiated between them as the first is a comprehensive and preliminary study for all aspects of the project are usually free, and the second type is an interconnection of a series of detailed and accurate studies.(Bin Sha'a Walid et al., 2020) The project requires efficiency and experience in its implementation and is often costly, and will briefly explain them in the following:

2.3.1 Prefeasibility Study

The prefeasibility study, which comes after the project's first value proposition, provides a broad overview of the project by using multiple analytical frameworks, allowing the feasibility expert to provide a recommendation on the feasibility study's applicability (Mesly, 2017).

Also, Legal feasibility study is use to conclude whether the proposed plan or system is conflicts with the national or international legal requirements (Abdollahbeigi et al., 2017). Protection Acts are simply used to determine any violations of the law. It is also a way that has been planned.(Roy & Mukherjee, 2017)

2.3.2 Detailed Feasibility Study

This study includes a set of studies in which data and information necessary to evaluate investment projects of all kinds are collected, as well as in which they are studied, examined and evaluated with the aim of knowing the feasibility of investing in them, and the extent to which they can succeed,

continue and grow, and then put them into practice.(Abdul Aziz Al-Sayed Mustafa, 2012)

2.3.2.1 Technical Feasibility Study

Technical feasibility is primarily concerned with the technological evaluation of the project. In this field, a group of engineers or technical experts examines the entire project and its technical features. This research aids such organizations in making correct assessments.(Schwender et al., 2005)

A riskier choice is to utilize technology that is new (first release) and unfamiliar to the systems experts who must install and maintain it, or that is a hybrid of many manufacturers' products. The feasibility score for such technology will be lower depending on the number and mix of risk factors (James A. Hall, 2010).

Technical feasibility includes: (Ali Hadi Jebrin, 2017)

1. Design, technical standards, and requirements.
2. If relevant, comparing the design and predicted performance to existing operations.
3. Explain how the new technology or equipment will affect the time it takes to get up and running.
4. The expense of new equipment and technology.
5. Justifications and benefits of the chosen design
6. Potential project site location, size, and needs

It also aids decision-makers in determining whether a planned scheme should be implemented later or now, based on the organization's financial situation. (Momin Mukherjee, 2017)

2.3.2.2 Market Feasibility Study

Focuses on the market demand for new products or services as well as the present market rivalry. It evaluates if the group can carve out a market niche and effectively compete with the competition. The new business will not be viable if the organization cannot generate adequate market demand for its products or services (Brockman, 2008).

A preliminary market study and analysis are necessary to determine the market's current demand for a certain kind of good or service. Prior to doing a feasibility study, market research and analysis must be carried out to determine whether there is a demand for the proposed product at the intended price and location.

For the technical design, viability, finance, and ultimately marketing of the good or service, the information gathered via market research and analysis is essential (Larson & Gray, 2011).

Administration should exchange information with specialists, experts, architects, engineers, and others who determine project costs, and then the feasibility study will determine if predicted revenues will be adequate to cover the expected costs (Larson & Gray, 2011).

Because market research is one of the riskiest sections of the project, it must provide a return that is commensurate to the level of risk in order to progress.

The Elements of Market research and analysis:(Larson & Gray, 2011)

1. Industry developments
2. Customer needs: Determine customers' views, preferences, and requirements, as well as their purchasing patterns and how the product or service will meet them.

3. Market type: Determine if the market is open (everyone can access) or closed (access is only available if you are a member of a group that meets certain criteria), and whether the possible market is retail or wholesale.

4. Seasonal variations: Determine whether there are any seasonal trends in the demand for the product or service, as well as how seasonal swings may affect prices.

5. Identify the major clients, whether they are members of the general public, companies, special interest groups, or organizations.

6. Identify the best method of contacting the target market based on the identification of the consumers and the target market, including local, national, or worldwide advertising, the internet, and sales personnel.

7. Sales volume: Using the anticipated customer base, market share, and other market research approaches, you should forecast future sales volume by determining how many units of product or service each customer is likely to purchase each month or quarter.

8. Identifying and evaluating competitors: A thorough description and proof of the competition should be included in the feasibility study.

9. Pricing for goods or services is a serious issue that frequently causes businesses to fail and has to be carefully evaluated. The market and people's propensity to pay are other factors in pricing determination, in addition to cost.

Geographic, Demographic, and Psychographic traits should be used to describe the target market.(Ali Hadi Jebrin, 2017)

2.3.2.3 Financial Feasibility Study

The financial feasibility study focuses on establishing the cash inflows and outflows of the investment project, which demonstrates its potential to

satisfy financial requirements and generate the targeted return. (Nizar Rafe' Muhammad Al-Farkahi & Anmar Amin Hahi Al-Barwari, 2013). This refers to the amount of money available to finish the project. The researchers are concerned about management's financial commitment to this initiative in the light of rival capital projects under consideration at this time (James A. Hall, 2010).

2.3.2.4 Environmental Feasibility Study

It refers to "the degree of protection and maintenance that is achieved for the environment by taking into account the environmental load within the framework of the proposed development plan from the present and future perspective, directly and indirectly, at the local, regional and global levels" (Abdel-Maqsood Zein El-Din, 2000).

2.3.2.5 Operational Feasibility Study

may be in charge of examining and deciding if the suggested solutions meet all types of business needs (Pollock et al., 2013). Its acts anticipate all feasible systems for identifying and resolving problems. This research might also look into and check if the project's plans for technique development are achievable or not. (Roy & Mukherjee, 2017)

2.3.2.6 Organizational Feasibility

Given the various governmental standards with which one must comply, organization structure and governance is a vital component of any health care auxiliary business. (Brockman, 2008)

It includes:(Ali Hadi Jebrin, 2017)

1. The legal framework of the organization.
2. Potential partners and investors in the proposed ownership structure.

3. The planned management structure: determine the essential positions required, as well as the required experience and qualifications.

2.3.2.7 Social Feasibility Study

Social feasibility involves a social perspective, not an economic or biophysical one (e.g. externalities and interdependencies). On the other hand, is a short-term approach that focuses on how well planned actions address needs of the community, interests, conditions, potentials, and capacities (Olaf Westermann, 2007).

The impressions held by people and citizens, advocacy organizations, and/or private corporations against project execution must be taken into consideration when presenting new projects not only to provide incentives for participation, but also to avert opposition, according to a basic premise of social feasibility study (Neil Macauley, 2006).

As a result, a team of consultants to participation (exploring stakeholder perspectives to guarantee project success) is more common in social feasibility studies than a more transformational approach to involvement (empowering stakeholders during the process) (Olaf Westermann, 2007).

The old-style feasibility study involves the group and data arrangement of various project substitutions to abstract information and measurements to assess every alternative in order to support decision-making. It is separated into the following steps as shown in fig. (2-1) : (Abou-Zeid et al., 2007)

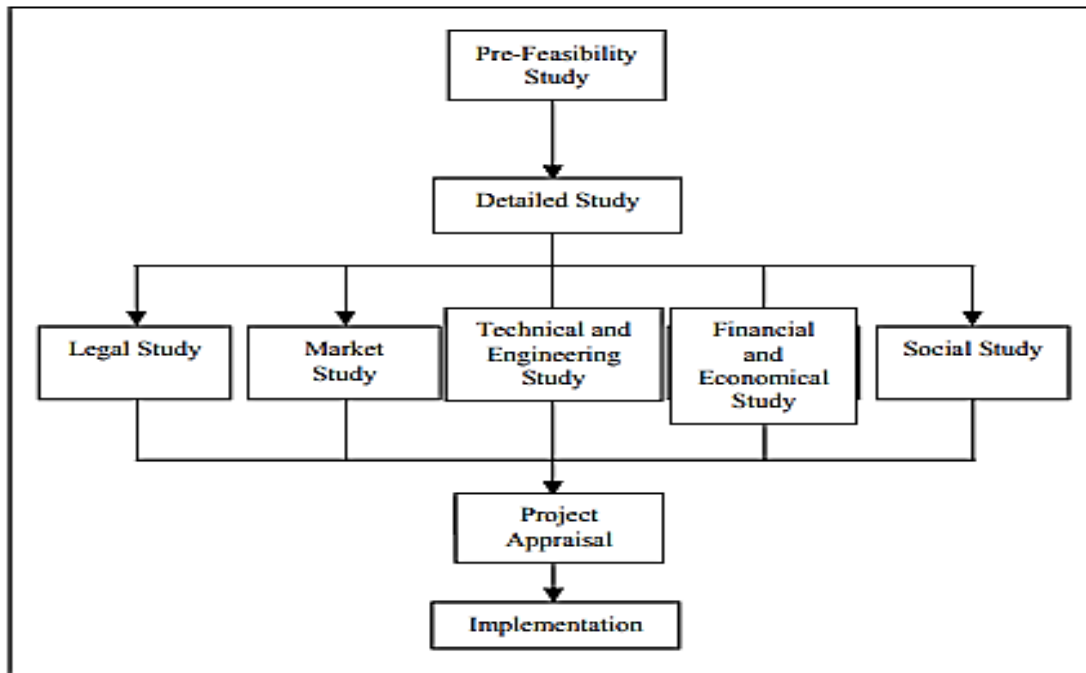


Figure 2-1: The old style of feasibility study procedure (Mohammed et al., 2019)

The feasibility study is categorized based on a number of factors, including profit kinds and function. According to the profit in various industries, it is shown in the following table.

Table 2-1: Arrangement of Feasibility Studies Agreeing to the Profit Kind(Ford et al., 2004)

Type	Cost	Benefits	Purpose
Private Feasibility Study	Add the price of the project's assets.	Describes the project's advantages to itself.	maximize the project's advantages to its backers or founders
Public Feasibility Study	Include project asset costs as well as externality expenses.	Outlines the project's internal advantages, external benefits, and any adverse effects it may have on other projects or the country's economy.	Reduce the project's self-benefits to society at large.

2.4 Objectives of the Feasibility Study

Feasibility studies aim to achieve several objectives, the most important of which are:

1. The best use of limited investment resources is made possible by the selection of economic projects with the greatest net benefits for society. This is done by giving investors the chance to choose investments that will increase income distribution equity by incorporating some social factors into the project evaluation process (Dawood; & Naeem, 2011).

2. The feasibility study is the document that banks rely on to prove the profitability of the project, its efficiency and its ability to repay the loan (Nouredine, 2010).

3. Choosing the economic projects that achieve the highest net benefit, which leads to achieving the optimal allocation of resources; And to provide an opportunity to choose those projects that work to increase equity in the distribution of income by including some social considerations when evaluating projects (Abdul-Wahhab Muhammad & Ahmad Mujib, 2018).

4. Feasibility studies are useful for the investor since they reassure that his money and investments are not only for the present time, but also in the future through knowledge of Annual project revenue, Tax rates, Rate of profit on invested funds, Increase in capital, Optimal funding structure, Comparison of financing alternatives, the cost of funding, investment climate in the country (Khanna & Fathi, 2013).

2.5 The Significance of Feasibility Study

The feasibility assessment is important because it may be based on facts and data for the entire facility, lowering the possibility of a sub-optimal design or operational solution, which would likely occur if an evaluation were done piecemeal. Previously, the focus tended to be on the capital cost, which is simply one of several factors used to assess the design's suitability for purpose and total value (Atkin & Brooks, 2015).

It's significance divided into 3 fields: (Zardak et al., 2011)

2.5.1 For Individual Investor

a. The feasibility study helps the investor to separate the available investment opportunities, thus making the right decision in a way that serves the investor's goals. It is a scientific and practical way to evaluate the proposed project according to objective financial and economic criteria far from random. It helps the investor to take the appropriate decision regarding investing in a particular project in a manner commensurate with his financial ability, and with an acceptable level of risk. (Saeed Abdel Aziz Othman, 2001)

b. It represents a guide for the investor in the light of the results and information it carries during the different stages of project implementation, which can be referenced in the various stages of implementation. The investor

avoids risks especially in large projects for which huge resources are allocated (Abdel Muttalib Abdel Hamid, 2014).

2.5.2 For the Project (Enterprise)

The Feasibility Study is the foundation of the decision-making process for establishing the project, demonstrating the project's potential to meet its objectives, and generating return from the monies invested (Mukhtar, 2017).

2.5.3 For the Community

By establishing a set of criteria that help to rank projects according to their importance, economic efficiency, and the availability of production elements, countries must identify priorities in investment projects. The feasibility study contributes to solving the general problem of relative scarcity of resources to meet the growing needs of the community (Zardak et al., 2011)

2.6 Difficulties in Conducting and Applying Feasibility studies

Despite the growing interest in economic feasibility studies, there are many difficulties And the problems that can be encountered when seeking to conduct or apply feasibility studies, the most important of which are the following: (Kadawy Talal, 2008)

1- Lack of availability and accuracy of information and High costs (Kadawy Talal, 2008).

2- Lack of experience, competence and skill, carrying out feasibility studies requires the presence of a team of experts with different specializations (Usrir Munawwar & Bin Haj Djilali Magrawa Fathia, 2015).

3- The difficulty of estimating the variables included in the study:

With the increase in the size of projects and the length of their operation, it becomes more difficult to estimate the variables involved in

studies feasibility such as demand and costs, or that some variables are indirect or not quantifiable, as in the social evaluation of projects (Noureddine, 2019).

4- Risks of Uncertainty: In light of globalization and the transformation of market mechanisms, the problems of dealing with internal changes in the national economy have increased. This would increase the risks of uncertainty in estimating the variables included in the feasibility studies during the life of the project, such as prices, demand, production method...etc. (Shuqiri Nuri Musa & Salam, 2009).

5- The degree of awareness and conviction of the importance of the study: Lack of interest in the feasibility study and being convinced of its importance and not spending on it makes investors serious Weak in the direction of establishing projects, as they often seek to present mock studies in order to obtain certain advantages Such as benefiting from the allocation of land or loans and profit from them (Abdul Karim Yaqoub, 2008).

6- Technical obstacles: These are mainly:

a. related to determining the start and end time of the project and engineering the project design, especially when experiences are Necessary to conduct minimal or expensive technical studies.(Muhammad Al-Serafy, 2005)

b. The length of the project implementation period beyond what was planned, which reduces the usefulness of the feasibility study that was previously prepared for the project.(Zahia Houry, 2007)

c. The length of time it takes to establish and implement investment projects as a result of the multiplicity of competent agencies Studying and approving these projects.(Muhammad Al-Serafy, 2005)

d. The difficulty of determining what is the detailed stage that needs the most detail and attention, the largest period of time, and the greatest amount of time Budget, when project objectives are equally important (Yasmine Darwazi, 2006).

2.7 Importance of Feasibility Study in Project Investment

Investment initiatives that require starting a new business from the ground up are extremely difficult. Any decisions made in this regard must be preceded by a thorough examination of the project's feasibility, not just in terms of financial viability but also in terms of legal, organizational, technical, and market viability (Teresa Szot-Gabrys, 2013).

The feasibility statement is a profit and loss statement in which the project's expected expenditures are deducted from the project's estimated income, yielding a profit or loss. A thorough financial feasibility analysis would look at items like cash flow, sensitivity to fluctuations, and performance indicators, among other things (Oprea, 2010).

In the field, UNIDO (United Nations Industrial Development Organization) provides a detailed approach. UNIDO is a UN-affiliated specialized organization that promotes industrialization processes and assists developing nations and governments through periods of economic transformation.

According to UNIDO, the life cycle of an investment project consists of the following stages:

1. Pre-investment stage,
2. Investment stage,
3. Operational stage.

Table (2-2) set out a detailed list of the phases of each individual stage of carrying out investment projects.

Table 2-2: Investment project cycle according to UNIDO methodology (Behrens et al., 1991)

Investment project	Pre-investment stage	Identification, possibility study
		Preliminary selection, pre-feasibility study
		Ancillary studies
		Feasibility study
		Evaluation and performance report
	Investment stage	Negotiations and concluding agreements
		Technical design
		Formulation (construction)
		Pre-production marketing
		Training
	Operational stage	Acceptance and start-up
		Exploitation
		Extension

Investors should at least utilize a simple method for selecting projects that can be removed early in the research to avoid the following investment disadvantages and risks: illiquidity, management, value depreciation, government regulations, real estate cycles, and legal complexity are all factors to consider. (Oprea, 2010)

2.8 The Roles of Infrastructure

Infrastructure is crucial to a society because it provides a physical foundation for the effective operation of organizations that offer critical structures and related commodities and services in an economy (Gramlich et al., 1994).

Roads, telephones, water supply, and railroads are examples of hard infrastructure, whereas governance, health, and education systems are examples of soft infrastructure that may sustain, develop, and maintain socioeconomic norms (Suresh Shanaka Kariyawasam Sittarage, 2015).

Therefore many governments have considered public infrastructure as a crucial factor in determining regional differences and supporting LED (Local Economic Development) (Andy Pike et al., 2010).

As a result, one of the key causes for the low level of LRED (Local and Regional Economic Development) in most developing nations is a lack of infrastructure (Suresh Shanaka Kariyawasam Sittarage, 2015).

2.9 Investments in Infrastructure Projects

In general, infrastructure investment benefits local economies by increasing the efficiency of enterprises' input-output flows as well as household goods and service flows (Underhill, 2012).

Both the usefulness of an investment project in a broader context and its affordability must be expressly shown, not just assumed. Clearly, the long-term viability of bank reserves as well as regional and national infrastructure development funds is jeopardized if infrastructure investments fail to provide sufficient returns or have positive economic consequences (Suresh Shanaka Kariyawasam Sittarage, 2015).

(Porter & E., 2008) call for strategic infrastructure investments in troubled metropolitan neighborhoods in the United States to foster innovation, increase competitiveness, reduce transaction costs, and provide the foundation for a high standard of life.

On the other hand, there are several examples of large-scale infrastructure projects that have failed, raising fundamental considerations

regarding the need to explore whether infrastructure expenditures are appropriate for supporting growth (Cockburn et al., 2013).

Infrastructure projects are inherently fraught with risk throughout their lifespan. As a result, it's critical to figure out how to connect the effects of an investment on many stakeholders, including not just investors and developers, but also those in local and regional economies (Suresh Shanaka Kariyawasam Sittarage, 2015).

2.10 Sources and Alternatives for Financing Investment in Infrastructure

Funding sources for investment in infrastructure can be classified into two main categories: the first category is traditional public and non-traditional, the main actor in it is the state through its general budget and what it allocates in terms of equipment and investment expenditures. As for the second modern category, which is the type that many countries have begun to follow this approach uses unconventional tools such as private sector participation in building and operating infrastructure projects.(Tayeb Ababbo & Rasheed, 2020)

2.10.1 Conventional Financing for Infrastructure Investment

For decades, the financing of infrastructure projects was limited to public investment and financed from public expenditures by relying either on the public budget or government loans, as the prevailing thought is that investment in infrastructure is the responsibility of the state alone, and this financing is divided into two parts, internal and external:

a. Internal public finance is achieved in the collection of public revenue, which is intended as a “financial instrument and is the set of incomes that the state obtains from various sources in order to cover its public expenditures

and achieve economic and social balance (Suzy Adly Nashed, 2008). The various sources represent the public will as a basis in taxes and fees, internal public loans and state revenues from its properties, cash issuance, gifts, grants and foreign subsidies.

b. External financing can be divided according to the foreign capital flows that came with it (Obstfeld, Maurice, 2001), as they classify foreign capital flows into five “05” sections arranged from debt flows to private flows as Bond Financing, bank financing, official loans foreign direct investment and portfolio investments.

2.10.2 Modern Financing for Investment in Infrastructure

Modern finance is intended to break out of the traditional and non-traditional financing system that was adopted on public financing of infrastructure, a system in which the state assumes responsibility for spending from building, operating, financing and renovating infrastructure projects, and it alone bears the risks arising from it. The idea of the state abandoning this system developed following the decline in oil prices for developing countries. And modern infrastructure financing has become embodied in the need for the private sector to intervene as a party, whether through privatization or through partnership with various modern methods such as the method of building, operating, transferring (BOT) (Tayeb Ababbo & Rasheed, 2020).

1. Partnership between the public sector and the private sector: Partnership is a form of cooperation between the public sector and the private sector through which arrangements are made through which the public sector can provide goods and services by allowing the private sector instead (Hakami Buhafs, 2016). The term public-private partnership refers to the investment activities carried out by the private sector to implement projects and provide

services in the field of infrastructure and major projects in which the public sector has traditionally invested (Afif Al-Hindawi, 2010).

According to the Asian Development Bank, the concept of partnership refers to the long-term contractual relationship between the public and private sectors in the field of financing, design, implementation and operation of infrastructure projects and services, which were traditionally established by the public sector. The following figure (2-2) shows the general principles to be available between partners.

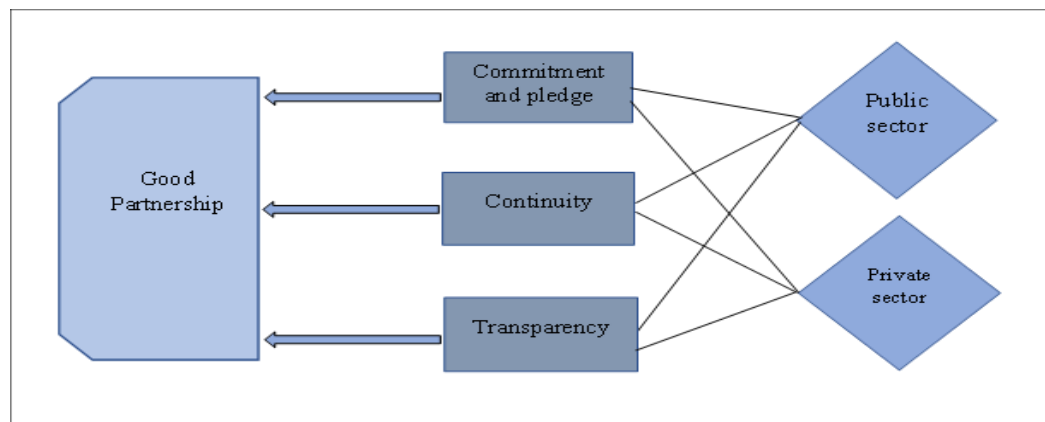


Figure 2-2: General principles to be available between partners (Public-Private Partnership, 2020)

2.11 Infrastructure Feasibility Study Considerations

Feasibility studies cover all aspects that might affect a project's success. Finance provision and procurement strategy are two examples. (Glaister et al., 2010) local surroundings (Rudžianskaite-Kvaraciejiene et al., 2015), institutional assistance (Quium, 2014) and customers' requirements (Mišić & Radujković, 2015)

As a result, successful feasibility studies should take into account a wide range of project performance-influencing factors. (Chioma Sylvia Okoro et al., 2020)

Furthermore, the individuals engaged may have an impact on feasibility studies and the processes used throughout them.(Chioma Sylvia Okoro et al., 2020).(Nicolaisen et al., 2012) and (Flyvbjerg, 2014) According to the researchers, insufficient or wrong feasibility evaluations are the consequence of illusions (psychological biases), honest mistakes and deceptions, or purposeful manipulations of data by those involved.

On their part, (Hyari et al., 2009) argue that a lack of understanding of the basic underlying mechanisms in feasibility studies leads to incorrect conclusions.

Because mistakes might be introduced and certain crucial parts could be ignored, the methods followed, which include allocating time and effort to performing feasibility studies, are critical (Rosenthal et al., 2014).

2.12 Summary

The literature reviews shows the importance of feasibility stages and types and define the feasibility analysis from different points of view for several researchers and it helps in proposition of frameworks in the following chapter.

Chapter Three: Proposed Feasibility Study Framework

3.1 Introduction

The third chapter includes the general proposed framework of feasibility study and other types of detailed feasibility study.

Reliance was placed on the review of previous literature related to the feasibility study (books, magazines, and articles dealing with the subject of feasibility, in addition to personal interviews with specialists. A general administrative system was reached regarding the feasibility study and systems for each type to organize the work and facilitate access to the necessary steps to be carried out in a suggested sequence that ensures access to the best results in knowledge if the project achieves the goal for which it was planned.

3.2 General Feasibility Study Framework

Feasibility study of projects specially infrastructure projects includes several stages in which projects are studied, analyzed and evaluated, on the basis of which a decision is made whether the project is feasible and performs the required goal or not.

As shown in Figure (3-1) , the first stage of the feasibility study includes the analysis of investment opportunities, which in turn are divided into two parts:

- A. Identifying investment opportunities
- B. Initial screening of investment opportunities

The discovery or search for investment opportunities represents the starting point in the investment project cycle, and the success of the project depends on the extent to which the available investment ideas and opportunities are exploited and converted into commodities in the markets and services to satisfy the needs of consumers, and at the same time achieve the return that the investor is looking for, and achieving the desired goal through

the establishment of the project constitutes the beginning of analyzing the feasibility of the project.

Furthermore, the availability of new investment ideas is sufficient if their suitability to the environment in which the project will be established is not taken into consideration.

In addition, after identifying opportunities, the stage of initial screening of opportunities begins, exclusion of invalid opportunities, and focus on opportunities that are suitable for projects of high profit value and achieve their desired objectives.

Figure (3-1) shows that the next stage is the arrangements of ideas in order of priorities then a full description and scope of the project, the description includes the study of engineering data, project background, objectives, and analysis of similar facilities to which help decision makers to make the right decision.

Moreover, need analysis is an important factor in project overview by preparation of necessary information and then investigate the collected information to take a suitable decision.

The next stage of feasibility analysis is prefeasibility study for project concept which study all the preliminary technical, socio-economic, financial aspects for the concept of the project.

Furthermore, to the above analysis, the study must consist of risk assessment, identification of alternative ideas, and finally the determination of total costs of the detailed feasibility study.

After that, the decision-makers will decide if the project is feasible, based on the previous analysis, it is moved to a more detailed study, which is more costly and takes a longer time, which includes market, technical, financial, environmental, social, organizational, and operational studies. But

if it is not feasible at that time, another investment idea is chosen based on the order according to the priorities.

Finally, the detailed feasibility study and its results will lead to either feasible project and that means continue the designs, implementation and construction or not feasible then the project will terminate. Figure (3-1) illustrates the sequence of the previous activities as detailed flowchart.

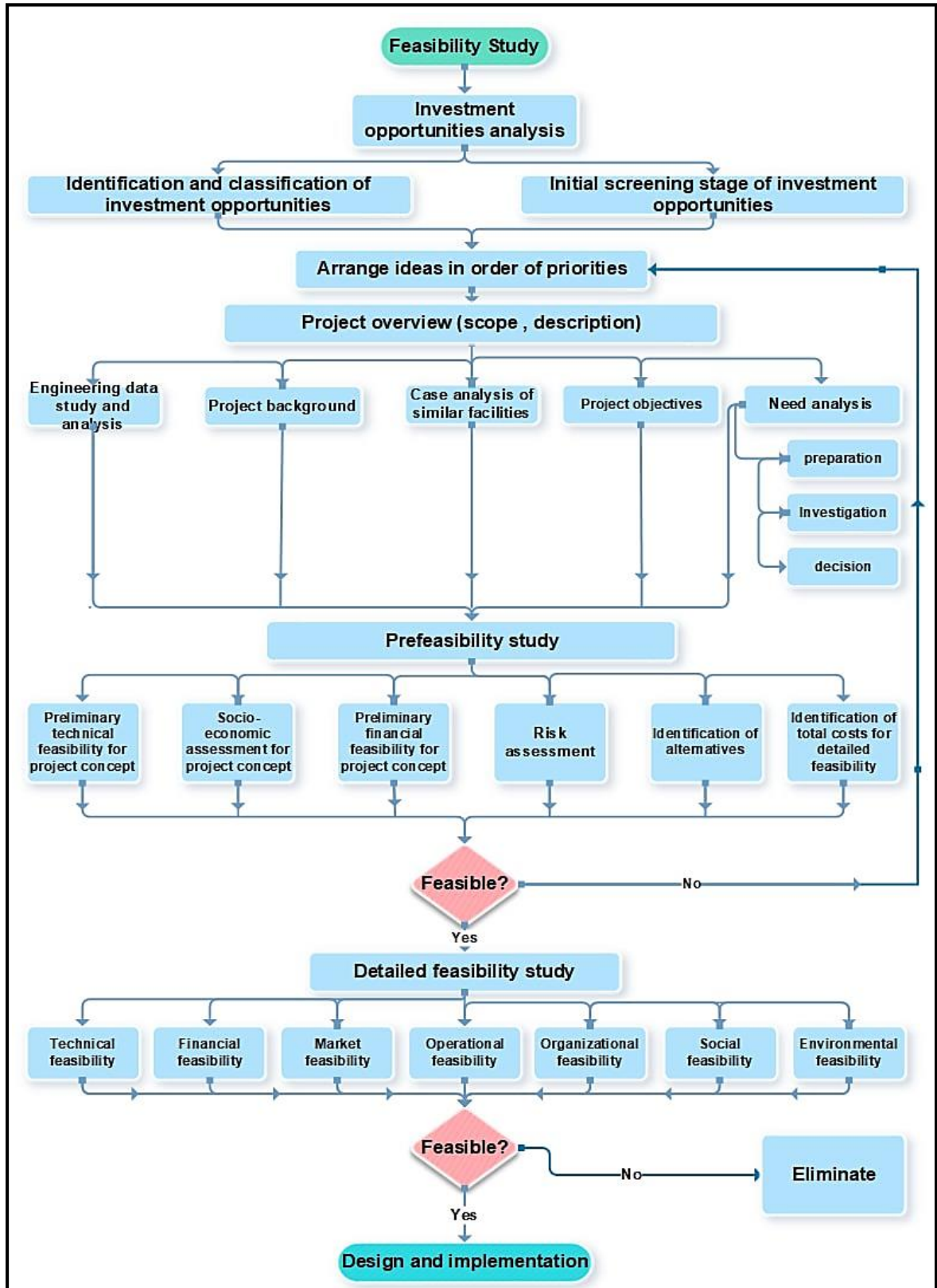


Figure 3-1: General Feasibility Study Flowchart

3.3 Pre-Feasibility Study Framework

Prefeasibility study is a short, focused and a low-cost assessment of a projects' viability. The intention is to define the project as infrastructure project, and to collate information necessary to develop the project concept based on engineering design concept, the technical and financial challenges of implementation, and expected project outcomes and impacts.

This study is also considered as an intermediate stage between the study of investment opportunities and the feasibility study it is also represented as an exploratory study that allows a decision to enter or not to a detailed costly feasibility study.

In this context, the initial feasibility study provides an impression to the investor about the possibility and probability of the initial success or failure of the project before going into its details.

Specifically, the pre-feasibility analysis will:

1. Evaluate the project's technical and operational viability through a preliminary examination of the engineering and technical components, the project's manageability from an operational standpoint, and any potential dangers.

2. Consist of the following social and environmental protection measures; Social and economic evaluation and analysis Scoping for an environmental assessment.

3. Evaluate the financial and economic viability of the project concept through a preliminary analysis of the assumptions for cost recovery and income generation, the likelihood of private sector interest in the project, the total project cost (capital plus operations plus maintenance), potential financial risks, and the identification of the project's likely economic benefits.

4. Identifying the private sector's involvement (direct or indirect investment, joint venture partner, etc.) can help to discover potential arrangements for private sector engagement.

5. Identifying the contractual framework for the PPP (Public Private Partnership) arrangement; outlining procedure for ensuring competition in the selection of the private sector partner(s); recognizing the legal documentation required to allow participation of the private partner(s).

Then the alternatives are identified and a preliminary study is conducted for each alternative (6 as a maximum), after which these alternatives are evaluated and selection of most promising alternative.

At the completion of this task the institution will have a well-defined description of the proposed project, preliminary cost estimates, identified social mobilization and environmental issues and requirements, income generating opportunities, initial financial viability, private sector opportunities, any identified project risks, and what further actions are required to complete the project preparation and by who. This process will provide a good basis for further pursuing the project.

The following figure (3-2) reveals the detailed operations done in prefeasibility study.

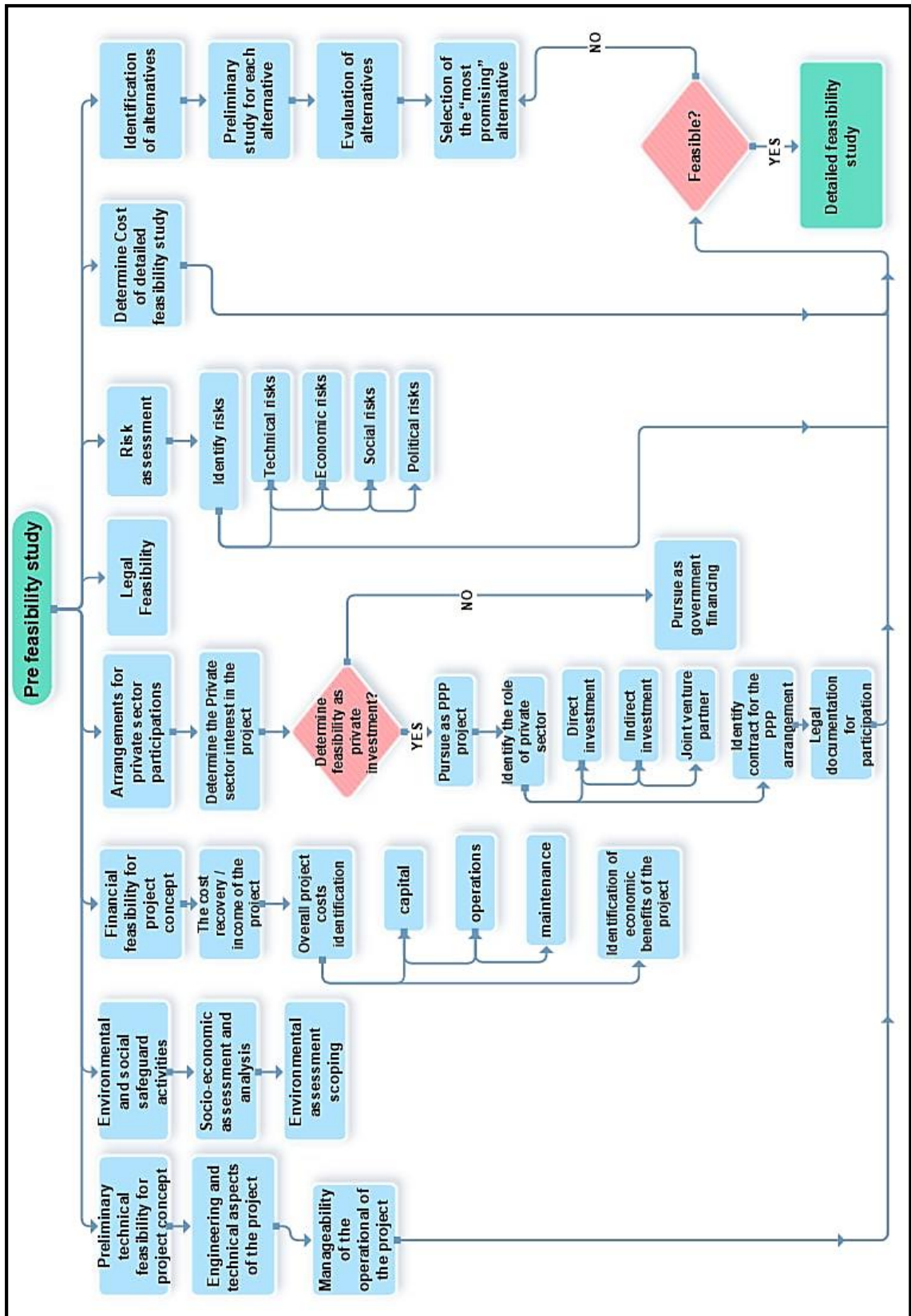


Figure 3-2: Prefeasibility Study Flowchart

3.4 Market Feasibility Study Framework

Market feasibility considered as an important study and must be conducted for infrastructure projects as well as other studies, figure (3-4) shows product or service description. It aims to address in detail the conditions of supply through determine the existing supplier markets, new markets, buyer markets.

On the other hand, the conditions of demand must be studied identifying society perceptions, preferences and how the service will satisfy society and price levels and to predict their future developments.

After studying the conditions of demand and supply, the market share is analyzed and whether the project is feasible from a marketing point of view.

It also defines product or service specifications in light of the tastes and desires of consumers, and draws up a marketing strategy that includes the best methods for distribution, promotion and pricing.

Moreover, the study of the market is concerned with analysis of industry profile by using SWOT (strengths, weaknesses, opportunities, threats) analysis technique.

SWOT analysis is a framework for assessing a firm's resources and capabilities (strengths and weaknesses) and external market situation (opportunities and threats). A number of studies have shown that SWOT analysis is one of the most widely used strategy tools among managers (Madsen, 2016).

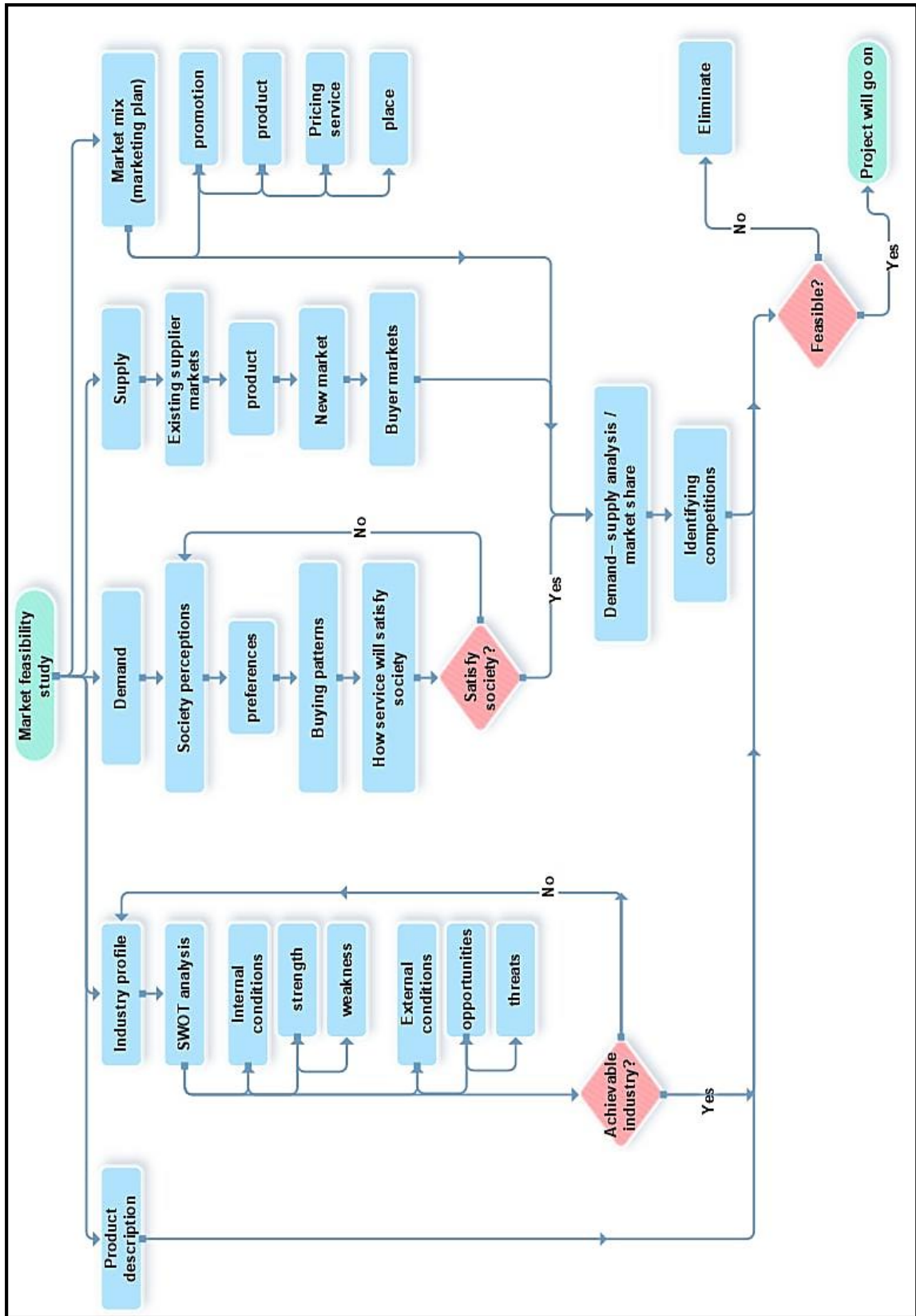


Figure 3-3: Market Feasibility Study Flowchart

3.5 Technical Feasibility Study Framework

it is based on planning and preparing production cards for building the project, on the basis of what was obtained through marketing feasibility studies, from determining the volume of production, available energies, the appropriate location of the project, production method, determining production needs, providing the necessary data to estimate investment costs - and annual operating costs.(Mohammed Al-Bay, 2015)

Therefore, all materials and supplies for the project must be provided, identified and classified, material inputs (input requirements, present and potential supply positions such as raw materials, processed materials, components or factory supplies.

Moreover, supply program must be considered and classified to quantitative supply program and development of supplies then determine the possible substitutes, prices and annual costs of supplies.

Another technical factor must be taken to account is location of the project and site by definition of location giving country, town, district and available infrastructure like (traffic, electricity) then show situation and size on geodetic maps to find out the value of lands and provide full description of the projects impacts on population ,infrastructure, landscape surroundings the project and make an assessment the tendency of these impacts (negative or positive) also describe socio-economic aspects and nearness to the market.

Technical feasibility concern with the technology and equipment which can be adopted and their environmental impacts.

Furthermore , costs of technologies is a major factor influence the use of the technology wherefore a rough estimation, layout of proposed equipment must be made by study preparer if the equipment was for production or auxiliary or service.

Engineering works considered as fundamental factor in technical analysis with the human resources requirements by give full description about staff and labor skills, availability and annual costs. Figure (3-4) demonstrates the steps.

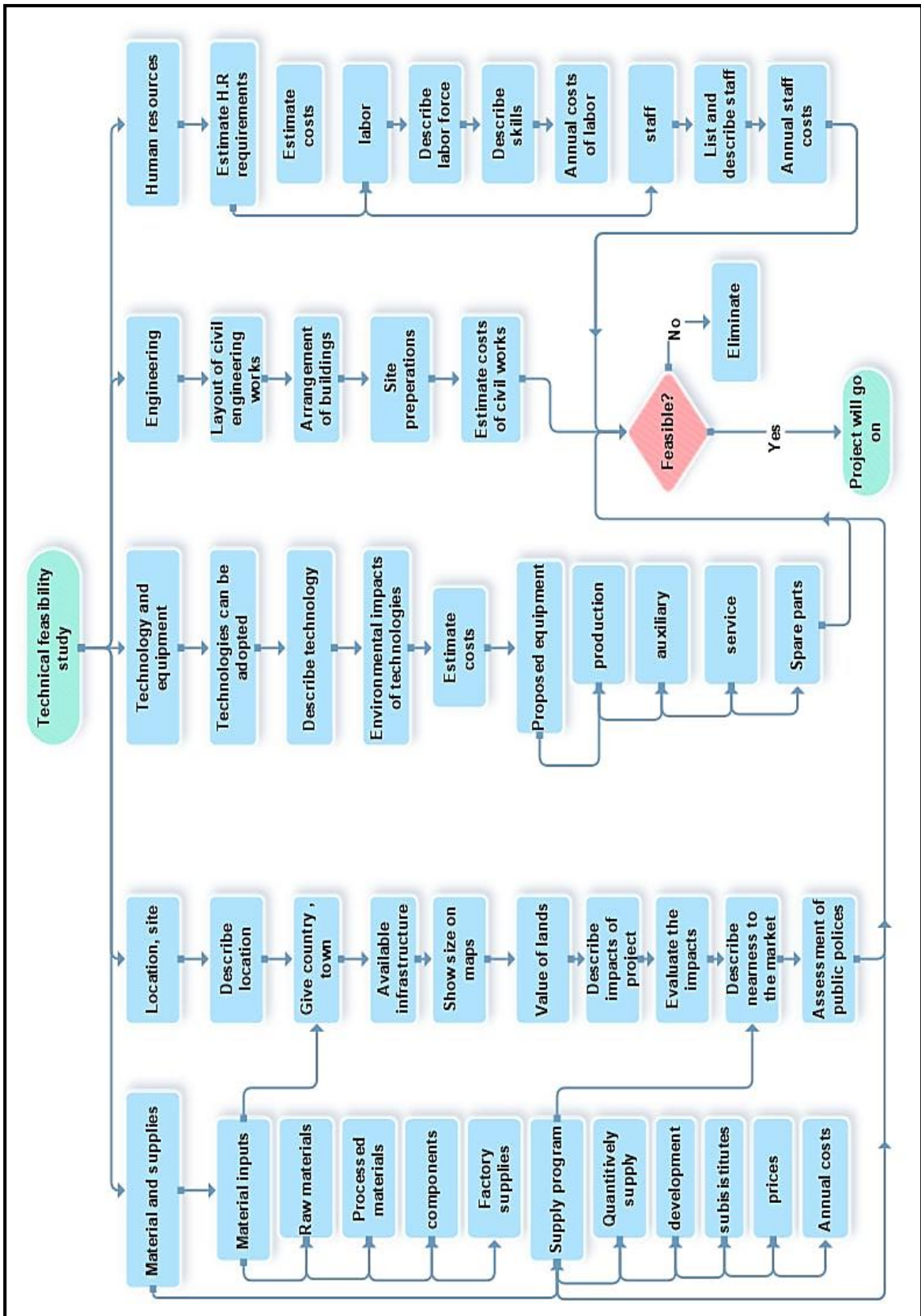


Figure 3-4: Technical Feasibility Study Flowchart

3.6 Financial and Economic Feasibility Study Framework

It aims to translate the results of other studies into financial estimates and this study includes costs of the project's investment, as well as the annual revenues over the expected useful life of the project, and determining how the project will be financed.

The financial feasibility study depends mainly on the money invested, which includes all capital costs from the initial capital costs related to engineering studies and fixed assets such as the cost of the land on which the project is built in addition to the annual fixed and variable costs such as annual depreciation costs, salaries and bills ... etc.

After determining the total cost of the project, the project is studied economically, based on the financial ratios that show whether the project is economically feasible or not.

These financial ratios are:

1. **Liquidity Ratios:** measure a company's ability to cover its short-term debt obligations in a timely manner.

This set of financial liquidity ratios which are commonly used to measure the financial performance as shown in table (3.1) (Ng Kim-Soon et al., 2013).

Table 3-1: Liquidity Ratios Formulas (Ng Kim-Soon et al., 2013)

No.	Name	formula	Ideal ratio
1	Current Ratio	$\frac{\text{current assests}}{\text{current liabilities}}$	1.2
2	Quick Ratio	$\frac{\text{Quick assests}}{\text{current liabilities}}$ Where Quick Assets = Current Assets – Inventories	1.1
3	Cash Ratio	$\frac{\text{Cash} + \text{Marketable Securities}}{\text{current liabilities}}$	1.0

2. Efficiency ratios:

3. Financial leverage ratio

4. Security ratio

5. Profitability ratios which give an idea of how profitably the firm is operating and utilizing its assets (Rhyne & Brigham, 2019).

The results of economic analysis will give an indication of the suitability of the project for work and the continuation of the study.

If the results indicate feasible project, then is moving to stage of investment appraisal analysis by several methods of evaluation the profitability of the project:

1. Return On Investment (ROI)

Simply put, a cost-benefit analysis, often known as a return-on-investment study, aims to assess and analyze the costs and advantages of a project. Three different applications for the cost-benefit analysis can be made: (Matthews, 2017)

A. As a planning tool for selecting options and allocating limited resources among conflicting demands.

B. As an assessment tool for examining an existing project or service

C. As a technique to build quantitative support to influence policy, the economy, or society.

2. Net Present Value (NPV): The term "net present value" refers to the difference between the present value of cash inflows and outflows over a specific time period. It is frequently used in capital budgeting and investment planning to forecast the future profitability of a proposed investment project. (Copeland et al., 2010).

$$NPV = \sum_{t=0}^n \frac{NCF_t}{(1+i)^t} - C_0 \quad 3-1$$

Where:

C_{Ft} = Net cash inflow-outflows during a single period t.

C₀=Total initial investment costs

i = Discount rate or return that could be earned in an alternative investment

t = Number of time periods

3. Internal rate of return (IRR)

The "annualized effective compounded return rate" or "rate of return" that increases the net present value of all cash (NPV as NET*1/(1+IRR)^{year}) is known as the internal rate of return on an investment or project.

flows from a specific investment, both positive and negative, equal zero. (Thron, & Moten,2012)

$$0 = NPV = \sum_{t=1}^n \frac{C_t}{(1+IRR)^t} - C_0 \quad 3-2$$

Where

C_t =Net cash inflow during the period t

C_0 =Total initial investment costs

IRR=the internal rate of return

t=the number of time periods

4. Payback Period in Years

The time needed to recoup the initial investment in a project through operations is known as the payback period. The payback period approach to financial analysis is employed to assess.

For capital projects, the return per year is calculated from the project's commencement until the total accumulated returns match the investment's cost; at that point, the investment is said to have been paid back; the period of time it took to achieve this payback is referred to as the payback period. According to the payback choice rule, viable projects must have payback times that are shorter than a management-specified maximum.(Femi et al.,2008).

$$\text{pay back period} = \frac{\text{Initial Investment}}{\text{Annual Cash Flow}} \quad 3-3$$

5. Break-even analysis

Break-even analysis is a simple attempt to estimate the volume point at which a firm can break-even (earn no profits but make no losses) on a product, a product line, on a factory, or even across a whole business. It is based on a

recognition that some costs are fixed with respect to volume and others are variable (Mcgee, 2015).

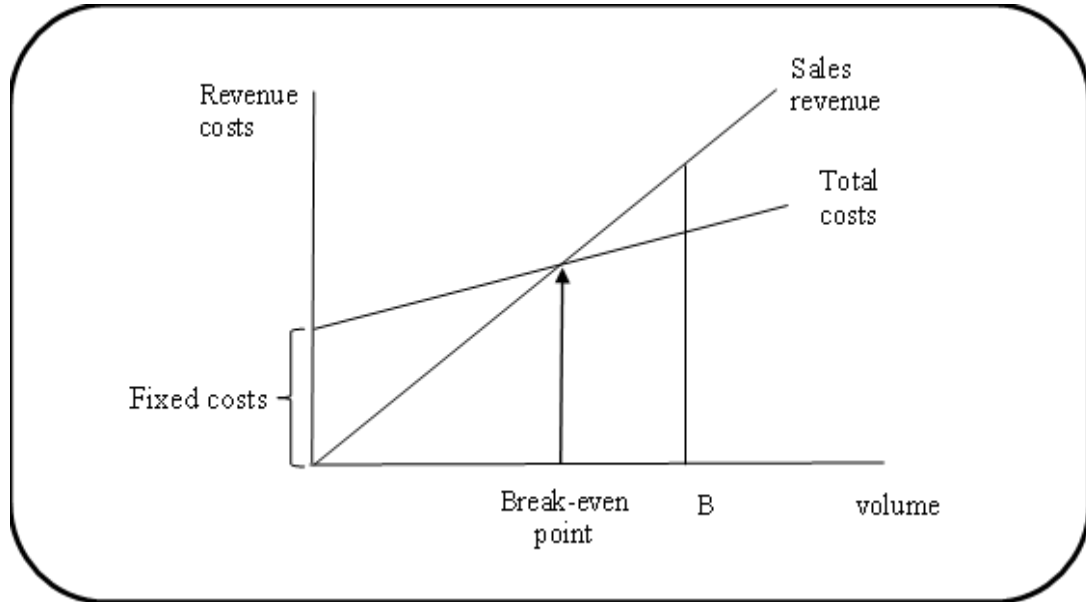


Figure 3-5: Break-even Point (Mcgee, 2015)

6. Margin of safety

The margin of safety is the difference between the amount of expected profitability and the break-even point. The margin of safety formula is equal to current sales minus the breakeven point, divided by current sales.

$$\text{Margin of Safety} = (\text{Current Sales Level} - \text{Breakeven Point}) / \text{Current Sales Level} \times 100 \quad 3-4$$

After all costs are analyzed using the above-mentioned methods, the results are analyzed using the sensitivity analysis criterion.

In a numerical (or otherwise) model, the Sensitivity Analysis (SA) is a method that measures how the impact of uncertainties of one or more input variables can lead to uncertainties on the output variables. This analysis is useful because it improves the prediction of the model, or reduces it by

studying qualitatively and/or quantitatively the model response to change in input variables, or by understanding the phenomenon studied by the analysis of interactions between variables. However, the target of interest must not be the model output per se, but the question that the model has been called to answer (Pichery, 2014).

All the above-mentioned steps of financial feasibility study are shown in figure (3-6).

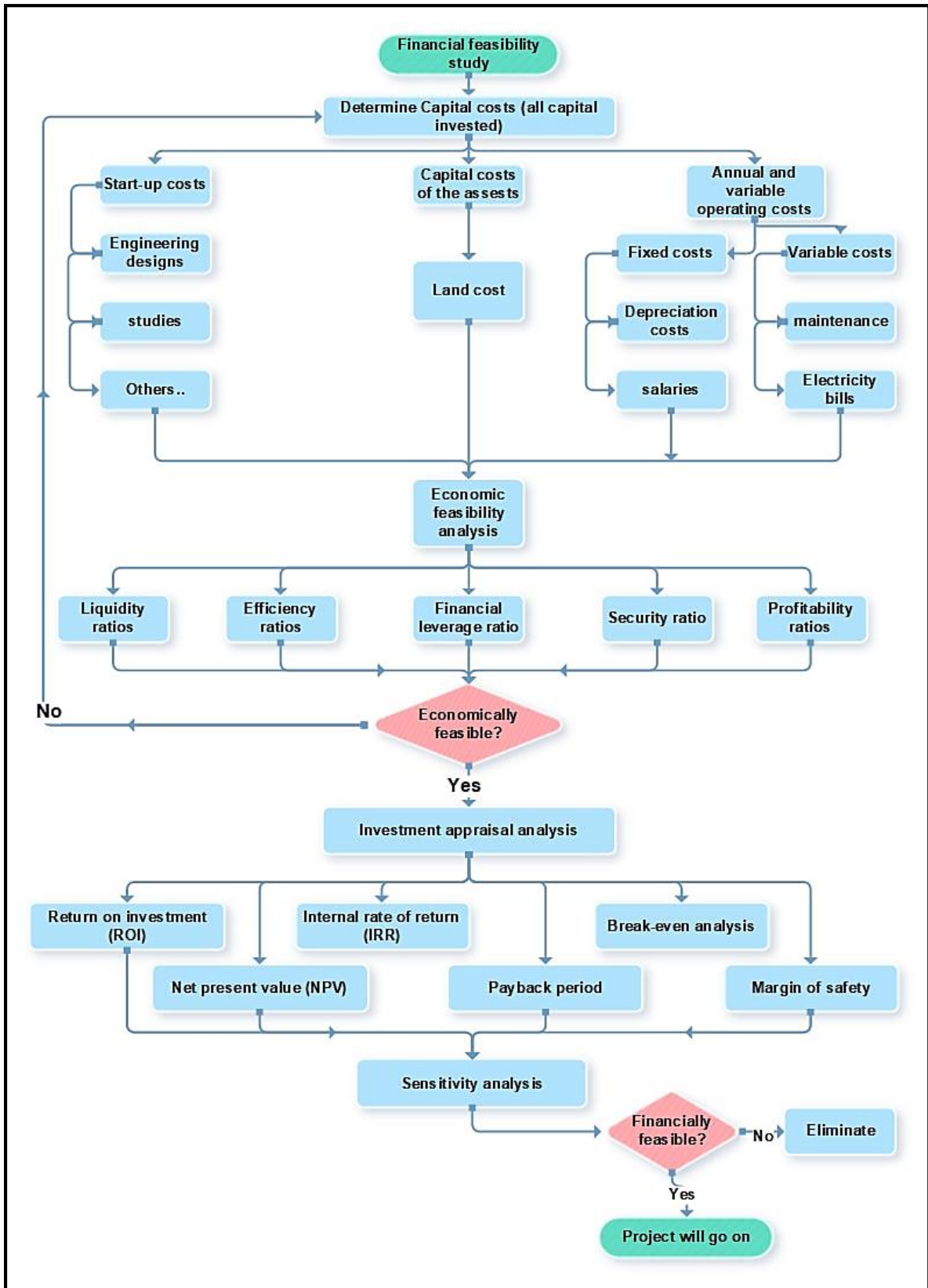


Figure 3-6: Financial Feasibility Study Flowchart

3.7 Operational Feasibility Study Framework

Operational feasibility framework consists of several interrelated activities to give an integrated study on the operation of the project, including performance level measurement followed by timely information needed for operation process then a specific economic analysis for this process contains a comprehensive and thorough study of several criteria in the project operation process as required and within the specified specifications.

These criteria are control, that is control information, data and accuracy and ensure security of these factors then check efficiency of the project via resources identification and availability and labor time utilization after that the assessment of service introduced by verify their reliability, flexibility and extendable services provision.

Operational feasibility study gives a clear idea about the feasibility of project during operation stage therefore it is important and every feasibility report must govern this study.

The proposed detailed flowchart shown in figure (3-7) illustrates sequence to achieve the project objectives in operation stage.

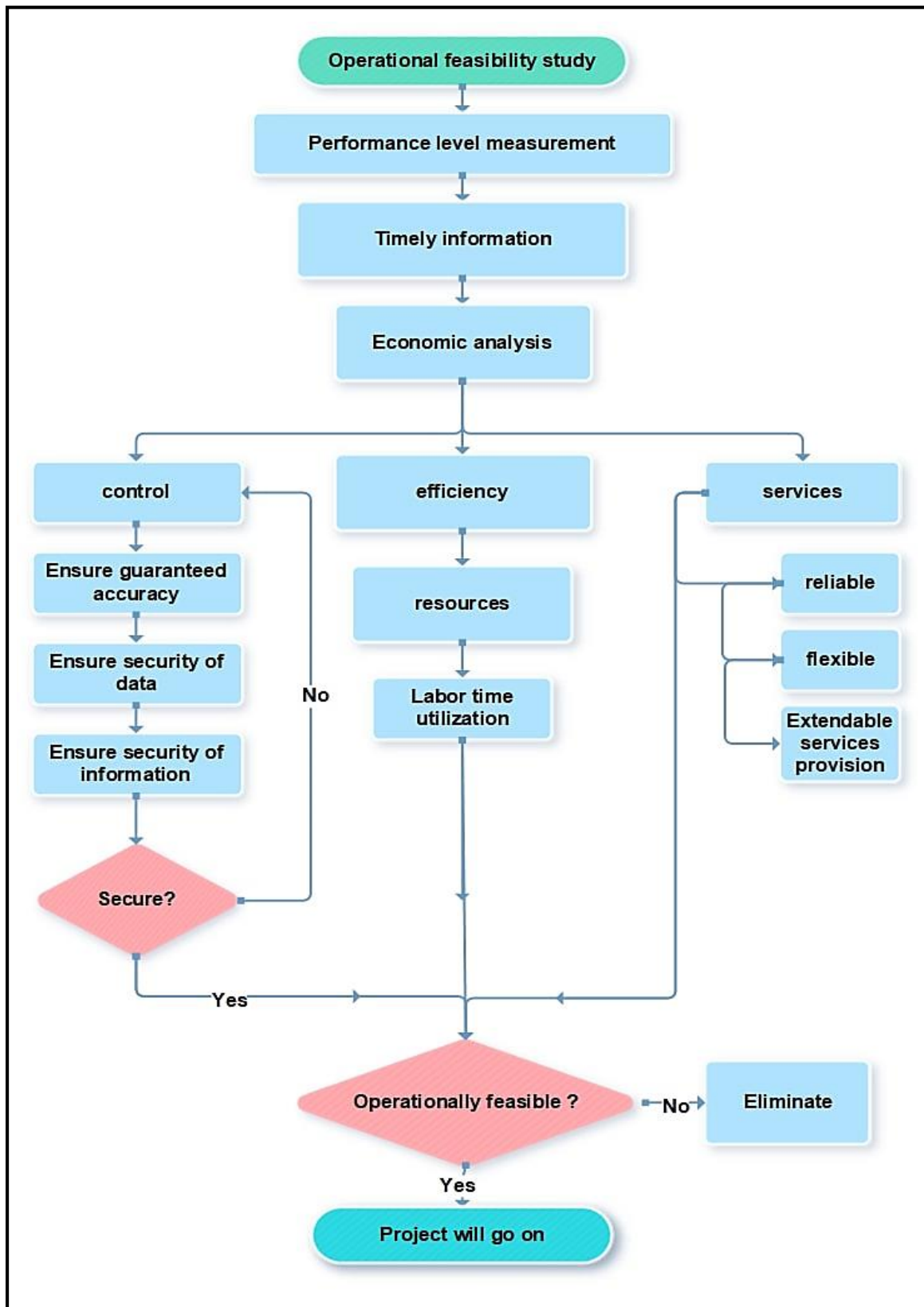


Figure 3-7: Operational Feasibility Study Flowchart

3.8 Environmental Feasibility Study Framework

Attention to environmental feasibility studies for various development projects has now become an imperative, in addition to economic feasibility studies aimed at ensuring that the project achieves the largest possible financial benefits.

The process of studying the economic feasibility of projects passes through many stages or steps that start with identifying the effects and end with providing recommendations.

These steps can be summarized by the identification of obstacles to the implementation and establishment of the project, identifying all available options to achieve its objectives, deciding the requirements, data and scope of the environmental impact assessment and to predict the size of the expected environmental impacts from the proposed investment project then evaluate the expected effects and their scope.

If these impacts affect the physical aspects of the environment such as air, water and land, or non-physical aspects such as odors, noise and biological diversity, all of them must be taken into consideration when studying the feasibility of infrastructure projects in order to preserve the environment surrounding the project and not harm it during construction, operation or maintenance.

Preparing the final environmental impact report is an urgent necessity in order to obtain approval from the competent authorities. The final environmental impact report includes: the results of the environmental impact assessment, data sources, and levels of confidence, conclusions and recommendations related to the basic requirements and risks to reduce environmental impact.

Adverse environmental impacts and possible control methods, as well as a description of the procedures and justify any necessary or recommended actions to be taken.as shown in figure (3-8).

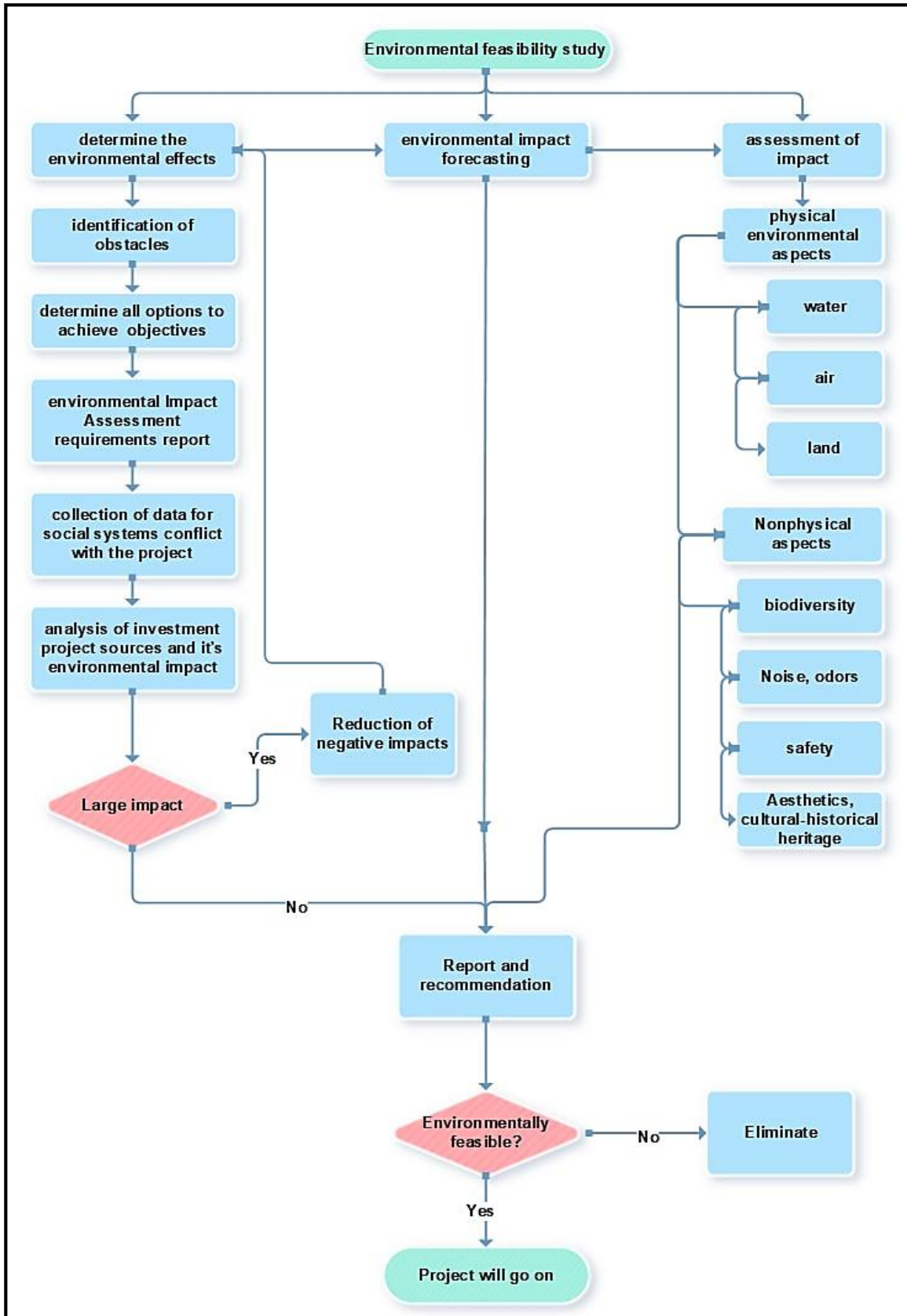


Figure 3-8: Environmental Feasibility Study Flowchart

3.9 Organizational Feasibility Study Framework

The planned ownership structure, the management group, and important organizational concerns should all be described in this section. It features: the organization's legal structure and the planned ownership structure: possible collaborators, financiers, and the suggested management structure: Determine the necessary experience and qualifications for the essential jobs. The flowchart in figure (3-9) reveals the above steps.

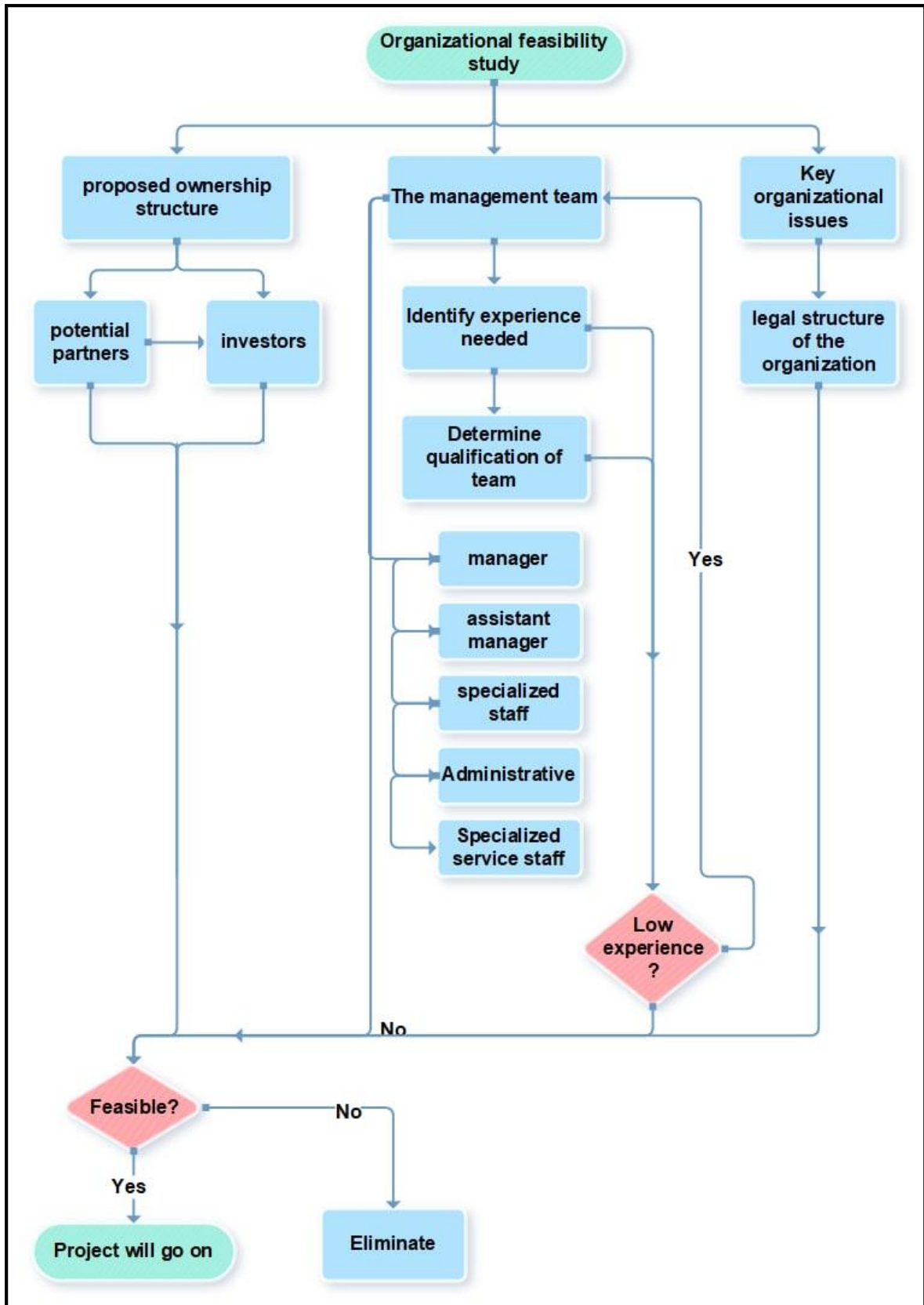


Figure 3-9: Organizational Feasibility Study Flowchart

3.10 Social Feasibility Study Framework

The social environment consists of the prevailing values and forces in society affecting it, which reflects its tangible impact on the intellectual and moral structure for individuals. The importance of its study lies in its close association with infrastructure projects, as it is profitable societal projects and in the fact that it is the main source of food supply the project under study, with its needs of experts, workers and technicians, and emphasizing the continuous change of the nature of the social environment, which necessitates the importance of the project gained sufficient flexibility to deal with these variables and the analysis of the social environment requires specific information about:

1. The degree of acceptance of the social environment for the products of the project under study.
2. If there is a conflict between the project's products and between the values and customs prevalent in society.

The proposed administrative system included several steps to analyze and study the social feasibility of the project. First, the impact of the project on employment and the provision of job opportunities for community members is studied, and how it is possible to reduce unemployment by employing graduates or workers and employees during the project implementation and operation period, and then follow this step to study the impact of the shock on national income Does it increase its cost compared to its cost?. In addition, the impact of the project on the balance of payments must be analyzed, and then the resulting effects on society from the project are evaluated, whether its effects are positive, as it improves the living conditions of community members and contributes to improving the services provided.

Finally, in all types of detailed feasibility study of the project, there must be an assessment of the potential risks of the project, determining whether the project is socially feasible or not, and making the final decision to continue or cancel the project. All the steps mentioned are shown in the figure (3-10)

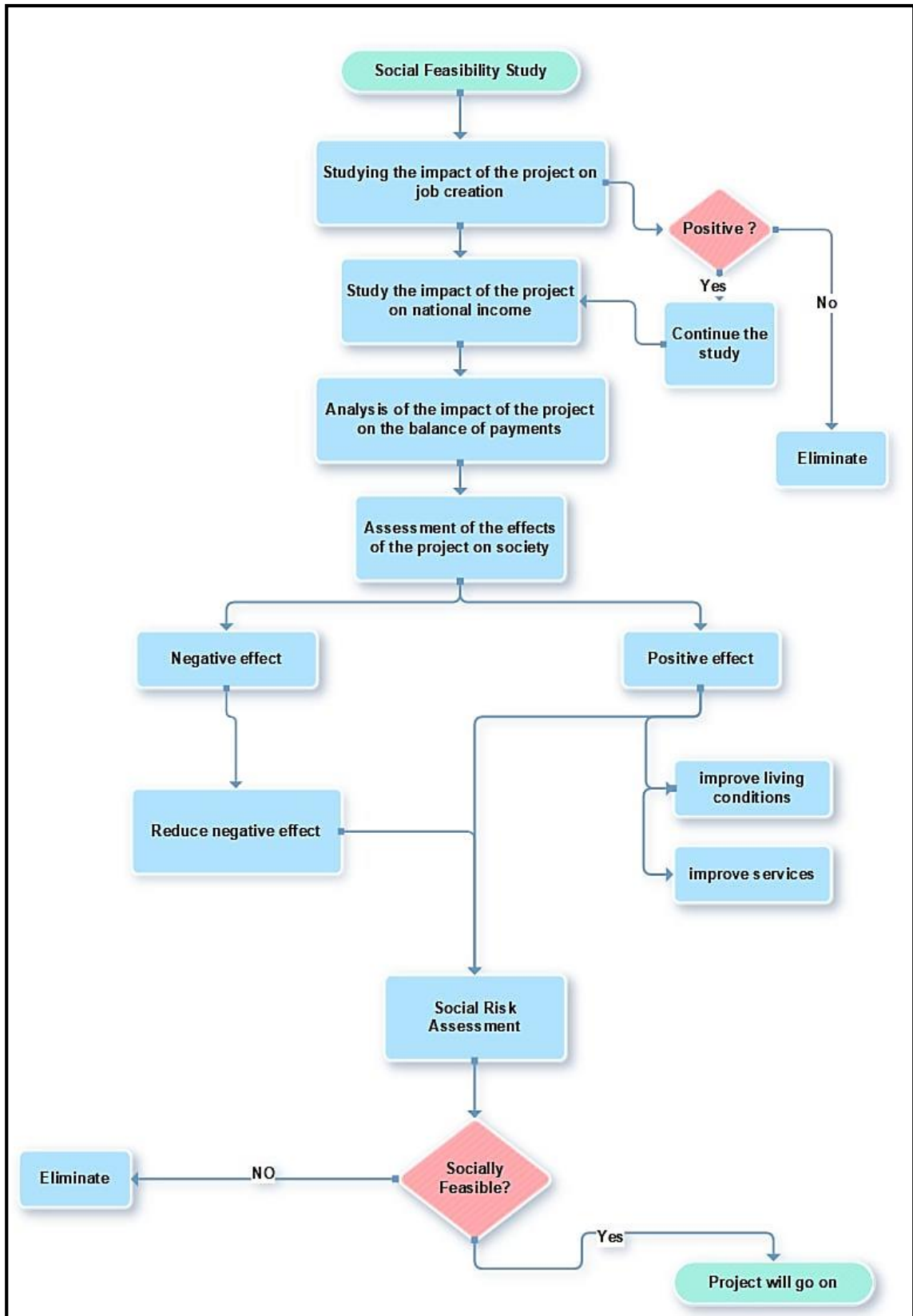


Figure 3-10: Social Feasibility Study

Chapter Four: Field Study

4.1 Introduction

The preceding chapters discussed the feasibility study idea and how to create a serial strategy for all sorts of feasibility studies. This chapter covers the aspects of the field questionnaire that support the research, including preparing the questionnaire questions based on the theoretical study and detailed schemes in the previous chapter and collecting and analyzing the questionnaire results, and the researcher's discussions about the extracted results.

4.2 Questionnaire Development

This stage of the field study includes the use of the questionnaire deduced from the theoretical study and the previous schemes as the main means of collecting field data used for the steps and types of the feasibility study from the previous stage. This stage includes the following:

4.2.1 Prepare Questionnaire Form

The questionnaire consists of two sections (Appendix 1):

The first section: Contains personal information about the members of the chosen sample such as, educational attainment, years of engineering experience, and current employment position.

The second section: This part of the form is concerned with determining the importance of the variables included in the study from (very important = 5 to not important at all = 1).

4.2.2 Selecting a Research Sample

The researcher circulated 75 questionnaires to engineers with project planning and implementation expertise, however only 54 forms were returned. During the selection process, it was stressed that the majority of the responders are engineers with expertise and positions in infrastructure project

directorates, as well as, university professors with extensive experience in this sector.

Table (4-1) shows the distribution of the sample items according to the districts in which the questionnaires were distributed and collected.

Table 4-1: The Distribution of the Sample Items

No.	Directorate	Number of forms distributed	Number of forms received
1	Karbala Investment Authority	11	9
2	Karbala Municipality Directorate	15	11
3	Karbala Roads and Bridges Directorate	9	5
4	Karbala Water Directorate	11	10
5	Department of Construction and Projects / University of Karbala	12	7
6	Karbala Sewage Directorate	10	7
7	University of Karbala	7	5

4.2.3 Reliability of the Study

The stability coefficient Alpha Cronbach was used, to ensure the stability of the measuring instrument used, and the overall test result reached 92.7%. It represents a high degree that reflects the stability of the measurement tool, as well as exceeding the acceptable percentage in the studies of social sciences and humanities (67%) (Fisher, 2007). The stability

coefficients for the study sections were also acceptable as shown in the following table:

Study axes	No. of questions	Reliability
The importance of the types of the detailed feasibility study	7	0.772
Difficulties in conducting a feasibility study	10	0.885
The steps of all kinds of feasibility studies	46	0.928
General Reliability of the questionnaire	63	0.927

Table 4-2: Reliability of questionnaire according to Cronbach's alpha stability coefficient

It shows the results of the Cronbach's alpha stability coefficient test for the study axes.

4.2.4 The Statistical Methods Used

A statistical package for the social sciences program (SPSS) was used and for the statistical methods that were used:

A- Descriptive Statistical Methods: percentages, frequencies, arithmetic mean and standard deviation, to describe the study sample and identify its characteristics, in addition to monitoring the trends of individuals towards the study variables.

B- Cronbach's Coefficient Alpha to know the reliability of the measurement tool represented by the questionnaire.

C- Relative Importance Level.

4.3 Analysis and Discussion of Results of the Questionnaire

To represent the results simply and easily, in addition to the relative circle (pie chart) representation.

4.3.1 The Personal Information of Research Sample

1. Academic achievement: The level of education is not lower than a bachelor's degree. Figure (4-1) shows the educational qualifications of the research sample, which shows that 68% of bachelor's degree holders.

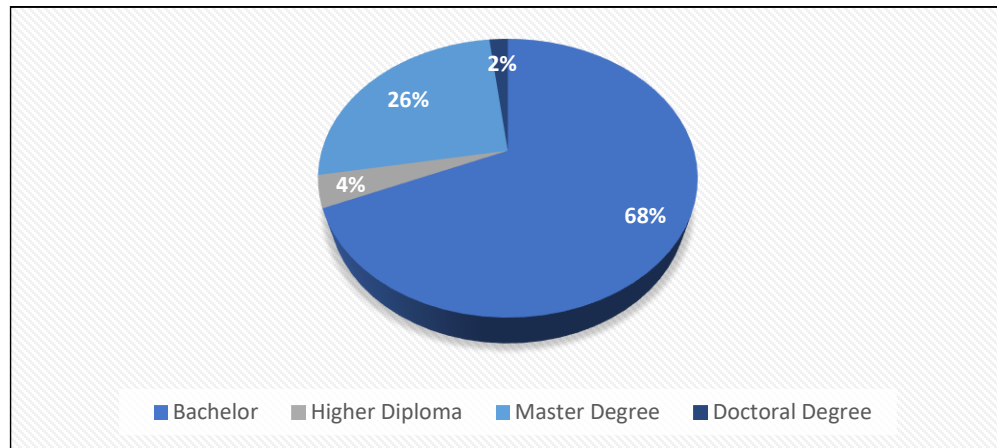


Figure 4-1: Academic Achievement of the Research Sample

2. Years of Experience: From Figure (4-2), it is noticed that most of the questionnaire samples have employment experience of more than 20 years, accounting for (37%), while those with experience between (5-10) years (13%), While the other percentages were distributed between years of experience (10-15) with (28%) and (15-20) years with a near percentage (22%).

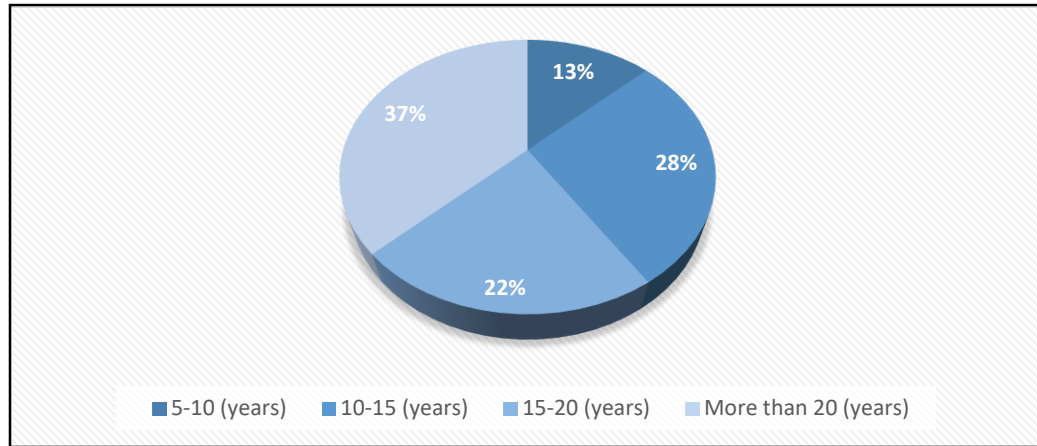


Figure 4-2: Years of Experience

3. Engineering Specialization: Figure (4-3) shows that the vast majority of the research sample (65%) are in civil engineering.

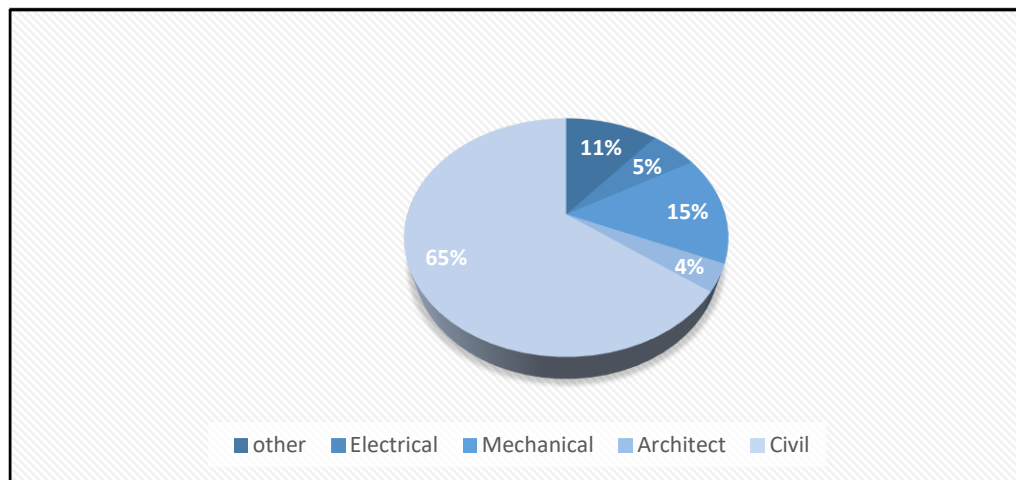


Figure 4-3: Engineering Specialization

4. Employment Position: Figure (4-4) shows the position of the research sample. It can be seen that (39%) of the sample are engineers, (24%) are department heads, (20%) are used for chief engineers, (9%) for managers, and (8%) for university professors.

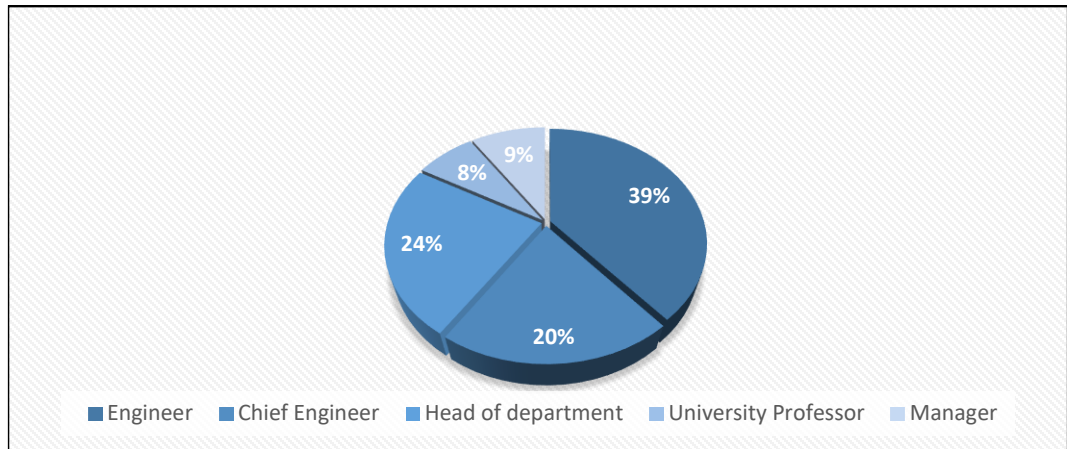


Figure 4-4: Employment Position for Research Sample

3. Relative Importance Index (RII)

Respondents' feedback on the questionnaire was assessed by using a five-point Likert scale (1-5). The scale provides an ordinal type because ranking is formal; important, neutral, not very important, not important. To ensure the reliability of the scale, the value of Cronbach's alpha for each construct was measured.

This should be noted when conducting research responses were obtained on a Likert scale (1-5). That is why parameterized methods are not practical nor applicable to assessing respondents' preferences (Waris et al., 2014).

Therefore, the relative importance index method is used to determine the relative importance of feasibility studies steps. The Relative Importance Index (RII) is a nonparametric technique commonly used by building and facilities management researchers to analyze the responses of structured questionnaires to data involving ordinal measures of attitudes. (Kometa et al., 2006).

Equation (4-1) shows a formula that was used to find out the relative index (Mukhtar et al., 2020).

$$RII = \frac{\sum W}{A*N} = \frac{5n_5+4n_4+3n_3+2n_2+1n_1}{5*N} \quad 4-1$$

Where:

W= the weighting that is assigned to each variable by the respondent

A = the highest weight

N = the total number of respondents.

The RII value ranges from 0 to 1 with 0 not inclusive and the higher the RII value, the more important the feasibility step, and vice versa.

The comparison of RII with the corresponding importance level is measured from the transformation matrix, as proposed by (Chen et al., 2010) According to him, derived importance levels from RII are as follows in table (4-3):

Table 4-3: Importance Level (Chen et al., 2010)

High	$0.8 < RII < 1.0$	(H)
High-Medium	$0.6 < RII \leq 0.8$	(H-M)
Medium	$0.4 < RII \leq 0.6$	(M)
Medium-Low	$0.2 < RII \leq 0.4$	(M-L)
Low	$0.0 < RII \leq 0.2$	(L)

1. Importance of Feasibility Studies:

the relative important index (RII) of feasibility studies and their importance level are shown in Table (4-5) The ranking table reveals that four categories were classified as "High" relevance levels, which are technical with

RII (0.94) followed by financial and economic feasibility with (0.93), operational (RII 0.84), environmental (RII 0.83). These types regarded as critical. The Relative Index (RII) of these "High" relevance indicators is in the range of 0.83–0.94. As it is clear from the respondents’ answers that the technical, economic, financial, environmental, and operational feasibility study is of the highest importance in the feasibility studies, followed by the rest of the studies also with medium to high importance rates.

Table 4-4: Relative Importance Index for Feasibility Study Types

No.	Feasibility Study	Mean	Std. Deviation	RII	RII Level
1	Technical feasibility study	4.69	.469	.94	H
2	Financial and economic feasibility study	4.65	.588	.93	H
3	Marketing feasibility study	3.91	1.014	.78	H-M
4	Environmental Feasibility Study	4.13	.933	.83	H
5	Social Feasibility Study	3.61	1.017	.72	H-M
6	Organizational Feasibility Study	3.83	.841	.77	H-M
7	Operational Feasibility Study	4.22	.793	.84	H

2. Difficulties and Obstacles in Conducting Feasibility Studies:

Table (4-6) shows the RII and RII levels for the obstacles to conducting a feasibility study in projects. It indicates that the

unavailability and accuracy of information obstacles have the highest RII with 0.9 followed by other difficulties.

Table 4-5: RII for Difficulties of Feasibility Study

No.	Difficulties and Obstacles	Mean	Std. Deviation	RII	RII Level
1	Unavailability and accuracy of information	4.52	.795	.90	H
2	The high costs of conducting the study	3.63	.958	.73	H-M
3	Lack of experience, competence, and skill in preparing studies	4.20	.810	.84	H
4	The difficulty of estimating the variables included in the study	3.94	.899	.79	H-M
5	Risks of Uncertainty	4.02	.858	.80	H-M
6	The problem of choosing the appropriate criterion or criteria in the evaluation	3.96	.800	.79	H-M
7	The degree of awareness and conviction of the importance of the study	4.15	.856	.83	H
8	Technical Obstacles	4.22	.839	.84	H
9	The lack of specialized offices in the region to complete the study	4.19	.826	.84	H
10	Lack of financial means to complete the study	4.00	.795	.80	H-M

3. The Variables Included in the Study

A. Technical Feasibility Study:

Technical feasibility steps included in the study were ranked as “High” level of importance for every step with a range between 0.87 - 0.9.

The engineering works (civil, mechanical...etc) has the highest RII 0.9 as shown in table (4-7). It will be noticed that RII values are convergent.

Table 4-6: RII for Technical Feasibility Steps

No.	Feasibility Study	Mean	Std. Deviation	RII	RII Level
1	Materials and supplies to be provided for the project	4.46	.605	.89	H
2	Work location and surrounding environment	4.44	.538	.89	H
3	The technology used in the project and machines	4.39	.685	.88	H
4	All engineering works (civil, mechanical, etc.)	4.48	.606	.90	H
5	Human resources (workers and employees)	4.39	.564	.88	H
6	Technical risk assessment	4.33	.727	.87	H

B. Financial and Economic Feasibility Study:

Financial and economic study is one of the most important studies in infrastructure projects and as shown in table (4-8) the most of the steps included in this study have an RII level is “High” with a range between 0.92-.82 where the step of determine capital cost (all the money invested) has the RII 0.92 and a break-even point is the only step has an RII level “High - Medium” with RII of 0.78.

Table 4-7: RII for Financial and Economic Feasibility Study

No.	Financial and Economic Feasibility Study	Mean	Std. Deviation	RII	RII Level
1	Determine capital costs (all the money invested)	4.61	.529	.92	H
2	Economic analysis (financial liquidity ratio, efficiency, safety, interest)	4.31	.609	.86	H
3	internal rate of return	4.15	.899	.83	H
4	Payback period	4.09	1.051	.82	H
5	Return on investment	4.20	.833	.84	H
6	Break-even point analysis	3.91	.875	.78	H-M
7	Determine the margin of safety	4.17	.694	.83	H
8	Assessing financial risks and finding solutions to them	4.33	.700	.87	H

C. Market Feasibility Study

Table (4-9) explains the steps of the marketing feasibility study included in the research and the levels of the relative importance of the variables were at the highest level. The description of the product or service resulting from the project has an RII of 0.85, while service specifications in light of the tastes and desires of consumers have an RII of 0.79 and it is considered a good percentage because the RII level is between “High-Medium”.

Table 4-8: RII for Market Feasibility Study

No.	Feasibility Study	Mean	Std. Deviation	RII	RII Level
1	description of the product or service resulting from the project	4.24	.799	.85	H
2	Analyze and study the details of the product and its manufacture	4.13	.802	.83	H
3	supply and demand conditions	4.11	.904	.82	H
4	Price levels	4.11	.839	.82	H
5	Service specifications in light of the tastes and desires of consumers	3.96	.951	.79	H-M
6	Drawing the marketing strategy, which includes the best methods for distribution, promotion ,and pricing	4.13	1.029	.83	H
7	Assessing risks in the market and finding solutions	4.17	.885	.83	H

D. Environmental Feasibility Study:

The environmental impact of the project has a significant impact, and the environmental feasibility study occupies an important position in the sequence of feasibility studies for mega infrastructure projects as it affects the environment surrounding the project and the impact during operation. Therefore, the study of its preparation steps was extensive, and the relative importance index for six out of the steps was between 0.83 and 0.87 at a "high" level. Where determining the environmental impacts (obstacles to the implementation and establishment of the project) step has the highest value of RII (0.89) as shown in table (4-10):

Table 4-9: RII for Environmental Feasibility Study

No.	Feasibility Study	Mean	Std. Deviation	RII	RII Level
1	Determining the environmental impacts (obstacles to the implementation)	4.43	.570	.89	H
2	Report the requirements, data ,and scope of the environmental impact assessment	4.30	.743	.86	H
3	Collect baseline data on social, economic ,and cultural systems, policies ,and development projects that are likely to conflict with the project	4.13	.802	.83	H
4	Forecasting the expected environmental impacts from the proposed investment	3.93	.866	.79	H-M
5	Assessment of the expected impacts, their scope ,and continuity	4.17	.607	.83	H
6	Preparing the final environmental impact report and the necessary recommendations	4.24	.671	.85	H
7	Environmental Risk Assessment	4.35	.588	.87	H

E. Operational Feasibility Study:

Table (4-11) illustrates the values of the relative importance index for the operational study steps, the efficiency of work staff got a “high” level of importance with an RII of 0.91 while the extendable service provisions got “high – medium” level and the other steps got “high” level.

Table 4-10: RII for Operational Feasibility Study

No.	Feasibility Study	Mean	Std. Deviation	RII	RII Level
1	Study project performance metrics	4.49	.608	.90	H
2	Information and time management	4.00	.614	.80	H-M
3	Control of data, information , and accuracy in project operation	4.39	.596	.88	H
4	Work staff efficiency	4.56	.572	.91	H
5	Make full use of working time	4.30	.662	.86	H
6	Study the characteristics of the service (effective, flexible)	4.04	.776	.81	H
7	Extendable Service Provisions	3.85	.856	.77	H-M
8	Assessment of the operational risks of the project	4.39	.656	.88	H

F. Organizational Feasibility Study:

Table (4-12) reveals the steps of organizational study; this study is rarely conducted for projects in Iraq.

The step of experience and qualifications required got the higher RII value of 0.92 with “high” RII level. Then the rest of the steps followed, where the level of the relative importance index ranged between “medium-high”.

Table 4-11: RII for Organizational Feasibility Study

No.	Feasibility Study	Mean	Std. Deviation	RII	RII Level
1	Proposed ownership structure	4.00	.777	.80	H-M
2	management team	4.19	.617	.84	H
3	Regulatory issues	3.87	.802	.77	H-M
4	Potential partners and investors	3.80	.877	.76	H-M
5	Experience and qualifications required	4.59	.599	.92	H

G. Social Feasibility Study:

The importance of social feasibility has already been known. Therefore, the answers of the respondents were in support of the proposed administrative system. The table shows the indicator of the relative importance of the steps of its implementation, as it obtained high rates.

The assessment of the effects of the project on society step got RII value 0.84 this is due to the importance of this matter while studying the impact of the project on national income step got 0.78 RII value with level “high-medium” due to respondent’s opinion. As shown in table (4-13).

Table 4-12: RII for Social Feasibility Study

No.	Feasibility Study	Mean	Std. Deviation	RII	RII Level
1	Study the impact of the project on employment	3.98	.687	.80	H-M
2	Studying the impact of the project on national income	3.89	.793	.78	H-M
3	Analysis of the impact of the project on the balance of payments	4.02	.765	.80	H-M
4	Assessment of the effects of the project on society	4.19	.826	.84	H
5	Social Risk Assessment	4.13	.972	.83	H

4.4 Summary

Looking at the previous results, which include the relative importance index and its level for the variables included in the study, it was found that these variables are important for the respondents and the indicators ranged from medium to high, which confirms that the questionnaire is supportive of the research and schemes mentioned in the previous chapter.

**Chapter Five: Development Computer Program to Feasibility
Study**

5.1 Introduction

In order to increase the capacity, portability and efficiency of the proposed administrative system, by taking advantage of the characteristics and advantages of using and employing the computer, and in order to achieve speed and accuracy in the results of the application of the system, the researcher has built and designed an interactive computer program that can be adopted in determining the feasibility of the project based on the main project information.

In order to achieve the best benefit from computer applications in the field of construction management or any other science, there are three different ways to achieve this:

1. Use the ready-made program.
2. Developing a program obtained through the use of ready-made software and making it compatible with the user's requirements.
3. Designing and building a program and making it fit with the problem for which it was developed and be easy to deal with by the user.

Accordingly, the researcher used the third type by building a program for the feasibility study, which is easy for the user.

5.2 Program Specification

The researcher has created and produced an interactive computer software that can be used in the feasibility analysis of any project, whether it is a large-scale infrastructure project or a small-scale project.

The following specifications described the intended program:

- a. Writing and designing the program using the (Access) application under the Windows operating system (Windows) and the language (Visual

Basic.net), keeping in mind that the program's needs are extremely simple and do not necessitate a computer with particular specifications.

B. The software user's comfort and simplicity was a title in the work, indicating that it responds to the most basic levels of computer comprehension and usage.

c. The speed, precision, and orderliness of the process are defining features.

D. Another need is the precision with which the evaluation findings are communicated, as well as the accuracy with which the reports created by the program are communicated.

5.3 Scheme of Program Work

The following diagram (5-1) illustrates the sequence of steps of the computer program:

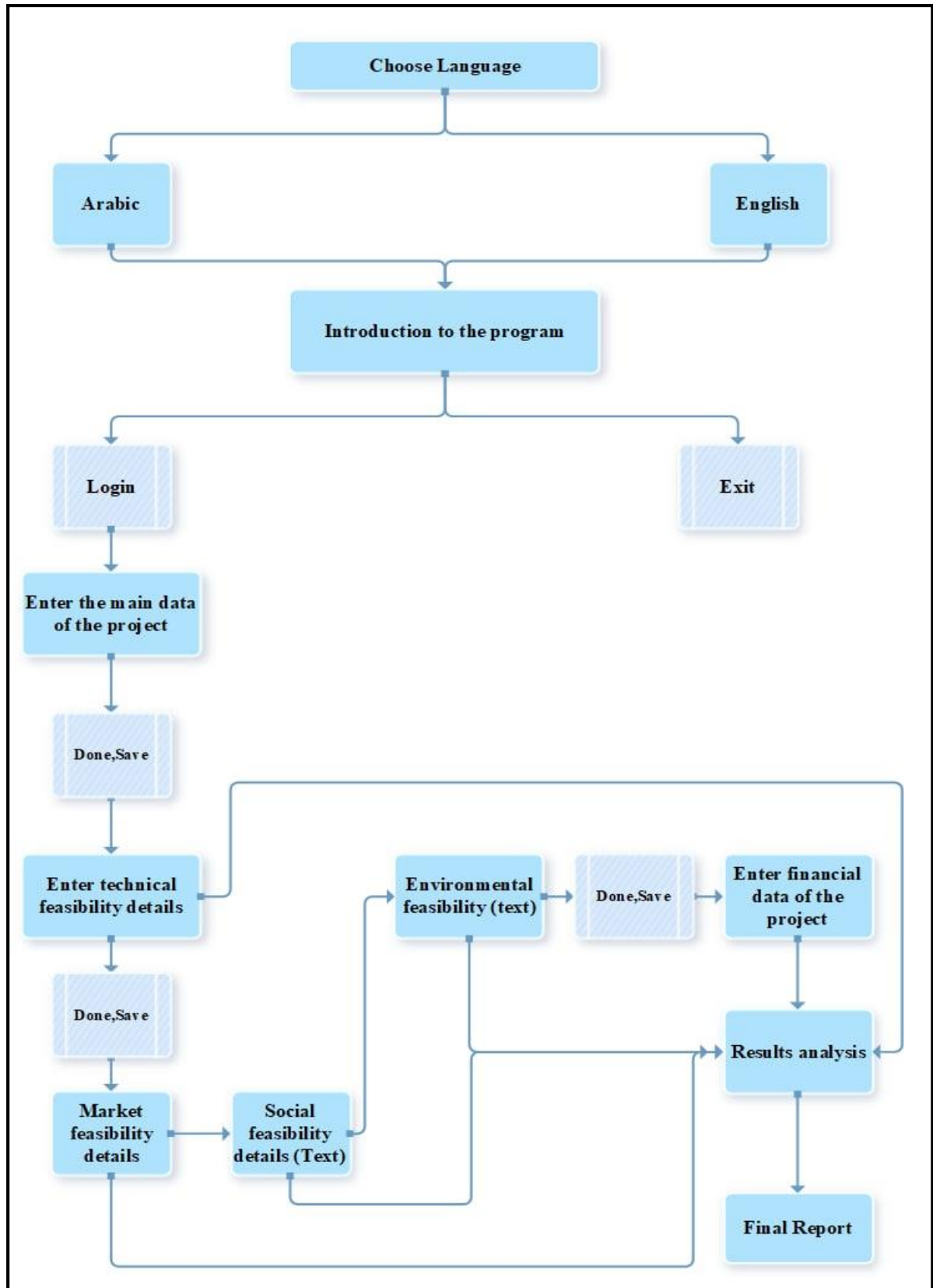


Figure 5-1: Scheme of Program Work

5.3.1 Running the Computer Program

For the purpose of running the program from the computer, follow the following steps:

5.3.1.1 Entering the Program

When the program is run, a language selection window appears if the user wants to use English or Arabic As shown in Figure (5-2) and (5-3)

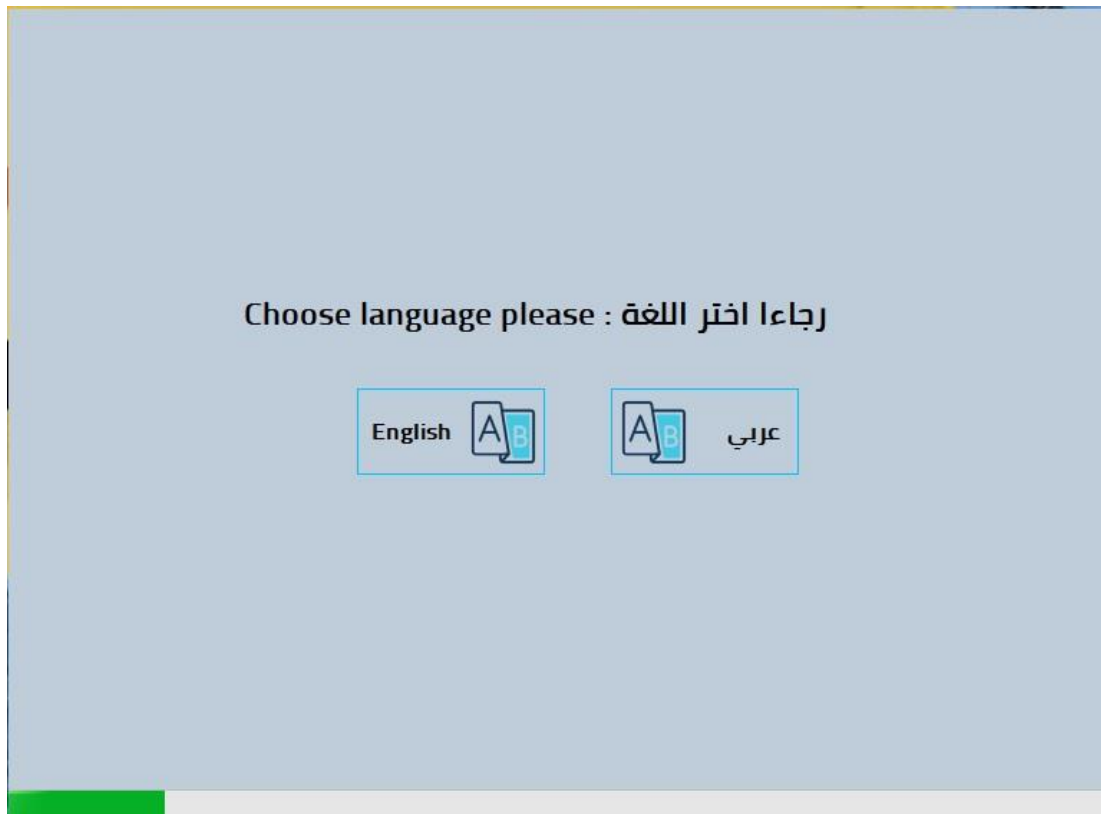


Figure 5-2: First Page of Program (Choose Language)

When user choose the language for example (English) the following window will appear. Figure (5-3)

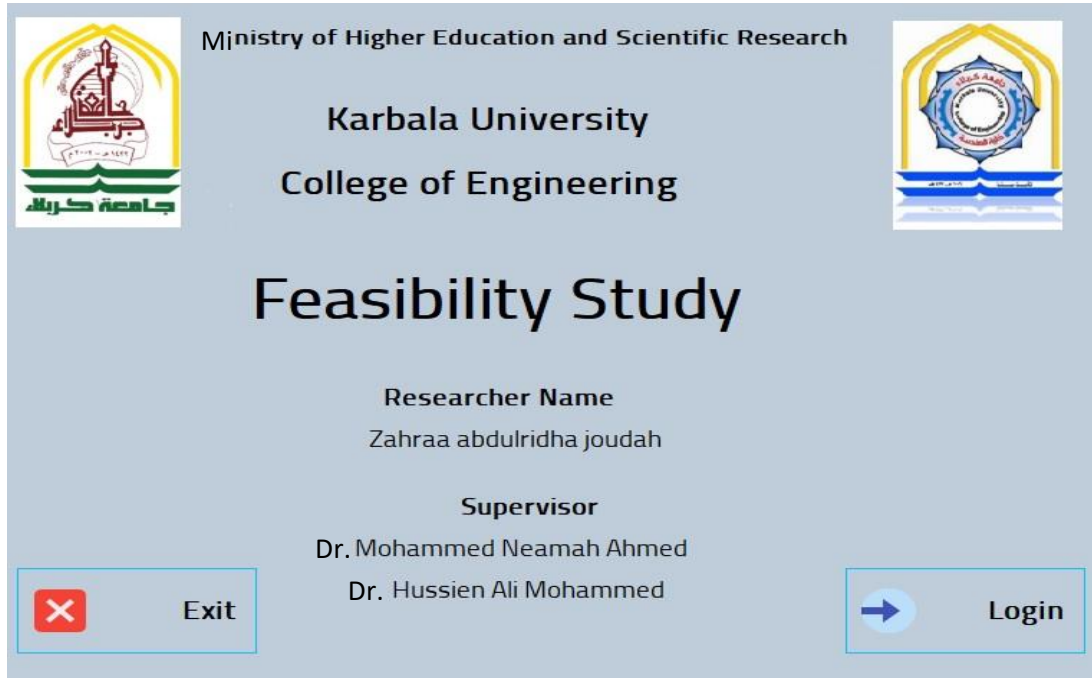


Figure 5-3: Program Introduction Window

After logging in to the program, a selection window appears, either as a new project or choosing a project whose data is already saved in the program's database, in addition to the option of deleting the selected project, as shown below in figure (5-4).



Figure 5-4: Data Base Options

5.3.1.2 Project Feasibility Details

1. The main data window

This window consists of the main data for the project which are the name of the project and the governorate in which it is implemented, in addition to the implementing agency and the beneficiary.

The main data also includes the total invested capital of the project, the foundation and the fixed, in addition to the labor required during the period of implementation and operation and the period of completion of the project.

When completing the entry of this data by the user, he presses on the word done, then to the top of the window and chooses the file list and presses save progress before moving to the next page. The above information is shown in the following figures.

The screenshot shows a software application window titled "Form1_en - (Frm1_en)". The window has a menu bar with "File" and "Previous studies". Below the menu bar is a ribbon with several tabs: "Main data" (selected), "Technical feasibility study", "Marketing feasibility study", "Financial and economic feasibility study", and "Study Result". The "Main data" tab contains a form with the following fields:

- Project name:
- Project location:
 - Governorate:
 - city:
 - District:
 - sub-district:
- Beneficiary:
- Implementing agency:
- Estimated total cost of the project:
- Fixed capital of the project:
- The start-up capital of the project:
- The capital invested for the project:
- Project implementation period:

At the bottom of the form, there are four buttons: "Done" (with a green checkmark icon), "Next" (with a blue left arrow icon), "Exit" (with a red X icon), and "Back" (with a blue left arrow icon). On the right side of the form, there is a decorative image of a calculator, a pen, and a document with a bar chart. The window title bar includes standard Windows window controls (minimize, maximize, close).

Figure 5-5: Main Data Window

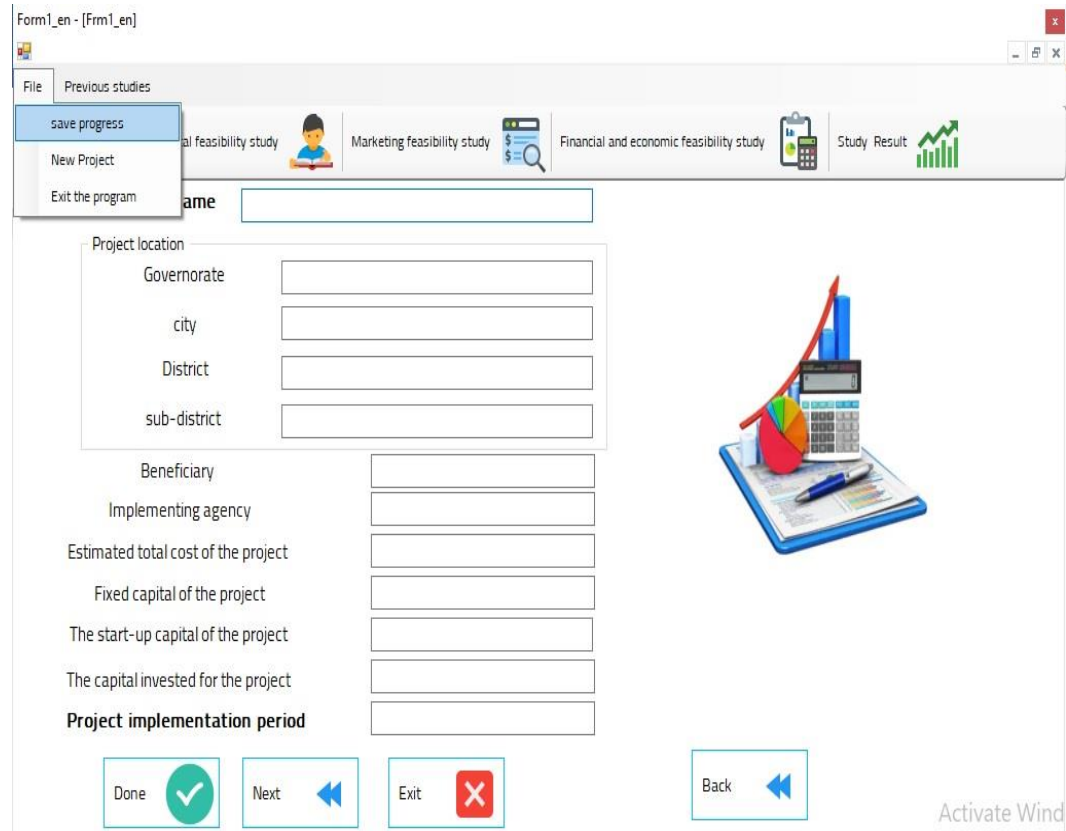


Figure 5-6: Save Progress Selection

2. Technical Feasibility Study Window

This window consists of technical feasibility information needed for the study including the internal planning of the project.

The user enters the technical feasibility information, such as the construction system of the project, the necessary numbers of employees and workers during implementation and operation, in addition to the availability of infrastructure to facilitate the implementation of the project, such as roads, water and electricity.

In the last text box, the user will enter the result of technical feasibility which not included in the above text boxes and click save progress to save the information.

Figure 5-7: Technical Feasibility Window

3. Marketing, Environmental, Social Feasibility Study Window

After selecting (next) option the window shown in figure (5-7) will appear, this window includes 3 studies which are market, environmental, social feasibility studies.

Form1_en - [Marketing feasibility study]

File Previous studies

Main data Technical feasibility study Marketing feasibility study Financial and economic feasibility study Study Result

Marketing feasibility study

Product Description

Price Levels

Service Specifications

The result of the environmental feasibility study

The result of the marketing feasibility study

The result of the social feasibility study

Done Next Close

Figure 5-8: Market, Social, and Environmental Feasibility Window

4. Economic and Financial Feasibility Window

In this window, all the information related to the financial and economic feasibility study is entered, which includes fixed costs such as the cost of the land, in addition to the costs of consulting, designs and others.

Then it moves to the fixed operational costs, where the expected depreciation rates for buildings, machinery and furniture and their costs are entered. The program automatically calculates the annual depreciation and then enters wages and salaries and automatically combines them with the depreciation costs to obtain the annual fixed operational costs. As shown in figure (5-9).

Figure 5-9: Financial and Economic Feasibility Window

After that, clicking on (done) option the following window will appear.

Figure 5-10: Second Window of Financial and Economic Feasibility

This window contains the variable costs and the program computes the annual revenue and return on investment in addition to payback period.

Furthermore, the program is able to compute net present value by entering the interest rate and annual flows over the required number of years, then the user presses (Done) and save the progress and then clicking on the option (Result of the study) .

The program will open a document in Microsoft word includes the result of the study and the evaluation of the project to print the report automatically.

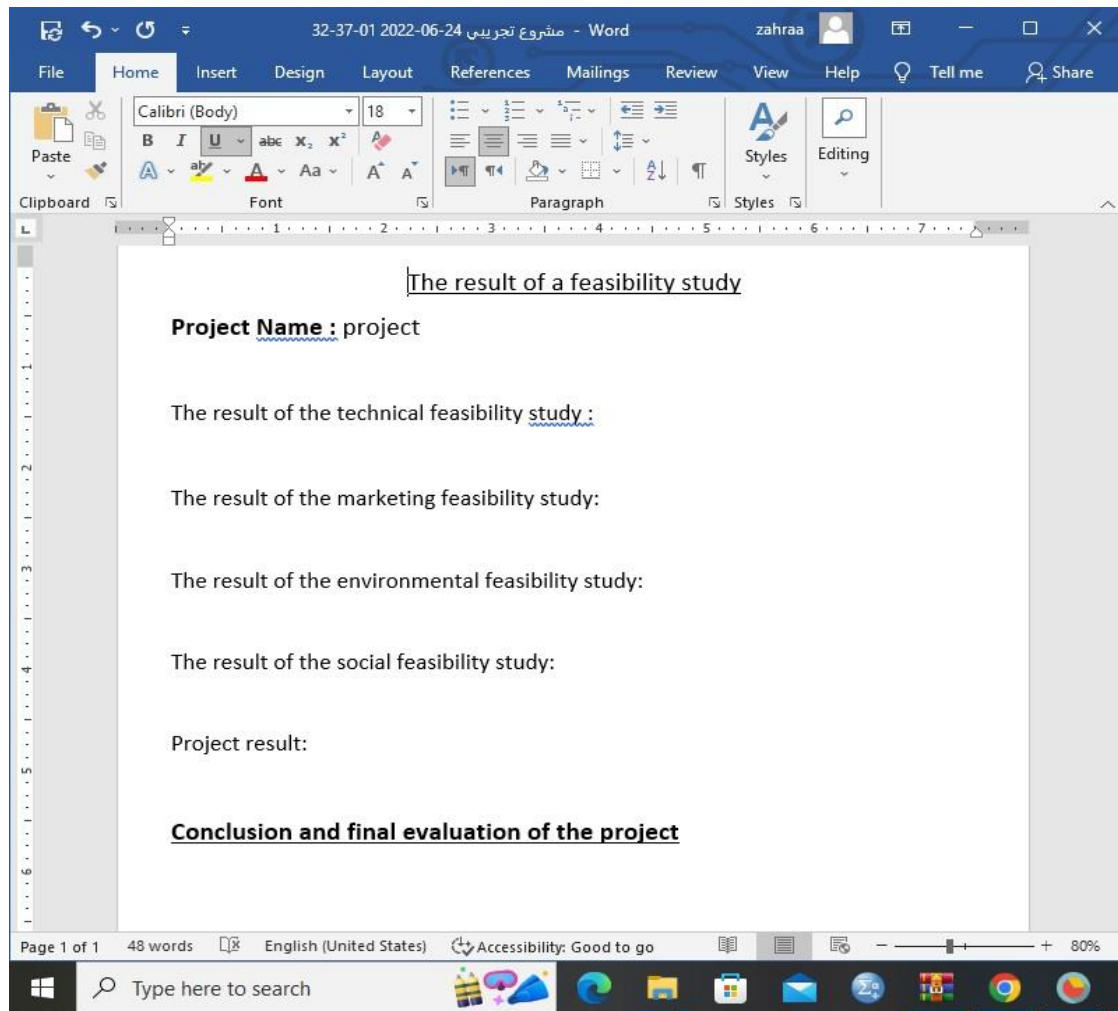


Figure 5-11: Microsoft Word Document (Final Report of The Study)

5.4 Case Study

To test the computer program, a case study was taken of the data of the project to establish a private university in Karbala, as it is one of the infrastructure and cultural elements of the country and because of its social importance to the governorate. The data was entered and a feasibility report was obtained in a Word file (costs by Iraqi Dinars) , as shown in the following figures:

Field	Value
Project name	University
Project location	
Governorate	Karbala
city	Karbala
District	/
sub-district	/
Beneficiary	Investor
Implementing agency	contractor company
Estimated total cost of the project	
Fixed capital of the project	6460956000
The start-up capital of the project	25000000
The capital invested for the project	7868594240
Project implementation period	18

Figure 5-12: Main Data of The Project

Form1_en - [Technical feasibility study]

File Previous studies

Main data Technical feasibility study Marketing feasibility study Financial and economic feasibility study Study Result

Technical feasibility study

Internal planning of the project

Project land area

Structural system

Availability of infrastructure

Electricity

Water

Sanitation

roads

Technical skills needed

workers during implementation

Labor during operation

Engineers

Number of employees

Number of workers

Materials to be provided

The result of the technical feasibility study

The building is designed according to the required design standards, urban planning standards are adhered to, and environmental and technical precautions are taken for that project is technically feasible.

Done Next Close

Figure 5-13: Technical Details of Project

Form1_en - [Marketing feasibility study]

File Previous studies

Main data Technical feasibility study Marketing feasibility study Financial and economic feasibility study Study Result

Marketing feasibility study

Product Description

Price Levels

Service Specifications

The result of the marketing feasibility study

The project is considered feasible from a marketing point of view as it supports the education sector in the country

The result of the environmental feasibility study

All environmental precautions were taken to preserve the environment adjacent to the project during the implementation phase and not to affect the environment during operation, as it is considered feasible from an environmental point of view.

The result of the social feasibility study

The project contributes to creating job opportunities and supporting the educational and cultural sector, as it is socially feasible

Done Next Close

Figure 5-14: Market, Environmental, and Social Feasibility Details

Chapter Five

Form1_en - [Frm4_en]

File Previous studies

Main data Technical feasibility study Marketing feasibility study Financial and economic feasibility study Study Result

Financial and economic feasibility study

The cost of fixed assets

cost of the land /

Capital costs (establishment)

Engineering Designs 15000000

Consultations 8000000

Other 2000000

cost of fixed capital in the project

Estimated building cost 6461956111

Operational costs

Annual fixed operating cost

A - Extinction

Depreciation rate for buildings 4

Depreciation rate for machines 10

Depreciation rate for furniture 15

Estimated cost of the building 6185956111

Estimated cost of the machines 125111111

Estimated cost of furniture 151111111

Operational costs

b- Wages and salaries

Employee salaries 875400000

Workers' wages 108000000

Total cost of wages and salaries 983400000

Total annual fixed operating costs 28457142219

Operational costs

Depreciation of buildings 24743824444

Depreciation of machinery 1251111110

Depreciation of furniture 2266666665

Total annual depreciation 28261602219

Done

Next

Close

Activate Windows
Go to Settings to activate Windows.

Figure 5-15: Financial Details of project

Form1_en - [Frm4_2_en]

File Previous studies

Main data Technical feasibility study Marketing feasibility study Financial and economic feasibility study Study Result

operating costs

Variable operating costs

Cost of services 5111111

Maintenance costs 12111111

Costs of training and rehabilitation /

Total annual variable operating costs 17222222

Annual operating costs 28474364441

Annual net profit

Annual Revenue 2192521111

Annual net profit 819881761

Profitability criteria

Rate of return on investment 10.419672637739 %

Annual cash flow 29081483980

Payback period

Investor arbitration period 50

Payback period 7.50570588674615

The payback period is less than the arbitration period (ok)

The payback period is greater or equal to the arbitration period

Break-even point of the project

Break-even point 9.057058867461

Net Present Value

Discount rate 1%

Number of years 5

Cash flows Click to enter cash flows

0

Done

Close

Result of the study

Figure 5-16: Profitability Criteria of The Project

As shown in figure above (5-16) the value of ROI was 10.4 % and it is considered as acceptable rate and payback period was 7.5 years which is less than 50 years.

As a result of the previous steps of the program the following window will appear showing the full report of the feasibility study including all types of it.

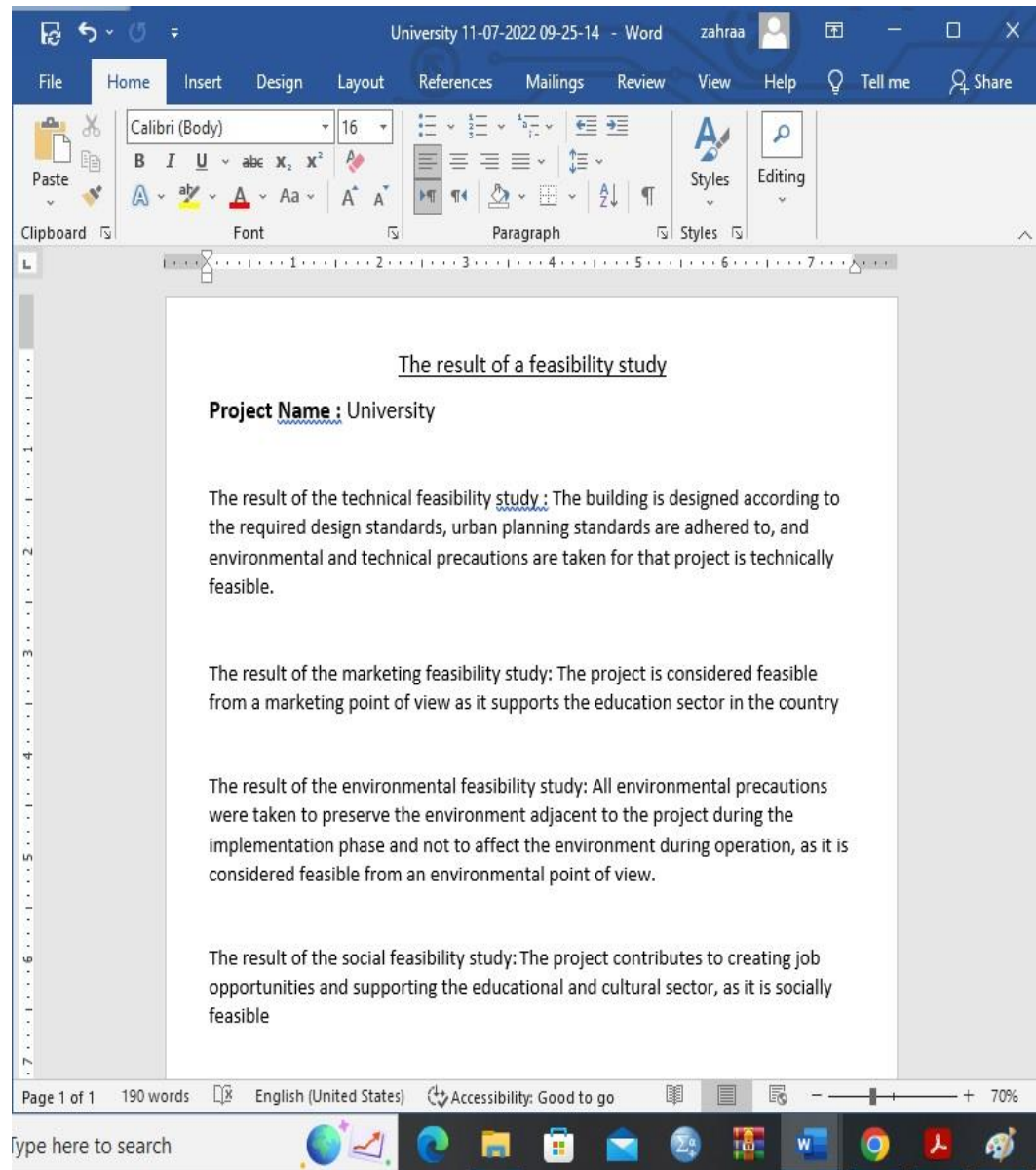


Figure 5-17: Final Report

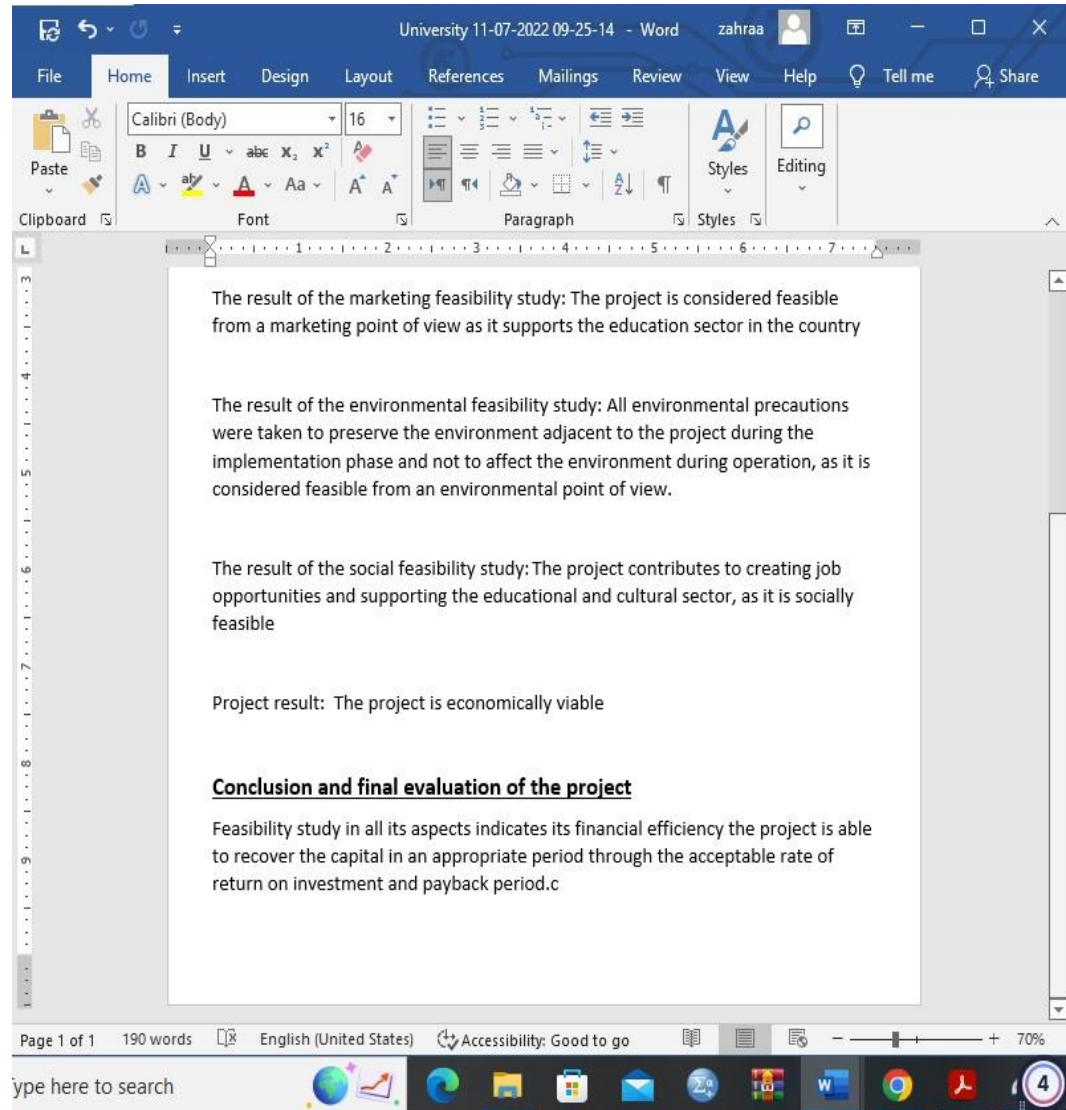


Figure 5-187: Final Report (Continued)

5.5 Assessment of Computer Program

The computer program has been evaluated by using two methods:

5.5.1 Direct Application Method

The evaluation was done through the direct application of the computer program by the elected user, where the program was run, data was entered for the project and the final report of the project was obtained.

5.5.2 Evaluation Questionnaire Method

For the purpose of evaluating the computer program in a more comprehensive manner and for the purpose of obtaining the largest possible number of observations about its use, the evaluation questionnaire method was adopted. Table (5-1) tabulates the answers that were obtained.

5.5.2.1 Analyze and Discuss the Results of the Evaluation Questionnaire

After the results of the evaluation questionnaire (Appendix 2) were collected and analyzed, the following observations emerged:

1. The percentage of (35%) of the sample members indicated the possibility of dealing with the program in an excellent manner, while (50%) of the sample members indicated that the possibility of dealing with the program well and (15%) in an average way.

2. 75% of the sample members agreed on the ease of data entry, while 25% of the users had difficulty using it for them.

3. (70%) of the sample members indicated that the program is progressing to achieve the purpose for which it was prepared in calculating the feasibility of projects, while (30%) indicated that the program needs to increase the information entered to achieve the full purpose.

4. With regard to whether it was possible to develop the program to include other goals, (60%) of the sample members agreed that the priority of developing the program, and (40%) of the sample members indicated that there is no possibility of further development.

5. There were no suggestions for program development.

Table 5-1: Evaluation questionnaire of computer program

No.	Question	%	Answer
1.	What is the possibility of using and dealing with the computer program?	35	Excellent
		50	Good
		15	Medium
2.	How easy is it to enter data into the program?	75	Easy
		25	Difficult
3.	Does the program achieve its goal in calculating the feasibility of projects?	70	Achieve its objectives
		30	Not achieve (need more data)
4.	To what extent can the program be developed to include other objectives?	60	Can be developed
		40	Not possible
5.	suggestions for developing the computer program (if any)	/	No suggestions

Chapter Six: Conclusions and Recommendations

6.1 Introduction

This study attempted to address the issue of feasibility studies and project evaluation, which is among the carefully studied problems by the researcher, by highlighting the scientific and practical methods on which the feasibility studies are based, the latter related to the optimal use of resources and their efficient allocation. This has been problematic search in the lack of a reliable, model integrated feasibility study steps.

The study required addressing this problem across the four chapters using the method and tools referred to in the introduction.

6.2 Conclusions

This study resulted in a set of results, whether from theoretical or applied studies, as follows a summary of these results:

1. It was found to the researcher through the field survey and personal interviews of the departments concerned with infrastructure projects that feasibility studies are sometimes overlooked in infrastructure projects in Iraq. There is abuse in use as it is ignored misuse of feasibility studies leads to cost and time overruns, environmental impact.

In the event that there is a feasibility study prepared for the project, it will be preliminary only, without addressing the detailed studies.

2. The most prominent obstacles to the feasibility study for infrastructure projects were the lack of information and the lack of information available to the departments concerned with the establishment of these projects by 90% and the high costs of the study by 73%.

3. Through the field study, it was found that the most important technical study with a relative importance index of 94%

4. Through a field survey and a questionnaire, the efficiency of the proposed administrative system was deduced in terms of the importance of the proposed steps in it for all types of feasibility study.

5. A computer program was proposed and designed to cover somewhat the most important project information ,it was concluded that it is effective in preparing the feasibility report for the project.

6.3 Recommendations

In the light of the results of the study, some suggestions and recommendations can be presented that would improve feasibility studies and their development, as well as , enhancing the appropriate environment for the establishment and growth of infrastructure projects, as follows:

1. Paying attention to the subject of the feasibility study, especially for infrastructure projects, as they are giant projects that require a thorough study before their establishment and the necessity of conducting detailed studies for them, since in such projects it is not sufficient to conduct a preliminary study of the project, but rather extensive detailed studies.

2. Work on developing a project evaluation and selection system by raising the efficiency of evaluation and selection methods and improving information systems associated with it and interest in providing expertise and specialists in this field.

3. The presence of supporting studies (marketing research), exploratory studies enhances and raises the level of studies feasibility and allows investors to make the right decision.

4. Encouraging the establishment of specialized institutions and offices in the field of collecting information about institutions.

5. The necessity of establishing gatherings and research centers specialized in evaluating investment projects, comprising a number of specialists in various fields (legal, environmental, technical, marketing, and financial).

6.4 Proposition for Future Studies

1. Study the impact of using the feasibility study on the performance of infrastructure projects.

2. Study the impact of the environmental feasibility study for infrastructure projects on the environment surrounding the project.

3. Studying the importance of conducting social feasibility studies in planning and implementing infrastructure projects.

4. Evaluating investment projects - a comparative study between the public sector and the private sector.

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Appendices

-Appendix 1-

جامعة كربلاء

كلية الهندسة

الدراسات العليا / بنى تحتية

السيد الخبير المحترم

م/ استبيان بحث

تحية طيبة..

اضع بين يديكم هذا الاستبيان الذي يحتوي على مجموعة من الأسئلة والتي تدرج في إطار إعداد رسالة ماجستير بعنوان : " تطوير نظام اداري لدراسة الجدوى لمشاريع البنى التحتية" نرجو منكم التفضل بالمساهمة في هذا البحث بالإجابة على أسئلة الاستبيان بكل موضوعية ودقة، وسوف يكون لتعاونكم معنا عظيم الأثر في النتائج التي نسعى إلى تحقيقها إن شاء الله، وأود التأكيد على أنه سيتم التعامل مع البيانات المتحصل عليها بكامل السرية، وبصورة خالية من الهوية واستخدامها سيكون لأغراض البحث العلمي فقط.

شكرا لكم مسبقا على حسن تعاونكم

وتقبلوا منا فائق التقدير والاحترام

الباحثة

زهراء عبد الرضا جوده

المشرف

أ.م.د.محمد نعمة

أ.م. د حسين علي محمد الحمامي

أولاً: معلومات عامة

- بيانات شخصية

(أ) التحصيل العلمي: دكتوراه ماجستير دبلوم عالي بكالوريوس دبلوم فني

(ب) الاختصاص: هندسة مدني هندسة معماري هندسة ميكانيك هندسة كهرباء أخرى

(ج) سنوات الخبرة: (5 - 10) (10 - 15) (15 - 20) (أكثر من 20)

(د) مكان العمل:

(هـ) المنصب الوظيفي أو الإداري:

ثانياً: يرجى وضع علامة (✓) امام كل فقرة بما ترونه مناسباً وتحت البديل الذي يعبر عن رأيك بكل صدق بما تملكونه من خبرة بخصوص دراسة الجدوى :

1. أهمية دراسات الجدوى

دراسة الجدوى	مهم جداً	مهم	متوسط الأهمية	غير مهم	غير مهم إطلاقاً
1 دراسة الجدوى الفنية					
2 دراسة الجدوى المالية والاقتصادية					
3 دراسة الجدوى التسويقية					
4 دراسة الجدوى البيئية					
5 دراسة الجدوى الاجتماعية					
6 دراسة الجدوى التنظيمية					
7 دراسة الجدوى التشغيلية					

2 . صعوبات ومعوقات اجراء دراسات الجدوى

دراسة الجدوى	مهم جداً	مهم	متوسط الأهمية	غير مهم	غير مهم إطلاقاً
1 عدم توافر ودقة المعلومات					
2 ارتفاع تكاليف اجراء الدراسة					
3 نقص الخبرة والكفاءة والمهارة في إعداد الدراسات					
4 صعوبة تقدير المتغيرات الداخلة في الدراسة					

					مخاطر عدم التأكد	5
					مشكلة اختيار المعيار أو المعايير الملانمة في التقييم	6
					درجة الوعي والقناعة بأهمية الدراسة	7
					المعوقات الفنية	8
					عدم تواجد مكاتب مختصة في المنطقة لإنجاز الدراسة	9
					عدم توفر الإمكانيات المالية لإنجاز الدراسة	10

3. المتغيرات الداخلة في الدراسة أ. دراسة الجدوى الفنية

دراسة الجدوى الفنية	مهم جدا	مهم	متوسط الأهمية	غير مهم	غير مهم اطلاقا
المواد واللوازم الواجب توفرها للمشروع					
موقع العمل والبيئة المحيطة به					
التكنولوجيا المستخدمة في المشروع والالات					
الاعمال الهندسية كافة (هندسة مدنية, ميكانيكية... الخ)					
الموارد البشرية (العمال والموظفين)					
تقييم المخاطر الفنية					

ب. دراسة الجدوى المالية والاقتصادية

دراسة الجدوى المالية	مهم جدا	مهم	متوسط الأهمية	غير مهم	غير مهم اطلاقا
تحديد الكلف الرأسمالية (كل المال المستثمر)					
تحليل اقتصادي (نسبة السيولة المالية, الكفاءة, الأمان, الفائدة)					
معدل العائد الداخلي					
فترة الاسترداد					
العائد على الاستثمار					
تحليل نقطة التعادل					
تحديد هامش الأمان					
تقييم المخاطر المالية وإيجاد الحلول لها					

ج.دراسة الجدوى التسويقية

دراسة الجدوى التسويقية	مهم جدا	مهم	متوسط الأهمية	غير مهم	غير مهم اطلاقا
وصف المنتج او الخدمة الناتجة عن المشروع					
تحليل ودراسة تفاصيل المنتج وصناعته					
ظروف العرض والطلب					
مستويات الأسعار					
مواصفات الخدمة في ضوء أذواق ورغبات المستهلكين					
رسم الإستراتيجية التسويقية والتي تتضمن أفضل الطرق للتوزيع والترويج والتسعير					
تقييم المخاطر في السوق وإيجاد الحلول					

د. دراسة الجدوى البيئية

دراسة الجدوى البيئية	مهم جدا	مهم	متوسط الأهمية	غير مهم	غير مهم اطلاقا
تحديد الاثار البيئية (العوائق التي تعترض تنفيذ المشروع وإنشائه)					
تقرير متطلبات تقييم الأثر البيئي وبياناته ونطاقه					
جمع البيانات الأساسية عن النظم الاجتماعية والاقتصادية والثقافية والسياسات والمشاريع الإنمائية التي يحتمل أن تتعارض مع المشروع					
التنبؤ بالاثار البيئية المتوقعة من المشروع الاستثماري المقترح					
تقييم الاثار المتوقعة ونطاقها واستمرارها					
إعداد التقرير النهائي للأثر البيئي والتوصيات اللازمة					
تقييم المخاطر البيئية					

د. دراسة الجدوى التشغيلية

دراسة الجدوى التشغيلية	مهم جدا	مهم	متوسط الأهمية	غير مهم	غير مهم اطلاقا
دراسة مقاييس مستوى أداء المشروع					
معلومات وإدارة الوقت					
السيطرة على البيانات والمعلومات والدقة في تشغيل المشروع					
كفاءة كادر العمل					
الاستفادة التامة من وقت العمل					
دراسة خصائص الخدمة (فعالة, مرنة)					
أحكام الخدمات القابلة للتمديد					
تقييم المخاطر التشغيلية للمشروع					

هـ. دراسة الجدوى التنظيمية

دراسة الجدوى التنظيمية	مهم جدا	مهم	متوسط الأهمية	غير مهم	غير مهم اطلاقا
هيكل الملكية المقترح					
فريق الإدارة					
القضايا التنظيمية					
الشركاء المحتملين والمستثمرين					
الخبرة والمؤهلات المطلوبة					

و. دراسة الجدوى الاجتماعية

دراسة الجدوى الاجتماعية	مهم جدا	مهم	متوسط الأهمية	غير مهم	غير مهم اطلاقا
دراسة اثر المشروع على التوظيف					
دراسة اثر المشروع على الدخل القومي					
تحليل تاثير المشروع على ميزان المدفوعات					
تقييم الاثار الناتجة عن المشروع على المجتمع					
تقييم المخاطر الاجتماعية					



No:

Date: / /

الس / مديرية بلدية كربلاء

م / ابداء مساعدة

العدد: 872 / 6 / 8

التاريخ: 2022 / 2 / 8

أنا المهندس عبد الله / الفاضل
أحمد /



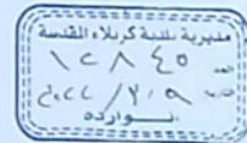
تحية و ذ احترام ...

انطلاقاً من مبدأ التعاون العلمي بين مؤسسات التعليم العالي ولقطاعات الاخرى خدمة للمسيرة العلمية في بلدنا العزيز ، راجين التفضل بإبداء المساعدة لطالبة الدراسات العليا / الماجستير (زهراء عبد الرضا جودة) في قسم الهندسة المدنية بكليتنا لغرض إكمال متطلبات رسالة الماجستير الخاصة بها. شاكرين تعاونكم معنا...مع التقدير.

أ.م.د. ميثاق نعمة رحيمه

معاون العميد للشؤون العلمية والدراسات العليا

2022 / 3 / 8



نسخة منه إلى ///

- مكتب السيد العميد المحترم / للتفضل بالعلم ...مع التقدير
- قسم الهندسة المدنية / للتفضل بالعلم ...مع التقدير .
- شعبة الدراسات العليا / مع الأوليات .
- الصادرة .



No:

Date: / /

الس / مديرية مجاري كربلاء

م / ايداء مساعدة

رقم: 875 / 6 / 1
تاريخ: 2022 / 3 / 8



انطلاقاً من مبدأ التعاون العلمي بين مؤسسات التعليم العالي والقطاعات الاخرى خدمة للمسيرة العلمية في بلدنا العزيز ، راجين التفضل بإبداء المساعدة لطالبة الدراسات العليا / الماجستير (زهراء عبد الرضا جودة) في قسم الهندسة المدنية بكليتنا لغرض إكمال متطلبات رسالة الماجستير الخاصة بها. شاكرين تعاونكم معنا...مع التقدير.

أ.م.د. ميثاق نعمة رحيمة
معاون العميد للشؤون العلمية والدراسات العليا
2022 / 3 / 8

الموافق
المراسلة
3/8

سجته لتفقد
صبي العائدية لصفها
بإرفاقها
- ٢٠٢١ / ٤ / ١٠

نسخة منه إلى ///

- مكتب السيد العميد المحترم / للتفضل بالعلم...مع التقدير .
- قسم الهندسة المدنية / للتفضل بالعلم...مع التقدير .
- شعبة الدراسات العليا / مع الأوليات .
- الصادرة.



No:

Date: / /

الس / هيئة استثمار كربلاء

م / إبداء مساعدة

سلا: 877 / 61
سراج: 2022 / 3 / 8



انطلاقاً من مبدأ التعاون العلمي بين مؤسسات التعليم العالي والقطاعات الأخرى خدمة للمسيرة العلمية في بلدنا العزيز ، راجين التفضل بإبداء المساعدة لطالبة الدراسات العليا / الماجستير (زهراء عبد الرضا جودة) في قسم الهندسة المدنية بكليتنا لغرض إكمال متطلبات رسالة الماجستير الخاصة بها.
شاكرين تعاونكم معنا...مع التقدير.

أم.د. ميثاق نعمة رحبحة
معاون العميد للشؤون العلمية والدراسات العليا
2022 / 3 / 8

السادة
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السادة

السادة

السادة

نسخة منه إلى ///

- مكتب السيد العميد المحترم / للتفضل بالعلم...مع التقدير .
- قسم الهندسة المدنية / للتفضل بالعلم...مع التقدير .
- شعبة الدراسات العليا / مع الأوليات .
- الصادرة .

شعبة الهندسة + الدراسات العليا + الدراسات العليا
السادة
السادة



No:

Date: / /

السى / مديرية طرق وجسور كربلاء

م / إبداء مساعدة

العدد: 874 / 6 / 1
التاريخ: 2012 / 3 / 8



٨٢-
٢/٩

تحية واذ واحترام ...

انطلاقاً من مبدأ التعاون العلمي بين مؤسسات التعليم العالي والقطاعات الاخرى خدمة للمسيرة العلمية في بلدنا العزيز ، راجين التفضل بإبداء المساعدة لطالبة الدراسات العليا / الماجستير (زهراء عبد الرضا جودة) في قسم الهندسة المدنية بكليتنا لغرض إكمال متطلبات رسالة الماجستير الخاصة بها. شاكرين تعاونكم معنا... مع التقدير.

أ.م.د. ميثاق نعمة رحيمة

معاون العميد للشؤون العلمية والدراسات العليا

2022 / 3 / 8

الموافق
للتاريخ

نسخة منه الى ///

- مكتب السيد العميد المحترم / للتفضل بالعلم... مع التقدير .
- قسم الهندسة المدنية / للتفضل بالعلم... مع التقدير .
- شعبة الدراسات العليا / مع الأوليات .
- الصادرة .

Republic of Iraq
Ministry of Higher Education
& Scientific Research
University of Kerbala
College of Engineering



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة كربلاء
كلية الهندسة
الدراسات العليا

No:
Date: / /

السى / مديرية ماء كربلاء
م / إبداء مساعدة

العدد: 873 / 61
التاريخ: 2022 / 3 / 8



انطلاقاً من مبدأ التعاون العلمي بين مؤسسات التعليم العالي والقطاعات الاخرى خدمة للمسيرة العلمية في بلدنا العزيز ، راجين التفضل بإبداء المساعدة لطالبة الدراسات العليا / الماجستير (زهراء عبد الرضا جودة) في قسم الهندسة المدنية بكليتنا لغرض إكمال متطلبات رسالة الماجستير الخاصة بها.
شاكرين تعاونكم معنا... مع التقدير.

أ.م.د. ميثاق نعمة رحيمة

معاون العميد للشؤون العلمية والدراسات العليا

2022 / 3 / 8

النشاط
٣٠٧١

السيد محمد
اصبر الابرار مع السيد
المدني في دائرة
٣٠٧٩

نسخة منه الى ///

- مكتب السيد العميد المحترم / للتفضل بالعلم... مع التقدير .
- قسم الهندسة المدنية / للتفضل بالعلم... مع التقدير .
- شعبة الدراسات العليا / مع الأوليات .
- الصادرة .

المديرية العامة
السوادة
الرقم ١١٥٩
٣٠٧٩

العراق . محافظة كربلاء المقدسة . حي الموظفين . جامعة كربلاء . كلية الهندسة
مكتب بريد كربلاء المقدسة ص. ب : 367
Email:engineering@eng.uokerbala.edu.iq

Republic of Iraq
Ministry of Higher Education
& Scientific Research
University of Kerbala
College of Engineering



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة كربلاء
كلية الهندسة
الدراسات العليا

No:

Date: / /

الس / جامعة كربلاء - قسم الإعمار والمشاريع

م / إبداء مساعدة

العدد: 876 / 161

التاريخ: 2022 / 3 / 8



تحية و احترام ...

انطلاقاً من مبدأ التعاون العلمي بين مؤسسات التعليم العالي والقطاعات الأخرى خدمة للمسيرة العلمية في بلدنا العزيز ، راجين التفضل بإبداء المساعدة لطالبة الدراسات العليا / الماجستير (زهراء عبد الرضا جودة) في قسم الهندسة المدنية بكليتنا لغرض إكمال متطلبات رسالة الماجستير الخاصة بها.
شاكرين تعاونكم معنا...مع التقدير.

أ.م.د. ميثاق نعمة رحينة

معاون العميد للشؤون العلمية والدراسات العليا

2022 / 3 / 8

نسخة منه إلى ///

- مكتب السيد العميد المحترم / للتفضل بالعلم...مع التقدير .
- قسم الهندسة المدنية / للتفضل بالعلم...مع التقدير .
- شعبة الدراسات العليا / مع الأوليات .
- الصادرة .

العراق - محافظة كربلاء المقدسة - حي الموظفين - جامعة كربلاء - كلية الهندسة

Email:engineering@eng.uokerbala.edu.iq

مكتب بريد كربلاء المقدسة ص. ب : 367

-Appendix 2-

الاستبيان الخاص بتقييم البرنامج الحاسوبي

الخبير المحترم

تحية طيبة.....

بعد الاطلاع من قبلكم عمليا على تشغيل البرنامج الحاسوبي، أرجو التفضل بالإجابة على الأسئلة المرفقة، والخاصة ببيان تقييمكم لهذا البرنامج الحاسوبي، خلال وضع علامة (√) في المربع المناسب لها وكذلك بيان مقترحاتكم في إضافة او تعديل تصميم البرنامج الحاسوبي ان وجدت.

مع جزيل الشكر والتقدير

الباحثة

زهراء عبد الرضا جودة

الاستبيان الخاص بتقييم البرنامج الحاسوبي

1. ما مدى سهولة فهم البرنامج الحاسوبي والتعامل معه ؟

ممتاز جيد متوسط ضعيف

2. ما مدى سهولة إدخال المعلومات في البرنامج الحاسوبي؟

سهل صعب

3. هل يحقق البرنامج هدفه في حساب جدوى المشاريع؟

يحقق لا يحقق

5. ما مدى امكانية تطوير البرنامج ليشمل أهداف أخرى؟

ممكن تطويره غير ممكن التطوير

6. مقترحاتكم لتطوير البرنامج الحاسوبي (ان وجدت)؟

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الخلاصة

البنية التحتية المدنية والبلدية مشاريع مرتبطة بالمجتمع والاقتصاد. الاستثمار فيها مهم جدا، سواء كان ذلك ممكنا أم لا. من الضروري إجراء دراسات دقيقة ومكثفة لهذه المشاريع الحيوية. تهدف هذه الدراسة إلى تسهيل عملية دراسة الجدوى وسهولة الوصول إلى المعلومات. تحتوي على سلسلة من الدراسات التفصيلية اعتمادا على مراجعة الأدبيات بالإضافة إلى إجراء مقابلات مع الخبراء والمختصين لاقتراح نظام اداري لمشاريع البنية التحتية، ثم تم تصميم استبيان لتحديد الأهمية النسبية لكل متغير في الدراسة لدعم النتائج وتحليلها باستخدام برنامج SPSS. ثم يعتمد تطوير برنامج الحاسب الآلي على نتائج خطوات نظام الإدارة والاستبيان الداعم باستخدام لغة Visual basic.Net وقاعدة بيانات Access واختبار البرنامج من خلال تطبيق دراسة حالة لجامعة خاصة، حيث تم استخدام البيانات الخاصة بإنشائها ومعرفة جدوى المشروع باستخدام البرنامج الحاسوبي. وقد تبين من خلال المسح الميداني والمقابلات الشخصية للمديريات المعنية بمشاريع البنية التحتية أن دراسات الجدوى يتم تجاهلها أحيانا في مشاريع البنية التحتية في العراق. وهناك إساءة استخدام تؤدي إلى تجاوز التكلفة والوقت والتأثير البيئي. التأثير سلبا على وقت وتكلفة المشروع، مما يؤدي إلى زيادة الوقت والتكلفة. وفي حال وجود دراسة جدوى معدة للمشروع، تكون أولية فقط، دون التطرق إلى الدراسات التفصيلية. ومن خلال مسح ميداني واستبيان اعتمد كليا على مهندسين ذوي خبرة في وحدات التصميم والتخطيط والمتابعة في أقسام مشاريع البنية التحتية، تم استنتاج كفاءة النظام الإداري المقترح من حيث أهمية الخطوات المقترحة فيه لجميع أنواع دراسة الجدوى. ويوصي الباحث بالاهتمام بموضوع دراسة الجدوى، خاصة بالنسبة لمشاريع البنية التحتية، كونها مشاريع عملاقة تتطلب دراسة مستفيضة قبل إنشائها، وضرورة إجراء دراسات تفصيلية لها، حيث لا يكفي في مثل هذه المشاريع إجراء دراسة أولية للمشروع، ولكن بالأحرى دراسات مفصلة واسعة النطاق. والعمل على تطوير نظام تقييم واختيار المشاريع من خلال رفع كفاءة أساليب التقييم والاختيار وتحسين نظم المعلومات المرتبطة بها والاهتمام بتوفير الخبرات والمختصين في هذا المجال.



جمهورية العراق
وزارة التعليم العالي و البحث العلمي
جامعة كربلاء
كلية الهندسة
قسم الهندسة المدنية

تطوير نظام اداري لدراسة الجدوى في مشاريع البنى التحتية

رسالة مقدمة الى مجلس كلية الهندسة / جامعة كربلاء وهي جزء من متطلبات نيل درجة الماجستير في
علوم الهندسة المدنية / بنى تحتية

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