Master Thesis

The Main Factors that Contributing to Bad Quality, Delay and Cost Overrun of Construction projects in Sulaimaniyah City

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Declaration

Sworn Statement

I hereby solemnly declare on my oath that the work presented has been carried out by me alone without any form of illicit assistance. All sources used have been fully quoted.

Dilan Lateef Polus

Abstract

The construction industry plays a central role in the creation of any nation `s wealth, for developing economies, it forms the backbone of most industries. The construction industry in Iraq/Kurdistan has faced a huge upward leap in increasing the amount of investments and developing in all construction sectors, especially after the end of past regime in 2003. Bad quality, delay and cost overrun in construction projects often offset the intended contribution of the industry to the economy.

The paper seeks to identify the major factors causing bad quality, delay and cost overrun in construction projects. These problems have been detected in most developing countries and in some of our neighbors countries are common that led many attempts to identify the reasons behind bad quality, delay and cost overrun, each country has its own significant factors and main causes. So in order to find the root causes a questionnaire survey was used to carry out the study. The questionnaire consisted of 51 factors which were grouped into two major categories by responsibility- Client factors, Contractor factors. The level of importance of the categories was measured and the relative importance of weights was ranked.

The most three important causes was inadequate planning by the owner before commencement of construction, financial difficulties of contractor during construction and Inaccurate estimation of the project cost, and the respondents agree that the client is the most responsible party for bad quality, delay and costoverrun.

The scope of this study is limited to construction projects in Sualimaniyah city. The data was gathered through a detailed questionnaire from 60 stakeholders in construction industry.

Based on the analysis of the ranking and intensity of causes of bad quality, delay and cost overrun in construction projects, this paper suggest possible improvement that could be made in order to improve those three problems in the construction industry.

Dilan Lateef Polus

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Chapter 1

Introduction

1.1 Overview

Construction refers to all types of activities usually associated with the erection and repair of immobile facilities. Contract construction consists of a large number of firms that perform construction work for others, and is estimated to be approximately 85 percent of all construction activities. The remaining 15 percent is performed by owners of the facilities, and is referred to as force – account construction (Hendrickson & Au, 2003). This study takes into account contract construction only.

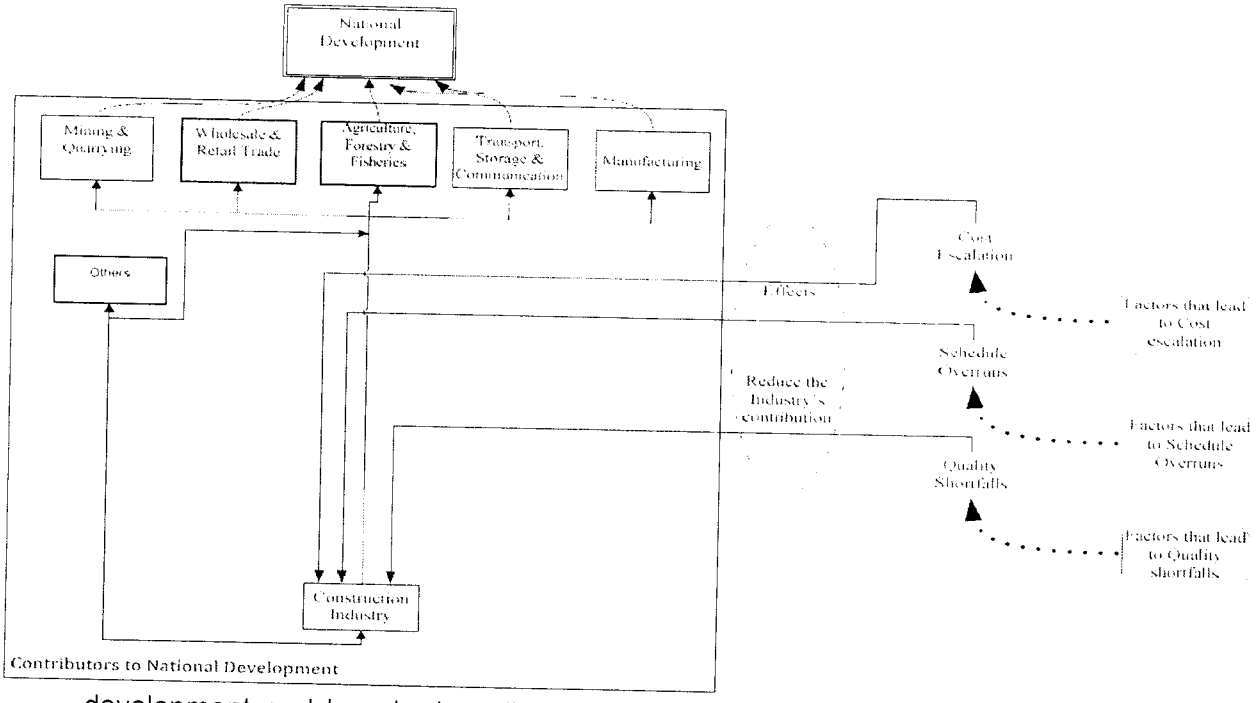
The construction industry has a great impact on the economy of all countries; it is one of the sectors that provide crucial ingredients for the development of an economy. The construction industry in Iraq has profited from the need to rebuild after Iraq `s several wars.

Public construction project in Iraq/Kurdistan region are parts of the country `s development initiative. It shared considerable amount of the countries scarce financial resources. In Iraq/Kurdistan region public construction projects consume an average annual rate of nearly 32% of the government `s capital budgets (Kurdistan Parliament, 2013)

Many, if not most, construction projects in Iraq/Kurdistan region have experienced Bad quality, delay and cost overrun. The public and various stakeholders have bemoaned the delayed handover the projects and prevalent quality shortfalls on construction projects. This study endeavor to establish the cause and effect of bad quality, delay and cost overrun on construction projects and proposes mitigation mechanisms.

Bad quality, Delay and cost overrun can occur due to a wide range of causes on various types of projects. If project costs or schedule exceed their planned targets, client's satisfaction would be compromised. The funding profile would no longer match the budget requirement and further slippage in schedule could result. On the other hand, if the project quality does not meet design standards, the client `s satisfaction would be compromised, thus cost escalation and schedule overruns would result in an effort to improve the situation. The resulting effects would be

detrimental, especially in the case of developing countries, whose wealth measure is greatly dependant on their performance in infrastructure provision through the construction industry. Figure 1-1 illustrates the relationship that exists among the major contributors to national



development and how bad quality, delay and cost overrun could affect a national development agenda (Kaliba, 2010)

Figure 1.1 Relationship Diagram (Kaliba, 2010)

The successive failure of construction projects in Iraq/Kurdistan region lead to recognize the best way to implement project management in construction projects and to open new era in thinking that led the researcher to study how project are managed in the Kurdistan Region, and what are the major elements and problems affecting the construction industry, and also urged the researcher to suggest a framework that copes with the development and the growing concerns regarding the construction within Sulaimaniyah city compared to other developing countries, in order to help managers to plan and implement construction projects in a proper way that lead to better and less risks, and to achieve success with good quality (Najma, 2011).

1.2 Statement of the problem

Many researches has been carried out on the reasons behind delay and cost overrun in different countries, but in Kurdistan/Sulaimaniyah these problems in construction industry have not recorded and studied yet, many construction projects have experienced bad quality, delay and cost overrun, especially public construction projects that some of them exceeded double time and costs that estimated for in initial estimation or even halted, and also faced a high ratio quality shortfalls.

Normally when the projects are delayed, they are either extended or accelerated and therefore, incur additional costs, the more time it takes to complete the project, the higher the cost of construction, leading to slow development progress and weak exploitation for resources because delay means more workforce, more hours worked, many more equipment and plants, increasing overheads and claims among stakeholders. The normal practices usually allow a percentage of the project cost as an allowance in the contract price and this allowance is usually based on judgment (Bin Mohammad, 2010).

Although the contract parties agreed upon the extra time and cost associated with delay, in many cases there were problems between the owner and the contractor as to whether the contractor was entitled to claim the extra cost.

As Quality has become one of the most important competitive strategic tools which all the stakeholders in construction industry have realized it as a key success of construction projects. And as (Waje, 2009) stated that the Cost Of Quality is the amount of money a business loses because its product or service was not done right in the first place, it has been suggested that the cost of poor quality can be range from 15%-40% of business cost, and as some of the construction projects in Sulaimaniyah facing a quality shortfalls a serious consideration should be taken into account concerning that issue.

1.3 Background and need

Construction industry is a major industry with significant contribution of the gross domestic products and the development strategy. The Kurdistan region government is currently investing heavy amount in the construction industry, because of the successive wars that the region faced during the past years, the ruin need to rebuild. After 2003 the libration of Iraq and the political stability of the region a lot of big projects need to implement, in order to finishing those project successfully a modern project management and urban planning fits with the development of rapid urbanization are needed. As a fact that the government departments and companies did not experienced implementing those big projects before and that led to bad quality, delay and cost overrun in most of the construction projects.

In spite of the big amount public complains and the extent to which bad quality, delay and cost overrun have affected the industry, not much has been done to systematically address the problem, the client and the contractor do not seem to have established methodologies for addressing the causes and effects of bad quality, delay and cost overrun of construction projects. Improved management of construction projects would only be demonstrated when projects of desired quality are delivered within their scheduled period and costs.

Therefore the aim of this research was to systematically address this causes and effects of bad quality, delay and cost overrun in construction projects in Sulaimaniyah. The study was also aimed at providing recommendations that could be used to improve the quality, reducing the delay and cost overrun on construction projects. The resulting addressed causes and effects and the recommendations expected to provide stakeholder involved in construction industry a structured boundary for identifying factors that would contribute to project success and aid in successful decision making process to keep time and cost overrun and quality shortfalls to the minimum.

1.4 Purpose of the Study

The main purpose of the study is to:

- Identify the main causes of bad quality, delay and cost overrun of construction project in Sulaimaniyah city.
- Define the significant causes and their frequency in construction project by empirical study to analysis and ranking them from strongly affecting to weakly affecting.
- Indicate the main responsible party for bad quality, delay and cost overrun, the Client or the contractor
- Develop a project management model that could be used to systematically enhance project cost, schedule and quality performance.
- Asses and establish the factors that lead to bad quality, delay and cost overrun in construction projects.
- Analyze how the identified factors related to overall projects performance and their impact on projects.
- Recommend some solutions to reduce the affect of these problems on construction sectors, depending on interviews and questionnaire.

1.5 Research Questions

Based on the definition of the problem, the objectives of the research were established, and then these objectives guided the process of the research and created the research boundaries. The research questions are:

1. What are the significant factors causing bad quality, delay and cost overrun of construction projects in Sulaimaniyah city?
2. The degree that each of Client and the contractor are responsible to the bad quality, delay and cost overrun of construction project in Sulaimaniyah city?
3. What are general challenges exposed during implementing construction projects in Sulaimaniyah city?

1.6 Significance to the Field

In Iraq/Kurdistan we have not noticed researches conducted to find the main factors that contribute to bad quality, delay and cost overrun in construction projects then finding best solutions.

Because bad quality, delay and cost overrun became a general phenomenon in most of projects in Kurdistan, this study is required and very important to be considered. It will study the main factors that contribute to bad quality, delay and cost overrun of construction projects in Sualimaniyah, and diagnosing according to priority then finding appropriate solutions and recommendations to reduce these problems in the next projects.

Doing this kind of research contribute to enriching academic institution libraries in resources and update data for further investigation and more researches in this sectors, and also it will help the participants of the questionnaire to gather their thought concerning the issue, that when they participate to fill the questionnaire forum, and all of the participants are stakeholder in construction industry, this give them boundary to think about the problems that facing the construction industry then each one will try to solve or reduce all or a part of those problems.

1.7 Definitions

Project:

Temporary rather than permanent social systems or work systems that are constituted by teams within or across organizations to accomplish particular tasks under time constraints.(Wikipedia, 2014).

Client:

Is the owner of the project, that is legally responsible to plan and finance of the project.

Client representative:

Anyone who represent the contractor or working for the contractor.

Contractor:

A person or firm that undertakes a contract to provide materials or labour to perform a service or do a job.

Contractor representative:

Anyone who represent the contractor or working for the contractor.

1.8 Limitations

- The study will be confined to Sulaimaniyah city geographical area in the Kurdistan region of Iraq, where a limited number of construction projects stakeholders will be accessed.
- A geographical limitation despite the decentralized management of the city, but some of the decisions given from Erbil the capital of Kurdistan Region so the geographical area.
- The study discusses just bad quality, delay and cost overrun of construction projects. Other problems like safety, environment and etc were not discussed.
- Some participant that in a decision – making position could not participate in the questionnaire, that argue they don't have enough time to participate in the questionnaire.

1.9 Ethical Considerations

In order to comply with the international standards the research conducted in an ethical manner with respect to the following aspects:

- The name of participant will not be recorded.
- No compensation will be paid to the respondent or participant in the study.
- All the captured information just used for the research purpose.
- The questionnaire distributed among the participants and adequate times given for respond for not affect their time of working.
- Quality of data capturing and accuracy in calculations.
- Obtaining permission from other agencies to access participants.

Chapter 2

Literiture Review

2.1 Introduction

The previous chapter presented an overview of the main causes of bad quality, delay and cost overrun in construction projects, the causes and purpose of the study were also presented. This chapter presents a review of available literature on the subjects of bad quality, delay and cost overrun in construction projects.

In the last few years many researchers have conducted on causes of bad quality, delay and cost overrun in construction projects in developed and developing countries for diagnosing the main causes and recommend a proper solutions, In Kurdistan region despite the small attempts done in this sectors to but there is no clear records published for diagnosing the main causes of bad quality, delay and cost overrun that most of the construction projects suffering from them.

The literature review will address two areas related to bad quality, delay and cost overrun in construction projects in Sulaimaniyah. The first section will address researches related to causes of poor quality of construction projects and its impact on project success, the second section will focus on research studies about the significant factors that cause delay and cost overrun of construction projects and their recommendations for to improve the project management performances in order to minimize the delay and cost overrun in construction projects. Then making a list of the main causes of bad quality, delay and cost overrun in construction projects to make a clear picture of main causing and ranking of significant factors in neighbor and other international countries to compare with Kurdistan region, and to show that the causing of those problems are different in each country and each region has its own challenges and causes.

2.2 Body of the review

Many researchers have studied the causes of bad quality, delay and cost overrun of construction projects, the study have broken into two parts; First, studies on causes of bad quality of construction projects, second, studies on causes of delay and cost overrun because these two problems are mostly related to each other more than other factors, and most of the researchers studies the factors leading to delay and cost overrun together.

2.2.1 Previous study on bad quality of construction projects.

- Study conducted in India by Jha and Iyer in 2006 and it was about critical factors affecting quality performance in construction projects, a preliminary survey identified 55 attribute responsible to impact quality performance of the projects, statistical analysis of questionnaire responses on the attributes resulted into two distinct sets of success and failure attributes separately grouped them into fewer critical success and failure factors. The critical success factors obtained were; project manager `s competence; top management `s support; monitoring and feedback by project participants; interaction among project participants; and owners` competence. The factors that adversely affected the quality performances of projects were; conflict among project participants; hostile socio-economic environment; harsh climatic condition; Project manager `s ignorance and lack of knowledge; faulty project conceptualization; and aggressive competition during tendering. Analysis also led to the conclusion that the extent of contribution of various success factors varies with the current performance ratings to the project. Project manager `s competence and top management support are found to contribute significantly in enhancing the quality performance of a construction project. As in the manufacturing industry, the study established that management plays an important role in achieving quality even in construction projects.
- . Amer M. A.A., (2002) conducted a research on modeling the factors affecting quality of building construction projects during the construction phase in Gaza Strip. The research is intended to

provide clients, project managers, designers, and contractors with necessary information needed to better manage the quality of a construction building project in Gaza Strip. Factors that affect the quality of a construction building project during construction phase are identified. Nominal Group technique was used at the preliminary stage to identify these factors and the associated sub-factors. Combining the results of nominal group technique and literature review yielded 14 main factors and 60 sub-factors affecting quality of a building construction projects. A questionnaire was developed and used as a research tool to obtain the opinions of 65 contracting companies and 24 consulting firms on the identified most important factors affecting quality. It is conclude that the most important factors affecting quality of a building construction projects are; characteristics of site layout, skill and experienced of site staff, characteristics of design documents, and using equipment. Materials, quality and labor management systems and the owner quick response in taking decisions. Type of awarding system and the political environment also among the factors effecting quality.

- Waje V.V. and Patil V. has undertaken a study in 2009 in India, studied cost of poor quality in construction, data is collected to identify what are construction defects and to understand the quality cost concept. The data collected is from various construction sites from ongoing projects and completed projects. The research found that Error on construction sites occur frequently and can be costly for the contractors and owners of constructed facilities. 6-15% of construction cost found to be wasted due to rework of defective components detected late during construction and 5% of construction cost is wasted due to rework of defective components detected during maintenance. (1) The nature of these errors is quit diverse. 20-40% of all site defects have their roots in errors arising during the construction phase, (2) 54% of the construction defects can be attributed to human factors like unskilled workers or insufficient supervision of construction work furthermore, 12% of the construction defects are based on material and system failure.

- Another research conducted by Kaliba, C. in 2010, to establish significant causes of Cost Escalation, Schedule Overrun and Quality Shortfalls on Construction Projects in Zambia. The survey of 70 participants from financiers, clients, consultants and contractors working in construction industry conducted, and also an interview with 15 stakeholder in construction projects as such as interview were targeted at professionals working for clients, consulting firms and contractor organizations within the public construction sector in Zambia. The study identified; in adequate and in consistent release of funds by client; poor financial management by contractor; long lapse between feasibility study and implementation of projects; in adequate supervision; and incompetence or lack of capacity by contractors to be the most significant casual factors for quality shortfalls.

Table (2.1) Summery of previous studies about bad quality in construction projects

No.	Author, Year	Objective	Conclusions
1	Jha and Iyer (2006)	Critical factors affecting quality performance in construction projects,	The factors that adversely affected the quality performances of projects were: - conflict among project participants - hostile socio-economic environment - harsh climatic condition; Project manager `s ignorance - lack of knowledge; faulty project conceptualization - Aggressive competition during tendering.
2	Amer M. A.A., (2002)	Modeling the factors affecting quality of building construction projects during the construction phase in Gaza Strip.	The most important factors affecting quality of a building construction projects are: - Characteristics of site layout -Skill and experienced of site staff - Characteristics of design documents - And using equipment. Materials - Quality and labor management systems - The owner quick response in taking decisions. -Type of awarding system and the political environment
3	Waje V.V. and Patil V.(2009)	cost of poor quality in construction	The research found that Error on construction sites occur frequently and can be costly for the contractors and owners of constructed facilities. 6-15% of construction cost found to be wasted due to rework of defective components

4	Kaliba, C. (2010)	to establish significant causes of Cost Escalation, Schedule Overrun and Quality Shortfalls on Construction Projects in Zambia	The most significant causes of for quality shortfalls: - In adequate and in consistent release of funds by client - Poor financial management by contractor. - long lapse between feasibility study and implementation of projects - In adequate supervision - And incompetence or lack of capacity by contractors

2.2.2 Previous study on delay of construction projects,

- Kaliba, C. in 2010, in the same previous study " Cost Escalation, Schedule Overrun and Quality Shortfalls on Construction Projects" in Zambia, identified ; Financial difficulties on the part of contractors; change order; poor sub-contractor performance; and change in drawings and specification were found to be the major causes of schedule overrun.
- Bin Mohemed, 2010 carried out a questionnaire survey in Kuantan to identify the delay factor and the effect of project delays, separately. This study takes an integrated approach and attempts to analyze the impact of effects. The survey conducted between about 40 participants from contractor and client, and then identified the most important causes of delay from a list 45 different causes and 5 different effects of delay and the recommendation to reduce the delay. The most important causes were delays in contractor `s payment to sub-contractors, change in material, shortage of material in construction, delays in sub-contractors, change in material, the weather condition, shortage of man power (skilled, semi-skilled and unskilled labor), construction works involve huge amounts of money, unpunctually material delivery, labor productivity, and unavailability of incentives for contractor for finishing ahead of schedule. Six main effects of delay were cost overrun, rescheduling and rearrangement of, litigation, disputes, and arbitration.

- A part of PhD study reported by Albogamy, Scott and Dawood, aimed to outline the main causes of delay in public building projects in KSA with their relative importance. For this reason a questionnaire conducted that a total 98 out of 182 questionnaires were collected as survey data. The survey included 63 delay factors and the participants were asked to indicate their degree of importance. The causes of delay were grouped into 4 categories such as owner/client related factors, contractor related factors, consultant related factors, and external factors. In analyzing the delay factors from the perspectives of the construction participants, shows that the large number of delays are occurring due to the contractors, and the owner/client is the second most influencing construction party causing delays. Finally the researcher attempted to rank all 63 delays factors. It was found that top 5 factors causing delays are; Low performance of the lowest bidder contractor in the government tendering system; delays in sub-contractors work; poor qualification, skills and experience of the contractor`s technical staff; poor planning and scheduling of the project by the contractor and delay in progress payment by the owner.
- Tume had undertaken a study in 2009 for to focus on a specific causes of delaying in construction industry in Libya, the preliminary data for this research was collected through a literature review and the use of a questionnaire survey targeted at some contractors, clients and consultants in some projects in Libya. The data collected through questionnaire surveys are analyzed and recommendations are made to mitigate the delays. The results of factors analysis of the items of contractor`s factors that cause delay in construction projects and their ranking as a whole presented. Based on the mean value criterion, the first ranking seemed to capture the respondents general feelings that it is improper planning that are the major factors that cause delay in construction projects in Benghazi city. Followed by "lack of effective communication" as the second ranked factors which cause delays. The factors "shortage of supply i.e. steel, concrete, etc." and "design error" seemed to be the third-ranked factors. Consequently, factors such as "slow decision making" and "Financial issues" were ranked fourth. The next

important factor that causes delays in construction projects in Libya is "shortage of material", it was ranked as number five.

Also Tume define delay and classify the types of delay as below:

Delays in projects:

Many projects suffer from delays. Suspension means stoppage of work directed to the contractor by a form from the client.

Types of Delays causes in Construction Projects.

There are two categories of delays used in determining delay damage:

1. **Inexcusable delays (Non-Excusable delays)**

   Are caused solely by the contractor or its suppliers. The contractor is generally not entitled to relief and must either make up the lost time through acceleration or compensate the owner. This compensation may come about through either liquidated damages or actual damages, providing there is no liquidated damages clause in the contract, Liquidated damage are generally expressed as a daily rate that is based on a forecast of costs the owner is likely to incur in the events of late completion by the contractor.

2. **Excusable delays:**

A) **Non-compensable delays:** are caused by third parties or incidents beyond the control of both the owner and the contractor. Examples typically include acts of God, unusual weather strikes, fires, acts of government in its sovereign capacity, etc. In this case, the contractor is normally entitled to a time extension but no compensation for delay damage.

B) **Compensable delays:** are caused by the owner or the owner`s agents. An example of this would be the late release of drawings from the owner`s architect. An excusable, compensable delay usually leads to a schedule extension and exposes the owner to financial damages claimed by the contractor. In this case, the contractor incurs additional indirect costs for both extended field office and home office overhead and unabsorbed home office overhead.

- Other studies (Al-Kharashi and Skitmore in 2008) identified the major causes of delay in Saudi Arabian Public sector construction projects. A new survey is reported that uses all the variable from the previous work and that are measured for both current degree of effect on delays and the extent to which each can be practically

improved. These are contained in seven grouping: Client, contractor, consultant, materials, labor, contract and relationship related causes. The survey covers a sample of 86 clients, contractors and consultants working in Saudi construction industry. The analysis reveals some considerable heterogeneity between the cause grouping and respondent groupings in terms of means and correlations, apparently partly due to lack of knowledge of respondents and a tendency for the consultants to blame the contractors for the delay and vice versa. The main results, therefore, are disaggregated to reflect the views of each respondent group concerning each group of causes. In general however, it is found that the most influencing current cause of delay is the lack of qualified and experienced personnel – attributed to the considerable amount of large, innovative, construction projects and associated current undersupply of manpower in the industry.

- In a study of a construction project in Nigeria Aibinu.and Jagboro in 2002 found that, delay has significant effect on completion cost and time of 61 building projects studied in a research named "The effect of construction delays on project delivery in Nigerian construction industry". The study investigates, firstly by questionnaire survey that 200 firms were selected and were given the questionnaires and 102 were returned representing a response rate of 51% and, secondly, by empirical method. The researcher conclude that cost overrun and time overrun were the two most frequent effects of delay; Delay had significant effects on actual projects duration; Loss and expense claims arising the delay and fluctuation claims during the delay period had significant effects on cost overrun; Loss and expense claims arise from ascertained and approved delay caused by the client or his agent; Acceleration of subsequent site activities in cases of delay to make up for the lost time has frequently failed in Nigeria building projects due to deficiencies in clients projects management procedure; and Finally; The contingency sums included in the pre-contract estimate of projects In Nigeria were not adequate to offset cost overrun.
- More recently in 2006 Sambasivan and Soon conducted a study to identify the delay factors and their effect on project completion. A questionnaire survey was conducted to solicit the causes and

effects of delay from clients, consultants, and contractors. About 150 respondents participated in the survey. This study identified 10 most important causes of delay from a list of 28 different causes and 6 different effects of delay. Ten most important causes where; (1) contractor `s improper planning (2) contractor `s poor site management (3) inadequate contractor experience (4) inadequate client`s finance and payments for completed work (5) problems with subcontractors (6) shortage in material (7) labor supply (8) equipment availability and failure (9) lack of communication between parties and (10) mistakes during the construction stage. Six main effects of delay were; (1) time overrun (2) cost overrun (3) disputes (4) arbitration (5) litigation and (6) total abandonment. This study has also established an empirical relationship between each causes and effect.

- Another study conducted by Alaghbari, Kadir, Salim and Ernawati in 2007 to identify the major factors causing delay in building construction projects in Malaysia. A questionnaire survey was used to carry out the study. The questionnaire consisted of 31 factors which were grouped into four major categories by responsibility-contractor factors, owner factors, consultant factors and external factors. The level of importance of the categories was measured and the relative importance of weights was ranked. The study finds that financial problems are the main factors and coordination problems are the second most important factors causing delay in construction projects in Malaysia. The results were analyzed to rank the causes of delay and further classify the types of delay. The scope of this study is limited to building projects in Klang Valley area.
- In Gana a research conducted by Frank D.K., Fuger and Adwoa B. to investigate the causes of delay of building construction projects in Gana to determine the most important according to the key project participants; clients, consultants, and contractor. Thirty two possible causes of delay were identified from the literature and semi-structured interviews of 15 key players in the implementation process. These delay factors were further categorized into nine major groups. The list of delay causes was subjected to a questionnaire survey for the identification of the most important

causes of delay. The field survey included 130 respondents made up of 39 contractors, 37 clients and 54 consultants. The relative importance of the individual causes and the groups were calculated and ranked by their relative importance index. The overall results of the study indicates that the respondents generally agree that financial group factors ranked highest among the major factors causing delay in construction projects in Ghana. The financial group factors were delay in honoring payment certificates, difficulty in accessing credit and fluctuation in prices. Material group factors are second that are; shortage of material on site or market and late delivery of material then followed by scheduling and controlling factors.

Table (2.2) Summery of previous studies about delays in construction projects

No.	Author, Year	Objective	Conclusions
1	Kaliba, C. (2010)	To establish significant causes of Cost Escalation, Schedule Overrun and Quality Shortfalls on Construction Projects in Zambia	The most significant causes of delay are: -Financial difficulties on the part of contractors; -change order; -poor sub-contractor performance; -and change in drawings and specification
2	Bin Mohemed, (2010)	To identify the delay factor and the effect of project delays.	The most important causes were: - Delays in contractor `s payment to sub-contractors. - Change in material - Shortage of material in construction - Delays in sub-contractors - Change in material - The weather condition
3	Albogamy, Scott and Dawood	To outline the main causes of delay in public building projects in KSA with their relative importance.	The top 5 factors causing delays are: - Low performance of the lowest bidder contractor in the government tendering system - Delays in sub-contractors work -Poor qualification, skills and experience of the contractor`s technical staff -Poor planning and scheduling of the project by the contractor -Delay in progress payment by the owner.

4	Tume (2009)	For to focus on a specific causes of delaying in construction industry in Libya,	The main factors that cause delay as its ranking: -Improper planning -lack of effective communication -Shortage of supply and Design error -Slow decision making and Financial issues -Shortage of material
5	Al-Kharashi and Skitmore in (2008)	For to identify the major causes of delay in Saudi Arabian Public sector construction projects.	It is found that the most influencing current cause of delay is: - The lack of qualified and experienced personnel-attributed to the considerable amount of large, innovative, construction projects and associated current undersupply of manpower in the industry.
6	Aibinu.and Jagboro (2002)	The effect of construction delays on project delivery in Nigerian construction industry	The researcher conclude that cost overrun and time overrun were the two most frequent effects of delay; Delay had significant effects on actual projects duration; Loss and expense claims arising the delay and fluctuation claims during the delay period had significant effects on cost overrun
7	Sambasivan and Soon (2006)	To identify the delay factors and their effect on project completion	Five most important causes of delay where: -contractor `s improper planning -contractor `s poor site management -inadequate contractor experience -inadequate client`s finance and payments for completed work -problems with subcontractors .Six main effects of delay were; (1) time overrun (2) cost overrun (3) disputes (4) arbitration (5) litigation and (6) total abandonment.
8	Alaghbari, Kadir, Salim and Ernawati (2007)	To identify the major factors causing delay in building construction projects in Malaysia	The study finds that the main factors causing delay are: -Financial problems -Coordination problems
9	Frank D.K., Fuger and Adwoa B.	To investigate the causes of delay of building construction projects in Gana.	The main group causes of delay are: -Financial group: The financial group factors were delay in honoring payment certificates, difficulty in accessing credit and fluctuation in prices. -Material group factors : That are shortage of material on site or market and late delivery of material -scheduling group factors -controlling group factors.

2.2.3 Previous study on cost overrun of construction projects.

- Kaliba, C. in 2010, in the same previous study " Cost Escalation, Schedule Overrun and Quality Shortfalls on Construction Projects" in Zambia, identified ; insufficient initial analysis of costs; change order; inflation; and schedule overrun to be the most significant factors of cost escalation.
- Arcila in 2012 tried to identify the critical success factors that influence the cost performance of construction projects, by performing a multi-case study method that constituted of 6 different projects in the construction industry, constructed by companies from the UK. Hence two different hypotheses were tested and the conclusion that there are certain Critical success factors that can help prevent the occurrence of cost overruns in construction projects in the UK. Therefore, the research identified Critical success factors that have an influence in the cost performance of projects that are; project manager competency; contractor `s competency; client commitment to getting the job done; good relationship between project parties; accuracy of plans and initial information; adequate specifications; early involvement of the contractor; accurate selection of form of contract; client involvement and feedback; availability of funding; initial identification of all the risks and architect `s competency.
- Study conducted by Nega in 2007 to find the causes and effects of cost overrun on public building construction projects in Ethiopia. Questionnaire survey together with desk study was used to collect data on cost overrun. A total of 42 questionnaire from clients, consultants and contractors were collected and a desk study of 70 completed public building construction project in Ethiopia were investigated and analyzed using both descriptive and inferential statistics. From the results it was found that 67 out of 70 public building construction projects suffered cost overrun. The rate of cost overrun ranges from a minimum of 0% to the maximum of 126% of the contract amount for individual projects. In this research it was found that the rate of cost overrun decreases with increase in contract amount. Respondents identified 39 causes of cost overrun

for Ethiopian case. The most important causes of cost overrun were found to be inflation or increase in the cost of construction materials. Poor planning and coordination, change order due to enhancement required by clients, excess quantity during construction.

Table (2.3) Summery of previous studies about cost overrun in construction projects

No.	Author, Year	Objective	Conclusions
1	Kaliba, C. (2010)	To establish significant causes of Cost Escalation, Schedule Overrun and Quality Shortfalls on Construction Projects in Zambia.	The most significant causes of cost overrun are: -insufficient initial analysis of costs -change order -inflation -schedule overrun
2	Arcila (2012)	To identify the critical success factors that influences the cost performance of construction projects in UK	Critical success factors that have an influence in the cost performance of projects are: -Project manager competency -Contractor `s competency -Client commitment to getting the job done. -Good relationship between project parties. -Accuracy of plans and initial information. -Adequate specifications -Early involvement of the contractor. -Accurate selection of form of contract. -Client involvement and feedback; -Availability of funding. -Initial identification of all the risks -Architect `s competency.
3	Nega (2007)	To find the causes and effects of cost overrun on public building construction projects in Ethiopia	Most important causes of cost overrun were found to be: -Inflation or increase in the cost of construction materials. -Poor planning and coordination -change order due to enhancement required by clients, -Excess quantity during construction.

-Below are reviews for two previous studies conducted to identify the main causes of delay and cost overrun together.

- Le-Hoai L., Lee D. Y and Lee Y. Jin in 2008 conducted a study in about delay and cost overruns in Vietnam large construction projects. This research has employed a questionnaire survey to elicit the causes of this situation by interviewing 87 Vietnamese construction experts. Twenty one causes of delay and cost overruns appropriate with building and industrial construction project were inferred and ranked with respect to frequency, severity and importance indices. Spearman `s rank correlation tests showed that there are no different in the viewpoints between three principal parties in the projects. A comparison of causes of time and cost overrun was done with various selected construction industries in constraint; Incompetence; Design; Market and Estimate; Financial capability; Government; and Worker. These finding might encourage practitioners to focus on delay and cost overruns problem that might have existed in their present of future projects.
- On the other hand Memon, Rahman. And Abdul Azis in 2012 on time and cost performance in construction projects in southern and central regions of peninsular Malaysia. This study assessed the time and cost performance of construction projects in Malaysia using structured questionnaire survey with 140 respondents from personnel involved in construction industry that include Client , consultant and contractor. The finding of the study revealed that 92% of construction projects were overrun and only 8% of project could achieve completion with contract duration. The amount of time overrun was in between 5-10% as agreed by respondents. In terms of cost performance only 11% of respondents mentioned that normally their projects are finished within the budgeted cost while 89% of respondent agreed that their projects were facing the problems of cost overrun with average overrun at 5-10% of contract price. The major contributors of this poor performance include design and documentation issues, financial resources management and project management and contract administration issues. Further, qualitative study was carried out using semi-structured interviews with the experience personal involving in managing

construction projects which results in developing 13 mitigation measure to improve time performance and 15 mitigation measure to improve cost performance in construction project.

Table (2.4) Summery of previous studies done about delays and cost overrun in construction projects together.

No.	Author, Year	Objective	Conclusions
1	Le-Hoai L., Lee D. Y and Lee Y. Jin (2008)	Delays and cost overruns in Vietnam large construction projects, A comparison with other selected countries	A comparison of causes of time and cost overrun was done with various selected construction industries in constraint; Incompetence; Design; Market and Estimate; Financial capability; Government; and Worker. These finding might encourage practitioners to focus on delay and cost overruns problem that might have existed in their present of future projects.
2	Memon, Rahman. And Abdul Azis (2012)	Time and cost performance in construction projects in southern and central regions of peninsular Malaysia	-92% of construction projects were overrun -8% of project could achieve completion with contract duration. -The amount of time overrun was in between 5-10%. The major contributors of construction projects poor performance: - Design and documentation issues -Financial resources management -Project management and contract -Administration issues

2.3Summery

This chapter provides a review of existing studies related to the main causes of bad quality, delays and cost overrun in construction projects. These studies were used as a theoretical foundation for this research, that understanding the situation and the main factors that cause bad quality, delay and cost overrun of other countries helps the author to be realistic with the existing problems in Kurdistan Region and put all the stakeholders in a circumstance to be able to connect all the related aspects together without bias to a specific party.

From summery of previous studies above, it noticed that each country and region has its own main factors that leading to bad quality, delay and cost overrun in construction projects and they vary from country to another as they arranged in tables (2.1, 2.2, 2.3, 2.4) and also the recommended solutions from the authors are different from country to another depending on the country's economical, political and social circumstance and its own nature. Because of that conducting these kind of researches are significant to identify the main factors that contribute to bad quality, delay and cost overrun in Sulaimaniyah in order to recommend some solutions and recommendations that compatible with the situation of Kurdistan Region.

The review showed that there has been high interest in the subject of causes and effect of delay and cost overrun but little on bad quality with regards to the construction industry world-wide.

The previous studies conducted on causes of bad quality, delay and cost overrun in construction projects stated many causes for that, then they ranked them from the most affected factor to the less affected factor. Related to bad quality the most affected causes were; Quality and labor management systems; lack of knowledge and experience; in adequate and in consistent release of funds by client and Poor financial management by contractor. Related to Delay the most affected causes were; Financial difficulties on the part of contractors; Change order; The weather condition; Delays in sub-contractors work; Delay in progress payment by the owner and contractor `s improper planning. Finally Related to Cost overrun the most affected causes were; Inflation; Insufficient initial analysis of costs; Contractor `s competency; Availability of funding; Poor planning and coordination

This current study will contribute to the existing research literature by identifying the main causes of bad quality, delay and cost overrun of construction projects in Sulaimaniyah city.

Chapter 3

Methods

3.1 Introduction

Most of the construction projects in Kurdistan Region facing bad quality, delay and cost overun that at the end led to the projects failure or out of scope. This research try to find and address some questinon that are; What are the significant factors causing bad quality, delay and cost overrun of construction projects in Sulaimaniyah city?What are the degree that each of Client and the contractor are responsible to the bad quality, delay and cost overrun of construction project in Sulaimaniyah city? How is construction projects managed in Sulaimaniyah city? What are general challenges exposed during implementing construction projects in Sulaimaniyah city?

In the previous chapter the author review of some literature that done before in different countries to address the main causes of bad quality, delay and cost overrun, then presenting an overview of the research, solution, recommendation and also their limitation for conducting the study.

In this chapter the author present the methodology used to carry out the research presented in this dissertation in order to address the defined study aim and objectives. The chapter explains how the problem was investigated and describes the tools used to undertake the investigation. It also describes the characteristics of the research sample and the methods of data analysis employed.

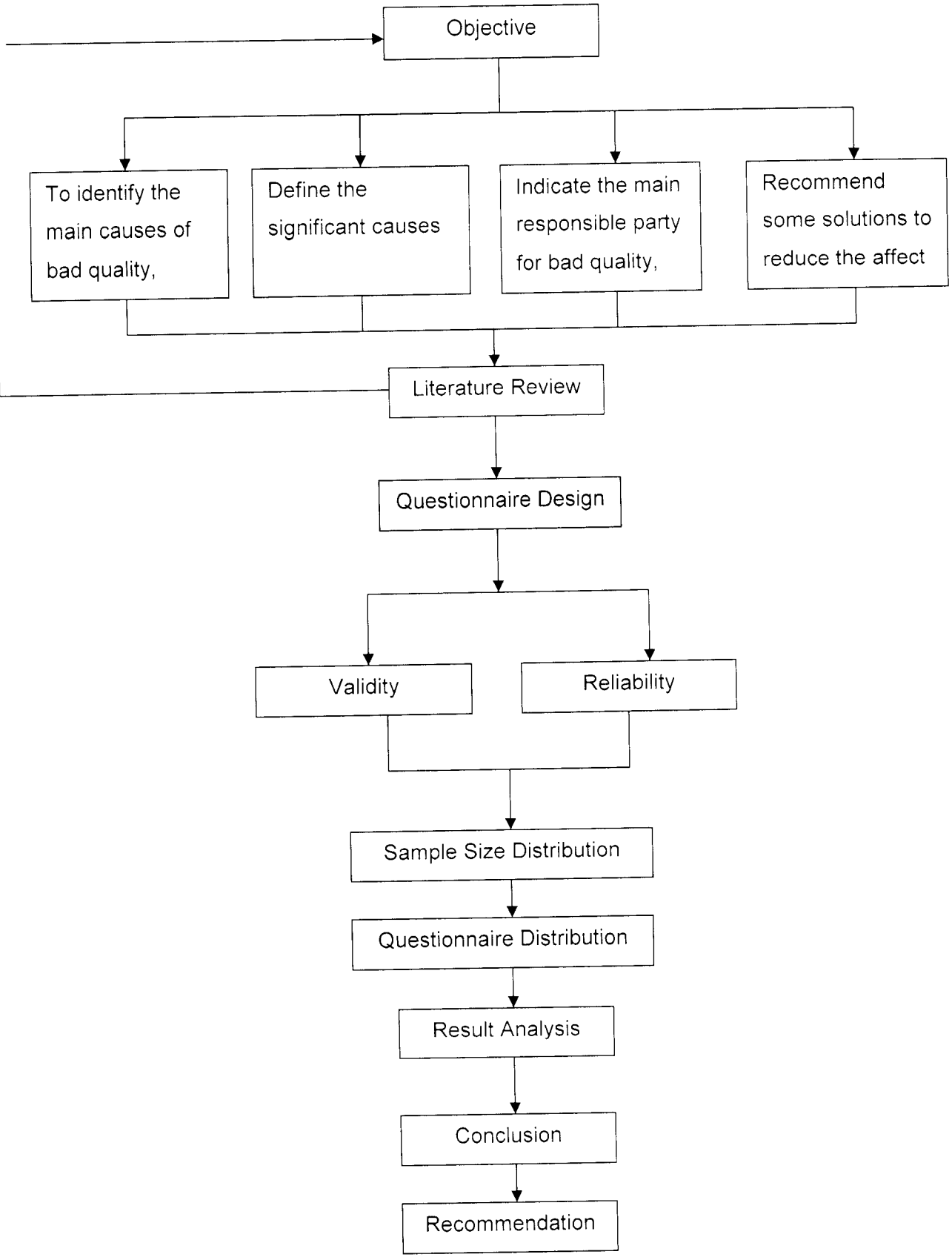


Figure 3.1 Summery of methodology used in this research

3.2 Research design

The methodology of this research was conducted by using a quantitative study method for the design of how to get data and preparing a questionnaire then distributed among involving parties in construction projects to get the right answers for research problem.

3.3 Setting

The study took place in Sulaimaniyah city, located in Kurdistan Region of Iraq among different government directorate, private company, unions and any stakeholder who have effect on the construction industry directly or indirectly. The government directorate was; Municipality of Sulaimaniyah; General Directorate of roads, reconstruction and housing of Sulaimaniyah; Directorate of roads of Sulaimaniyah; Municipality of towns around Sulaimaniyah; Engineering scoters of Sulaimaniyah governorate; Engineering sector of Health directorate and general directorate of investment. The private sector participants were large to medium size companies. Also it took place in four engineering and consultant bureaus, finally some unions participate like Kurdistan engineering union, Contractor union, and investors union.

The questionnaire conducted sometimes with an arranged appointment in their place of work, or outside in public places and some of them distributed and collected through e-mail.

3.4 Sample/Participants

Samples were selected from those places were the study conducted randomly between directors of the directorates, managers of departments, representative engineers, contractor, contractor representative engineer and consultants. The participants selected from different sectors of construction, building construction, road construction, Health facilities infrastructure or any other sector of construction, also in the participants mostly selected those with high experience in order to reach a right result for research questions.

3.5 Measurement Instrument

The measurement instrument used in this research was questionnaire to collect data.

3.5.1 The questionnaire

Two measuring type were used in the questionnaire; Ordinal scale and normal scale. For the section one normal scale used to measure data in three questions, and for section two nominal scale were used in 51 causes and ranking depending on the weight of each causes by within a scale prepared (Very significant, Moderately significant, Slightly significant, Not significant) and another column for those causes that the participant cannot decide on its significance.

The design of the questionnaire was set to reach the objective of this research and to answer its hypothesis and questions, the author mainly depend on last literature review for widening his information and knowledge about this sector and its problem beside of the authors experience in construction industry and implementing projects in Sulaimaniyah city.

The questionnaire developed to cover all aspects needed to achieve the goals of the study. It was decided to divide the questions into two parts as below:

1. Part one: Questions related to the respondent information, for example the place of working, the specialty and years of experience.