Root Causes of Delays in the Construction Projects in the UAE Public Sector and the Client's Project Manager role in Mitigation

الأسباب الجذرية للتأخيرات في مشاريع البناء في القطاع العام بدولة الإمارات العربية المتحدة ودور مدير المشروع ممثل المالك في تخفيفها

by

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Abstract

The problem of delay is very common in the construction industry of the UAE public sector, and since that most projects of the public sector are governmental, the authorities hire project managers to represent them to manage the projects and deliver it within the time, cost, and quality required. This research aims to determine the root causes of delays in the construction projects in the UAE public sector, and the main role of the client's project manager in mitigating the delays, and to demonstrate the key competencies that they must have in order to deliver the projects of the UAE public sector successfully. Qualitative and quantitative methods were approached to investigate the research problem, answer the research questions, meet the research objectives, and achieve the research aim. The research revealed that the main causes of delays in the construction projects are related to the principal project participants, the client, the consultant, and the contractor, while the minor causes of delays are related mainly to the ineffective performance of the contractor. The research indicates that the main causes of delays in the construction projects in the UAE public sector are related to contractual, financial, and technical issues. In addition, the research results show that the client project manager must be able to adopt the new technologies and tools of project management, and should have strong soft skills in order to deliver the project successfully. furthermore, the project manager must have enough experience and knowledge in the laws and regulations of the country, condition of contracts, clear understanding of the project objectives and the client's requirements, and the scope of work of each stakeholder in the project to be able to maintain the project's main constraints. The research ascertain that the potential risks of the project must be identified at a very early stage of the project and prior the commencement date by the client's project manager to avoid the negative impact of them on the project.

الملخص

مشكلة التأخير مألوفة جداً في صناعة البناء بالقطاع العام الإماراتي ، وبما أن معظم مشاريع القطاع العام هي مشاريع حكومية ، تقوم السلطات بتعيين مديري مشاريع لتمثيلهم لإدارة المشاريع وإنجازها في الوقت والتكلفة ، والجودة المطلوبة. يهدف البحث إلى تحديد الأسباب الجذرية للتأخيرات في مشاريع البناء ، والدور الرئيسي لمدير مشروع العميل في التخفيف ، وإثبات الكفاءات الرئيسية التي يجب عليهم تبنيها من أجل تسليم مشاريع القطاع العام في الإمارات العربية المتحدة بنجاح. تم اتباع الأساليب الكمية والنوعية لحل مشكلة البحث والإجابة على أسئلة البحث وتحقيق أهداف البحث وتحقيق أهداف البحث. وكشف البحث أن الأسباب الرئيسية للتأخير في مشاريع البناء تتعلق بالمشاركين الرئيسيين في المشروع ، والعميل ، والاستشاري ، والمقاول ، في حين أن الأسباب الثانوية للتأخير تتعلق بشكل أساسي بالأداء غير الفعال للمقاول. ويشير البحث إلى أن الأسباب الرئيسية للتأخير في مشاريع البناء في القطاع العام الإماراتي تتعلق بالمسائل التعاقدية والمالية والفنية. بالإضافة إلى ذلك ، تظهر نتائج البحث أن مدير مشروع العميل يجب أن يكون قادرًا على تبني التقنيات والأدوات الجديدة لإدارة المشروع ، ويجب أن يتمتع بمهارات قوية من أجل تسليم المشروع بنجاح. علاوة على ذلك ، يجب أن يكون لدى مدير المشروع ما يكفي من الخبرة والمعرفة بقوانين وأنظمة الدولة ، وشروط العقود ، وفهم واضح لأهداف المشروع ومتطلبات العميل ، ونطاق عمل كل صاحب مصلحة في المشروع ليكون قادرًا على الحفاظ على المعوقات الرئيسية للمشروع. يتأكد البحث من أن المخاطر المحتملة للمشروع يجب تحديدها في مرحلة مبكرة جدًا من المشروع وقبل تاريخ البدء من قبل مدير مشروع العميل لتجنب التأثير السلبي لها على المشروع.

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List of Abbreviations

AACE	Association of the Advancement of Cost Engineering
BIM	Building Information Modelling
BOQ	Bill of Quantities
COC	Condition of Contract
CPM	Client's Project Manager
CPM	Critical Path Method
EI	Emotional Intelligence
MEP	Mechanical, Electrical and Plumbing
NOC	No Objection Certificate
OBS	Organisation Breakdown Structure
PLC	Project Lifecycle
PM	Project Management
PM	Project Manager
PMBOK	Project Management Body of Knowledge
PPP	Public-Private Partnership
PRO	Public Relations Officer
RFI	Request for Information
RM	Risk Management
RMP	Risk Management Plan
SWOT	Strength, Weaknesses, Opportunities, Threats
UAE	United Arab Emirates
VE	Value Engineering
VM	Value Management

Chapter 1

Introduction

1. Introduction

1.1. Background

The construction industry is one of the most important industries in the world, with a direct impact on the economy of the countries. In the last three decades, the United Arab Emirates (UAE) has progressed and showed a clear development in all aspects and fields. To strengthen the country's economy, the government has spent a lot of money on large and unique projects to attract investors and tourists. UAE is now regarded as a regional and global leader in construction projects, with its economy growing at the quickest rate in the Middle East. The opening of the gulf region construction industry to global competition for the foreign contractors is having a huge influence on the region's construction industry, both for contractors and for clients. This is particularly evident in UAE, where rapid economic expansion and investment in tourism as a growing source of revenue has resulted in rapid infrastructural construction. This has resulted in a construction boom that local companies are unable to satisfy, necessitating the use of foreign companies in all aspects of the industry. In addition, employing foreign contractors has had a beneficial and negative impact on the construction industry. On the good side, competition has exposed clients to the best contemporary construction practices in order to provide them with appealing "cost, time, and quality" components in bidding for this valuable industry. On the negative side, several Contractors have engaged in protected contractual disputes and claims as a result of projects that have gone over budget and schedule.

A delay in construction refers to a period of time that extends beyond the contract deadline or the date agreed upon by the parties for the project's completion. Because the majority of the Clients are government organizations working on civil engineering projects, a delay causes societal disruption and revenue loss. It can also result in a loss of production, a significant cost of disruption, and a cost of extension for the Contractor. Hence, a construction project can be considered as a successful project if it maintained the three constraints, time, cost, and quality. construction project delays are a major issue that has a direct impact on the construction industry in all the countries. Moreover, it has a direct impact on the public sector and the private sector projects in UAE. In fact, delays can have a significant negative impact on the projects, the stakeholders, and even the construction industry in general, while the root causes of delays can be related to the project stakeholders and the various external factors. Identifying the different factors of project delays is a crucial step in resolving the problem. The construction industry must create strategies and techniques for preventing and resolving delays more quickly. In terms of liability, project delays could be classified into four types as, excusable delays and non-excusable delays, concurrent and non-concurrent delays, critical and non-critical delays, and compensable and non-compensable delays. Each of these types of delays has a unique mitigation and preventive strategy.

Mainly the project manager (PM) is the one responsible for the delivery of the project and achieving the project’s objectives, and in overall charge of planning, execution, managing the resources of the project, the procurement, and the risks. Project Management Institute (PMI) has produced a Project Management Body of Knowledge (PMBOK) guide that defines the project management processes and describes how to

manage each phase of the project lifecycle. In addition, it explains the project management area of knowledge that provides an effective project management. Moreover, project managers need to have communication and leadership skills in order to manage the project team and to be able to take proper decisions to solve any issue that can possibly occur. Mainly, construction project managers must have an adequate experience, sufficient managerial abilities, and a strong technical background in order to deliver a project maintaining the timeframe of it, the budget set for it, and the quality of the work. They must be able to identify and foresee the sources of delays and uncertainties, as well as deal with them in order to avoid, mitigate, or eliminate them.

In the public sector in the UAE, each of the project stakeholders has his own project manager, who leads the project team and communicates with other parties for procurement and financial issues, quality of the project, and achieving the project's milestones. In fact, these project managers have to be able to prevent their side from being responsible of a delay. For example, the contractor's project manager has to stick to the planned activities and scheduling, make a proper procurement management and expedite the payments to the suppliers, stick to the safety rules and regulations while performing the different site activities, and provide the required resources and make a proper resources levelling and allocation. On the other side, the consultant's project manager has to ensure that design drawings are complete and there are no discrepancies in the contract documents, make an adequate design management, perform a sufficient quality supervision on the work, response as early as possible to the inquiries, and make sure that there is a proper communication between the staff. The client's project manager or can be referred to as a client's representative acts as an intermediary between all the project stakeholders and the client, he is responsible of making sure

that the project is being delivered as per the client's requirements, budget, and timeframe. Therefore, the client's project manager is authorised to manage the project managers of the contractor and consultant indirectly.

1.2. Aims and Objectives

1.2.1. Aim

This research aimed to study and investigate the various types of the construction project delays in the United Arab Emirates and to find the project manager's role in eliminating the causes of delays and mitigating the impact of it. A questionnaire was developed and analyzed, interviews with experts were approached to achieve the aim of the research.

1.2.2. Objectives

The main objective of the research is to help the client's project managers in defining the different causes of delays in the construction projects in the UAE private sector, and to give adequate solutions for mitigating these delays. the following research objectives are listed as follow:

- To define the main root causes of the construction project delays of the public sector in UAE.
- To determine the phase of the construction project's lifecycle that is more likely to face delays.
- To ascertain the client's project manager key competencies that must be adopted in order to deliver a project successfully.

- To describe the client's project manager's role in mitigating the causes of delays in the construction projects in the UAE public sector.
- To identify the negative risks of the construction projects in the UAE public sector.

1.3. Research Questions

- What are the main causes of delays in the construction projects in the UAE public sector?
- In which phase of the construction project's life cycle do delays occur most?
- What are the competencies that the client's project manager must adopt to be able to manage a project in the UAE construction industry?
- What are the roles and the responsibilities of the client's project manager?
- What are the potential risks that might have a negative impact on the project's successful delivery?

1.4. Research Problem

The occurrence of delay and failure in the delivery of the construction projects is very familiar in the UAE construction industry due to the nature of the market and the complexity of the sequences that are being implemented to hand over a project. The construction industry in the UAE is developing rapidly in order to push the economy of the country forward, and recently the problem of delay is not affecting only the construction projects stakeholders only, it has a direct impact on the economy of the country. However, there are hardships and limitations face the client's project managers in mitigating the occurrence and the impact of delays in the UAE public sector construction projects, some of them are related to the nature of the project and others related to the competency of the project manager.

Chapter 2
Literature Review

2. Literature Review

2.1. UAE Public Sector & Construction Industry

2.1.1. Projects of the Public Sector in the UAE

Public Projects can be defined as a project that is financed and sponsored by a government and the government is the client, and can have full control on it. Public projects include mega infrastructure projects and public facilities. They are primarily supported by tax income, they are subject to higher scrutiny, and greater openness in the bidding and contract award procedures is essential. UAE has proved its capabilities in responding to the global changes and the global competition, it has achieved an enormous growth in the development of all different aspects in both public and private sectors. According to Al Qubaisi (2015), UAE factors of success were studied and concluded that the UAE was ranked in the 24th place out of 144 competitive countries. The study determined the critical factors that had an influence and contributed in the success of projects in the UAE, which were understanding the project's culture, leadership style, and last but not least the sufficient communication between the project's team. According to F. Alhammadi (2021), UAE has adopted the Public Private Partnership (PPP) to facilitate the integration of project management within its public sectors and the implementation of successful projects serving its strategy and aims. A PPP is a contractual arrangement between one or more public entities and one or more private sector company. Each side has a specific function to perform within a larger developmental framework. Holland (2017), stated that UAE government's success is because of the construction public sector modernized projects, the huge developed infrastructure system, and concentrating on the fourth industrial revolution. As the government is having new projects, it seeks for qualified project manager to be

in charge and to represent it. Alayan (2018), As a result of the current increasing trend of undertaking projects in the UAE public sectors as a result of rapid development and global competition, as well as a new strategy for enhancing the country's social and economic life, the UAE government must face the challenge of hiring and approving a qualified PM who manages the accountability and responsibility of the success and failure of the projects. According to Rahahleh and Kashwani (2020), based on the UAE leadership efforts to reduce the government's dependency on oil for income by diversifying sources of income from the industrial and tourism sectors, projects are generally becoming more complex, raising the demand for skilled PM and workforce to meet market's needs.

2.1.2. The Construction industry in the UAE

Leaders in UAE have always had the vision of development for the country and for the people who live in it as well. The country has been offering investments opportunities in different sectors, especially the construction industries. G. Rehman (2015) stated that Abu Dhabi and Dubai lead the construction industry in the UAE, and both emirates set the pace for the country. The UAE government intends to push the economy ahead with a development and enhancement approach. The UAE is recognized as the core of regional tourism, which generates considerable revenue for the construction industry while also increasing demand throughout the whole tourism sector. Uncertainty in the area has highlighted the UAE as a safe place, which is having a positive developmental influence on the sector. Comparing to the neighbor countries and the region generally, UAE has recovered from 2008 economic crisis and has been developing since then rapidly. Adel and Martin (2008) assured that the country was relieved from the 2008 commercial crunch faster than all of the countries in the region. In addition, Ahsan and

Gunwan (2010) added that the construction industry has ben developing quickly comparing to the rest of the countries in the Middle East. According to Faridi (2006), the oil and gas sector influences the revenues of the construction industry in the UAE. Mega projects in different sectors and different types like residential, commercial, and infrastructures in the UAE are being executed by international and foreign contractors who may have different requirements, methods, and standards. Robert (2005) conducted the study in the UAE and discovered that contractors must be established and, more significantly, must retain solid relationships with suppliers and subcontractors in order to ensure continuous material delivery as and when necessary, avoiding any delay to the project. However, it was discovered that even if contacts with connected parties are managed, it is critical to evaluate their price in order to preserve budget within the restrictions. In addition, many overseas contractors are familiar of the UAE's building environment in order to maintain competitive pricing. Some of them are even interested in purchasing resources in advance and stockpiling them, which may cause market pricing to fluctuate. M. Atout and Ren (2008) stated that the UAE had seen great growth in the economic and social sectors over the last 20 years, with many projects completed in the public and private sectors ranging. However, due to the rapid increase and high demand, the construction industry was facing numerous challenges throughout the UAE. G. Rehman (2015) has noted that Construction project delays are categorized into several categories based on their type, causes, and extent. The availability of sufficient finance and funding for the project is a primary factor for construction project delays in both the public and private sectors. Owner-introduced excessive job orders are one of the key causes of the delay, as is poor planning. Delays are caused by factors such as delayed decision making, delayed approvals, low

productivity, mismanagement, cash flow issues, and so on. The major goal of the growth of the construction sector in the UAE was to increase the living standards of persons coming from visionary leadership with the viewpoint and vision of continuing development. This has provided the UAE a significant boost in both the commercial and public sectors, with significant investment in the building industry as it was stated by E.Z. (2006).

2.2. The Project Management in the construction industry

The project management is a considered to be a modern approach. It is mainly the methods of controlling the existing resources of the project with special management tools and techniques as it was mentioned by Kerzner (2009). The Project Management Body of Knowledge (PMBOK) (2006) has defined the project management as the process and applications of knowledge, skills, tools, and techniques to the different project activities in order to deliver the project. The project has to be considered by the project managers as a series of sequential or parallel activities that has planned start and finish dates to achieve the project objectives and complete it within the required budget. In order to plan the project, at early stages, the assigned project managers must verify the capability of attaining the project objectives and milestones, and the sequence of the required activities to complete the project milestones. Thite (1999) stated the person who is responsible for managing the required resources to complete the project within the time and the budget required is the project manager. In the construction industry projects, project managers have to work according to the element of the project plan in order to deliver the project successfully on time. Berger (2010) stated that the project managers must develop practices of implementing the project management implications at the beginning of the project in order to help their team and

to be an effective tool to solve and get through different issues during the execution phase. Regardless the similarity of the size, value, design criteria, or even the shape, every construction project is a unique case. Therefore, project management must be known, clear, and able to be adapted by all the project parties and disciplines, noting that the project management processes are applicable to be applied to all types of projects and to be adapted by the project different teams. Yaziei (2010) confirmed that the project management processes and tools have been developed and structured over the years and enhanced to be fixed phases to suit all types of projects. If the project managers adopted an inadequate management process, this attributes in delays in the project and cost overrun. Therefore, Atout M. M. (2020) stated that tools of the project management must be used in implementing the financial analysis and revenue for the project. this helps the project managers to complete the project and achieve the objectives of the project that was mentioned in the feasibility study period.

2.2.1. The Project Management Processes in the Construction Projects

All the construction projects are not similar, hence, the activities and tasks for completing the project must be prepared in advance throughout the project management processes. Project Management Institute (PMI) have set five processes for the project management during the project life cycle, which are, Project Initiation, Project Planning, Project Execution, Project Monitoring and Control, and finally Project Closing. Each of these phases has its own inputs, tools, and outputs. These processes fall into one of three groups in a project, processes which are used at a predefined point in the project or only once, processes that are performed periodically as needed, and the processes that are performed throughout the project's life cycle continuously.

2.2.1.1. Initiation

The first stage of the project management processes is the initiation phase. It involves all the steps required and must be taken before initiating with the planning for the project. In this stage, all the authorized parties in the project prepare their feasibility studies and business case. Blomquist T. (2010) stated that before the commencement of any project, the organizations and authorities' requirements and needs are recorded and prepared. The documentation for the project at this stage will contain the project's degree presentation, the objectives, the necessary assets, and terms. The business case is mainly developed in the initiation stage of the project, and the direct stakeholders set their requirements. The effort and the time that is being spent on the feasibility study and the planning for the project will support achieving the objectives and the deliverables of the project. Meanwhile, inadequate launch arrangement will lead to disappointments and several issues. One of the main outputs of the initiation stage is the project charter that must be approved by all the different parties. Atout M.M. (2020) highlighted that during the initiation phase, the major and the difficult endeavours may be divided into stages to be more manageable and produce substantial outcomes. Recognizing the main deliverables of the project, preparation of the project documents in order to get the project approval, choosing the best project delivery method by utilizing and analysing the available resources, and assigning the project manager, are the main activities in the initiation stage that was set by PMBOK.

2.2.1.2. Planning

The longest stage of any project is the planning phase. This phase determines the project design, cost, duration of the project. Moreover, with more data being founded and provided, extra conditions, terms, opportunities, risks, presumptions, necessities will

appear. Kerzner (2013) stated that in the middle of the planning phase, project data is gathered from a variety of sources, each with varying degrees of accuracy. Iterative planning is used during this stage. Initially, it focuses on investigating all aspects of the extension, innovation, calendar, and expenses. Redesigns resulting from verifications during task execution may have a significant impact on areas of planning. As a result, greater emphasis will be placed on anticipating all aspects of a project (for example, timetable, costs, assets, and so on) in order to fulfil the specified project degree overall. Planning and goal setting are two critical leadership abilities that construction project managers must master. The capacity to identify goals and then design action plans to achieve those goals is referred to as planning. Turner (2012) mentioned that all the stakeholders of the project must be included during the planning phase in order to avoid any impact on their tasks and productivity during the execution phase. As per the PMBOK guide, project planning includes defining the requirements of the work, the resources needed, and the quality and the quantity of the work. In addition, scheduling all the activities and their duration, setting the milestones, and evaluation for all the different risks that might occur. Project managers have to focus on the time schedule, different resources, the organization break down structure (OBS), major project milestones. Moreover, the planning stage will produce different management plans that must be checked and revised by the project manager before starting the execution of the project like, quality management plan, execution plan, risk management plan, procurement plan, and change management plan.

2.2.1.3. Execution

One of the longest phases in the project is the project execution. It is mainly to finish all the work that was planned during the planning stage and to achieve the project

milestones without deviating from the project charter's objectives. Drucker (2010) confirmed that in order to manage the execution phase properly, the project manager has to have good communication skills, fast decision making, and problem-solving abilities. Project managers in this stage must track the progress of the project continuously, and make sure that the project is being implemented as per the planned dates and sequence of work by managing the processes, people, and communication. This step also handles the work scope that has already been defined and implements approved adjustments. Typical execution variations result in some work deplaning. These changes may include action terms, asset profit and accessibility, and unexpected risks. Such adjustments may have an impact on the project's planning but necessitate a few inquiries. Different PMBOK shows that the main activities and responsibilities by the project managers in the execution phase are improving the team members by working with them as a supportive member, directing and managing the work, negotiate with the team member and find room for enhancement. Pretorius S and Jordan JC (2011) mentioned that the construction project managers role in the execution phase is to identify any changes occurred deviating from the execution plan, control project changes, prepare updated reports and share it with the different stakeholders, ensure that the responsibilities are distributed well and each member is doing his work sufficiently, check the actual versus planned progress regularly, and to check the availability of the different resources.

2.2.1.4. Monitoring and Control

This stage is associated with monitoring task execution so that potential issues can be discovered in a convenient manner and corrective actions can be taken, as necessary, to manage task execution. The main benefit of this phase is that extended execution is

closely monitored and measured on a regular basis to detect deviations from plans. This stage also includes managing changes and recommending preventative measures in the event of a problem. When the project is up and going, it is critical that the project manager maintains control. Skoyles (2011) noted that project managers who are also leaders must be able to make intelligent decisions, form conclusions and take choices that will lead to resolve the different issues as they arise. Conflict resolution is another common difficulty that project managers may confront during this phase; it is defined as differences in ideas, views, and perspectives on any given topic, and conflict resolution is a vital leadership trait to acquire in a project manager. This is due to the frequency with which conflicts arise in construction projects as it was noted by Wand and Hannafin (2012). As it was confirmed by Berends (2007), an adequate monitoring is achieved in delivering the project within the time, cost, and the quality level required. Monitoring is one of the most important jobs of any project manager, and it include assessing work progress, gathering, assessing, and evaluating information, and using that knowledge to identify areas of improvement as required to enhance performance. Hamilton (2001) discussed the role of the project manager in the monitoring and control phase, he noted that project managers have to observe changes and their consequences, monitor and track the progress of the project, keep an eye on the expenses and the budget, monitor the risk mitigation actions, monitor the actual versus planned project progress, control the quality by monitoring the inspection tests and for handle the situation for the delayed activities.

2.2.1.5. Closing

This stage is associated with the final completion of all activities of the project, the hand-off of the finished item to others, or the closure of a drop project. Robichaud and

Anantatmula (2010) noted that when this phase is reached, it validates that all of the specified procedures have been completed in all the phases to bring the project to a suitable closure, and officially forms that the work has been completed. It is frequently neglected, but it is critical to ensure that the task is properly closed. Many projects do not have a realistic end point because there is no official and clear close down. It is vital to have the client's assurance that the project has been fully completed and the target is accomplished and that no more work and activities will be performed. Once the project is completed, the project manager should audit it and document the good and bad points in order to note the project's learned lessons so that the right decisions that has been made and good points can be repeated and mistakes can be avoided in the future.

2.2.2. The Competencies and Skills of Project Managers in the Construction Industry

The Project managers in the construction industry must have enough managerial experience and strong technical knowledge in order to deliver a project successfully, whether he/she was a contractor, consultant, or a client representative. The project manager ought to have the hard and soft skills to be capable of delivering the project successfully. Ballesteros & Chavarria (2015) noted that A technical or hard skill is one of the key managerial abilities that a project manager has to have. It indicates the knowledge of a complex activity that involves methodologies, techniques, procedures, or strategies such as scope management, project planning, scheduling, and controlling. On the other hand, soft skills are those that presents the project manager’s personality and helps him leading the project’s team like communication and negotiants skills R. Dobgegah (2011), P. Chen (2006), and L. Crawford (2000) all assured that the

successful project manager must have a strong technical background and knowledge in time management, risk management, value management (VM), Value Engineering (VE), cost control, resources management including resources allocation and resources levelling, procurement management, conflicts, claim management, and disputes. In addition, some of the competencies that are required by the project managers that was mentioned by G. Hwang and W. J. (2013) are scope management, organization management, human resources management, and health and safety management. Meanwhile, K.T. Odusami (2002) & Arditi B. (2009) stated that all the project managers must have similar skills in order for them to success like, leadership skills, communication, fast decision making, teamworking, and delegation. In addition, they need to be well-organised, analytical, proactive, agile, and ethical. Project managers must be familiar with the procurement methods and the contracts, and should be able to read and understand the contracting documents, especially the condition of the contract (COC), in order to be able to negotiate different parties in case of any disputes. N. Ahamad (2009) recommended that terms and conditions of the contract have to be read when a conflict arises, and each party's project manager must clearly understand their obligations and responsibilities before they start the work to prevent any disputes. He added that understanding the condition of the contract is a key to the project manager to be strong and success in delivering the project. M. Atout (2008) Noted that the project managers must be supported and have powers from their employer to hire the needed manpower and team to help him. A supported project manager can be agile and have the ability to deliver the project more successfully.

2.2.2.1. The Project Manager’s Emotional Intelligence (EI)

According to Vaida and Opre (2014), Emotional Intelligence (EI) was described by Peter Salovey and John D. Mayer in 1990 as the capacity to assess one's own and others' thoughts and emotions, to distinguish among them, and to utilize this knowledge to guide one's thoughts and behaviours. Because a human is a crucial pillar for conducting a project's strategy and attaining project success, and because emotional intelligence has a significant impact on a personality of the leader, the project manager out to the required emotional intelligence skills in addition to his leadership abilities. Vaida and Opre (2014) identified the emotional intelligence as the management, processing, and identification of emotions. According to Turner and Muller (2005), "the leader's emotional intelligence has a stronger influence on his work efficiency and success as a leader and the success of the project team's than the leader's mental abilities. F. Alhammadi (2021) stated that the effective project management is governed not just by technical or hard talents, but also by emotional qualities. "The project manager's capacity to comprehend and control emotion in self and others develops excellent performance, productive interactions with both internal and external stakeholders. There are four main categories for the EI and can be referred to as a model for emotional intelligence, were mentioned by Rezvani (2016) and also by Goleman, Boyatzis, and McKee (2002), self-awareness, self-management, social awareness, and relationship management. nineteen competencies were mentioned as a total under all of the categories. Casper, C. M. (2002) stated that EI is beneficial in improving the guidance of thinking, transforming changing rapidly, the ability to influence other people and persuade, assisting team to achieve the project’s success, and remove barriers between the project manager and his team.

Table 1.Emotional Intelligence Model

	Self (Personal Competence)	Other (Social Competence)
Recognition	**Self-Awareness** • Emotional self-awareness • Accurate self-assessment • Self-confidence	**Social Awareness** • Empathy • Service orientation • Organizational awareness
Regulation	**Self-Management** • Emotional self-control • Trustworthiness • Conscientiousness • Adaptability • Achievement drive • Initiative	**Relationship Management** • Developing others • Influence • Communication • Conflict management • Visionary leadership • Catalyzing change • Building bonds • Teamwork and collaboration

Generally, in order for the project manager to be successful, he doesn't have to be focused only on the technical part and experience, the soft skills and EI are very important to complete his personality as an effective project manager who can lead and take decisions.

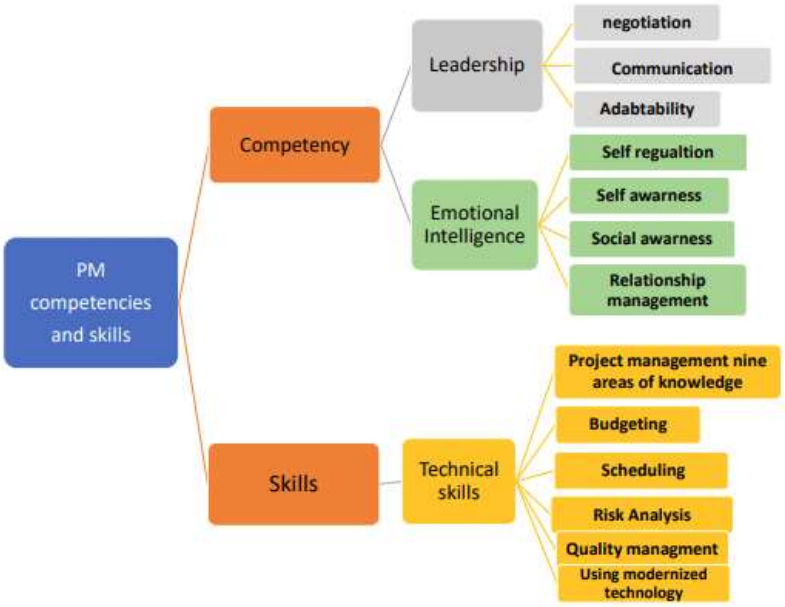

Figure 1. The PM competencies and skills, F. Alhammadi (2021)

2.3. The Client's Project Manager

The client's project manager can be defined as a representative of the client in a project who can be an intermediary between the project's client and the project's different stakeholders. A client project manager in the public sector was defined by K.P. Negara (2019) as a person working in public sector who has been put in charge by the client to act on his/ her behalf to engage with other parties, implement the contract, and ensuring the client requirements is fulfilled. The involvement of the client in the project might have an impact on the project success. Odeh et. (2001) Stated that during the project execution, the client's interference might cause delays in the delivery of the project. The client is one of the main contributors in the success of a project. However, Salleh (2009) stated that the client's variations, poor communication, and slow decision making are some factors that have major impact causing project delays. In the UAE public sector's construction projects, the government different authorities are mainly the client, meanwhile the government depends mainly on its projects managers in delivering a project successfully. Meanwhile, the client can be an individual who has employed a representative named the client project manager or the client's representative, who has a lot of responsibilities that must be attained in order to deliver a successful project maintaining the three constraints, time, cost, and quality. Pos J. (2017) claimed that the construction project manager generally must have a good technical experience in order to deliver a project avoiding time overrun and cost overrun.

2.3.1. The client's project manager role in construction projects

An effective strong project manager is not easy to find. As it was mentioned by Whitten, N. (1999) in order to be a successful project manager, you need to understand

the main roles and responsibilities of the project manager in each of the project phases in the project's lifecycle. He added that because of the nature of this position, project managers must be carefully chosen, trained, and fostered to ensure their success. This is the person in charge of project management on behalf of the client. This could be a member of the client's staff or a consultant, such as an architect, surveyor, engineer, or project manager. According to Hughes, W. and Murdoch, J. R. (2001), even if they are an external consultant, the client's representative should act as if they are the client or a member of the client organization. This may entail establishing an office within the client's organization, utilizing the client's stationery and business cards, and so on. If they do not accomplish this, they risk being perceived as just another consultant. It is critical that their job and assigned responsibilities and authorities are defined. The client's project manager main role is to ensure that the project is being delivered as per the client's requirements and as closed as per his satisfaction in terms of time, cost, and quality. By closing out a project maintaining these three constrains, the project is considered to be successful, and to ensure that, project managers must be able to define the different objectives of the project, avoid scope creep, ascertain that the work is being implemented as the project management plan, to perform a proper communication management and integration management, and to be a proactive problem solver. Godbold A. (2016) has specified the responsibilities of the client's project manager as, managing the strategic framework to guarantee that the basis and company strategy that were used to approve the project keep valid, ensuring that the organization and sponsor are brought up to date on the progress of the project, ascertaining that the project is clear, and that there are no sudden issues and mistakes, Supporting the client enterprise's business case, financial governance, and project

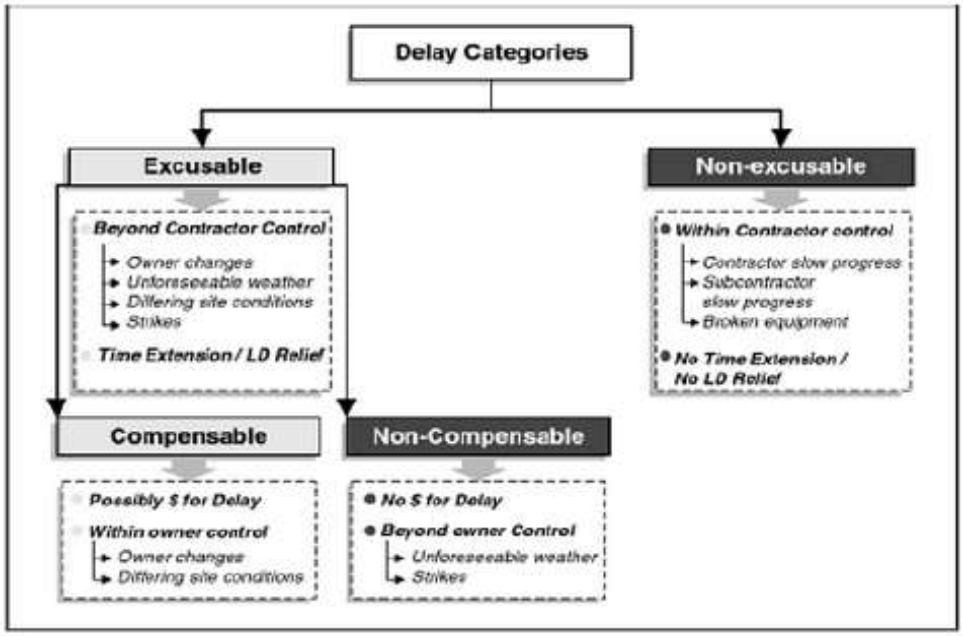

Figure 2. Delays Categories

delivery approvals, making sure that the project's benefits are realized by incorporating the necessary procedures and accountability, and assuring that the accurate information and tools are provided to the deliverer in accordance with the contract, and that queries are answered in a regulated and timely manner.

2.4. Causes of Delays in Construction Projects

2.4.1. Types of project delays

Generally, there are four types of project delays:

a. Critical & Non-Critical delays

b. Excusable & Non-Excusable Delays

c. Compensable & Non-Compensable Delays

d. Concurrent & Non-Concurrent delays

Intan E. and John K. stated that the time beyond contractual time that has been set during the tendering stage can be referred to as an extension of time. In a construction project, Delays must be identified in the case of occurrence whether if it is critical or

non-critical. Moreover, all types of delays are either excusable or non-excusable, both excusable and non-excusable delays can be characterized as either concurrent or non-concurrent. furthermore, Delays can be divided into compensable or non-compensable delays.

2.4.1.1. Critical & Non-Critical Delays

Prior to starting a project, a master baseline schedule must be prepared. The baseline schedule contains the milestones and the activities with its durations of the whole project. A critical path must be determined and it is the longest path in the network of the activities, this method is defined by the Critical Path Method (CPM). Koo (in 2007) stated that Sequencing construction works is an essential task for project planners in order to maintain efficient project control. Arranging activities necessitate planners determining the influence or "role" of one action on subsequent activities. They must also assess the state of activities, that is, which activities is or is not required to postpone. Construction projects delays must be identified either if they are critical or non-critical. Non-critical delays are the ones that cause a delay in the work progress without affecting the whole baseline schedule, while critical delays are the delays that occur in the project that has a direct effect the overall project completion. To provide a well estimated baseline schedule, project planners have to distinguish and be fully familiar with the difference between the status and the duration of an activity and the function of it. Moreover, this will help planners to understand the sequence of work. Therefore, it is better to have experienced project planners. The critical path method defines the sequence of work, based on the type of the project, the complexity, and the sequence of work. It organizes the projects and show them as series of activities. A major limitation to the CPM is that it does not reflect any resources changing, it's not possible to track any of the project resources. basically, it is only an activity-based method. Critical Path Method has become a widely accepted method for scheduling the activities and to keep track on the sequence of work and the duration of the whole project. As well as the activities that might cause a delay for the project. Shaikh Asif Saeed, (2009) stated

that claiming extension of time and evaluating the delays with the impact programs, are used by the method programming schedules.

2.4.1.2. Excusable & Non-Excusable delays

Delays can occur in different ranges and sizes of projects, from small building projects to mega complex projects. Some delays can be unforeseeable and out of control from the contractor side, these delays are called Excusable. Vice versa, the Non-Excusable delays are referred to the ones that caused by the contractor and can be foreseen and expected. Basically, the distinct between the two types is obvious, it is understanding the liability of the delays and knowing to which of the project parties it's referred. Project managers must have the ability to classify the delays and need to understand the contributing factor that caused it, to decide whether a delay is excusable or non-excusable, to know if the contractor can ask for an extension of time or no, as well as if the contractor can claim a compensation for the extension of time. Excusable delays can be considered as compensable or non-compensable depending on the type and cause of delay. Majid et (1998) stated that the Understanding the underlying variables that lead to non-excusable delays would aid in recognizing and addressing challenges encountered by contractors during the building process. The Ishikawa or fish bone diagram has been utilized as an analytical tool to aid in finding the components leading to causes of non-excusable delays, and a ranking technique has been developed. Non-Excusable delays are caused mainly by the contractor, and major non-excusable causes of delays are, inadequate experience, poor site management, difficulties in financing the project, errors and defects in the construction which leads to rework, delays in site mobilization and ineffective planning and scheduling of the project. A good communication between the client, consultant and contractor would be a way to mitigate the delays that can occur by any of the project's stakeholders. Each of the project parties must know his scope of work, liability, responsibilities and resources. In addition, all the stakeholders, especially the contractor, should have the ability to analyze the different factors that can cause a delay to the project progress and to highlight the high-level risks from

the very beginning, all different high-level risks must be identified in the project charter, and that to deliver a successful project. To avoid disputes and mistrust, condition of contract should be clear with all the penalties of any project delays that can occur by any of the project parties.

2.4.1.3. Compensable & Non-Compensable Delays

Excusable delays divided into compensable and non-compensable delays. Non-Compensable delays are the ones that out of control of the contractor and the contractor can ask for an extension of time, and the contractor can ask for extension of time and compensation in the case of compensable delays. Mostly, Client & Force Majeure are the reason behind the excusable delays. Excusable compensable delays examples are, slow decision making, owner interference, suspension of work, delayed payments for the completed work by the client, unrealistic project duration, and ineffective delay penalties, and variation orders and change of scope during the construction by the client, which requires rectifications for the work that has been done before and starting new tasks and activities that can affect directly the baseline schedule of the project and it may affect the critical path negatively and that will lead to a delay and for the whole project handing over. Risk management plan must highlight the issue of change order and project manager must know how to come up with solutions to avoid delays. Yang, (2007) mentioned that the evaluation of the project risk management is relayed on the project time period and activity criticality. Non-compensable delays include, weather effect, force majeure as war, revolution, riot and earthquakes, change in regulations, slow permits and approvals by the government, lack of communication between the parties, and fluctuations in cost/currency.

2.4.1.4. Concurrent & Non-Concurrent Delays

There's no specific definition of a concurrent delay, its generally the occurrence of the delay from both parties in the project, the owner and the contractor at the same time, which leads to delay in the project. It's scientifically two or more delay events share the same time and fall in parallel in the critical path. James G. Zack in 2011 stated that When project owners impose liquidated costs at the ending of a delayed project, contractors typically reply with claims of existing delay. That is, contractors claim that part or all of the project delay was caused by the owner or an external source, and hence liquidated damages should be waived or excused. One of the most important factors in any construction project is the project duration and to hand over the project on the time that was agreed on. This arises problems between the owner and the contractor in different aspects. However, the debate in the case of the concurrent delay is classifying the liability of the delay and who is the reason behind delaying the project. In this case, the owner puts the blame on the contractor and requests from the other party (the contractor) to complete the project on time and to pay the delay damages or the liquidated damages that has been caused by the contractor or that was mentioned in the contract. While the contractor requests two things, either an extension of time, or an overhead cost, or both together. Each party try to get rid-off the responsibility to get his compensation or extension of time. Delays that happen in the critical activities or in the critical path cannot be considered as concurrent delays with other delays that are not on the critical path arising in an overlapping period. There different cases of concurrent delays depending activity, duration of the delay and who started and finished first. This leads to a conclusion that if the delay is excusable or non-excusable and compensable or non-compensable. AACE has addressed the net effect of a delay

event concurrent with another delay event caused by another party in the following table. AACE International - Forensinc Schedule Analysis

Table 2. Net Effect of Concurrent Delays

Delay Event	Concurrent with	Net Effect
Owner Delay	Another Owner Delay or Nothing	Compensable to Contractor, Non-Excusable to Owner
Owner Delay	Contractor Delay	Excusable but Not Compensable to both Parties
Owner Delay	Force Majeure Delay	Excusable but Not Compensable to both Parties
Contractor Delay	Another Contractor Delay or Nothing	Non-Excusable to Contractor, Compensable to Owner
Contractor Delay	Force Majeure Delay	Excusable but Not Compensable to both Parties
Force Majeure Delay	Another Force Majeure Delay or Nothing	Excusable but Not Compensable to Contractor

Both parties, owner and contractor must educate their staff and project team on the contract management procedure and understand the conditions and the term of the contract clearly, and to adhere to the contract management procedures

2.4.2. Internal Factors of Delays

2.4.2.1. Delays caused by the Client

The client in the construction project is one the main direct stakeholders, can be referred to as the owner or the employer, is a single person usually in a small project, or a group of individuals, an authority or even a developer in big projects who has a control over the project and has an interest in it. According to Z. Ren, M. Atout and J. Jones, (2008), the delays that are caused by the client can significantly affect the consultant and the contractor.

General causes of delays by the clients are, ***Poor communication and irregular interface*****.** A proper communication is very important between the client and other parties of the projects in order to deliver a successful project. It mitigates problems and

risks, and creates trust between the project's different parties. It can be done basically by setting regular weekly and monthly meetings that discuss the progress of the projects and any problems and risks that could face the different stakeholders, and any financial hardships. ***Changes and Variations.*** Or sometimes referred to as variation order, is generally a form of change either by an addition or omission in the scope of work of the construction contract. These changes and variations may include the design of the construction, quantity, quality, working conditions and the sequence of work. Changes may possibly occur if the contracting documents were not clear and does not describe the work properly. Variations are a main cause of conflicts and disputes if they were not agreed in the condition of contract or can lead to financial losses to the consultant and the contractor. M. Atout (2008) mentioned that Without advance notification, an instant change order might be issued to the Contractor via the Consultant depending on the Client's orders, in certain situations even without any formal authorization for the payment of the extra works. This usually has an influence on the Contractor's strategy. ***Non-clear project objectives***. A construction project can easily fail if the objective and purpose of it was not clear. therefore, the client has to have a clear vision and purpose of his project and do his best to not deviate from the high-level objectives of the project. As well as to prevent many variations. Ferguson E. (1992) mentioned that the client's requests and needs have to be clearly stated in order for the project's design to be directed correctly. Having a clear objective and a fixed scope of work ensures that all the project parties and stakeholders are working toward achieving the same goal and to deliver a successful project. Brij B. & Donald F. stated that It is said that 20 projects out of 24 case studies had a rise in the scope of work, with the causes being altered conditions from those mentioned on the Contract

documentation and the required extra work beyond the primary scope of the work contained in the contract. ***Nomination of contractors and suppliers***. Some clients prefer to hire sub-contractors and suppliers under the main contractor in circumstances and conditions that may not be accepted or preferred by the main contractor. Conflicts a delay in the project progress might occur until an agreement is signed between the different parties. ***Client's irregular payments***. The contractor's cash flow might be affected and disturbed by a delay of payment from the client. This will cause a direct delay to the whole project and work progress, because the payments from the contractor to the sub-contractors and the suppliers will be disturbed, and this in turn will cause a financial problem between the project parties. ***Routine of government authorities and approvals***. Local authorities may cause some delays for the construction project regarding some approvals of design, drawings, licenses, and even inspections to the site work environment and efficiency of the construction elements. If the client was not aware of the authorities' routine and approvals for construction, delays could occur and might not be only caused by the main contractor. M.A Othuman Mydin in 2014 stated that the project management team (client and consultants) should be more experienced and responsible in their own domains, rather than relying on the contractor to handle their difficulties, particularly when dealing with local authorities. Furthermore, the client or project team should minimize internal processes or long procedures for getting permissions and confirmation, which typically disrupts the construction planning on the construction site. ***The Experience of the Client's Representative***. Client's representative in a construction project must be an experienced project manager in order to deliver the project within time, cost, and quality that is required by the client. In addition, client's project manager must have

enough knowledge of tendering, construction processes and activities, design process, risk management, value engineering, and cost control to be able to take critical decisions on behalf of the client. Project managers who are not fully familiar with the project management area of knowledge and don't have enough skills of implementing the project management process in the construction projects might not be able to handle the project in a way that a client requires. Usually, clients finance the project by borrowing from finance companies or banks, and the bank representative demands to become one of the project members to gain an access to the project documents and data in order to protect his venture by sharing in decision making in technical issues and procurement strategies, and this can be easily a big risk to the project performance. Mardosh J. in 1998 mentioned that as the client is the final user of the project, it is critical to pay the contractor immediately and complete amount for the work that has been done, and in some situations to reimburse the Contractor for any loss or expenditures caused by the Client. In addition, the client's representative should be familiar with the progress of the work and the project's milestones, and get an update on regular basis from the project manager about the status of the site and the current problems and the potential risks to update the client about the exact status of the project precisely.

2.4.2.2. Delays caused by the Consultant

The consultancy offices must accept their size and experience in order to know if they have the ability to design or supervise a project. Otherwise, this will affect quality of the project and the contractor's performance.

General causes of delays by the consultant are, Incomplete ***Drawings & contract documents***. Demanding an unrealistic project duration might lead the consultant to

have a lot of errors in the project specifications and drawings, therefore, a lot of clashes might appear between different disciplines, and wrong estimations. therefore, *i*n the tendering stage, specifications, Bill of Quantities (BOQ), and Drawings must be ready to have a clear and stable bidding process and to avoid any unwanted delays that might occur. Assaf, S.A and Al-Hejji, S. (2006) recommends that following up by the architecture and the client helps solving by schedule and completes design documents. In addition, the consultant can verify any mistakes in the contract documents on behalf of the client, but the staff of the consultancy office usually are not confident to take such a step and issuing instructions without raising it to the top management. So, the contractor sometimes will have to wait until receiving the instructions about the rectifications. Battaineh H. in (2002) noticed that The Consultant's failure to successfully manage and prepare the contract document, including the bill of quantities and authorized drawings, is a primary cause of delays, resulting in a huge error in margin and deficiency in amounts. ***Changes in Drawings & Specifications***. Authorities' approvals will take longer time in cases of new design solutions. In other words, sometimes the contractor will discover problems and errors in the drawings during the execution of the project due to the inexperience of the consultant engineer, and this will cause major delays to the project schedule because there is no stable foundation to the construction process that the contractor can rely on without approved drawings. Edwin H. (2005), confirmed that the consultant has the responsibility of the design which was transformed from the proprietor organization. Also, the consultant is responsible for the design management, and the design procedure system. ***Delay in Approval of documents***. In the construction process, the consultant has to give approval for the documents that the contractor submits during the project as well as

prior starting the execution. The process of giving approvals by the consultant is complex and time consuming, and the contractor in many cases cannot proceed with the work without these approvals. ***Duration and process of the site inspections.*** The consultant is role is to supervise the quality of the work and to make sure that it is being implemented as per the drawings, method statements, and specifications. And some of the site inspectors do not have enough experience to do these inspections, or there are no specific criteria of the inspection process provided by the consultant to the contractor. ***Poor communication between the consultant staff***. When a discrepancy occurs, the contractor raises the problem to the consultant. In some cases, the consultant engineer cannot find a solution immediately and he needs to check in the contract documents or with another colleague from his team or from another department. A proper communication tool has to be provided and a well-prepared platform can ease the process of answering the inquiries and finding the best solution in accordance with all the different departments in the consultant office. ***Poor quality control***. The consultant has the right to do site visits and surveillances as much as it needs to keep an eye on the project's quality and the contractor's performance of implementing the work. M. Atout mentioned that, removing and correcting faulty work is the consultant duty to issue the directions for. The lack of quality control can arise problems in site inspections and the consultant will be surprised by the quality that the contractor presents, which can cause a rejection of the work. Therefore, the work sometimes has to be stopped because the contractor cannot proceed with the next activity without the approval of the consultant.

2.4.2.3. Delays caused by the Contractor

Since that the contractor is the executor, he is the reason behind most of the construction project delays, and if a delay occurred from another stakeholder, the impact will directly affect the contractor somehow and might lead him to change some plans or the procurement strategies in order to compensate the delays.

General causes of delays caused by the contractor are, ***Improper project planning***. Prior the commencement of any project, a proper plan must be prepared. Basically, a project plan describes how the project will be completed and executed within a certain duration through a certain process. It includes the stages and the resources that is needed for the project. A project plan defines the project objectives and specifies the required tasks to achieve these objectives. Project plans that have to be prepared are, construction execution plan, quality plan, procurement plan, health and safety plan, risk management plan, logistics plan, sustainability plan, construction waste management plan, and project management plan. Geberhiwet & Luo (2017) mentioned that Inadequate planning in the early phases of a project expresses it throughout the project, causing delays at different stages. Only a well-planned project can be successfully executed. usually, small and medium sized contacting company don't care about the project planning as much as the big contactors, and they end up proceeding with the work with only a small scope of planning the dates required without identification of the required resources and cost of each stage. In the very beginning, it is a must to start with a proper planning for each project and to define the contract risks that could occur and affect the project progress directly and indirectly and come up with an initial summary plan. And for a detailed operational program to be prepared, the sequence of work and the construction site layouts must be done properly, the

project plan will be prepared and revised by the project manager, and the consultant has to give an approval for it. The project plan is prepared and the project manager and the planner of the project have to communicate continuously and regularly during the project's life cycle to identify areas of errors and delays by preparing weekly and monthly progress reports that include mainly the actual vs planned progress and the project cashflow. ***Inadequate project financing***. Some contactors when they receive their payment from the client, they use this payment in other places to run other urgent stuff, like another project which could be more profitable. This will cause shortage of material in the project and problems in paying the salaries to the project staff, and even will affect the size and quality of the sub-contractors of the project. According to Assaf, S.A., and Al-Hejji, S. (2006), "the customer must release payment on schedule lest contractors damage capacity to fund the activity." Furthermore, the contractor should handle his monetary resources and organize his cash flow using progress payment. Therefore, the contractor sometimes is forced to issue claims to the client in order to get paid for the delays that occurred in order to pay the subcontractor and to relieve from the damages that happened in his cashflow. ***Lack of experience in similar projects***. In order for the contractor to deliver the project as per the time frame and the quality required with the specified cost. A study has to be done to ensure the capabilities of delivering the project. The contractor's experience and lessons learned from previous project are very important to initiate each phase of the project with the minimum numbers of errors and mistakes in all aspects. The contractors nowadays tend to bid projects they don't have similar previous experience in it, and that might lead to several problems in the organization breakdown structure, the number of the staff, and the experience of the hired team in all the different departments, it will affect the

procurement strategies for the contractor, the planning of the project, and the quality as well. This will lead to a direct impact on the progress of the project. ***Inexperienced technical team***. The technical team plays a major role in delivering the project, the main responsibilities of the technical team are to prepare the shop drawings that the construction team will rely on in the execution of the different structural, architectural, MEP, façade, and all the different disciplines' activities. They are responsible for reviewing the shop drawings that is prepared by the subcontractors prior handing them over to the consultant for approval. The technical department role is to prepare the material submittals and to ensure that the material will be delivered by the different suppliers as per the project specifications and the design shop drawings. One the major roles of the technical team is to find any discrepancies in the contract design documents and to issue Request for Information (RFI) to the consultant to solve it, therefore the shop drawings and the material that will be issued to the site will be approved without missing any details that might stop the project from progressing forward. The technical team of the project has to have the enough experiences in site and in the office to make a proper coordination between the design documents and the work that must be implemented at the site by the construction team. ***Lack of coordination between the sub-contractors*.** As per Constantino N. (2001), The primary objective for subcontracting is the necessity to reduce liability exposure due to increased claims and legal proceedings, as well as a strategy to shift potential risks and unexpected variabilities. The construction team that includes the construction managers, project engineers, and the site engineers have to make a proper coordination between the different subcontractors, and be familiar with the different activities and their sequence to know when and how to engage each sub-contractor's labors in the site. Moreover,

the contractor's project manager must be aware of the baseline schedule activities that has been planned prior starting the project and the actual site status in order to know when it is the best time to engage a sub-contractor into the project. And therefore, the financial plan and the procurement strategy will not be affected due to delay of the work or the material delivery for each subcontractor. The technical department in the project is responsible for the coordination between the different subcontractors' materials and drawings in one item, and coordination has to done through meetings, intelligent tools or emails, and even letters depending on the item. Miscoordination and bad communication between the subcontractors might cause a trouble for the main contractor's technical departments in getting approvals from the consultant. In addition, each sub-contractor must understand their exact scope of work before submitting their quotations and initiate their work at the project. ***Poor site quality***. The contractors are responsible to deliver the project as per the client's and the consultant's standards and requirements, and to keep their satisfaction, a proper quality management plan has to be done properly to comply with the project requirements. Construction sites quality has to be managed in all aspects by the construction team, quality manager and the project manager. In other words, site quality includes the quality of the structural elements, the finishes work, tidiness of the site's logistics areas, and the quality of the equipment and materials. In addition, it will help the contactor not to waste his manpower on housekeeping and stopping the site activities. Consultant usually requests mock ups from the contractor to make sure that the work will be implemented as per the specifications and drawings, in parallel, the contractor should stick to the approved work benchmarks in all the site activities to prevent any possible delays. According to Geberhiwet and Luo (2017), in a rapidly growing country,

demand frequently exceeds supply, causing prices to rise and contractors to delay purchasing operations until prices fall as a consequence of a scarcity of quality material. ***Mistakes during the construction.*** Construction workforce must be divided into groups, each with his specialty. Groups of the construction's labors are steel fixers, scaffolders, carpenters, masons, etc. site engineers and foremen have to keep a closer eye on the labors to watch their productivity and quality of work Ali and Wen (2011), mentioned that if a construction manager fails to direct and supervise the construction project, quality issues may occur. As a result, efficient construction management is vital for any construction project. In addition, Manpower supply companies get their labors to construction site without adequate training, which may lead to poor workmanship and work has to be done more than once prior to the quality control engineer and the consultant inspection. Proverbs D. and Holt G, (1999) stated that construction method, labour utilization, and monitoring the productivity rate, by managing the three major concepts, the project time performance will be achieved. ***Lack of resources management***. Contractor's resources are mainly the tools of construction, these resources are the manpower, materials, and equipment. Sub-contractors, finance, space and facilities are also considered as a part of the project resources. The contractor has to provide an adequate number of labors and engineers in order to prevent any delays in the construction activities. These resources shall be experienced and skilled enough to avoid any construction mistakes and delays. In addition, the construction equipment and materials have to be delivered to the site on time and with the proper quality that complies with the project specifications and meets the standards and requirements of the client. The construction resources have to allocated properly everyday by the construction manager to produce the best

productivity pre day, in parallel, the project manager has to make a sufficient resource levelling with the planning manager to keep the project on track and as per the baseline schedule, and it's project management a technique used reallocate the different resources of time, humans, and materials to ensure that the project can be completed with the available resources to mitigate delays, and this provides creating a balanced productivity in the construction project. ***Lack of Risk Management.*** The contractor's risk management process has to be done properly and at all the stages of the construction process. Risk management generally is defined by the PMBOK as an unforeseeable event or circumstance that, if it occurs, has a favourable or unfavourable impact on a project goal. The positive effects are referred to the opportunities and the negative effect is referred to the threats. Risk management is important to mitigate the project threats and recognize all the opportunities that will make the contractor deliver the project and achieve the goals with the least number of losses. The contractor's project manager has to be fully familiar with the process of risk management and risk mitigation, and the types of risks that might occur in the construction project. Project managers must know how to identify risks, measure them, report and monitor risks, control them, and to evaluate and oversee the risk management process. Project risk management processes are defined by PMBOK as planning risk management, identifying risks, executing qualitative and quantitative risk analysis, planning risk responses, enacting risk responses, and monitoring risks. Construction project risks can come from the different stakeholders of the project, but the contractor has to have the ability to avoid, transfer, mitigate, and to know when to accept the risk. Construction risks are a lot, and can be categorized as time overrun risk, cost overrun risk, quality risks, procurement risks, and disputes. All these categories of risks can occur because

of the lack of supervision on the site quality and progress, inadequate site tools, equipment, and materials, miscoordination between the subcontractors, lack of communication between the client, consultant, and contractor, change in scope and design variations, force majeure.

2.4.3. External Factors of Delays

In the construction projects, some of the delays might occur are not caused by the project direct stakeholders, they are considered as delays caused by external factors, and these delays can be related to the stakeholders indirectly. Aibinu and Odeyinka (2006) noted that the external factors are those impacts, conditions, or situations over which a company has no control and which have an impact on the organization's decisions made by the management and stakeholders. There are several external factors that might have a significant influence on the company's capacity to fulfill its strategic goals, and their projects' objectives. Weather related factor was mentioned by Arditi (1985) to be the main external factor that has a direct impact on the project's progress. The weather being unsettled, dusty, very windy, cold, hot, or even rainy, cause a risk to the labours and might stop the project from progressing, therefore, unexpected delays might occur. land ownership, many stakeholders, changes in regulations and legal requirements, and claims and conflicts are the five main reasons for delay, according to Venkateswaran and Murugasan (2017). Moreover, Assaf and Al-Hejji (2006) noted that the increase of the prices of the material is an external delay factor that affects the contractor and client directly, and it might lead to variations as well in order not to exceed the project's budget. They also added that the delas in obtaining approvals and permits from the different authorities is an external factor of delay and not related to the client or the contractor. Some of the external delay

factors are the unstable political situation of the country and the bad economic conditions as it was noted by Olawale and Sun (2010). According to L. Muhwezi (2014), governments regulations, unforeseen site conditions, civil disturbances, and labours strikes are main external factors.

2.5. Risk Management and Construction Delays

2.5.1. Risk Management

Applying the risk management process in any project is the key to the project's success. Akintoye & MacLeod Mentioned that in order to minimize the losses and to improve the project's profitability, it's necessary to implement the risk management processes in the construction phases and activities. Mainly, risk management in the construction projects is to control and deal with the unexpected events that might occur in the project and might have a certain impact directly on the project's completion and success. The main difference between the risk and the uncertainty is that risks outcomes are measurable and can be quantified, while the uncertainty cannot be measured and outcomes can't be predicted. Perry and Hayes (1985) assured that Risk is a measurable uncertainty, while uncertainty is an un-measurable risk.

Table 3. Risk & Uncertainty Differences, Merna & AlThani 2005, p.14

Risk		Uncertainty
Quantifiable	→	Non-quantifiable
Statistical Assessment	→	Subjective probability
Hard Data	→	Informed Opinion

S. J. Simister (2004), Merna & Al-Thani (2008), J. R. Turner (1999) and Thevendram and Mawdesley (2004) all gave similar definitions to the risk management (RM) that complies with the PMBOK definition of it, which is to be the processes of identifying risks that might occur in the project, accessing the impacts of the risks on the project, perform quantitative and qualitative risks analysis, plan the responses and coming up with strategies to reduce the impact of the risks and the possibility of happening, and to monitoring and controlling process to the risks. The Risk assessment should be implemented against the most important three constraints in the project, time, cost, and quality. Gary & Larson (2007) suggested that in order to initiate a project successfully, project risks must be identified and the responses for these risks must be planned before the project starts. In addition, risks at the planning stage of the project are considered to be high and it's cost of it occurring is low, hence, by the end of the project at the delivering stage, the chances of risks to occur are very low, and the cost of risks is very high. The Risk Management Plan (RMP) is created at the planning phase of the project lifecycle. The RMP describes how the project's risks will be managed, and it must be updated within the project lifecycle, moreover, each level could have its own risk management plan. Ross (2005) believes that having a risk manager in a project will establish a well-founded risk management strategy in the project and will maintain a proper coordination in the company, also, a risk manager will monitor the effectiveness and the efficiency of the procedures and systems. In addition, risk management must be involved in the strategic development and management. For risk identification, as it was mentioned by H. F. Al-Ajmi (2018), there are many tools and techniques that can be used like, document review, project stakeholder brainstorming, Delphi Technique – anonymously consulting a team of experts, interviewing, root cause analysis,

assumption analysis, SWOT (strengths, weaknesses, opportunities, and threats) analysis, and checklist analysis, all of which can be developed based on historical data and knowledge gathered from previous similar projects. The following tactics can be used to manage the responses to the identified negative risks: avoid risk, transfer risk, mitigate risk, and accept risk.

2.4.2. Major Risks in Construction projects

It is critical to have a process in place that can reduce risk for all stakeholders participating in the project. There is no such thing as a risk-free project. However, a significant level of risk may be reduced by strategically placing the contract document. The approach should be developed by identifying the risks in the project, the areas that have a significant impact on the project's performance, evaluating them, and defining appropriate measures to reduce these risks. According to K. Jayasudha and B. Vidivelli (2016), it was mentioned that risks are internal and external, and there are general types of risks in the construction projects such as, financial risks, material, weather, engineering, operational, procurement and contractual, environmental, economic, political, social, people, insurance, and reserves risks. In addition, some of the major risks are, Inexperienced contractors bid on the project, here the client must guarantee that skilled, experienced qualified bidders are asked to bid on the project when in the stage of qualifying bidders. K. Mhetre, B. A. Konnur, and A. B. Landage (2016) stated that external influences/interests, as well as political forces, and economical issues must be avoided. The project will be threatened and put in risk if it is awarded to an inexperienced and unprofessional bidder. Therefore, the client and consultant must invite only the qualified contractors based on a well-studied prequalification, another major risk is an undefined scope of work and occurrence of scope creep. According to

H. F. Al-Ajmi (2018), As far as feasible, the scope of work must be precise, unambiguous, and specified. A poorly specified scope of work will result in many gaps and associated adjustments, posing a significant risk to the project. The inclusion of special needs by the different stakeholders may cause the project scope of work to expand and become more complex. The project will be in risk as a result of this. He also added that Client designers should explicitly specify the scope of the project for contractors, and any interconnections with facilities should be documented. Changes of regulations and laws was mentioned as a major risk by M. Nayfeh (2012) who noted that a country's laws change with time, and most of the clients are not in proper control of these changes. A significant change in the legislation, such as environmental law, may pose a significant risk to the project. Therefore, the contractor must be compensated if the change has an influence on the contract.in addition, Polluting the environment, Cheng Siew Goh and Hamzah Abdul-Rahman (2013), confirmed that the project must meet the environmental standards and regulations of sustainability and not impact or have an influence on it in any possible way, and the client's designers should follow the rules as well as the contractor. Also, Unexposed site conditions is a major risk, and according to P. Mutgi and U. D. Hakar, If the current site is not accessible, exposed, or visible and all subsurface facilities are not identifiable. This will have an influence and risk on both time and budget. The site should be studied and surveyed Geo-technically by the designer in order to inform the contractor in the case and to prevent and disputes. Unskilled and shortage in manpower. It was investigated that Hadyan Fahad Al-Ajmi (2018) that Some of contractors are not providing the required manpower to complete the project and as well the skilled manpower to increase the productivity of project. This will cause a delay to the project as well as a

loss of contractor profit. During the bid submission, the contractor must include in his execution plan the manpower histogram, subcontracting strategy, and a list of key people profile, so that the customer may assess the contractor's capacity to complete the project. Contractor’s unsafe execution of the project. Some contractors fail to provide the necessary qualified safety officers to supervise the labors in doing their tasks in a safe way. The project will be in a risk of as a result of this. K. Patel (2013) stated that the client must specify in his contract that the contractor must assign safety officers for a specific group of laborers working in the same location, and the contractor must comply with this demand. Furthermore, the safety manager must have authority over the site's activities. as well as to submit a safety management plan. One of the major risks that can cause a negative impact on a construction project is the currency and commodity price fluctuation. Commodity price risk is the risk that a change in the price of a raw material will have a negative effect on a firm that employs that raw material. Changes in commodity prices after the Bid has been submitted might cause a cost and budget change that might lead to cost impact or cost overrun and put the contractor at a risk of delay as well. Moreover, Kendrick T. (2009) added that currency fluctuation is caused by the variable exchange rate of one currency to another. If the currency of the contract price has changed against other currencies between the time of bid submission and the time of invoice submission, this will have a cost effect and risk for the contractor. Unexperienced designers. Chapman R.J. (2001) highlighted that some contractors are failing to provide the experienced engineers and designers necessary to finish the full design of the project as stipulated in the contract. This will put the project at a big risk of delay and cost overrun. During bid submission, the contractor must include the personnel of all lead design engineers and the engineering

manager in his execution plan so that the client and the consultant may assess the contractor designers' capacity to complete the project.

Chapter 3

Conceptual Framework

3. Conceptual Framework

This chapter shows the main factors affecting the successful delivery of a construction project. in addition, it reflects the outcomes of the literature review and the opinion of experts in the construction industry and researchers discussing the causes of delay in the construction project. meanwhile, it shows the skills that the client's project manager must have in order to be competence enough to influence the root causes of delays positively and to maintain the project's main constraints.

Root causes of delays can be categorised into categories as it's shown in Figure. 3. Each of these factors can be dealt with and mitigated in a certain way, depending on the liability and the severity of the impact.

Since that the client, consultant, and contractor are the main stakeholders in the construction projects. The delays factors that can possibly have an influence on the project main constraints are related to each of them depending on the liability, authority and responsibility of each.

The conceptual framework shows the external factors of delays in the construction project that were deduced from the literature review. Mainly can be defined as the factors that are out of the control of any of the project main stakeholders and can have a negative impact on the project's delivery.

The literature review assured that implementing risk management and defining risks of the project is necessary in order to deliver a project successfully. Therefore, Undefined project risks were added in the conceptual framework as a main category of factors affecting the project's delivery.

The client's project manager contributes in mitigating the different causes of delays directly and indirectly. The level of the client's project manager contribution depends on his/her experience and the different acquired soft and hard skills.

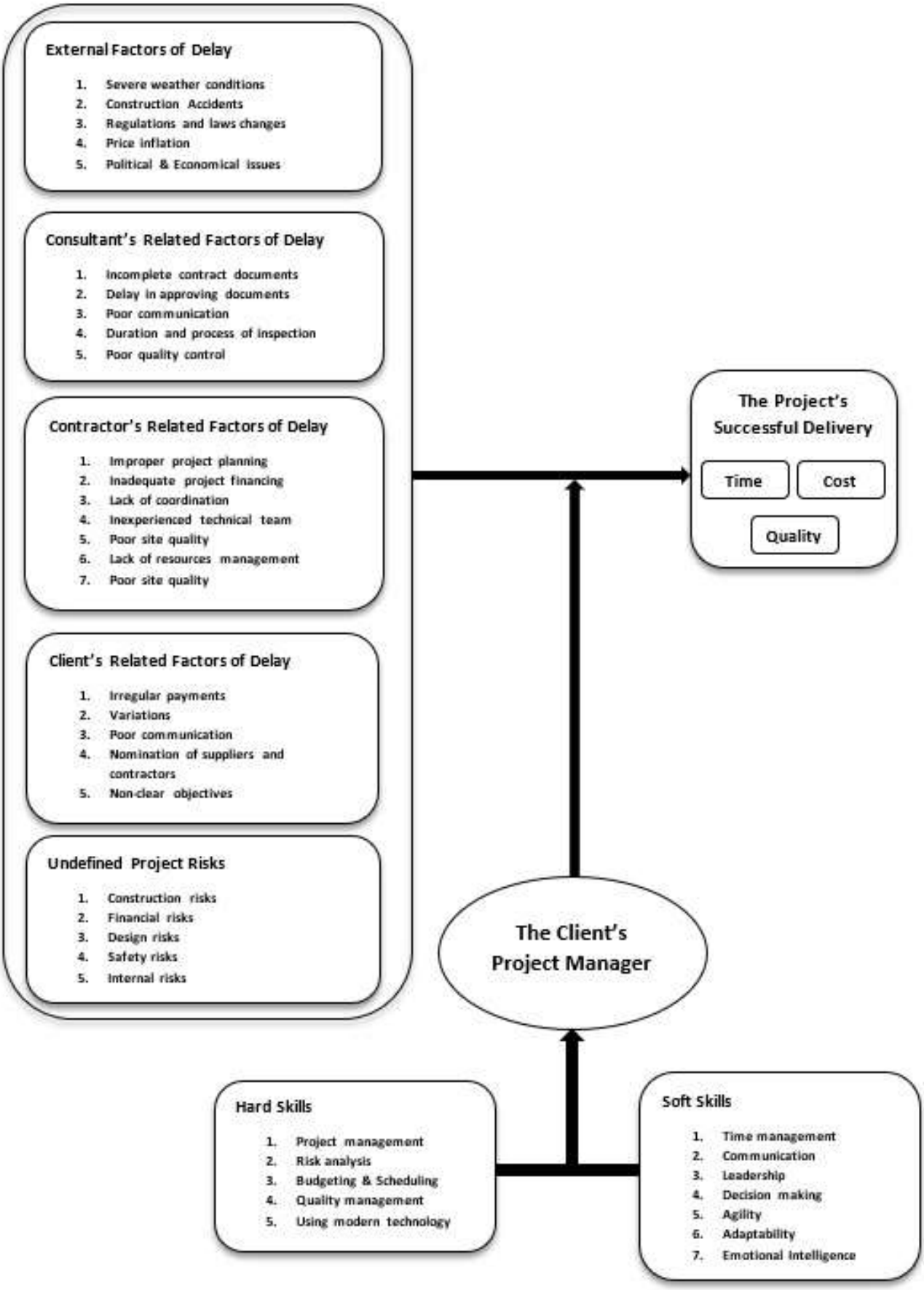

Figure 3. The Conceptual Framework of The Project's Successful Delivery

Chapter 4

Research Methodology

4. Research Methodology

4.1. Introduction

This chapter presents the methodology that was approached to achieve the main purpose of this research and to answer the research questions as well as to attain the research objectives. The research aimed to determine the main root causes of delays in the construction projects in the UAE public sector and the role of the client's project manager in mitigating these delays in order to deliver the project successfully.

However, primary data were collected by a questionnaire survey that was distributed to professionals from the construction industry including professionals form different companies and stakeholders (clients, contractors, consultants) in the UAE who are working mainly in public sector construction projects. In order to support the primary data collection, client's project managers who are working as clients' representatives in different construction projects were interviewed to assess the influence of the competent client's project managers on the construction projects and his/her contribution in mitigating the different causes of delays.

The questionnaire survey was developed according to the factors that were collected from the literature review. The literature review included many articles, researches, journals, books, guidance, dissertations, thesis, and studies addressing the role of the project managers in the construction industry and different factors of delays in the construction projects, this can be considered as a collection of secondary data.

4.2. Research Methodological Approach

The research adopted both qualitative and quantitative data analysis in order to achieve the research aims and objectives. it's referred to as mixed methods. The choice of

applying both methods is to enhance the capability of reaching to the different research objectives and to answer all the research questions, and this will be achieved by integrating between both methods. However, the method of data analysis was applied based on the type of data that is collected.

The approach of quantitative data analysis was applied on the questionnaire survey results to determine the main causes of delays in the construction projects and to assess the liability of each stakeholder, and to define the least concerned factors and discuss why these factors are neglected since they have an impact on the project. this approach was chosen as it helps in obtaining precise and reliable data. On the other hand, qualitative data analysis approach was selected in order to analyse the answers of the professional participants as it is more open for the respondents to share their thoughts and experience without limitation to the normal questionnaire. Also, it gives more understanding to the topic which helps in answering the questions of the research. This approach focused mainly on the client's project manager role in the mitigating the different causes of delays that can occur from the clients, consultants, and contractors in the UAE.

The research had primary data collection by appointing interviews with construction project managers from the UAE public sector and a questionnaire survey that was distributed to professional participants from the construction industry in the UAE. In addition, secondary data collection was approached by reading different articles, researches, and books to extract information that is related to the topic.

4.3. Data Collection Methods

4.3.1. Data Collection

Primary and secondary data collection methods were approached in this research. Primary data was collected from interviews with project managers in the construction industry. It included six questions related to the project manager's skills, competencies, and roles in mitigating delays in the construction projects. Also, the interview included thoughts about the construction industry in the UAE public sector and enhancement methods for the future. It supported in answering the research questions and achieving the research objectives. In addition, a questionnaire survey was developed to help assess the main root causes of delays. The questionnaire included different factors of delays in the construction projects that can be related to the client, consultant, and contractor, also, it included external factors that might occur and cause the project to be delayed. The questionnaire was prepared and created based on the data collected from the literature review. In other words, the literature reviews showed that there are many factors causing delays to the projects, and these factors can be related to different parties. Therefore, these were analysed and utilized in order to create the questionnaire which complies with the research aims, needs, and objectives and can be filled properly and easily by the participants. The data that was collected from the literature review is the secondary data, that was used to create the questionnaire to come up with the primary data, hence, an integration between the data from the questionnaire survey and the interviews answers to reach the project's objectives.

4.3.2. Participants Selection

The participants of the questionnaire survey were all professionals working in the construction projects of public sector in the UAE, and that to keep the answers and

their choices more related to the research topic which helps in analysing precisely the causes and effects. It involved participants from many different organisations to make wide variety of answers. The questionnaire was distributed to project directors, project managers, construction managers, different departments heads, designers, project engineers, and site engineers. 100 participants were chosen to fill the questionnaire survey, divided into 3 groups, 30 participants representing clients, 35 working with consultants, and 35 with contractors.

The participants in the interviews were chosen to be a client's representatives in the construction projects in the UAE public sector and working mainly as a client project manager. This helped in answering all the questions related to the client project manager's skills and competencies, also his roles, authorities, and responsibilities precisely, and his ways of managing with the projects risks and controlling the contractors and consultants as a client's representative in order to mitigate the project delays as much as possible. Moreover, interviewing personnel who are in the construction projects of public sector is more related to the research topic, therefore, all the answers and the points that was discussed in the interview were integrated with the answers from the questionnaire survey which was distributed to personnel in the public sector as well.

4.3.3. Questionnaire Survey Design

The research questionnaire was designed based on the data that was collected and extracted from the literature review of this research. The questionnaire survey mainly focused on the factors of delays in the construction projects. Based on the literature review, the factors of delays were categorised into four categories depending on the liability and responsibility of the factor of delay. Client related factors, consultant

related factors, contractor related factors, and external factors are the four categories that consist of 46 factors of delay mentioned in the questionnaire survey. The participants in the questionnaire survey are professionals working in the public sector construction industry, who had to rate every factor from 1 to 5 based on the severity, while 1 is lowest and 5 is the highest value. Each of the factors of delay that was mentioned in the questionnaire survey has an impact on the project progress directly and indirectly. The questionnaire survey design was developed based on the severity scale to help in understanding the main causes of delays in the construction projects based on the opinion of the participants. The questionnaire survey is attached in the research appendices.

4.3.4. Interviews Questions

Four client representatives who are working as client's project manager were chosen and agreed to participate in the interview, all of them are currently working as position of a client project manager in the construction industry in the UAE public sector, and they were selected after looking up in the governmental authorities that have construction projects in UAE.

The interview consists of 6 questions related directly to the research topic and answering the research questions. The interview questions were structured based on the project's success factors and the project manager roles and responsibilities of delivering a successful project. In addition, it showed the competencies that the client project manager must own in the construction industry of the UAE public sector. Noting that some of the interviews were face-to-face and some were of them were done through the phone, and most of the interviews' duration lasted approximately 15 mins, and their answers were noted for analysis and further usage.

4.4. Data Analysis Methods

Based on the research topic and the type of the data collected, qualitative and quantitative analysis methods were selected. For the interviews' responses, to understand the idea and the words of the interviewees, and interpret that data that was collected, qualitative analysis is approached. While the quantitative analysis method was selected to analyse the data collected from the questionnaire survey and to study the frequency of the responses and distinguish between them, and this included a systematic statistical analysis.

The top 10 and the lowest 10 causes of delays were taken into consideration for discussion and analysis, while the responses from the interview questions were integrated with the questionnaire survey findings in order to find the consistency between the results and the literature review. Moreover, this supported in justifying the research theme and answering the research questions.

4.5. Validity and Reliability

The data that was collected from the questionnaire survey and the responses from the participants are based on their experience and background knowledge. All of the participants are working currently in the construction industry in the UAE representing clients, consultants, and contractors. In addition to that, the project managers who were interviewed have given their answers based on their long experience and the criteria, measurements, and assessment of the construction projects success in the UAE public sector. Therefore, the data and the results in this research are considered to be valid and reliable.

4.6. Dissertation Structure

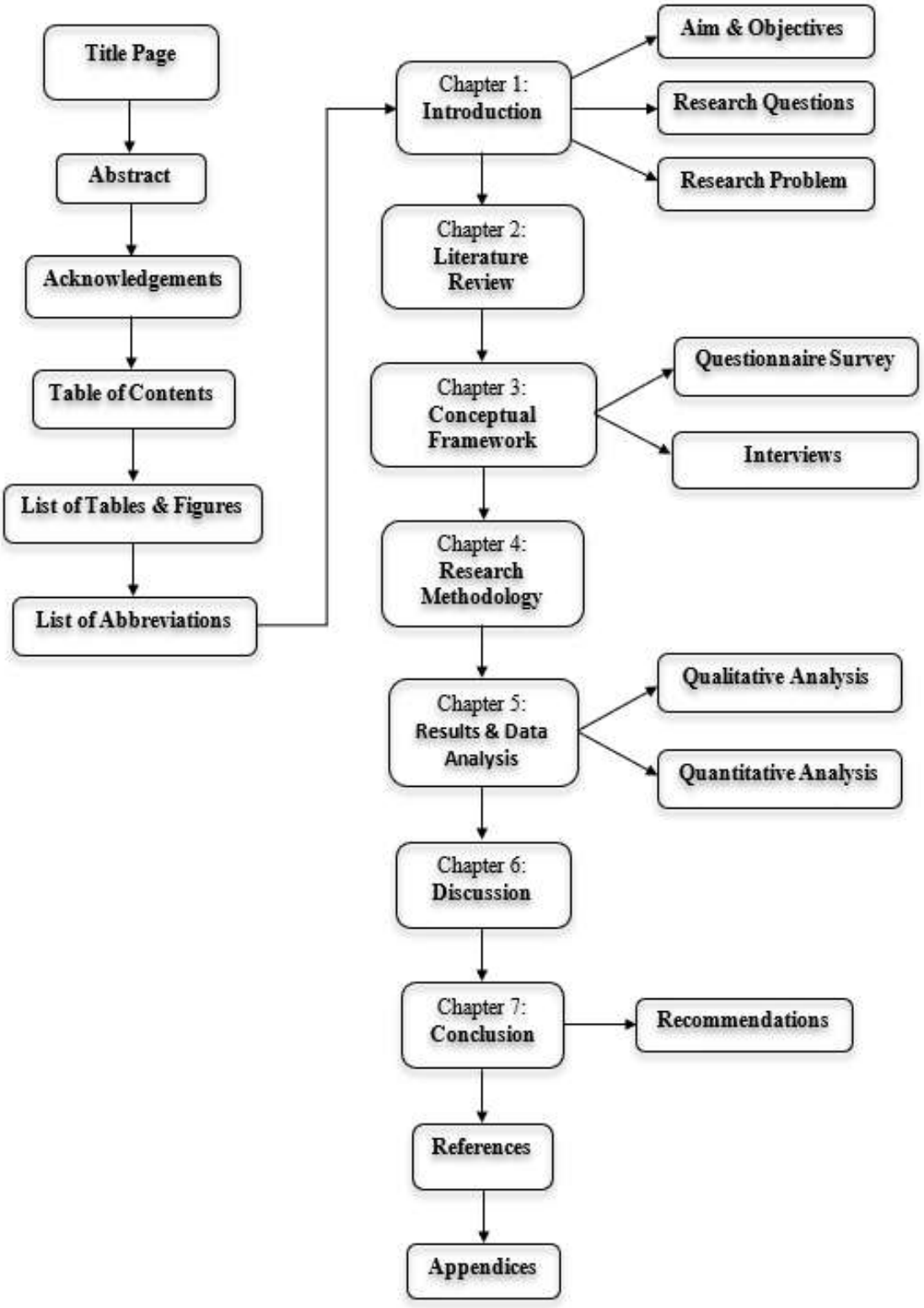

Figure 4. Dissertation Structure

Chapter 5

Results and Data Analysis

5. Results and Data Analysis

5.1. Responses From the Participants

5.1.1. The questionnaire Survey

The questionnaire survey was distributed to 100 participants, 30 representing clients in the industry, 35 consultants, and 35 representing contracting companies. Out of 100 participants received the questionnaire survey, only 68 responded, 10 clients, 37 contractor, and 21 consultants. However, data analysis was made based on the respondents' feedback. The participants assessed the severity of each factor based on their experience in the construction industry and how each factor has an impact on the construction projects in the UAE public sectors. Noting that a sample of the questionnaire survey is attached in the appendices section

5.1.2. The interview Questions

To understand the client project manager role in the construction projects in the UAE public sector, four interviews were made with client project manager who are working currently in the construction projects in the public sector. The answers of the questions were compared and analysed and integrated with the questionnaire survey to meet the research objectives and answer the research questions.

Each of the interview questions was answered and the answers were put in tables showing how the participants responded to the questions based on their background knowledge, experience, and their role as a client project manager in the construction industry in the UAE public sector.

5.2. Questionnaire Survey Results and Analysis

5.2.1. Mean Value

As a first step to analyse the data that was received from the questionnaire survey, mean value was calculated to organise the data in term of severity. Practically, after the responses were received from the participants, each of the severity value that was assessed by the participants were summed and divided by the number of the participants which 68, then each of the project delay factors were sorted from highest severity to the lowest. Mean Value was calculated using the following equation.

$$Mean\ Value = \frac{\sum N}{68}$$

While N represents the severity of one factor of delay and the value must be between 1 and 5, and 68 is the number of respondents

5.2.2. Ranking Factors of Delays

Factors of delays were ranked based on the mean value of severity that was mentioned from the respondents. All 46 factors were ranked from highest to lowest and shown in one table. Meanwhile, other 4 tables were created to show the ranking of the factors that are related to one source/category.

This table shows the different factors of delay that was ranked based on the responses from the participants in the questionnaire survey and the mean value of severity based on their feedback and response. The table shows that 19.56% of project delays factors are related to the client, 21.73% are related to the consultant, 13.04% of the factors are related to the external, while the contractor related factors made 45.65% of the factors in the table.

Table 4. Ranking of Factors of Delay

Ranking	Source of delay	No.	Factor of Delay	Mean Value of severity
1	Consultant	2.2	Changes in drawings and specifications	4.86
2	Contractor	3.3	Inadequate project planning and scheduling	4.82
3	Client	1.3	Irregular and late payment	4.76
4	Contractor	3.11	Lack of coordination between sub-contractors	4.74
5	Client	1.8	Weak Suppliers and Contractors nomination	4.52
6	Contractor	3.7	Delay in material delivery	4.41
7	Consultant	2.1	Incomplete contract documents	4.38
8	External Factors	4.3	Health pandemics	4.29
9	Contractor	3.1	Inadequate project financing	4.26
10	Client	1.4	Unrealistic project duration	4.22
11	Client	1.1	Changes and Variations	4.15
12	Consultant	2.3	Slow response to technical enquiries	4.05
13	Consultant	2.9	Inadequate design management process	3.98
14	Contractor	3.19	Inexperienced site team	3.87
15	Contractor	3.12	Poor site quality	3.83
16	Contractor	3.10	Inexperienced technical team	3.81
17	Contractor	3.14	Subcontractors' and suppliers' incompetency	3.77
18	External Factors	4.1	Weather conditions	3.76
19	Consultant	2.7	Complexity of the design	3.74
20	Client	1.6	Non-Clear project objectives	3.72
21	Contractor	3.2	Disputes with the sub-contractors	3.51
22	Contractor	3.15	Low productivity of manpower	3.44
23	Consultant	2.5	Delays of approvals and submittals	3.38
24	External Factors	4.4	Prices inflation	3.31
25	Consultant	2.6	Low level of Management and Technical experience	3.25
26	Contractor	3.13	Construction mistakes	3.18
27	Contractor	3.4	lack of resoures management	3.12
28	Contractor	3.8	Shortage of manpower	3.05
29	Consultant	2.4	Lack of communication between the consultant staff	2.99
30	Client	1.2	Late client's decision making	2.92
31	External Factors	4.5	Changes in laws and regulations	2.86
32	Contractor	3.18	Lack of communication between different departments	2.79
33	Client	1.9	Poor communication and interference	2.73
34	Client	1.7	Government and authorities' approvals routine	2.66
35	Contractor	3.5	Bad quality of the material	2.6
36	Contractor	3.9	Lack of experience in similar projects	2.53
37	External Factors	4.2	Political and Economic issues	2.47
38	Contractor	3.20	Late work permits by authorities	2.4
39	Contractor	3.17	Unavailability of equipment	2.34
40	Contractor	3.6	Shortage of material in the market	2.27
41	Client	1.5	Lack of technical knowledge	2.21
42	Consultant	2.8	Weak quality control	2.14
43	Consultant	2.1	Duration and procedure of site inspections	2.08
44	Contractor	3.16	Congested site	2.01
45	Contractor	3.21	Level of response to changes	1.95
46	External Factors	4.6	Traditional and cultural conflicts	1.88

The following four tables are showing the factors of delay ranked based on their source/ category. Client related factors, consultant, contractor, and the external factors.

Table 5. Ranking of delays caused by the client

Ranking	No.	Factor of Delay Related to the Client	Mean Value of severity
1	1.3	Irregular and late payment	4.76
2	1.8	Weak Suppliers and Contractors nomination	4.52
3	1.4	Unrealistic project duration	4.22
4	1.1	Changes and Variations	4.15
5	1.6	Non-Clear project objectives	3.72
6	1.2	Late client's decision making	2.92
7	1.9	Poor communication and interference	2.73
8	1.7	Government and authorities' approvals routine	2.66
9	1.5	Lack of technical knowledge	2.21

Table 6. Ranking of delays caused by the consultant

Ranking	No.	Factor of Delay Related to the Consultant	Mean Value of severity
1	2.2	Changes in drawings and specifications	4.86
2	2.1	Incomplete contract documents	4.38
3	2.3	Slow response to technical enquiries	4.05
4	2.9	Inadequate design management process	3.98
5	2.7	Complexity of the design	3.74
6	2.5	Delays of approvals and submittals	3.38
7	2.6	Low level of Management and Technical experience	3.25
8	2.4	Lack of communication between the consultant staff	2.99
9	2.8	Weak quality control	2.14
10	2.1	Duration and procedure of site inspections	2.08

Table 7. Ranking of External factors of delay

Ranking	No.	Factor of Delay Related to the External Factors	Mean Value of severity
1	4.3	Health pandemics	4.29
2	4.1	Weather conditions	3.76
3	4.4	Prices inflation	3.31
4	4.5	Changes in laws and regulations	2.86
5	4.2	Political and Economic issues	2.47
6	4.6	Traditional and cultural conflicts	1.88

Table 8. Ranking of delays caused by the contractor

Ranking	No.	Factor of Delay Related to the Contractor	Mean Value of severity
1	3.3	Inadequate project planning and scheduling	4.82
2	3.11	Lack of coordination between sub-contractors	4.74
3	3.7	Delay in material delivery	4.41
4	3.1	Inadequate project financing	4.26
5	3.19	Inexperienced site team	3.87
6	3.12	Poor site quality	3.83
7	3.10	Inexperienced technical team	3.81
8	3.14	Subcontractors' and suppliers' incompetency	3.77
9	3.2	Disputes with the sub-contractors	3.51
10	3.15	Low productivity of manpower	3.44
11	3.13	Construction mistakes	3.18
12	3.4	lack of resoures management	3.12
13	3.8	Shortage of manpower	3.05
14	3.18	k of communication between different departm	2.79
15	3.5	Bad quality of the material	2.6
16	3.9	Lack of experience in similar projects	2.53
17	3.20	Late work permits by authorities	2.4
18	3.17	Unavailability of equipment	2.34
19	3.6	Shortage of material in the market	2.27
20	3.16	Congested site	2.01
21	3.21	Level of response to changes	1.95

5.2.3. Top 10 Causes of Delays

The table below presents the top 10 causes of delays based on the mean value of severity according to the feedback of participants in the questionnaire survey. The table shows that 30% of the top 10 factors of delay are related to the client, 20% to the consultant, 10% external factors, and 40% are related to the contractor.

Table 9. Top 10 Factors of Delay

Ranking	Source of delay	No.	Factor of Delay	Mean Value of severity
1	Consultant	2.2	Changes in drawings and specifications	4.86
2	Contractor	3.3	Inadequate project planning and scheduling	4.82
3	Client	1.3	Irregular and late payment	4.76
4	Contractor	3.11	Lack of coordination between sub-contractors	4.74
5	Client	1.8	Weak Suppliers and Contractors nomination	4.52
6	Contractor	3.7	Delay in material delivery	4.41
7	Consultant	2.1	Incomplete contract documents	4.38
8	External Factors	4.3	Health pandemics	4.29
9	Contractor	3.1	Inadequate project financing	4.26
10	Client	1.4	Unrealistic project duration	4.22

5.2.4. Lowest 10 Causes of Delays

The table below presents the lowest 10 causes of delays based on the mean value of severity according to the feedback of participants in the questionnaire survey. The table indicates that 20% of the lowest 10 factors are related to the external factors, 50% are related to the contractor, 20% to the consultant, and 10% to the client.

Table 10. Lowest 10 Factors of Delay

Ranking	Source of delay	No.	Factor of Delay	Mean Value of severity
37	External Factors	4.2	Political and Economic issues	2.47
38	Contractor	3.20	Late work permits by authorities	2.4
39	Contractor	3.17	Unavailability of equipment	2.34
40	Contractor	3.6	Shortage of material in the market	2.27
41	Client	1.5	Lack of technical knowledge	2.21
42	Consultant	2.8	Weak quality control	2.14
43	Consultant	2.10	Duration and procedure of site inspections	2.08
44	Contractor	3.16	Congested site	2.01
45	Contractor	3.21	Level of response to changes	1.95
46	External Factors	4.6	Traditional and cultural conflicts	1.88

5.3. Research Themes

The research key themes were developed in order to give more understanding of the topic and the objectives of the research. The research themes were built to justify the research questions and it was created to integrate the research questions and objectives, and most importantly, the structure of the qualitative data was created around these themes.

Based on the three themes of the project which are, First, The root causes of delays in the construction projects in the UAE public sector and the phase that delays occur most in, Second, The client's project manager's key competencies that must be adopted to mitigate the delays in the construction projects in the UAE public sector, and Third, The potential risks that have an impact on the main constraints of the construction project in the UAE public sector, the interview questions were developed to answers the research questions and justify the themes of the research.

Table 11. Research Themes

Question No.	Research Questions	Theme No.	Theme
1	What are the main causes of delays in the construction projects in the UAE public sector?	1	The root causes of delays in the construction projects in the UAE public sector and the phase that delays occur most in.
2	In which phase of the construction project's life cycle do delays occur most?		
3	What are the competencies that the client's project manager must adopt to be able to manage a project in the UAE construction industry?	2	The client's project manager's role and key competencies that must be adopted to mitigate the delays in the construction projects in the UAE public sector.
4	What are the roles and the responsibilities of the client's project manager?		
5	What are the potential risks that might have a negative impact on the project's successful delivery?	3	The potential risks that have an impact on the main constraints of the construction project in the UAE public sector

5.4. Interviews Questions Responses

The participants in the interviews were selected to be project managers who are representing clients in the UAE public sector organisations as it was mentioned in the methodology chapter, and this to help answering the research questions and meeting the research objectives and aim.

The interview's six questions were answered by the project managers based on their experience as project managers in the UAE public sector and background knowledge. The answers were noted and put in tables to simplify the analysis and the integration between the questionnaire survey responses and the answers of the interview questions.

Based on the first theme, questions number 1,2, and 3 were developed and answered, while questions number 4 and 5 were developed as per the second theme, and the last question of the interview which is question number 6 was made based on the third theme. The interview request letter and questions are attached in the appendices section.

Table 12. Interviews First Question and Responses

Question No. 1	Participant No.	Answer
How can you define the project's success? And what are the measures that you follow to as a client project manager to assess the project's success?	P1	1. If the potential risks are identified at a very early stage. 2. When the project milestones are maintained on time. 3. When variations and changes and monitored and controlled and shared regularly with stakeholders. The main measures are Time, Cost, Quality, and Safety.
	P2	When the implementation of work is done in accordance with the project scope, tender documents, specification and within allocated budget for the project and time. Measures to follow are Schedule, Time, Scope, and Quality
	P3	Project Success is defined by the completion the project within Time, Cost and required Quality, and these are the measures for the project's
	P4	1. Fulfil the critical success factors determined during the project design and definition phases 2. Comply with execution constraints related to cost, time and quality 3. Yield positive results and long-term impact on stakeholders

Table 13. Interview Second Question and Responses

Question No. 2	Participant No.	Answer
From your point of view, what are the main factors of delays in the construction projects in the UAE public sector?	P1	1. The foreign consultants who are not familiar with the regulations of the government and authorities that might cause a lot of changes during the design and construction (depending on the type of contract). 2. Lack of knowledge of environmental and cultural aspects of the external stakeholders such as the consultant, mainly the manpower. 3. Cultural factors of these external stakeholders who contribute in the project 4. The updated legislations and regulations due to the fast growth of development in the construction industry
	P2	1. Vender, material and drawing Approval 2. Obtain NOC 3. Approving subcontractors
	P3	Failure of Contractor due to Commercial issues and cashflow during the project will lead to big drop and delay the project.
	P4	1. Prequalification of the technology utilized in the project 2. Overhead related to permits and design approvals 3. Contractor's commitment to unfeasible schedules

Table 14. Interview Third Question and Responses

Question No. 3	Participant No.	Answer
In which phase of the construction projects' lifecycle do delays occur most? Why do you believe so?	P1	Execution phase, and the reasons are: 1. lack of communication (internal external stakeholders) 2. delay in obtaining NOCs from the authorities 3. lack of competent resources and skilled manpower 4. Inadequate verification of the contract documents 5. Obtaining the approval of the submitted detailed master work program 6. late procurement of materials (especially long lead items) 7. late submittal and approval of materials 8. Modification of the design by the consultant (due to technical enquiries) 9. Frequent changes of the client.
	P2	The execution phase is the longest in the project life cycle where the construction team has to put everything that was developed in the planning phase into implementation. In this phase all the planning mistakes will be revealed and rectified, and this will have a serious impact on the execution timeframe of the project and will affect the sequence of the work at the project. and let's not forget the problems of the execution phase like the lack of resources, low productivity, material procurement issues, variations and change orders, and financial hardships.
	P3	Civil Construction phase and through lifecycle of project. and the reason for that is the big possibility for the lack of communication between OBS team and weak contractor performance which have the biggest impact on the project schedule
	P4	The execution phase because there are so many activities are going together, like implementation of the work at the construction site which might be affected by a lot of variables, and technical issues regarding the design and this might lead design changes and variations by the consultant or the client and could cause a delay to the project.

Table 15. Interview Fourth Question and Responses

Question No. 4	Participant No.	Answer
What are the skills that the client's project manager in the UAE public sector must adopt in order to be competent?	P1	1.Leadership skills 2.Communication skills 3.Team organizing skills 4.Planning skills 5.Monitoring and controlling skills 6.Negotiation skills
	P2	1. Leadership skills 2. Effective communication 3. Planning and strategic thinking 4. Team management
	P3	Strong strategy to adopt with market change and new development in technology and digitalization.
	P4	1. segregation of duty (a project manager does not represent operations or maintenance) 2. communication and soft skills 3. subject matter expertise 4. decision making

Table 16. Interview Fifth Question and Responses

Question No. 5	Participant No.	Answer
What are your roles and responsibilities as a client project manager in the UAE public sector? And how can you mitigate the main causes of delays?	P1	1. By being fully aware of condition of contracts between the client and contractor, client and the consultant, client and the nominated contractors. 2. Appointing qualified and experienced consultant and contractor to achieve the project objectives 3. Understanding exactly the client needs and project objectives, having a clear detailed working program covering the major milestones and other related work activities. 4. Identifying the potential risk at very early stage of execution part 5. Being adequate in the process of following up, monitoring, and controlling 6. understanding the scope of the work of the different stakeholders especially nominated suppliers and contractors.
	P2	1. Identify and analyse constraints and assumptions during the project's life cycle. 2. Lead and direct the project and facilitate the approval of Project Management Plan. 3. Ensure that the implementation of work is done in accordance with the project scope, tender documents, specification and within allocated budget for the project and time. 4. The main causes can be mitigated by performing overall Project Management from the initial stage up to the closing phase of the project.
	P3	1. Lead the project throughout the lifecycle and ensure project progressive as per schedule, cost and quality need. 2. Adopting Agile and Lean concept 3. Studying the lesson learned from previous projects 4. Adopting new technology for civil and electrical works 5. Create a culture change in organization for employees such as OBS team and PM to own the project and strengthen the communication in agile concept and utilize SCRUM frameworks.
	P4	Management of the entire project lifecycle across all phases, and sometimes during project warranty and support. Delay mitigation by: neutrality and segregation of duty, escalation, control over contractor's actions, continuous focus on win-win situation.

Table 17. Interview Sixth Question and Responses

Question No. 6	Participant No.	Answer
What are the potential risks that must be identified in early stages of the construction project to avoid delays?	P1	1. Lack of cash liquidity 2. Discrepancies in contract documents 3. Lack of resources 4. Variations and change order
	P2	1. Safety hazards that lead to worker accidents and injuries. 2. Delay in vendor approval 3. Incomplete drawings. 4. Lack of resources
	P3	1. Nature of the project 2. Market change factor 3. Force major 4. Failure of contractor and supplier 4. Construction mistakes 5. Electrical equipment failure in testing and operation 6. Delays in Permit for work 7. Unknown Services in plot
	P4	1. Payments and Financial risks 2. Design uncertainty and changes 3. Weak contractor and supplier selection 4. Unavailability of resources.

Chapter 6
Discussion

6. Discussion

The results indicate that the data collected from the questionnaire survey and the responses from the project managers on the interview questions are related with the data collected from the literature review and have a high consistency. The results show that the factors of delay can be categorised as, contractual, financial, and technical. It indicates that the project manager competencies rely on his/her soft skills, hard skills, and project management background knowledge and abilities.

This Chapter is separated into two main parts, the first part discusses the top 10 factors of delay and the lowest 10 factors of delay based on the participants feedback on the questionnaire survey. While the second part discusses the participant's answers and responses in the interviews based on the research themes.

6.1. Top 10 Causes of Delay

As a result of the feedback and the responses from the participants in the questionnaire survey, top 10 causes of delay were ranked based on the severity that was indicated by the participants as shown in table 4 in chapter 5, and the mean value was calculated where the values of severity of the top 10 factors fall between 4.86 and 4.22 out of 5 as shown in table 9 in chapter 5. Where 5 indicates the highest value and 1 indicates the lowest value. The following shows the top 10 factors of delay and how each factor attributes to the project delay in the UAE construction industry. Figure 5 in this chapter shows the top 10 factors as a bar chart. Each of the factors is analysed in terms of causes, impacts on the construction project, and solutions for preventing and mitigation. Most of the factors that were ranked as top 10 are mentioned in the literature review.

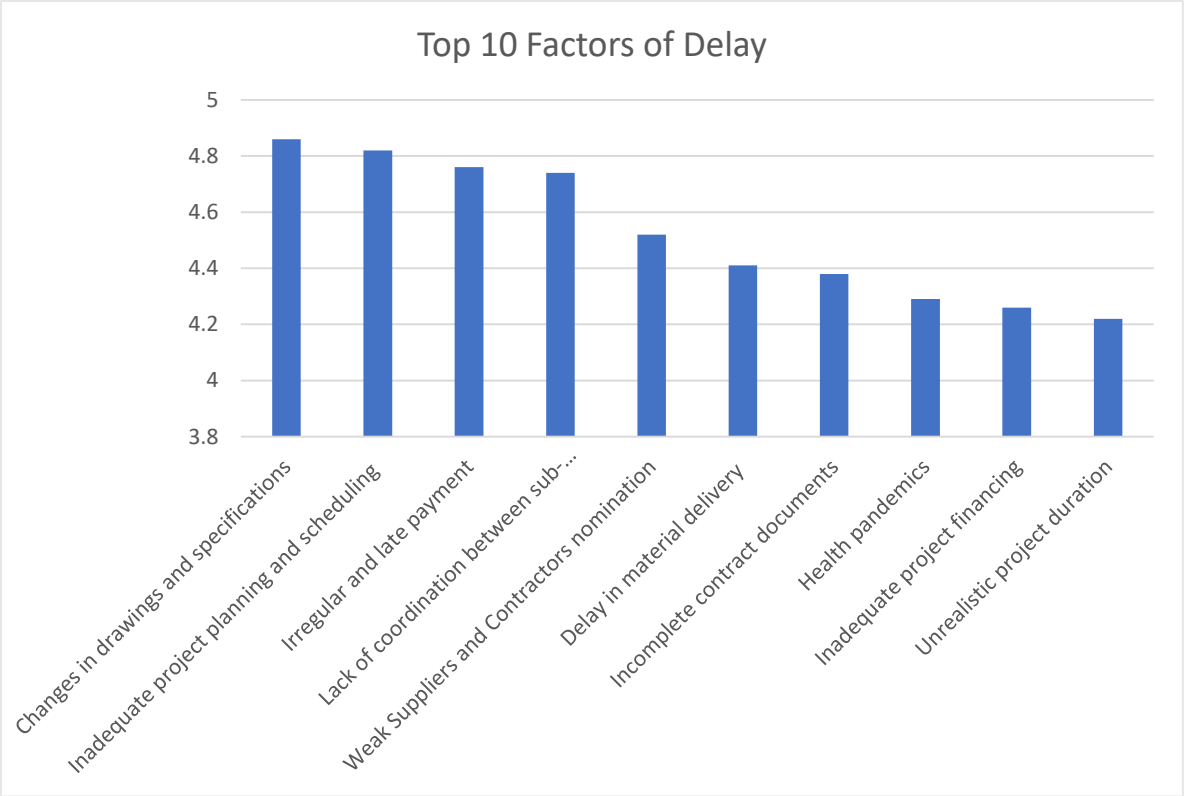

Figure 5. Top 10 Factors of Delay

1. **Changes in Drawings and Specifications (Caused by Consultant)**

Changes in drawings and specifications occur due to mistakes in the design, clashes and discrepancies between different structural, architectural or electrical elements in the building, or to technical issues that is raised by the contractor. This indicates an inadequate design management process by the consultant and weak communication and coordination between the consultant team or lack of experience by the consultant.

2. **Inadequate Project Planning and Scheduling (Caused by Contractor)**

The project plan must be prepared by an experienced planning engineer who is familiar with the construction process in the UAE, sequence of the site activities, and the role of the different stakeholders of the project and their possible interference. The project manager should monitor the project plan which must be updated regularly and especially in the case

of any changes in the design or the sequence of work by the client or the consultant to maintain the efficiency of the project. This happens due to the lack of coordination between the planning engineer and the project manager at the early stage of the project in the planning phase.

3. Irregular and Late Payment (Caused by Client)

The Client has to be able to afford the required expenses for the project in order to avoid delays. In this case, the project's cash flow will be affected and the payments for the main contractor of the project will be delayed, as well as the payments from the contractor to the subcontractors who are responsible to purchase the required material from the suppliers. Lack of value of financial liquidity of the project's budget is not always available with the client which leads to delay in payments. Sometimes in the cases of delays in payments in the UAE construction industry, the labours raise strikes and stop working which will affect the productivity of the work and the project plan and schedule. Moreover, same will happen with the suppliers who will stop providing the required material to the project and to the subcontractors.

4. Lack of Coordination between the Subcontractors (Caused by Contractor)

The main contractor is required to make a proper coordination between the different subcontractors of the project. Each subcontractor has his own scope of work and might not focus on the area of defects that they will cause to other subcontractors' work, especially between the MEP subcontractors and the Civil subcontractors. The main reason behind this issue is the lack of experience of the project manager who should have the enough skills of communication and coordination. Nowadays, in mega projects in the UAE, the main contractors are using BIM (Building Information modelling) as a tool for coordination

between the different disciplines and subcontractors, avoiding clashes, and to reveal discrepancies in the design.

5. Suppliers and Contractors Nomination (Caused by Client)

The client's project manager or representative has to study the prequalification of each supplier and contractor whom is nominated by the client in order to check the capabilities of providing the required services, the situation of each financially, and their experience in previous similar projects. The client's project manager must be aware of the choices that the client makes, and must advice him/her to take the right decisions regarding them where many of the client representative don't have the correct prequalification criteria of the nomination which might cause a delay.

6. Delay in Material Delivery (Caused by Contractor)

Delay in material delivery is a vital issue to the contractor, especially the long lead items. It might be caused due to the lack of coordination between the suppliers, purchasing department of the contractor, procurement manager, and the project manager. It would affect the progress of the work and the program plan and schedules. The project manager must monitor the material procurement plan and the subcontractors who are providing the materials and their productivity in order to avoid any possible defects that can raise any issues of delay.

7. Incomplete Contract Documents (Caused by Consultant)

The consultant is fully responsible for providing the complete contract documents for the project. If the contractor finds any missing documents, this will cause a claim from the contractor to the client asking for either a compensation in time or compensation in cost or both together depending on the missing details. In both cases the project's duration will be affected and parallelly will impact the project's cost. This common factor is always caused

due to the lack of managing the design process by the design manager during the project design phase.

8. Health Pandemics (Caused by External Factor)

The world was facing lately a health pandemic which is the COVID-19, almost all the countries in the world have banned travelling in and out of it. The construction industry in the UAE was affected directly due to the strict regulation imposed by the government and the authorities from preventing this virus which affects the health of manpower. Shipping of the construction materials and the equipment from foreign countries has been heavily affected along with the concerned suppliers which affected negatively the work progress of the project. Moreover, the transportation of the labours and the staff of the construction projects in the country was banned and therefore the productivity of the projects and the progress plans stopped completely which attributed to a big delay on the project duration.

9. Inadequate Project Financing (Caused by Contractor)

The contractor must be completely able to afford the financial requirements of the project such as the payments of the subcontractors, suppliers, salaries of the project staff and manpower. Irregular contractor's payments occur due to the lack of proper financial planning and the inadequate preparation of the cashflow. Otherwise, the project schedule will be affected by the shortage of material, project staff and labours, and the quality of the work.

10. Unrealistic Project Duration (Caused by Client)

The clients in the UAE market are looking for a rapid return for their investments, therefore, they will ask the consultant for a quick design process and the contractor for a fast execution and handing over process. The design process will be subject to a lot of mistakes and changes, and variations in the execution phase. While the construction execution quality will be impacted directly due to the rapid process and will not meet the clients and the consultant

requirements and satisfaction, that will lead to a repeated work and delay in the project. The main reason is of this factor is the client who is not getting the right advice from the project manager about the project objectives and the approximate correct duration.

6.2. Lowest 10 Causes of Delay

The lowest 10 factors of delay were mentioned by the participants and noted in table 10 in chapter 5. However, the listed factors are the lowest factors mentioned by the respondents where many of them comply with the causes of delay that has been identified in the literature review. These factors are presenting issues related to the circumstances of projects, each project manager treats the issues of these factors as an individual problem to sort it out. The bar chart in Figure 6 below presents the lowest factors of delay, noting that the mean values of the lowest 10 factors fall between 1.88 and 2.47 out of 5.

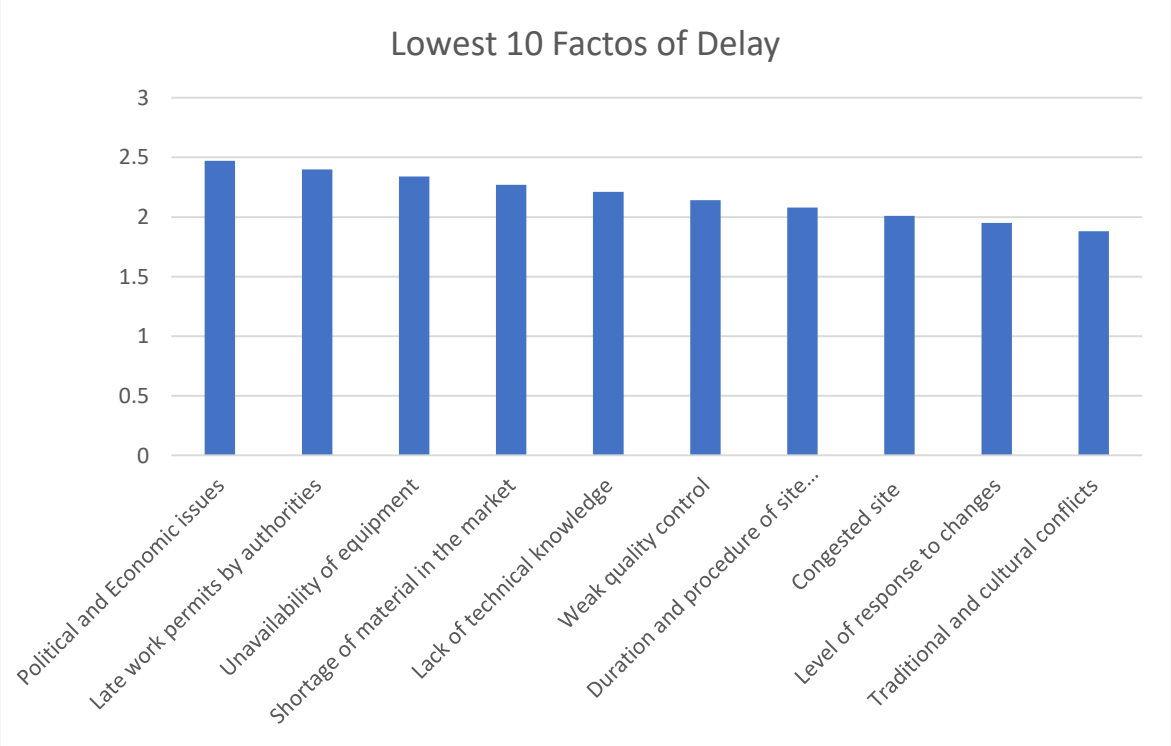

Figure 6. Lowest 10 Factors of Delay

1. **Political and Economic Issues (External Factor)**

The contribution of the construction industry in the economy is significant. This makes most of the authorities focus on the political and economic impact on the construction industry by analysing and studying the circumstances surrounding these factors. These factors are affected by the new regulations and legislations that affects the infrastructure, employment, and housing. Most of the contractors in the private sectors are focusing on making fast profit, they don't think about the significant contribution of these factors to the fast development and growth. Which might be considered as a cause of delay.

2. **Late work Permits by Authorities (Contractor)**

Work permit is essential in any kind of project where authorities are permitted to issue these permits.it is totally not allowed to proceed with the work without obtaining all the NOCs from the public authorities. Contractors don't have the experienced PROs to issue the required NOCs consequently once the project started. It requires continues collaboration and coordination between the project manager, PRO, and other authorities. Failing to do so causes a major delay to the real commencement of the work.

3. **Unavailability of Equipment (Contractor)**

One of the common factors of project delays is the unavailability of the equipment on the site. It happens due to the lack of the petty cash with the project manager who is not authorised to purchase any required equipment without referring to the procurement process which delays the equipment arrival to the site. It is not easy to estimate the required number of equipment that the manpower needs and must be available all the time unless they need it on the spot, so that is why storekeepers and project managers must have the permits to purchase this equipment.

4. Shortage of Material in the Market (Contractor)

Most of the contractor's project managers issue the order at a very late stage for the specified material whenever they need it, which is not correct. Material orders must be approved, and issued during the first 4 months of the project commencement. The list of the approved material must be monitored directly with the procurement office and the project manager to avoid such delays. To prevent this issue, mechanism of material procurement and storage should be prepared at a very early stage of the project.

5. Lack of Technical knowledge (Client)

Sometimes clients are issuing work instructions, additional work, and variations to the contractor during their site visits without referring directly to the consultant. These work orders may require new materials which require special technical specifications which needs the required routine process for approval. These orders are making big impact on the work process, especially if the contractor asks for additional time or cost for these changes.

6. Weak Quality Control (Consultant)

The consultant is either responsible for the design of the project or responsible for the supervision of the quality of work implemented the quality of the material, or both together based on the contract. the consultant must have the enough experience in supervision and have a strong staff in order to be able to deliver the project without any defects at the site. In addition, the consultant needs to be strict with the contractor in issuing the site notes and non-conformance reports in the cases of defects in the work which may not be as per the drawings or the material used which may not be as per the project's specifications.

7. Duration and Procedure of Site Inspections (Consultant)

Most of consultants they don't have the enough practical experience and criteria for the work inspections which causes a lot of time to inspect the work item especially if the work

is rejected where the contractor has to resubmit another request for the work inspection. Many contractors suffer from this issue, in addition, the working hours of inspectors of consultants are much less than the contractors' working hours which leads to do the inspection on the second day.

8. Congested Site (Contractor)

The congested site situation must be studied by the contractor prior to the commencement of the work and at early stages of the project. otherwise, the contractor will face difficulties in offloading and loading the materials from the trucks, parking spaces, location of the mobile crane, tower crane, and small trucks. The contractor project manager must prepare a plan for the site logistics to prevent any disturbance during the execution of the work that might cause delays.

9. Level of Response to Change (Contractor)

Based on the client's variations and needs during the lifecycle of the project, many clients are issuing official changes and new work orders to some items which need a certain process to issue the change order (change order management). The contractor is mainly involved in this process where he has to follow a certain procedure to approve these changes according to the condition of contract to ensure the implications of the cost and the time that must take its place.

10. Traditional and Cultural Conflicts (External Factor)

Since the construction industry in the gulf region is witnessing a fast development, many clients, developers, consultants, and contractors are hiring big international firms from all over the world to cope with these developments. These experts once they arrive and start working on developing these new projects, they don't have the enough experience about the work environment of the UAE that might affect the work progress, especially once they want

to obtain the approval for the projects from the authorities such as (working hours, Fridays, holiday, Ramadan timings, religious factors, aims and habits, traditional factors)

6.3. Research Themes and Interview Responses

As shown in table 11 in chapter 5, three research themes were developed based on the research questions. Therefore, six questions were created to determine the causes of delays and the client's project managers roles and key competencies in mitigation. The questions were asked to project managers representing clients in the construction industry in the UAE public sector. The answers are analysed and discussed below based on the three themes of the research. The interviews responses by the participants match the data that was indicated in the literature review, and shows the roles and the competencies that is required by the client's project managers in the UAE public sector in order to deliver the project successfully as well as to avoid and mitigate the different causes of delays. it discussed the potential risks that must be identified at a very early stage of the project, which has a high consistency with the information that was collected from the literature review.

First Theme: The root causes of delays in the construction projects in the UAE public sector and the phase that delays occur most in.

As a result of the questions that were prepared in order to comply with the theme. It was shown that in order to deliver a project successfully, the project constraints must be taken into consideration at all the phases of the project's lifecycle, and the main measures of the project success are time, cost, and quality. The main causes of delays in construction projects in the UAE public sector can occur at every stage of the project, but mainly, the execution phase is more likely to face a lot of delays, and the reasons behind that are many, and can be divided into technical, contractual, and financial. The participants agreed that the verification of the contract documents (drawings and specifications), change orders and variations, the

issues occur while implementing the planning phase into execution, the hardships and the process of obtaining the NOCs, the communication between the project team and the different stakeholders, and the materials approval and procurement are all reasons that make the execution phase is more likely to be delayed in the construction project's lifecycle more than the other phases. Moreover, main root causes of delays in the construction projects in the UAE public sector were mentioned by the participants, the main factors are the foreign consultants who are not familiar with the regulations of the government and authorities that might cause a lot of changes during the design and construction (depending on the type of contract), the updated legislations and regulations due to the fast growth of development in the construction industry, lack of knowledge of environmental and cultural aspects of the external stakeholders such as the consultant (mainly the manpower) and cultural factors of these external stakeholders who contribute in the project. One of the most important issues that causes delay are the failure of the contractor due to commercial issues and cashflow during execution. In addition, the participants have agreed that obtaining NOCs is a major issue in the public sector projects due to high requirements by the authorities and the governments, and approving the contractors based on their prequalification by the client.

Second Theme: The client's project manager's role and key competencies that must be adopted to mitigate the delays in the construction projects in the UAE public sector.

The project managers who have participated in the interviews have mentioned that in order for a client's project manager to be successful, he must adopt the skills of leadership, communication, team management and organising, planning, monitoring and controlling, fast decision making, and negotiation. Furthermore, since the construction industry in the UAE is developing rapidly, the client's project managers must have a strong strategy to adopt with market change and new development in technology and digitalization. Moreover, since

the projects in the public sector projects in the UAE are complex, the client's project manager must be able to distribute and segregate the duties in order to avoid errors and share different responsibilities with different department heads, with a full understanding of the roles and the responsibilities of every department and party in the project. The role of the client's project manager in the UAE public sector was addressed by the participants in details, and they have shown that a full implementation of the tasks would mitigate the causes of delays. The main role of the client's project manager is to identify and analyse the main project constraints and assumptions during the project's life cycle to ensure that the implementation of work is done in accordance with the project scope, tender documents, specification and within allocated budget for the project and time, understanding exactly the client needs and project objectives and having a clear detailed working program covering the major milestones and other related work activities understanding the scope of the work of the different stakeholders especially nominated suppliers and contractors, lead and direct the project and facilitate the approval of project management plan, Identifying the potential risk at very early stage of execution phase, appointing qualified and experienced consultant and contractor based on a strong prequalification and with what complies with the requirements of the governments' projects and new technology to achieve the project objectives, most importantly is to be fully aware of condition of contracts between the client and contractor, client and the consultant, client and the nominated contractors. The client's project manager role in the UAE construction industry includes adopting ad developing new technologies and tools of methods of construction and management. Hence, he/she must create a culture change in organization for employees such as OBS team and PM to own the project and strengthen the communication in agile concept and utilize SCRUM frameworks, therefore, adopting agile and lean concepts is mandatory. The client's project managers as it was

mentioned by the participants can mitigate the delays of the project by neutrality and segregation of duty, escalation, control over contractor's actions, continuous focus on win-win situation, studying the lesson learned from previous projects, and by performing an overall project management process from the initial stage up to the closing phase of the project.

Third Theme: The potential risks that have an impact on the main constraints of the construction project in the UAE public sector.

Project risks have to be identified at a very early stage of the project to avoid any threats and damages that might affect the project's main constraints. Each respondent has listed the possible risks that might occur in the construction projects of the UAE public sector, and the risks are similar and have a high consistency with the risks that were mentioned in the literature review. The participants responses can be categorised into five main categories of risks, construction risks, financial risks, design risks, safety risks, and internal risks, as it was mentioned in figure 3 that shows the conceptual framework. The participants have noted that the payments and financial risks and lack of cash liquidity are risks that have to be analysed, and to avoid this type of risks, each of the stakeholders must do a proper feasibility study, and an adequate planning of the cashflow of the project, and the parties must find another source of financial support to pay the payments to all the related parties. The lack of required resources of the project is a risk that must be analysed and studied before starting the project. It might occur due to the unavailability of the enough money to bring the required number of resources, or lack of resources management, and an improper coordination between the different parties that are responsible for the resources of the project. The participants assured that the discrepancies in the contract documents, incomplete drawings, design uncertainty, and client's variations and order are all major risks that will cause a direct impact on the

project progress and duration, and will affect the cost of the project. They have also mentioned that weak performance of the contractor and the suppliers might lead the project to a failure and these risks must be assessed since the beginning of the project or prior the commencement day of the contractor and supplier. Risks might occur due to accidents and injuries due to safety issues and construction mistakes, therefore, the project manager and the safety manager must be able to visualize the risk at the construction site and make a proper risk assessment for each of the site activities and safety inductions for all the project staff and the labours. The respondents ensured that each project in the UAE construction industry is subject to face a force majeure risk due to the weather conditions, prices inflations, and changes in the laws and regulations.

6.4. Implications

The results of the research should be taken into consideration by the project managers who are representing clients in the construction projects in the UAE public sector. It will provide them with the required key competencies that they must adopt and with the main role of a client project manager in the construction projects in the UAE. The results add to a previous existing data and researches that the public sector construction projects in the UAE are subject to face delays due to contractual, financial, and technical issues because of the complexity of the projects and variety of the foreign and international contractors and consultants who are taking a place in the UAE construction industry. The project managers in the UAE public sector must be able to assess and analyse the project potential risks prior the commencement of the project to avoid any delays. Hence, the project managers should classify each risk to either financial risks, design risks, internal risks, construction risks, or a safety risks and deal with each type of risk with the concerned personnel and parties to mitigate the impact of it on the project. In addition, the results show different sets of factors

of delay, while all of the project delays must not be ignored because in all cases a factor of delay will cause either a minor or major impact on the project's success. The project managers should focus on handing over the project maintaining the main three constraints of a project, which are time, cost, and quality.

Chapter 7

Conclusion

7. Conclusion

The different root causes of delays in the construction projects in the UAE public sector were investigated and studied based on the data collected from the literature review, questionnaire survey, and interviews with experts and professional in the industry. Based on the findings of the research, the data revealed that the project main stakeholders, the client, the consultant, and the contractor, all contribute in the delay of the construction project in the UAE public sector.

The implementation of the qualitative and quantitative data analysis was selected in the research as a methodology to collect data in order to answer the research questions, meet the project's objectives and achieve the project's aim. In addition, the implementation of the mixed method helped in solving the research problem by explaining how the client's project manager can mitigate the different causes of delays that are related to the nature of the project and the inefficient performance of the different project stakeholders in the UAE construction industry.

The study indicated that the public sector in the UAE faces major delays related to contractual, financial, and technical issues that are caused by the main three stakeholders of the project, the client, the consultant, and the contractor. On the other hand, the research showed that minor causes of delays occur due to weak performance by the contractor. Based on the results of the study, the execution phase duration in the UAE public sector is more likely to be delayed due to change orders, variations, design issues by the client and the consultant, and the contractor's inadequate performance and lack of construction management.

The data of the research demonstrated that the client's project manager in the UAE public sector must have the enough experience and soft skills in order to be successful. Moreover, new technologies, tools, and management methods and processes must be implemented by the project manager to be capable enough to deliver a project successfully. The client's project managers need to ensure that the implementation of work in accordance with the project's scope, tender documents, specification and within allocated budget for the project and duration. In addition, to understand the client's requirements, the project objectives, and scope of the work of all the project stakeholders and to be fully aware of condition of contracts between the client and contractor, client and the consultant, client and the nominated contractors in order to be have a clear understanding of the whole project and to take right decisions that will have a positive impact on the project.

The integration between the different data sources in this research (literature review, questionnaire survey, and interviews responses) has contributed in clarifying the role of the client's project manager at each stage of the construction projects according to the PM processes.

- **Initiation**
    - Identifying the project objectives.
    - Preparing the project charter.
- **Planning**
    - Making sure that project time schedule and resources are prepared.
    - Identifying the project milestones.
    - Checking the risk management plan.
    - Analyse the organisation break down structure and check the capabilities. Ensuring that the BOQ has been developed as well as the package cost plan.
    - Ascertain the quality plan, procurement plan, change management plan, and project management plan have been prepared and audited.

- **Execution**

    - Monitoring the execution of the activities.
    - Ensuring that the regular meetings are being attended by the concerned parties to maintain a proper communication and coordination between the stakeholders.
    - Control the changes through documents and assuring that all the stakeholders are noted and updated immediately.
    - Checking regularly the planned vs. actual progress of the project and identify the areas defects.
    - Preparing weekly and monthly reports for the status of the project in terms of progress and financially.

- **Monitoring and Control**

    - Monitor any changes in the project and their impact on the project main constraints.
    - Controlling the excessive cost of the additional works.
    - Monitor the quality control of the project. Prepare a reporting system in order to control keep tracking.

- **Closure**

    - Recording and reviewing the lessons learned. Collecting the project reports.
    - Reviewing the schedules of the project maintenance.
    - Ensuring that the project spare manual of the materials is prepared.
    - Checking the project's warrantees

.

The data in this research clearly indicated that the project risks must be identified at early stages of the project by the project manager in order to be prepared in the case of occurrence of any problem, therefore, the impact of the issues that arises in the project will be mitigated or prevented.

7.1. Recommendation

Based on these conclusions, it is recommended for the project managers who represent clients in the UAE public sector projects to do following actions to mitigate the potential delays to the maximum level on daily and regular basis.

- Ensure a clear understanding of scope of work and project objectives.
- Identify the stakeholders and their needs and expectations at very early stage of project.
- Establish a clear and an accurate communication plan within project and program level.
- Manage and control agreed level of requirements.
- Ensure effective Risk Identification, Analysis, Response Planning and Management Process.
- Ensure Pro-active approach to avoid project delays.
- Maintain a maximum efficiency of project management plan.
- Monitor and control the work progress.
- Control the cost of project.
- Ensure up-to-date and accurate project progress reports.
- Managing the efficiency of resources.
- Control changes and variations.
- Identify the potential learned lessons and the building strategy for continuous improvements and growth.

For further research that is related to the topic, it is recommended to focus on the implementation of the project management processes by the project management firms in the construction industry in the UAE. Furthermore, to integrate between the construction management and the project management to develop a strategic procedure for the construction management process that can be utilised and adopted by the project managers in the UAE.

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Appendices

The appendices of this research that is provided in this section are the following:

- **Questionnaire survey**
  including the request letter, demography, and the survey table.

- **Interview**
  including the interview request letter and the interview question.

Questionnaire Survey Request Letter

Dear Participant,

I'm Sami Atout, a Project Management Master's student at the British University in Dubai.

This is to inform you that I'm doing Master's in Project Management, and as a partial fulfilment of the program, a thesis has to be submitted, and it is entitled as "Root causes of delays in the construction projects in the UAE public sector and the role of the client's project manager in mitigation".

According to your background and experience in the construction industry, I request from you to participate in the questionnaire survey that is related to the topic. The questionnaire consists of two parts and will take less than five minutes to be filled.

The main purpose of this interview is to get the feedback and opinions of professionals in the industry to support achieving the aim and objectives of the research.

If you agree to participate in the study, kindly, please fill the data below and sign.

Name of Participant: _____

Date: _____

Signature: _____

Your valuable time is highly appreciated.

Regards,

Sami M. Atout
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Dubai, United Arab Emirates
Phone: 050 2926 241
Email: 20197591@student.buid.ac.ae
Email: samiiatout@hotmail.com

Part A - Demography

Kindly, please choose one of the following below where it is related to you, and fill the required information

1. Your organisation is

-Local -International

2. The organisation is related to

-Private sector -Public sector

3. Your organisation represents a

-Client -Consultant -Contractor -Other, please mention: _____

4. Your role at the organisation is: _____

5. Years of experience in the construction industry: _____

6. Years of experience in the construction industry in UAE: _____

Part B – Questionnaire Survey

In the next table, you will find different factors of delays categorised into 4 categories, please assess the following factors of delay in the construction projects in terms of severity, where 1 represents the lowest value and 5 represents the highest value.

Source of Delay	No.	Factor of Delay	Severity				
			1	2	3	4	5
Client	1.1	Changes and Variations					
	1.2	Late client's decision making					
	1.3	Irregular and late payment					
	1.4	Unrealistic project duration					
	1.5	Lack of technical knowledge					
	1.6	Non-Clear project objectives					
	1.7	Government and authorities' approvals routine					
	1.8	Weak Suppliers and Contractors nomination					
	1.9	Poor communication and interference					
Consultant	2.1	Incomplete contract documents					
	2.2	Changes in drawings and specifications					
	2.3	Slow response to technical enquiries					
	2.4	Lack of communication between the consultant staff					
	2.5	Delays of approvals and submittals					
	2.6	Low level of Management and Technical experience					
	2.7	Complexity of the design					
	2.8	Weak quality control					
	2.9	Inadequate design management process					
	2.10	Duration and procedure of site inspections					
Contractor	3.1	Inadequate project financing					
	3.2	Disputes with the sub-contractors					
	3.3	Inadequate project planning and scheduling					
	3.4	lack of resources management					
	3.5	Bad quality of the material					
	3.6	Shortage of material in the market					
	3.7	Delay in material delivery					
	3.8	Shortage of manpower					
	3.9	Lack of experience in similar projects					
	3.10	Inexperienced technical team					
	3.11	Lack of coordination between sub-contractors					
	3.12	Poor site quality					
	3.13	Construction Mistakes					
	3.14	Subcontractors' and suppliers' incompetency					
	3.15	Low productivity of manpower					
	3.16	Congested site					
	3.17	Unavailability of equipment					
	3.18	Lack of communication between different departments					
	3.19	Inexperienced site team					
	3.20	Late work permits by authorities					
	3.21	Level of response to changes					
External Factors	4.1	Weather conditions					
	4.2	Political and Economic issues					
	4.3	Health pandemics					
	4.4	Prices Inflation					
	4.5	Changes in laws and regulations					
	4.6	Traditional and cultural conflicts					

Interview Request Letter

Dear Project Manager,

I'm Sami Atout, a Project Management Master's student at the British University in Dubai.

This is to inform you that I'm doing Master's in Project Management, and as a partial fulfilment of the program, a thesis has to be submitted, and it is entitled as "Root causes of delays in the construction projects in the UAE public sector and the role of the client's project manager in mitigation".

According to your long experience in the construction industry, working in different sectors, and in many leading positions, I request to make an interview to answer some questions related to the role of the client's project manager in the construction industry and causes of delays in the construction projects in the UAE.

The main purpose of this interview is to get the feedback and experience of professionals in the industry to support achieving the aim and objectives of the research.

Note: The interview includes 6 questions and all the answers to the questions and the data collected will only be used for research purposes.

If you agree to participate in the study, kindly, please fill the data below and sign.

Name of Participant: _____

Role at your organization: _____

Date: _____

Signature: _____

Your valuable time is highly appreciated.

Regards,

Sami M. Atout
British University in Dubai
Dubai, United Arab Emirates
Phone: 050 2926 241
Email: 20197591@student.buid.ac.ae
Email: samiiatout@hotmail.com

Interview Questions

1. How can you define the project's success? And what are the measures that you follow as a client in the public sector to assess the project's success?

2. From your point of view, what are the main factors of delays in the construction projects in the UAE public sector?

3. In which phase of the construction projects' lifecycle do delays occur most? Why do you believe so?

4. What are the skills that the client's project manager in the UAE public sector must adopt in order to be competent?

5. What are your roles and responsibilities as a client project manager in the UAE public sector? and how can you mitigate the main causes of delays?

6. What are the potential risks that must be identified at early stages of the construction project to avoid delays?