A TRANSFORMATIONAL ORGANISATIONAL FRAMEWORK FOR IMPROVING IRAQI QUASI-GOVERNMENTAL CONSTRUCTION COMPANIES' PERFORMANCE

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Dedication

I would like to dedicate this research endeavour to

my dear mother,

my beloved wife,

& my lovely kids, Ahmed, Ali, and Mustafa.

Declaration

This thesis is submitted in partial fulfilment for the award of Doctor of Philosophy at the University of Salford, United Kingdom and has not been previously submitted to meet requirements for an award at any higher education under my name or that of any other individuals.

Any materials previously published or written by another person(s)/organisation(s) is made reference accordingly. Yet, during the progress of study, some of the research arguments and findings were published in conference papers and as conference presentation prior to the submission of the thesis, as listed in Appendix E.

Taha S. Ameen Al-Obaidi

Abstract

Rising globalisation, the liberalisation of international trade and rapid technological development over the last two decades have subjected the business environment to rapid, dynamic change. In the face of such change, seminal researchers and business leaders have reached a conclusion that Business Process (BP) is the core of an organisation. Thus, in order to survive, grow, and stay ahead of the competition in today's turbulent environment, organisations need to mainly focus on improving their business processes.

Similarly, the Iraqi business environment, after the 2003 conflict, have been subject to profound change influenced by the radical changes to Iraq's political and economic systems. These changes have directly impacted on Iraqi Quasi-Governmental Construction Companies (IQGCCs) where, after decades of domination over most publicly funded construction contracts, these companies face now fierce competition from in excess of 3,500 local and international private firms. As a result, IQGCCs have subsequently struggled to both win contracts and generate profit and the majority have incurred substantial financial losses, becoming unsustainable burdens on the national budget. Although the Iraqi government has attempted to reform the performance of these companies, most of these efforts have ended in their recapitalisation, rather than the identification and resolution of their problems. Accordingly, through employing Business Process Management (BPM) as a comprehensive and widely used approach to increase BP's principles in an organisation, this research aims to synthesise a transformational organisational framework to address the challenges emanating from current practice within IQGCCs with the view to determining a step change improvement that could ultimately enhance their bottom line performances.

To achieve this aim, an exploratory study, which comprised three companies selected from IQGCCs as case studies, was conducted with the aim of mapping and examining the current operational processes employed by these companies and pinpointing the main challenges existing in these processes. Thereafter, a series of semi-structured interviews were carried out with ten experts selected from various management levels of three IQGCCs in order to test the applicability of the theoretical framework developed from the literature to address the challenges inherent in the IQGCCs' processes. Based on the experts' responses, the theoretical framework was refined and then further validated through four more semi-structured interviews to produce the final recommended transformational organisational framework for IQGCCs.

The study empirically uncovered a number of challenges and impediments inherent in the IQGCCs' current practices that need to be overcome if their performances are to be enhanced. Many reasons were also identified and grouped together as underpinning causes of the current challenges and barriers to efficiency. The study also showed that the IQGCCs could solve most of the identified challenges through shifting their focus from a traditional functional orientation to a business process orientation. To facilitate this, the study produced a transformational organisational framework that acts as a roadmap to streamline and continuously improve Iraqi QGCCs' core business processes and, ultimately, institute the business process' principles within these companies.

Chapter One - Introduction

1.1 Research Background

Governments worldwide have long sought to establish state-owned enterprises (SOEs) with the aim of achieving a variety of public policy objectives, such as: building basic physical infrastructure; providing essential services including finance, water and electricity; controlling natural resources; generating revenue for the treasury, and so forth (World Bank Group, 2014). These entities have formed a significant part of the global economy through the delivery of services. Analysis by the World Bank Group (2014) suggests that SOEs account for 20% of global investment, 5% of global employment, and as much as 40% of the total output for some countries.

Despite the apparent significance of SOEs, global studies conducted in different countries suggest that SOEs tend to be less efficient and perform poorer than their private sector counterparts (Issham *et al.*, 2008; Bouri *et al.*, 2010; Rocha, 2011; De Luna-Martinez & Vicente 2012; World Bank and Development Research Center, 2013). In trying to account for this lack of efficiency with SOEs, Arocena and Oliveros (2012) allude to three principal causes, which are directly related to the ownership of the organisation and, in turn, cause lags in performance. These root causes include: the separation of ownership and control; government protection of public organisations from bankruptcy; and finally, the intervention of politicians, bureaucrats, and government officials in managing the SOEs. Yet, these findings are contested by others, such as Broadman (1995), Aivazian *et al.* (2005), Koppell (2007), Curristine *et al*. (2008), and Alice and Esther (2011), who espouse that the traditional management model adopted by these organisations, which is typified by a highly bureaucratic and hierarchical structure, is the main cause of their inefficiency. The effects of this are then amplified by the incompetence of directors and employees. As a result of the toxic mix of incompetence and inefficiency, public organisations often fail to achieve their business objectives.

In light of these challenges, the transfer of SOEs to the private sector is often considered as the most effective action to remove the inefficiencies inherent in public organisations, through reducing distortions and increasing incentives (Xu & Uddin, 2008; Ariff *et al.*, 2009). However, Esu and Inyang (2009) argues that the key driver for enhancing the performance of public organisations is the improvement of their management systems. Aivazian *et al.* (2005) and

Arocena and Oliveros (2012) also identify that SOEs that typically show higher improvement levels in their efficiency after privatisation, are those that had higher efficiency before privatisation. Aivazian *et al.* (2005) assert that the reform of state-owned organisations, through the adoption of less radical methods rather than direct privatisation, is considered an important step that should be undertaken before embarking on any privatisation. The Corporate Governance Guidelines of State-Owned Enterprises produced by the OECD (2005), suggests this can be achieved through: 1) giving SOEs a high level of independence and decentralisation in decision making by enhancing managerial accountability, 2) increasing competition, and 3) improving the management system.

In addition to the aforesaid challenges, the business environment, over the last few decades, has witnessed dynamic changes due to: rising globalisation, the liberalisation of international trade and rapid technological development (McCormack & Lockamy, 2004; Shtub & Karni, 2010; Ivanko, 2013). All these changes in the business environment have resulted in an urgent need to reform the state-owned sector so that it is able to compete with private sector firms, attract customers and enhance satisfaction with the services provided (Hansford, 2009).

However, the question of how some organisations have managed to survive and grow within such an environment has attracted wide interest amongst management practitioners and researchers. Seminal researchers, such as Porter (1985), Imai (1986), Hammer and Champy (1993), Harmon (2003), McCormack (2007), and more recently Bronzoa *et al*. (2013) and vom Brocke and Rosemann (2015), argue that organisations can survive, succeed and improve their overall performance by focusing on the enhancement of their business processes (BP). Focusing on business process means viewing and managing the organisation as a combination of highly integrated processes, rather than as collected functional areas (Hammer & Stanton, 1999), and being oriented towards processes, customers and outcomes, as opposed to bureaucracy and hierarchies (McCormack, 2007). Accordingly, various management approaches have been developed over the last three decades including: Total Quality Management (TQM), Business Process Reengineering (BPR), Lean, and Business Process Management (BPM). Zhang and Cao (2002) suggest these approaches have been widely adopted by private and public organisations to improve their performance. Although these theories propose very different forms of implementation and change within organisations, they collectively focus on the operational business processes as the most important way to enhance organisational effectiveness and efficiency (Skrinjar & Trkman, 2012).

In terms of the construction industry, Kohlbacher and Reijers (2013) suggest that many construction companies have adopted the production-based philosophy that is found in the manufacturing industries, and have set themselves targets to move away from functional-oriented structures to focus on process thinking. Bronzo *et al.* (2013) assert that the design and management of core business processes have become a key driver for organisations to effectively compete in today's turbulent business environment. By focusing on the optimisation, streamlining, and continuous improvement of business processes, organisations can establish a solid competitive advantage and promote their performance through reducing the product lifespan and costs, improving the quality, and enabling an adaptation to change requirements (IBM, 2011).

During the 1970s and 1980s, countries such as Iraq, which is considered an oil-rich nation, established hundreds of SOEs in various sectors with the aim of increasing the role of the public sector in the national economy. This attempted to mitigate the effects of the 'resource curse' and diversify the economy to reduce the country's dependence on oil revenues alone (Sanford, 2003). According to the Iraqi Prime Minister's Office [IPMO] (2015), Iraq currently has 172 SOEs, of which 12 are construction companies. For the purpose of this study, these construction SOEs will be termed Quasi-Governmental Construction Companies (QGCCs). Iraq's QGCCs (or IQGCC) have faced wide criticism during the last ten years, due to their poor performance, low productivity and inefficiency in the implementation of projects (Al-Alwani, 2011; Al-Shaykhly, 2007; Al-Haidari, 2011; Filaih, 2013). Gunter (2013) and Abdulrazzaq and Mohammed (2014) have argued that one of the main reasons for the reported drop in performance within these companies can be directly linked to the management systems implemented within the organisations. These management systems have effectively hampered the organisation's ability to react to the rapid changes that occur in their business environment as post-conflict Iraq takes shape. Consequently, this research explores how the management systems implemented within these organisations can be enhanced in a way that will produce a step change improvement in the performance of QGCCs in Iraq, and thus ensure the existing QGCCs are made ready for the evolving post-conflict business environment. In doing so, the aim is that they can operate commercially as competitive and viable entities which have the ability to compete effectively against private sector investment and expertise.

1.2 Research Problem

In 2003, Iraq was subjected to a dramatic change, especially in its political and economic systems. Politically, Iraq transformed radically from one of the world's most dictatorial and centralised systems to a more modern democratic system that believed in pluralism and participation in governance. On an economic level, for the first time since 1990, Iraq has become able to use and invest oil revenues freely in rebuilding its economy and infrastructure that was completely destroyed due to the wars and international sanctions during the 1980s and 1990s. Moreover, in order to further support its national economy, the new Iraqi government has established a plan to reform the economy through transforming it from a centrally planned to a market economy (Bureau of Economic and Business Affairs, 2013). Accordingly, several measures have been taken to encourage the private sector and foreign investments through tax reform and the removal of all restrictions on foreign investment through the suspension of all customs duties and tariffs (Moore & Parker, 2007).

These measures, along with substantial investment in the development of the country's infrastructure, have encouraged many local businessmen to enter into the construction industry; they have thus attracted numerous foreign construction companies to invest in Iraq (Cheema, 2013). The Bureau of Economic and Business Affairs (2013) have attested that the changes in the Iraqi business environment have put the IQGCCs into direct competition with the private sector, thus ending the monopoly of IQGCCs over most publicly funded construction contracts. This is significant as it is an arrangement that has existed for decades and has prevented businesses adopting the free market models seen in other quasi-governmental bodies in countries such as the UK. Consequently, IQGCCs have struggled to win contracts and generate profit in the now highly competitive Iraqi market (Wing, 2009). As a result, IQGCCs have incurred substantial financial losses, and have become an unsustainable burden on the national budget (IPMO, 2015), which is now in urgent need of reform.

Graetz and Smith (2009) and Gunter (2013) argue that the traditional bureaucratic management systems and centralised control employed in managing most Iraqi SOEs are two of the main factors negatively impacting on their effectiveness and efficiency. This prevents them from meeting the challenges of the new business environment. Naji and Abass (2013) also state that most of the organisational structures adopted by Iraqi construction companies are unable to: accelerate decision-making, facilitate communication among different managerial levels, and support the flow of information. Jassim (2013) emphasised that the lack of perception amongst

senior managers in the main organisations regarding their core roles and responsibilities is one of the key reasons for the poor performance of public organisations in Iraq. Nevertheless, studies on this area are often generalised in nature, failing to concentrate on empirically examining the current practices in IQGCCs or identifying conceptual frameworks that can be followed for the purpose of improving the performance of these companies. Moreover, the bulk of the previous research, (Kagiglou *et al.*, 1998; Lindfors, 2003; Koskela, 2011; Song & Choi, 2011; Sapuan & Mansor, 2014; Shang & Pheng, 2014; Antunes & Gonzal, 2015; Cherian & Kumaran, 2016; Mostafa *et al*., 2016; Eadie & Perera, 2017), have proposed maps related to generic construction processes, and show an intensive focus on enhancing the processes of a construction project from the exclusive viewpoint of the client or architect. Therefore, it can conclude that research focused on operational processes, especially from the IQGCCs' perspectives as contracting organisations, has not yet been conducted.

In light of the above, and as a result of the lack of an effective and appropriate solution for Iraqi QGCCs' performance problems, it is proposed that a study exploring how performance can be improved within these organisations is urgently needed. The study will explore how existing IQGCCs can be remodelled to cope with the new market processes adopted in post-conflict Iraq. As a result, this doctoral study explores and maps the operational business processes adopted by IQGCCs with the aim of developing a better understanding of the current practices and associated inefficiencies. These will then be compared to the theoretical framework developed from the literature to identify potential areas of enhancement and produce a transformational organisational framework that enables a step change improvement in the IQGCCs' performances.

1.3 Research Questions

Based on what has been discussed above, the primary research question for this study is:

How can the overall performance of Iraqi quasi-governmental construction companies significantly be improved and rectified to meet the current challenges in the Iraqi business environment?

Whilst the secondary research questions are:

1) How have some organisations managed to survive and grow under dynamic business environment, and what are the main factors, model, and techniques that can bring about a step change improvement in the organisations' performance?

2) What are the current industry good practices that need to be adopted by large construction companies in delivering their projects under traditional procurement in order to achieve a high level of effectiveness and efficiency?
3) What are the current practices adopted by IQGCCs, and the key hindrances and challenges associated with those practices?
4) What are the required amendments and enhancements that should be made on the proposed framework in order to suit the IQGCCs' context and effectively improved their performance?

1.4 Research Aims and Objectives

The main aim of this research is to develop and present a transformational organisational framework for Iraqi Quasi-Governmental Construction Companies that acts as a roadmap to improve the efficiency and performance of these companies.

Accordingly, the objectives of this research project are to:

1) Theoretically investigate the impacts of the changing Iraqi business environment on IQGCCs and how these organisations can survive and succeed;
2) Develop an in-depth understanding of business process concepts and principles alongside the main related process performance improvement approaches and models;
3) Synthesise a theoretical framework for streamlining and continually improving the operational processes of large construction companies under traditional procurement;
4) Investigate, map, and examine the Iraqi QGCCs' 'as is' operational processes to facilitate a better understanding of the key challenges and barriers to efficiency in these processes;
5) Test and validate the conceptual transformational organisational framework within IQGCCs to address the challenges in their operational processes and thereby enhance their performance.

1.5 Research Scope and Assumptions

As previously mentioned, there are two main reasons for the poor performance of state-owned enterprises, namely, ownership, and the management system. However, the scope of state-owned enterprises is broad, therefore, this research project focuses only on IQGCCs owned by Iraqi Ministry of Construction and Housing which are currently unprofitable, and particularly on improving their management systems. This is because the improvement of the management system is deemed extremely important in improving an organisation's performance, making it

commercially viable, and thereby facilitates the process of ownership transformation and privatisation. Hence, the major concern of this research is to map and examine the current operational processes adopted by these companies and identify the main factors and techniques that can be used to streamline those processes. In this context, the researcher concentrates on developing a transformational organisational framework that aims to produce a step change improvement in the IQGCCs' performances, but does not address how to implement this transformation or the factors that can affect the transformational process. Furthermore, this research is based on two assumptions: 1) Iraqi QGCCs are profit-seeking entities, independently managed and not subject to the current governmental regulations and/or political interference in commercial operations or strategic planning; 2) the contractual relationships between clients and those companies are generally governed by the traditional procurement form, namely the 'design bid build contract' and 'unit price' agreement, as this contracting form is considered the most extensively used form in Iraq.

1.6 Research Process

Achieving the aims and objectives of this study is a challenging task. In order to meet the objectives, a qualitative methodology is employed to: review, understand, and synthesise literature available on the related themes of the research; empirically investigate the IQGCCs' current practices; and finally, produce a framework to improve the current practice by drawing on the experience of engaged experts. A graphical representation of the research process is depicted in Figure 1:1, which illustrates that the process of this research comprises three main phases. These phases are as follows:

1) **Phase one:** This phase forms the main base of this research study. It comprises the literature review that helps in defining the research aim and objectives along with designing the research methodology. This also helps in developing a better understanding of IQGCCs' current local context, the concepts and principles of business processes, and good practice operational processes of large construction companies under traditional procurement. This phase concludes by synthesising a theoretical framework that serves as a process map enabling construction companies to systematically manage and improve their operational processes.

2) **Phase two:** This phase includes the conduct of an exploratory study to capture, map and examine the current practices employed by IQGCCs during the delivery of their projects. The phase was achieved through using a case study research strategy and qualitative

paradigm to collect and analyse the required data. By the end of this phase, a holistic map of the IQGCCs' current operational processes, alongside a list of the key challenges in these processes with their underlying causes, will be produced.

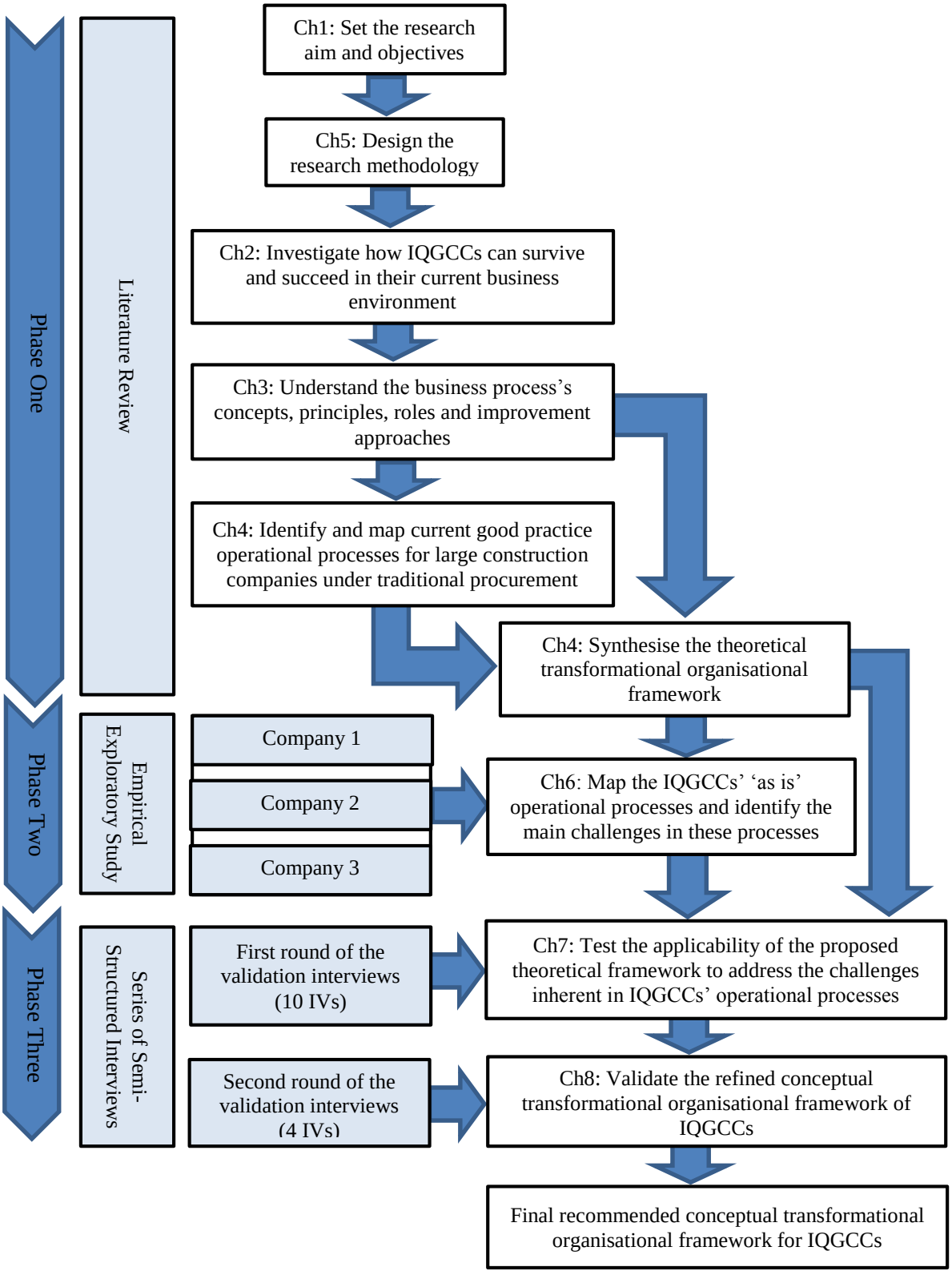


Figure 1-1: Research process

3) **Phase three:** This phase involves a two stage validation processes. Both stages are achieved through conducting semi-structured interviews. The first stage aims at validating the outcomes obtained from the exploratory study and testing the applicability of the proposed theoretical framework in order to address challenges in the IQGCCs' current practices. As a result of this exercise, amendments will be made to produce the refined conceptual transformational framework that suits the context of the IQGCCs. This version of the framework will be then taken forwards into a further confirmation stage to ensure its validity and produce the final recommended transformation organisational framework for IQGCCs.

1.7 Structure of the Thesis

This thesis is structured into nine chapters, which are summarised as follows:

Chapter one introduces an overview of the research background, research problem and main aim and objectives. It also discusses the research scope and assumptions. Finally, this chapter provides a summary of the process employed to achieve the aim and objectives of this study, along with its structure.

Chapter two provides an overview of Iraq and investigates the impacts of the changing Iraqi business environment on the construction industry in general and IQGCCs in particular. The chapter also briefly highlights the performance of IQGCCs under the current business conditions and why they need to change and focus on business process in order to improve their performances.

Chapter three introduces the concepts and principles of business process and business process orientation alongside the key approaches and models developed to increase the principles of business process in an organisation. It also discusses a number of modelling techniques that can be used to map the IQGCCs' operational process with the aim of identifying and resolving their challenges. Moreover, the chapter highlights the main process research and initiatives produced to improve the process of construction. Finally, the impact of changing businesses on organisational structure is discussed along with an analysis of the main organisational structure types that can be employed by construction companies.

Chapter four identifies, describes, and visually represents the widely accepted good practice for operational processes for large construction companies engaged in traditional contracting.

This chapter also synthesises a theoretical transformational organisational framework to help construction companies streamline and consciously improve their core business processes.

Chapter five explores and discusses the research philosophy and methodology with the aim of identifying the most appropriate research approach, strategies, data collection and analysis techniques that can be used to achieve the research objectives.

Chapter six analyses the data collected through an exploratory study comprising three construction companies selected from IQGCCs as case studies. The chapter describes and visually represents the 'as is' operational processes employed by each company studied during the delivery of its projects. In addition, these processes are analysed and their key challenges identified along with the main causes of these challenges.

Chapter seven is designed to test and discuss the applicability of the proposed transformational organisational framework to address the challenges identified in the IQGCCs' current core business processes. By employing a thematic data analysis, this chapter, step by step, analyses and discusses the interviewees' perspectives regarding the elements of the proposed theoretical framework, the solutions suggested through these elements, and any amendments required to ensure the framework suits the IQGCCs' context. This chapter concludes by producing a refined version of the transformational organisational framework based on the experience of IQGCCs' experts.

Chapter eight provides a broader confirmation regarding the validity, credibility, suitability and applicability of the refined conceptual framework produced from the first round of validation interviews. The chapter explains the procedure used in: collecting the data required at this stage; discussing the results obtained from analysing the collected data; and finally, presenting the details of the final recommended transformational organisational framework for IQGCCs.

Chapter nine is the final chapter of this study. It revisits the research objectives, briefly explaining how this study has been conducted and what has been achieved. It also outlines the importance and contributions of the research to both the academic community and practice. Finally, the research limitations are explained along with the proposal of a number of further research directions.

Chapter Two - Iraqi Quasi-Governmental Construction Companies' (IQGCCs) Performance and Need for Change

2.1 Introduction

This chapter provides an overview of Iraq's business environment and identifies the impacts of the changing business requirements on the performances of Iraqi state-owned enterprises in general and Iraqi QGCCs in particular. It starts by introducing a general historical, geographical, and economical view of Iraq. Thereafter, the impact of changing the political and economic systems on Iraq's construction business environment and the IQGCCs' performances over the last 50 years is discussed. The chapter then addresses how some organisations worldwide have managed to survive and grow in a highly competitive and turbulent business environment, such as that experienced by IQGCCs nowadays. The fundamental lesson learned from companies' experiences reveal that, in order to succeed and stay ahead of the competition, organisations need to focus on improving their operational processes. Yet, this may also mean affecting organisation change. Therefore, the final part of this chapter covers organisational change in terms of concept and types.

2.2 Iraq an Overview

Iraq is an Arabic country, governed by a federal democratic parliamentary republic system. Historically, since the ancient times, Iraq was known as Mesopotamia - the land between the rivers - which was an advanced civilisation that emerged by 4000 B.C. in a large area of the plains of the Tigris and Euphrates rivers. Sometime after 2000 B.C., this land became the centre for many civilised empires, such as the ancient Babylonian and Assyrian (Roux, 1991). In 762, Baghdad was built on the same land and became the capital and the intellectual, cultural, political and economic centre of the Islamic empire under the Abbasids' caliphate (Corzine, 2004). However, Iraq's current geographical borders were identified by the British occupation in 1921 when they established the Kingdom of Iraq under their control. In 1958, the republican regime was established in Iraq after the overthrow of the monarchy (Marr & Al-Marashi, 2017).

Geographically, the republic of Iraq lies in the south-west of the Asian continent between latitudes 29° and 38° N, and longitudes 39° and 49° E with an area spanning over 437,072 km2, which is mainly divided into three sections: a mountainous area in the north, a desert area in the west, and a large fertile plain in the middle of its south (Frenken, 2009). Iraq shares borders

with Syria to the north-west, Jordan to the west, Saudi Arabia and Kuwait to the south, Iran to the east, and Turkey to the north. Moreover, it has a narrow section of coastline measuring 58 km (35 miles) between Umm Qasr and Al Faw on the Arabian Gulf, which makes it one of the Arab Gulf countries, as shown in Figure 2-1.

Figure 2-1: Iraq map

Source: Alhadeff (2016)

Iraq comprises eighteen administrative regions; Baghdad is the capital and commercial centre and located in the centre-east of the country. Other major cities include Al-Basara in the south, and Mosul and Arbil in the north. In Iraq; there are two main rivers, namely, the Tigris and the Euphrates that run all the way through the centre of Iraq from north to south. These rivers provide Iraq with arable land and create diverse landscapes varying from green plains to deserts, which cover most of western Asia.

Economically, Iraq is considered one of the top three oil-richest countries in the world and the second-largest oil producer in OPEC. Its economy is mainly dominated by the oil industry, which has traditionally provided about 95% of the country's foreign exchange revenue (Bartels *et al.,* 2012; International Energy Agency [IEA], 2012) and accounts for 55% of the GDP (Trading Economics, 2017). Apart from oil production and refining, Iraq has a small varied industrial sector that includes the production of construction material, chemical, metals, leather

goods and textiles (United Nations Educational, Scientific and Cultural Organisation, 2014). The construction industry contributes to 8% of Iraq's GDP (Trading Economics, 2017).

According to estimates by the Iraqi Ministry of Planning (2013), the population of Iraq will reach than 40 million by the end of 2018 with a population growth rate of almost 2.9. In light this substantial growth in the population rate, Iraq's population is most likely to increase in the coming years and reach a figure of around 56 million by 2030 (World Population Review, 2017). Figure 2-2 illustrates Iraq's expected population growth over the next century.

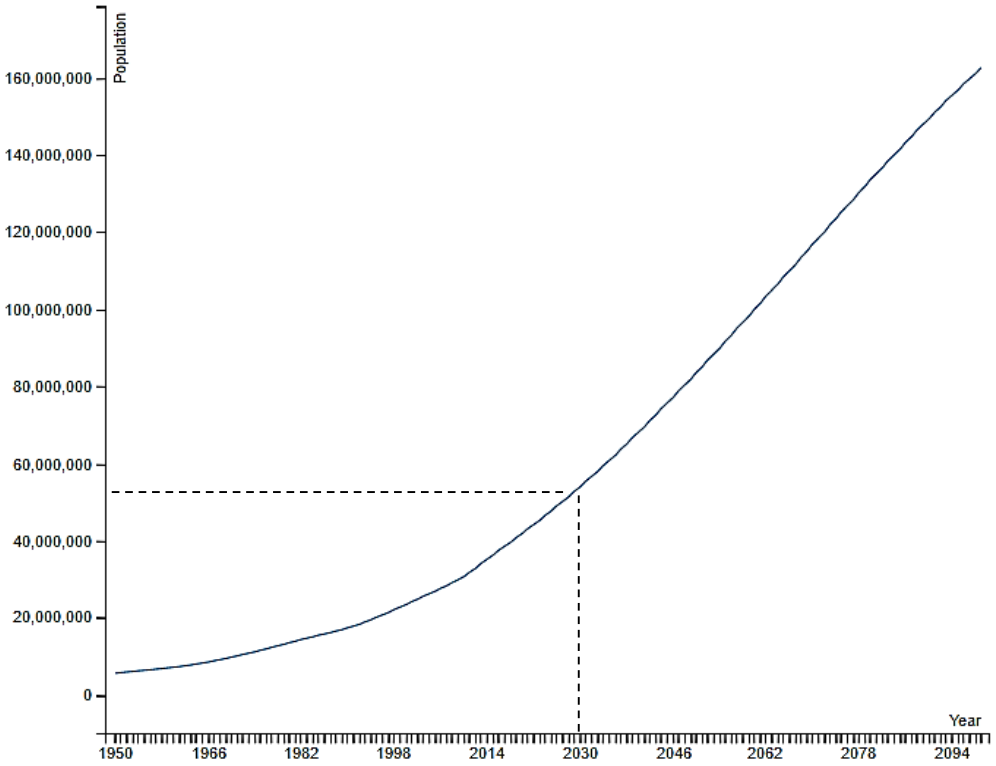


Figure 2-2: Iraq's expected population growth

Source: World Population Review (2017)

2.3 Iraqi Business Environment Pre and Post 2003

As a result of the US led invasion in 2003, Iraq was subjected to radical change, especially, in the political and economic systems. This change has directly affected the country's business environment, the construction industry, and state-owned enterprises. So, to develop a better understanding regarding the aforementioned themes, the nature of Iraq's political and economic systems pre and post 2003 are discussed in the following sub-sections.

2.3.1 Iraq Pre-2003

From 1958 until 2003, Iraq was officially governed by a republican presidential system. In that the President of the Republic represented the highest authority in the country and also the Chairman of the Council of Ministers, which was responsible for both the executive and legislative powers. Under the bylaws promulgated in 1978, the Council of Ministers had responsibility for planning and determining the country's internal and external policies and decision-making processes. The President assigned all Ministers, their deputies and Chief Executive Officers (CEOs) of the different ministries and public organisations and companies (Sanford, 2003).

Throughout the aforementioned era, socialist models influenced all successive governments that ruled Iraq. Therefore, they emphasised several themes that bore this stamp, such as: employment central economic planning to manage the country's resources; elimination of foreign economic influences (notably in the oil sector), and land reform. Accordingly, several measures were taken to increase the role of the public sector in the national economy. These included: nationalising all banks, insurance companies, and many industrial and construction firms; reorganising other companies, and establishing many new state-owned enterprises in various sectors. The adoption of a socialist approach to governance accompanied by the move towards a planned economy contributed to the flight of investors and thereby their money, which meant the government had to rely completely on oil revenue as its single source of GDP (Sanford, 2003).

As a result of growing oil revenues, by the 1970s, Iraq was able to proceed with its socialist methodology and make substantial investment into different sectors, including water, health, education, power generation and distribution, housing and other infrastructures (Moore & Parker, 2007). In fact, the era of the seventies can be considered as the golden age of Iraq's economy in general and the construction industry in particular. Yet, investment in the construction industry slackened during the Iran-Iraq War of 1980 to 1988, due to reduced revenue and the diversion of most of the country's wealth to fund the war effort. By the time the war with Iran ended, Iraq was left with a huge foreign debt of up to $80 billion, and extensive damage to its physical infrastructure (Polk, 2006). As a response of the economic crisis, the Iraqi government sought to implement a sweeping programme of economic liberalisation. The programme began in the mid-1980s, but its scope and intensity increased dramatically by late 1987 and into 1988, resulting in privatising hundreds of state-owned enterprises considered unimportant to either the national treasures or military preparedness (Moore & Parker, 2007).

However, the government's efforts to reform the national economy did not succeed. By 1989, the economic crisis deepened and the standard of living for most Iraqis significantly deteriorated. This toxic mix led to the government re-imposing control over market rates, the re-nationalisation of several firms, and the increase of government subsidy for various sectors (Chaudhry, 2002). The First Gulf War in 1991, and the subsequent draconian sanctions, lasted for the next 13 years, as the international response to the Iraq invasion of Kuwait wreaked havoc on an already distressed economy and caused a collapse in the Iraqi infrastructure (Sanford, 2003). The international economic sanctions prevented Iraq from exercising any trade or financial action with other counties.

Consequently, in the absence of investment, the Iraqi government worked on supporting and activating state-owned enterprises in different sectors with the aim of investing local resources into that which could be repaired from the destroyed infrastructure. Many of those enterprises were specialised in the construction industry and distributed over a number of the state ministries and institutions. For example, the Ministry of Housing and Construction had a number of Quasi-Governmental Construction Companies (QGCCs) specialised in different construction fields and responsible for executing most of the projects offered by the Ministry or other state entities. In other words, the majority of these companies were founded to conduct missions for the government and ministries to which they belonged. Thus these companies had no difficulties in securing new projects, where most of the government contracts were directly awarded to them without serious competition, especially with the semi-absence of the private sector due to the poor economy and the government orientation toward a centrally planned economy.

2.3.2 Iraq Post-2003

By 2003, and as a result of more than two decades of conflict, Iraq's infrastructure, including its electrical infrastructure, oil pipelines and fields, railroads, roads, bridges, airfields, irrigation and communications systems had been devastated (Gunter, 2013). In 2003, the United States with the participation of a number of EU countries toppled the government of Saddam Hussein through the military occupation of Iraq and established an interim authority to govern Iraq, called the Coalition Provisional Authority (CPA) (Wing, 2009). This invasion led to a dramatic change including several aspects that directly influenced the Iraqi business environment. Politically, Iraq radically transformed from one of the most dictatorial and centralised systems worldwide to a more modern democratic system that believed in pluralism and participation in

governance. Under the new government system, the executive power became the responsibility of the Cabinet headed by the Prime Minister who now has the highest executive authority in the country, whilst the legislative power has become the responsibility of Parliament. Ministers are now nominated by the Prime Minister and must be ratified by the Parliament. Otherwise, regarding the general structure and hierarchy of the government, ministries and institutions remain managed within the same traditional bureaucratic system (Sanford, 2003; Gunter, 2013).

Moreover, after 2003, the Iraqi economy witnessed great development and has considered one of the fastest developing economies in the world, with an average annual growth in Gross Domestic Product (GDP) of 6% during the last ten years (Trading Economy, 2017). This growth in the economy is mainly dependent on oil extraction. However, the construction industry, supported through large-scale government infrastructure development, such as the treatment and distribution of water, new sewer systems, roads and airports, has also contributed 8% to the national GDP (Trading Economy, 2017). Indeed, the potential of the construction industry in Iraq has no limits. In addition to the need for millions of new houses and the renovation of existing buildings, significant infrastructure regeneration is also highly necessary. According to the PressReader (2013), in 2010 the industry expanded by 4.4%, to become worth US$ 5.6 billion, and was expected to grow annually by 6.18% until 2015. Moreover, the latest National Development Plan (2013-2017) calls for spending, totalling US$357 billion, on projects that concentrate on energy, building and services, agriculture, education, transport and communications (PWC, 2014). This huge investment into developing the country's infrastructure reflects the importance of the construction industry for Iraq.

Nevertheless, the sharp drop in oil prices since 2014 and the invasion by the group the Islamic State in Iraq and Syria (ISIS) claiming one third of Iraqi land in the same year, have both led to cuts in government spending on the construction sector, which has significantly and negatively impacted Iraq's construction industry. The report entitled "*Construction in Iraq - Key Trends and Opportunities to 2020*" published by Timetric (2016) shows that the industry contracted in real terms, by 19.0% in 2014 and 7.3% in 2015. Thus, as in other similar countries, the construction sector in Iraq is affected by the amount of government spending. Therefore, with the improvement of Iraq's fiscal position that allows the government to invest in reconstruction and a broad spectrum of infrastructure projects, it is expected that the industry in Iraq will expand by an annual average of 5.9% until at least 2021 (Business Monitor International, 2017).

However, among the greatest problems facing the current Iraqi government is that the national economy is mainly dependent on oil production, and continues to be dominated by SOEs who tend to be costly and low-quality producers. Therefore, any large-scale infrastructure investment will involve one or more of these inefficient SOEs (Bureau of Economic and Business Affairs, 2013; Gunter, 2013). In order to overcome these problems and further support its national economy, the Iraqi government has set up a plan to reform the economy through transforming from a centrally planned to a market economy. This plan was first proposed and applied by the Coalition Provisional Authority (CPA) through implementing a free market and free trade reforms and cutting governmental support for almost 192 SOEs with the aim of privatising them (Wing, 2013). However, all efforts to privatise SOEs have failed because of opposition from the Iraqi government, since the topic is politically sensitive. Nonetheless, they have been open to measures that would make state-owned companies more efficient and competitive through modernising these enterprises to operate commercially as competitive businesses, or employing Public Private Partnerships to attract private sector investment and expertise (Gunter, 2013; The Swedish International Development Cooperation Agency [Sida], 2014). Yet the poor performances of these organisations do not encourage investors to engage in partnerships with them (World Bank, 2004). Accordingly, the CPA has changed course and decided to reform and modernise SOEs, while maintaining employment by supporting their transition towards modern practices with the goal of becoming commercially viable entities that can attract foreign investment (Bureau of Economic and Business Affairs [BEBA], 2013; Wing, 2013; Sida, 2014). Subsequent Iraqi governments have tried to follow a similar path proposed by the CPA, and have thus taken several measures to encourage private sector and foreign investment through tax reforms, and the removal of restrictions on foreign investment including the suspension of all duties and tariffs on Foreign Investment (Moore & Parker, 2007).

These measures, along with substantial government investment focused on developing the country's infrastructure, have encouraged many local businessmen to enter the construction sector, and have attracted numerous foreign construction companies to invest in Iraq. Conversely, little progress has been made in the much-discussed reform of SOEs. Indeed, rather than the reforming them, the government has started to re-capitalise the companies and implemented protectionist policies that have allowed them to be maintained without the need to implement reform or take the difficult decisions needed to address their problems (Wing, 2013). Yet such a policy is arguably un-sustainable as the country moves forwards with its wider economic transformation. At some point, the reform of SOEs will need to be

implemented, and as such, conducting research into the potential avenues this reform could take would be important for all stakeholders.

2.4 The Performance of Iraqi State-Owned Enterprises and the Need for Change

According to the Iraqi Council of Prime Minister Office [IPMO] (2015), Iraq currently has 172 SOEs grouped under fourteen line ministries, as shown in Table 2-1, and employ over 600,000 Iraqis, many of whom are underutilised.

Table 2-1: Summary of SOEs and their affiliation with line Ministries

No	Ministry	Number of SOEs
1	Agriculture	7
2	Electricity	24
3	Finance	12
4	Health	2
5	Construction and Housing	8
6	Industry and Minerals (MIM)	71
7	Irrigation	3
8	Oil	18
9	Trade	7
10	Transport	10
11	Defence	6
12	Education	1
13	Communications	3
14	Culture	4
Total		172

Source: IPMO (2015)

Most Iraqi SOEs are large in size and have 5-15 medium to even small-sized branches distributed at different sites that are usually far from the main headquarters. Although these branches act as separate units in undertaking technical functions, they do not have commercial autonomy as they are not registered as legal entities. Thus, they are not permitted to sign contracts with customers or receive credit from banks (The World Bank, 2004). On account of the wars and years of international sanctions, most of these companies have suffered physical damage or under-investment, and thus become unviable economically (BEBA, 2013). Moreover, the new governments' endeavours to implement free trade reforms have led to the lifting of tariffs and put SOEs in direct competition with a flood of cheap and better quality imports. This has resulted in the loss of Iraq's SOE market share in several sectors, since their management systems, equipment, and production technology are obsolete (Wing, 2013).

However, in relation to the construction sector, Iraq currently has twelve SOEs or Quasi-Governmental Construction Companies (QGCCs). Under the Iraqi Law of State Companies

No.22 of 1997, which is still in force, IQGCCs have been defined as self-financed, state-owned economic units that independently operate based on the profit-loss principle (Iraqi Local Governance Law Library, 2018). Accordingly, they should not be seen as public service government bodies, but should be given greater autonomy in managing their business as profitable organisations (IPMO, 2015). These companies are clustered within three ministries, as shown in Table 2-2. Collectively, they employ 17,092 Iraqis (IPMO, 2015) and this is broken down by ministry in Table 2-2.

Table 2-2: Summary of IQGCCs and their affiliation with line ministries

No	Ministry	Number of QGCCs	Number of Employees
1	Construction and Housing	8	13700
2	Irrigation	3	2833
3	Transport	1	559
Total		12	17092

Source: IPMO (2015)

Similar to other Iraqi SOEs, IQGCCs, in fact, have not been immune to the effects of change in the Iraqi business environment and government actions to move toward an open market economy. Where after decades of domination over most publicly funded construction contracts, these companies face fierce competition from, in excess of, 3,500 local and international private firms. As a result, IQGCCs have struggled to both win contracts and generate profit (Wing, 2009). Consequently, the majority have incurred substantial financial losses and become an unsustainable burden on the national budget, as reported by the IPMO (2015) and revealed by successive annual reports of the Iraqi Federal Board of Supreme Audit [IFBSA] throughout the last decade. The resulting widespread public criticism of these companies, alongside concerns about their ongoing inability to improve their poor performance and low productivity (Al-Shikhely, 2007; Wing, 2013; IPMO, 2015) have led to calls for the Iraqi government to radically reform or even close these loss-making businesses. Particularly that the main objective of establishing these companies, as stipulated by Iraqi Law of State Companies No.22 of 1997, is to enhance the national economy through founding profitable economic units that are commercially viable.

Indeed, an exploratory study conducted by Al-Obaidi and Higham (2017), revealed that, although radical change has occurred in the Iraqi business environment, IQGCCs have continued to be managed in the same traditional functional operating system dominated by centralised control and bureaucratic procedures. This is a system that, as Graetz and Smith, (2009) profess, has become old and unable to cope with the challenges and continued changes

in the new business environment, such as those facing IQGCCs nowadays. This view is further supported by Banner and Gagné (1995) who assert that the slow-moving traditional bureaucratic system is seemingly more outdated than ever before. Since, by the time a major decision goes up for review and implementation through several management layers in the hierarchy, the organisation can be too late in responding to major environmental changes. Therefore, according to Hansford (2009), in order to survive and stay ahead of competition, nowadays, organisations seem to have little choice but to adapt to the relentless pace of changes in the business environment with the aim of responding to the changes in customers' requirements.

In fact, one of the main features in the new operational business environment is that customers have more and better choices, which make product or service providers less secure and more vulnerable to competition (Loudon & Carter, 2014). Successful organisations are those that have the ability to beat their competitors by being better, faster and cheaper (Lindfors, 2003; Loudon & Carter, 2014; Asquith, 2017). Lindfors (2003) declares that organisational efficiency is what is needed by construction companies to achieve these three features without trade-offs between them. Asquith (2017) also insists that construction companies can only respond to the need for all three success features through integrating organisational efficiency with technology. Moreover, Schmidt and Lyle (2010) emphasise that, in order to be better, faster and cheaper, companies have one way forward, which is through investment more effort, time and sometimes capital in improving their operational processes. Similarly, Asquith (2017) argues that optimising the core business process, through removing non-value added activities and bad waste, is key to improving efficiency. As such Asquith states that construction companies need to exploit the opportunity to streamline existing and embrace new processes where they can take advantage of information technology development to enhance the efficiency of their operational processes.

Thus as a response to increasing competition in the global market, awareness of business processes has been raised as the most important management approach in the new millennium (Levi, 2002; Kohlbacher, 2013; Trkman *et al*., 2015; Glavan & Vuksic, 2017). Today many reference standards, such as Capability Maturity Model Integration (CMMI), international best practice guidelines, such as the Project Management Body of Knowledge (PMBOK) and Projects in Controlled Environments two (Prince 2) and general guidelines for quality assurance, such as ISO 9001:2008, strongly advocate that organisations focus on managing their business processes in order to increase their efficiency, business activities and profit. By

focusing on the continuous improvement of operational business processes, organisations can enhance their overall performance and establish a robust competitive advantage through cost reduction, quality and efficiency enhancement, and by enabling responsiveness and adaptation to the internal and external organisational changes (Hammer, 2007a; McCormach, 2007; Vergidis *et al.*, 2012; vom Brocke & Rosemann, 2015; Khosravi, 2016). Accordingly, to improve their performance and gain a better competitive advantage in order to face dynamic changes in the market place, the Iraqi Quasi-Governmental Construction Companies (IQGCCs) need to adopt organisational change management and move away from traditional functional management systems to focus on improving and managing their business processes.

2.5 Organisational Change Management

The English Oxford Living Dictionary (2017) provides a simple and useful definition of change, which is "*an act or process through which something becomes different*". Change is an inevitable event for individuals, organisations and society (Lazar, 2012). Burnes (2009) considers change as an important ever-present feature of organisational life, whether at a strategic or operational level. Thus, there should not be any doubt to organisations of the significance of identifying where the business desires to be in the future, and what is required to change in order to get there. Accordingly, organisational change should not be seen as an event separated from organisational strategy, or vice versa (Todnem, 2005; Burnes, 2009).

In construction companies, changes can occur at two different levels: organisational and project (Erdogan *et al.*, 2005). During the development of a construction project, companies are usually confronted by many project changes. These changes can occur at any stage of project owing to several causes from different sources (Motawa *et al*., 2007; Dhimmar *et al.*, 2016). According to Arain and Low (2005), project changes involve any alteration to the contractual agreement provided by the contractors or owner. Similarly, Hwang and Low (2012) consider any additions, deletions or amendments to the project goal or scope as project changes. Changes in a project arise as a reaction to internal and external factors. Internal factors can include, but are not limited to: uncertainties about the project; the shortage of available resources; a change in management; design errors; inadequate pre-project planning; and so forth (Ibbs *et al.*, 2001; Erdogan *et al.*, 2005; Hwang *et al.*, 2009). While, external factors usually pertain to: natural unforeseeable circumstances; government interventions; disasters; the national economy or legal issues (Hwang & Low, 2012; Dhimmar *et al.*, 2016).

In addition to the project changes, construction companies are sometimes required to implement changes at the organisational level or, as is well known, organisational change. Organisational change can include a shift in organisation processes and system, structure, power distribution, culture, technology, and so forth (Cao *et al.*, 2004, Erdogan *et al.*, 2005). It is often brought about as a response to changes in the external surrounding business environment, such as changes in political control, the country's economic system, technology, globalisation, laws and regulators, competition, customer requirements, and so forth (Lanning, 2001; Jamali *et al.*, 2009; Hansford, 2009; Lazar, 2012; Bourne & Bourne, 2016). Yet it can also originate from sources inside the organisation itself; for example, management change, new market opportunities, deficiencies in the existing system, an increasingly diverse workforce, and so on (Lanning, 2001; Erdogan *et al.*, 2005; Morris, 2007; Chen *et al.*, 2016; Rizescu & Tileaga, 2016). Thus, the key aim of organisational change is to make changes to how business is performed in order to cope with the new requirements of the business environment and introduce improvements in an organisation's effectiveness and efficiency (Erdogan *et al.*, 2005; Lazar, 2012). This is significant, since without such changes, organisations would become stale and struggle to survive (Bourne & Bourne, 2016). Based on what have discussed throughout this chapter, the focus of this research lays within the scope of organisational change.

Moreover, whilst organisational changes can occur in different sizes and shapes, change management literature commonly distinguishes between two main types, which are first-order and second-order change (Levy & Merry, 1986; Porras & Robertson, 1992; Newman, 2000; Gareis, 2010; Burke, 2011; Cockrell *et al.*, 2012; Palmer *et al.*, 2017). The distinction between these two types is fundamentally based on the magnitude and the pace of change. More detail about these types of organisational change is presented in the following sub-sections.

2.5.1 First-Order Change

First-order changes are characterised as being less dramatic, evolutionary, often incremental and continuous in nature (Gareis, 2010). According to Palmer *et al.*, (2017) this type of change can comprise minor improvements and modifications in systems, functional processes, structures, or recognition and reward programmes, which do not essentially change the corporate strategy, core values, or identity. Changes under the first-order are implemented in the context of existing organisational paradigms with the aim of maintaining and developing the organisation (Gareis, 2010). In other words, the underlying assumptions of the operation, in this type of change, can continue unchanged with a reliance on increased efficiency through,

for instance, removing non-added value activities. First-order changes are almost designed in a paradoxical manner to support organisational continuity and order through reshaping perceptions, procedures, and behaviours, but in unnoticeable way (Cockrell *et al*., 2012). According to Yu (2011) incremental changes can be seen as a pattern of endless modification in the business processes or local practices, driven by organisational instability and daily contingencies. This type of change is graphically illustrated in Figure 2-3.

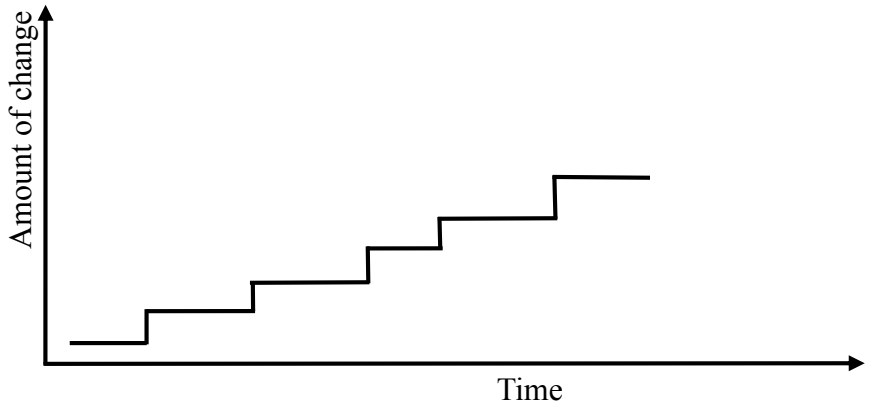


Figure 2-3: First-order / Incremental change

Luecke (2003) believes that a better approach to changing an organisational situation is through continually monitoring and responding to business environmental changes in small steps as an ongoing process. This view is also supported by Burnes (2009) who claims that the best way to implement change is through successive, limited and negotiated shifts. Bourne and Bourne (2016) also state that, although continuous, incremental change is less disruptive, lower risk and makes change habitual. However, it is also criticised as being slow, ineffective in responding to large-scale market changes and can lead to tunnel vision and missed opportunities (McAdam, 2003).

2.5.2 Second-Order Change

In contrast to incremental change, second-order changes are described as transformational, multi-dimensional, radical, and revolutionary, and usually involve a paradigmatic shift (Levy & Merry, 1986; Porras & Robertson, 1992; Gareis, 2010). They are discontinuous, deeply structural and fundamentally change the organisation's systems, core and culture (Palmer *et al*., 2017). Such changes mainly aim to produce step-change improvements in the organisational performance (Chen et al., 2016) and possibly lead to a transformation in the nature and identity of the organisation (Todnem, 2005; Burke, 2011).

According to Senior (2002), a transformational change is commonly triggered by major internal problems or a considerable external shock. It usually occurs when the current operational practices can no longer meet the demands of the external environment, and a fundamental change is needed in a short period of time to secure continuity in the business (Chen *et al*., 2016). Luecke (2003) also professes that transformational changes are onetime events involving large and widely separated initiatives and are directly followed by long periods of consolidation, as depicted in figure 2-4.

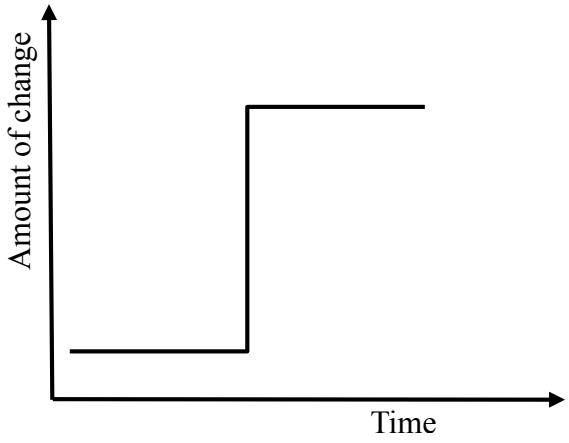


Figure 2-4: Second-order / Transformational change

Transformational change usually results from benchmarking or business process re-engineering exercises (Bourne & Bourne, 2016). Upholders of transformational, discontinuous organisational change claim that this sort of change is cost-effective since it does not foster a never-ending process of costly change initiatives effective in responding to the radical change in the business environment (Todnem, 2005). Nelson (2003, p.18) also declares that, "*change cannot be relied upon to occur at a steady state, rather there are periods of incremental change sandwiched between more violent periods of change which have contributed to the illusion of stability once assumed to be the case*". Moreover, it can lead to a significant improvement in an organisation's performance and competitive advantage in a short period.

However, this approach, as Bourne and Bourne (2016) argue, is risky and may lead to a disturbance in performance during the change phase. Burnes (2009) also argues that its benefits do not last. Whereas, Luecke (2003) claims that it allows defensive behaviour, complacency and routines that lead again to the production of organisational statuses where major reform is frequently required.

2.6 Reflection on the Change Management Needed for IQGCCs

Based on what has been discussed above, it is clear that an organisational change is what IQGCCs need to implement in order to enhance their overall performance, competitive advantage and survival opportunities. Yet, within organisational change there are two main types, namely continuous evolutionary and transformational revolutionary change, where each has strengths and weaknesses. As deduced from section 2.4, to cope with their new, highly competitive business environment and produce a significant improvement in their performance, IQGCCs need to make a fundamental change to their management systems through a move away from the current traditional ones to focus on business process views. Such change is considered transformational and revolutionary, involving a change to the core business processes of the companies, their structures, cultures, and systems. Yet, to avoid the weaknesses associated with transformational changes after implementation, IQGCCs are required to continue focusing on monitoring and optimising their processes, systems, people, and structures to align with the internal and external business requirements (Luecke, 2003; Burnes, 2009). In other words, IQGCCs need to adopt both types of organisational change but sequentially. They first need to implement a transformational organisational change as a response to the radical change that has occurred in their business environment, and then to go through a continuous improvement step change to ensure they can cope with the daily and continuous changes in the internal and external business climate. Thus, the main aim of this research is to develop a transformational organisational framework which acts as a roadmap for producing a step change improvement in IQGCCs' performances through streamlining and continuously improving their operational processes and, ultimately, institute the process' principles in these companies.

2.7 Summary

This chapter provided an overview of Iraq and discussed the main changes that arose in the Iraqi context, namely within the political and economic systems as a result of the radical change that occurred in 2003. The impact of this change in the Iraqi business environment, the construction industry, and state-owned enterprises was also explored. The performance of Iraqi SOEs in general, and IQGCCs in particular, was briefly reviewed. Accordingly, a step change in the performance of these companies has been recognised as urgently needed to secure their survival. This can be achieved by adopting a transformational organisational change that aims to shift IQGCCs away from the current traditional functional bureaucratic adopted system to adopt a process thinking approach in managing their businesses.

Chapter Three – The Role of Business Process and Organisational Management

3.1 Introduction

As discussed in the previous chapter, in today's dynamic business environment, organisations need to focus on their business processes in order to succeed and stay ahead of the competition. Accordingly, this chapter aims to define the business process (BP), introducing its roles, elements, types and importance in improving the organisation's efficiency and overall performance. The chapter also discusses the concept of business process orientation in the management of organisations in general along with the key approaches that can be employed to promote the implementation of the business process and techniques widely used in mapping it. The need to adopt process thinking in managing the construction industry, and key research and initiatives that have attempted to enhance process thinking in the construction industry are also discussed. Finally, different organisational structures are analysed and the role of information technology in supporting business process is presented.

3.2 Background and Emergence of Business Process Thinking

Before the emergence of 'Business Process', organisations were generally managed using the basic principles of Adam Smith, namely specialisation. Smith, in his seminal 1776 text, the *Wealth of Nations*, proposed the dividing of work into small and simple specialist tasks executed separately through functional areas or departments (Shtub & Karni, 2010; Sungau *et al.*, 2013). This fundamental concept became the basic methodology for organising corporate businesses for nearly two hundred years (McCormack & Johnson, 2001) with other seminal thinkers, such as Henry Ford (the grandfather of mass production), simply advancing Smith's core message that specialisation creates efficiency and economies of scale that can be used to maximise profit (Sandmo, 2014; Ucak, 2015). Under this model, organisations depend on hierarchical structures and functional silos to manage, monitor and examine their businesses. Furthermore, it provides organisations with a means of allocating and distributing their resources, such as capital, personnel, and equipment, among and within their functional units. Moreover, this approach allows the organisation's management to clearly present the roles and responsibilities of the organisation's employees, in terms of who is in charge and when, to lower personnel (Shtub & Karni, 2010). To a certain extent, this can be attributed to linking the organisations' business performance directly to capital investment in personnel and equipment

(Gulledge & Sommer, 2002), in addition to the lack of communication and transport facilities available at the time (Al-Ajam, 2008). Therefore, skilled managers at various levels within the organisation were particularly important in managing the information flow and coordinating the various functional activities. Thus, better focus and coordination of the organisation's resources led to enhanced business profitability (McCormack & Johnson, 2001; Al-Ajam, 2008).

An organisational chart, shown in Figure 3-1, is usually considered the best visual way to describe the hierarchical functional organisation. The chart demonstrates how individuals have been grouped together in order to operate efficiently, and it shows the line of command and reporting relationships. However, it does not reflect the customer and the what, why and how of the business (Teece, 2010). According to Sungau *et al.* (2013), the traditional functional approach may facilitate local optimisation, but often negatively affects the overall performance. This is because each functional unit in the organisation develops its own objectives and means of performing its businesses, regardless of the overall organisational goals and objectives. Thus, the different goals, interests and backgrounds of the people within these functional units usually create barriers between them, which leads to problems in communication and inefficient coordination in handovers between functions (Shtub & Karni, 2010). As a result, functional organisations appear slow to respond to any change in their business environment, such as changes in markets, customer needs, or technology (Johnson *et al.*, 2015). For instance, customers who need special products, information or services that are not a part of the repetitive business may have difficulty in getting what they want because they may need to deal with several functional departments. The inflexibility and slow response to the changes in a business climate could cause an organisation to lose its competitive advantage and thus fail.

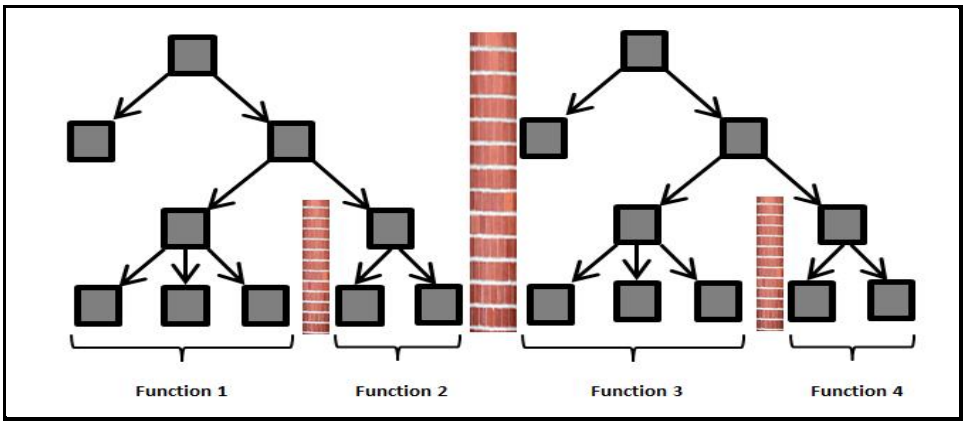


Figure 3-1: Functional Organisation
Source: McCormack and Johnson (2001)

Rising globalisation, the liberalisation of international trade and rapid technological development over the last three decades have subjected the business environment to fast dynamic change (Shtub & Karni, 2010; Ivanko, 2013). Consequently, in order to survive and stay ahead of the competition, organisations have needed to change dynamically to cope with their business environment. Under such circumstances, organisations have realised that the results of adopting restructuring as a methodology to change and improve their performance are limited (Bronzo *et al.*, 2013). Since such methodology concentrates on examining the organisation's internal administration without considering the inter and intra-operational side of its specific business processes, or the internal supporting value that these processes offer to other aspects of the business and their value to external customers (Teece, 2010). Moreover, coping with a dynamic and changing business environment has required organisations to restructure on an almost constant basis, which, as Holtham (1994) argues, results in significant inefficiency and high insecurity amongst the workforce, along with increasing staff retraining costs. Ultimately, this results in a lower quality output and less client satisfaction.

It is necessary to consider all the restrictions evident in the restructuring hierarchy approach, alongside the success achieved by many industrial organisations in the 1980s that, instead, focused on improving the business process to enhance performance. It can be argued the latter approach would be far more suitable for IQGCCs' looking to enhance productivity, improve efficiency and prepare themselves for the increased competition that the post-conflict Iraqi economy brings. However, since 1980s, the focus on business processes to improve performance and efficiency has gained the attention of many researchers and theorists in the business world. Michael Porter (1985), for instance, is often cited as a leading proponent of business process modification, having devised the seminal theory of the 'value chain' as a systematic way to manage organisations horizontally based on the core business process. Similarly, W. Edwards Deming (1986) introduced the 'Deming Flow Diagram', which portrayed a business as a series of horizontal continuous processes from the supplier to the customer that can be measured and optimised continually with the aim of increasing both customer value and profitability. Michael Hammer (1993) presented the 're-engineering' concept as a strategy to overcome the aforementioned problematic issues evident in the old organisational functional model by making a radical organisational change to produce a new organisational model. This new model should be built on the fundamental processes of the business from a cross-functional perspective and supported by information and organisational technology.

Accordingly, this new way of looking at organisations has placed relatively little to no emphasis on the organisational structures when defining business functions, activities and their logical sequence within the processes (McCormack *et al.*, 2009). Instead, the focus has been oriented toward adding value, efficiency and continuous processes improvement. Generally, these innovative approaches have shifted the organisations' emphasis from:

1) Upward and task oriented (how to meet the functional managers' expectations) to outward and customer oriented (how to address customer needs more astutely, and capturing value from providing new products and services) (Bangemann, 2005);
2) Power and authority in managing a business, to focus on the activities that bring value to the customer from its perspective (Teece, 2010);
3) Vertical and functional silo operations that is built on large capital investment in equipment and employees, to horizontal cross-functional processes based on investment in customer relationships, strong branding, partnerships, building quality, loyalty and trust (Cecere & Chase, 2013);
4) Adopting organisational structure hierarchy as a methodology to use core business process supported by information technology for accountability and resource allocation (McCormack & Rauseo, 2005).

For the Construction Industry (CI) in the UK, these shifts in the way of managing business largely concur with the recommendations suggested by Latham (1994), Egan (1998, 2002), Wolstenholme (2009) and more recently Farmer (2016). Indeed, over the last two centuries, a traditional functional structure has been the dominated approach for conducting works in the Construction Industry. In this type of structure, each party engaged in a project performs its own tasks without much concern of how it suits into the tasks of other involved parties. Moreover, it can lead to creating communication barriers between the different project parties along with fostering a conflict and adversarial culture between them. The focus on the customer, under this approach, becomes clouded and fuzzy, in addition to undermining many things in relating to enhancing the entire life cycle of the product (Amaratunga *et al*., 2002). Accordingly, the hereinabove reports have collectively come to advocate that, to improve its performance, the UK construction industry must move away from traditional functional thinking and embrace process thinking underpinned by production and not economic theory (Koskela & Ballard, 2006). However, the focus of this study is on the operational process of the main contractor rather than the whole process of a construction project.

3.3 Business Process (BP)

Prior to embarking on the benefit that can be obtained by adopting the process thinking in managing organisations and the approaches and techniques used to implement its principles, it is important to grasp the concept of business process and explain its characteristics, elements and types in a generic context.

3.3.1 Business Process (BP) Definition and Elements

The word 'process' is still ambiguous, and might be interpreted as different things by different people based on the field, market, and function in which they are working (Palmberg, 2009; Lee *et al.*, 2010). Consequently, different definitions have originated from different areas of study. Yet, there are particular business process definitions from some authors, such as Hammer and Champy (1993) and Davenport (1993), that are cited within almost every other reference. A summary of the business process definitions, as derived from the existing literature, is provided in Table 3-1.

Table 3-1: Business process definitions

Author(S)	Business process definitions
Davenport (1993, p.5)	A business process is "*the chain of activities whose final aim is the production of a specific output for a particular customer or market. It represents a revolutionary change in perspective: it amounts to turning the organisation on its head or at least on its side*". A process is a "*specific ordering of work activities across time and space, with a beginning and an end, clearly defined inputs and outputs and a structure for action*".
Johanson *et al*. (1993, p.57)	A business process is "*a set of linked activities that takes an input and it transforms it to create an output. It should add value to the input and create an output that is more useful and effective to the recipient*".
Hammer & Champy (1993, p.35)	A process is "*a collection of activities that takes one or more kinds of inputs and creates an output that is of value to the customer. A business process has a goal and is affected by events occurring in the external world or in other processes*".
Keen (1997, p.17)	"*The process-as-workflow definition excludes many processes that have no clear inputs, flows and outputs*".
Soliman (1998, p.814)	A business process "*may be considered as a complex network of activities connected together*".
Agerfalk (1999, p.4)	A business process "*consists of activities ordered in a structured way with the purpose of providing valuable results to the customer*".
Volkner & Werners (2000, p.634)	A business process is "*a sequence of states, which result from the execution of activities in organisations to reach a certain objective*".
Dustdar (2005, p.275)	A business process consists of a "*sequence of activities. It has distinct inputs and outputs and serves a meaningful purpose within an organisation or between organisations*".
Havey (2005, p.3)	A process is "*step−by−step rules specific to the resolution of a business problem*".
Harrington (2006, p. xxii)	A business process is "*a series of interconnected activities that takes an input, adds value to it, and produces output. It's how organisations work their day-to-day routines*".
Isaksson (2006, p.634)	*A process is "a network of activities that, by the use of resources, repeatedly converts an input to an output for stakeholders".*

Petter (2009, p.243)	A process is a "*specific ordering of work activities across time and space, where activities occur both in sequence and in parallel using one or more resources to create a result of value for the receiver in the organisation or the client outside the organisation*".
Palmberg (2009, p.207)	A business process is a "*horizontal sequence of activities that transforms an input (need) to an output (result) to meet the needs of customers or stakeholders*".
Looy *et al*. (2011, p.1124)	A business process is a "*repeatable set of coherent activities, triggered by a business event and performed by people and/or machines, within or among organisations, for jointly realising business goals and in favour of internal and/or external customers*".
Joseph and Mohapatra (2014, p.42)	A business process is "*a related group of steps or activities in which people use information and other resources to create value for internal or external customers. Business process consists of steps related in time and place, have a beginning and an end, and have inputs and outputs*".

The analysis of the business process definitions presented in Table 3-1 indicates that most of the authors adopt very similar concepts and elements to describe a business process. These include:

1) **The span of time and space**: Davenport (1993), Petter (2009) and Joseph and Mohapatra (2014) explain that a business process has predictable start and end points, and this may occur within one or across several organisations;
2) **Inputs and outputs:** most of the authors emphasise that a process starts with an input and ends with an output as a result of that process.
3) **A set or group of clearly defined and interrelated activities:** the majority of the authors (Johanson *et al*., 1993; Hammer & Champy, 1993; Agerfalk, 1999; Dustdar, 2005; Harrington, 2006; Palmberg, 2009) contend that each business process involves a number of interrelated activities. These activities should be clearly defined and arranged in a linear, logical sequence or flow;
4) **Horizontal or across functional:** some authors clearly declare that one of the characteristics of a process is to be horizontal and across-functional (Davenport, 1993; Harrington, 2006; Palmberg, 2009). Davenport (1993) explains this idea by turning the organisation on its side;
5) **Having a purpose or value for customers**: the main purpose of the business process is to produce a specific service or product that has value for the customers, stakeholders and other internal individuals. This takes place through transforming an input across an organisation's functions to create an output meeting the customer's expectations (Johanson *et al*., 1993; Hammer & Champy, 1993; Agerfalk, 1999; Dustdar, 2005; Harrington, 2006; Palmberg, 2009; Petter, 2009; Joseph & Mohapatra, 2014);

6) **Using resources**: Isaksson (2006), Looy (2011), Peter (2009) and Joseph and Mohapatra (2014) mention the importance of using resources, such as people, equipment and information, in performing process activities in order to generate a result of value for the internal and external customers;
7) **Repeatability**: Isaksson (2006) and Looy *et al*. (2011) stress that the activities of a process are repeatable. The repeated process feature allows it to be measured and improved over time.

Such elements give a business process the transformative feature that is originally built on an industrial philosophy proposed in the seminal work of Michael Porter (1985). Porter advanced the theory that an organisation has a chain of activities that add value to an input (raw material) in order to transform it into an output (product) that meets the needs of their customers. Anything not directly adding value in this process can, therefore, be eliminated, reduced or outsourced to reduce cost. Figure 3-2, as developed by Palmberg (2009), depicts the transformative feature of a process with its main elements.

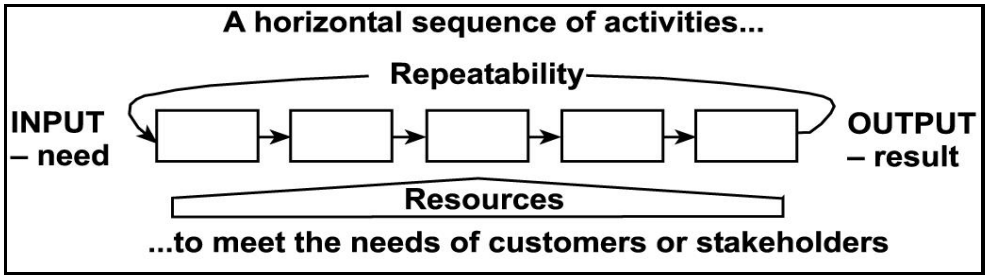


Figure 3-2: Business process elements

Source: Palmberg (2009)

Although the transformative view of business processes is the most powerful view (Lind, 2006), it is not the only possible view. Keen (1997), for example, argues that business processes may not have clearly defined inputs, flows or outputs, but they are a coordinated network of inter-related commitments between the contracted parties. Keen, in fact, rejects the transformative/product view and proposes the communicative and coordinative view as an alternative. According to this view, business processes begin with customer needs and end when the commitment from both sides (supplier and customer) is fulfilled. It arises through requests, offers, agreements and commitments, and other communicative acts (Taylor & Van Every, 2000). In other words, business processes are performed by virtue of established agreements and commitments. Essentially, this view is based on the idea '*when you communicate, you also act*' (Lind, 2006, p.63). It can be clearer in a field, such as service delivery, where the

interpretations and exchange of unstructured information are the dominant aspects between actors (Looy *et al.*, 2011). However, Lind (2006) argues that this view of business processes tends to overemphasise coordination and communication on account of the transformative and material actions that should be the main concern of any organisation seeking success.

Havey (2006) describes a process as a travelling journey that needs to be planned first. A process, according to Havey (2006), has logical sequences of steps within a specific predetermined date for the completion of each step. Failure to complete any step requires the cancellation of subsequent steps and reporting of the problem to the customer. If the customer does not wish to continue, the process will be stopped. Otherwise, it needs to be started again from the first step. In comparison, Volkner and Werner (2000) explicate a process from the system-theoretical viewpoint where a process refers to a succession of changing states of a system. They believe that the basis of a business process is a flow, and its design is based on a system of activities. Therefore, any change in the execution of these activities will lead to a change in the state of a business process.

Accordingly, it can be concluded that, although most of the business process definitions use rather similar concepts and elements to describe business processes, there is still no consensus amongst authors on these concepts or even the ways of conceiving business processes. Indeed, the criticisms regarding these definitions have generally focused on two points: 1) the definitions have not highlighted the business components; and 2) they have not adequately distinguished between manufacturing and production processes (Lind, 1996; Siegel 2008; Palmberg, 2009; Al-Tuwaijari, 2013).

Nevertheless, the transformative view tends to deal with tangible things, such as those found in industrial and construction sectors. This view of looking at business process has been successfully applied in manufacturing field and was advocated in Egan's (1998) seminal review of UK construction to improve its performance (Cooper *et al.*, 2005). Therefore, there is a need to adopt such an approach to bring about change in IQGCCs in order to improve their performance. However, the communicative view, represented by collaborative activities, still needs to be considered a part of a business process. Based on this, a business process can be defined as a set or group of interrelated, repeated and clearly defined tasks and collaborative activities arranged in a horizontal and logical sequence in order to transform a definable input into a predictable output that has value to the customers by using a set of resources and information within a specific span of time and space.

3.3.2 Why is Process Institutionalisation Important?

Processes define the way activities are organised, managed, measured, supported and improved to reach a goal (Doroodchi & Roudaki, 2009). In other words, they determine the activities and tasks required to achieve a certain goal and the way in which people should act, interact, and react to perform these activities and tasks in an efficient manner (Amaratunga *et al.*, 2005). For instance, there is a process for 'going to school', a process for 'bidding', a process for 'hiring a new employee', and so on. Disciplined processes provide repeated and consistent patterns of behaviour in which people, whether individuals or groups, follow a structured way of performing tasks in the same (or similar) way time after time. Thus, they allow organisations to confidently re-apply successful practices and avoid those that do not add value or can lead to failure (Jeong *et al.*, 2004). Having clear and well-defined processes also helps senior management to establish a set of key performance indices to control and improve the processes and thereby enhance the entire organisation's performance.

Processes within an organisation include groups of people. Therefore, in order to accomplish a disciplined process that is efficiently shared by the entire organisation, the process should be well and widely established (institutionalised) in the organisation, otherwise, every employee would follow his or her own manner of carrying out a task (Al-ajam, 2008), and this might lead to a conflicting work environment and stress on projects. Conversely, when the processes are common and well institutionalised, staff can conduct their activities smoothly, efficiently and in harmony with each other. Moreover, the process itself becomes transparent since it purely becomes the standard way of carrying out business activities (Jeong *et al.*, 2004; Wu & Ying, 2004). Thus, processes can help individuals to employ their specialist skills more effectively through allowing them to focus on what they are doing without having to constantly think of how things should be done. Moreover, they help to ensure that what is performed is aligned with the business's needs and the conditions of the environment in which it operates (CMMI Institute Partner, 2015).

3.3.3 Business Process Types

Business process can be divided into three functional types, namely: 1) core or value-adding processes; 2) support or value-enabling processes; and 3) management processes, as shown in Figure 3-3 (Amaratunga *et al.*, 2005; Palmberg, 2009; Looy *et al.*, 2011).

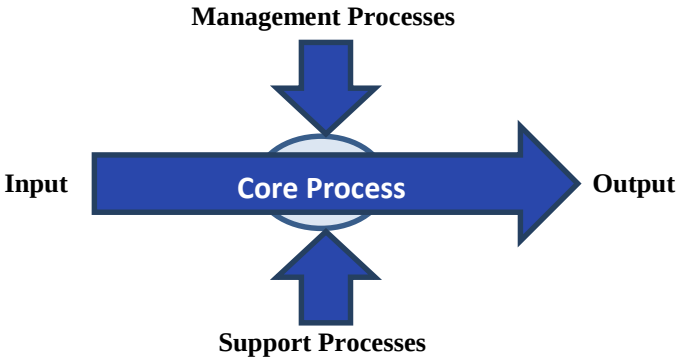


Figure 3-3: Types of processes

Source: Construct-IT (2001)

1) Core business process

A core business process, or operational process, can be seen as the most important type of corporate business processes. It is defined as a "*key activity or cluster of activities which must be performed in an exemplary manner to ensure a firm's continued competitiveness because it adds primary value to an output*" (Business Dictionary, 2017). According to Levi (2002), it is the process that gives the uniqueness to an enterprise in its marketplace. Core business processes run across the organisational functions to get work done through directly adding value to the products or services in a way that external customers understand (Amaratunga *et al.*, 2005). These processes are usually undertaken as a response to customer needs, hence, they fundamentally focus on carrying out the key activities and tasks that have interactions with the customers and generate profit (Das *et al.*, 2012). Therefore, an organisation's capability to perform core business processes correctly and efficiently can directly lead to an improvement in the overall performance of this organisations and an enhancement of its customers' satisfaction (Das *et al.*, 2012).

The core business processes that were firstly described by Michael Porter in 1985 as a 'value chain' have since become the main focus subject for many of the management theories, such as: Total quality Management (TQM); Business Process Reengineering (BPR); Lean; and Business Process Management (BPM) (Armistead & Machin, 1997; Johnson & McCormack, 2011; Shrinjar & Trkman, 2013). Porter (1985), Davenport (1993) and Brown (2008) declare that these processes generally comprise the:

1) Logistical process;
2) Manufacturing process;
3) Marketing process;
4) Order management process;

5) Delivery process.

Hua (2013) explains that, in applying the aforementioned operational processes to the construction industry, the core construction processes would include:

1) Construction and manufacture process;
2) Design process;
3) Project definition process;
4) Business analysis and facilities management process.

By reflecting this on construction companies under traditional procurement, it can be concluded that the core business process for such companies would comprise:

1) Bidding process;
2) Pre-construction planning process;
3) Construction process and;
4) Closeout and termination process.

El-Gohary and El-Diraby (2010) state that, in the context of the construction sector, core business processes are deemed as product-specific. The primary products generated by these processes, are generally represented by projects or their deliverables, such as design, planning, or constructed facility. Consequently, core processes are mostly described as technical processes and highly dependent upon the characteristics and type of project. Therefore, such processes could be quite variable from project to another. However, Sir John Egan (1998) in his report '*Rethinking Construction*' rejects the common belief that construction is different to other industries because every product is unique. He emphasises that many sectors in construction, such as building and roads, have repeated products that can be continuously improved; however, the most important thing is that the construction process is itself repeated in its essentials from project to project. The report shows that approximately 80% of the building sector inputs are repeated and the same processes are usually repeated in a lot of maintenance and repair work. Rather concentrating on the results and success of their individual projects, Erdogan *et al.* (2005) argue that construction companies should focus on the processes that lead to achieve such success, and work on optimising and repeating them consistently to secure an increase in the quality of the end product and productivity. Accordingly, identifying a set of common high-level operational processes that can be applied in a consistent and repeatable form would be extremely important for IGQCCs to enhance their efficiency, effectiveness and productivity.

2) Support or value-enabling processes

Support processes facilitate the company's performance by supporting certain activities of those in core processes (Das *et al*., 2012). They mainly aim to satisfy the internal customers through providing a suitable work environment, which may directly or indirectly contribute by adding value to the clients (Amaratunga *et al*., 2005); therefore, these are also known as enabling processes (Looy, 2011). According to Hua (2013), the supporting processes of an organisation typically comprise: IT development, corporate accounting, human resource management, and facilities management.

El-Gohary and El-Diraby (2010) clarify that, in construction, these processes usually include the administration (accounting, legal, etc.), information management, communication, and human resource management. They also explain that supporting processes are not only necessary to enable core processes, but are significant in supporting management processes. Although supporting processes are not directly linked to the primary project objective, they are vital in facilitating project success, and hence they cannot be ignored. These processes are characterised as highly repetitive across the project life span and can be found both in projects, such as the process of project documentation and in a base organisation, such as administrative processes (Marcheridis, 2008).

3) **Management processes**

Management processes are defined by Bititci *et al*. (2011, p.857) as "*organisational routines that underpin the dynamic capabilities of an organisation by controlling and reconfiguring the organisation's resource base, thus impacting on the organisation's ability to attain, sustain or enhance performance in the long term*". Looy *et al*. (2011) explain that these processes primarily concentrate on managing the core and support processes and controlling all activities in the company. They are typically linked to the strategy and policy setting and the overall organisational planning. According to Das *et al*. (2012), the purpose of management processes is to generate the underlying capabilities, which are vital to the core and enabler processes (Das *et al*., 2012). They also stress that these processes are not generally tied to a specific business transaction. In an organisation, management processes may involve: setting the organisational direction; strategic decision making; managing strategy; managing performance; resource planning and allocation; managing change; partner recruitment processes, etc. (Bititci *et al*., 2011). Similar to support processes, management processes can also be found at the project and organisational level. Management processes at the project level aim to manage the project

lifecycle; while at the organisational level, they are designed to manage the whole organisation through goals, strategic plans, and policies (Marcheridis, 2008).

In addition to the functional categorisation, processes are also classified into several levels or a hierarchy. Wolf (2003) argues that organisations might have one or a few value chains (core business processes). Each value chain is typically decomposed into several business processes, normally from three to seven high-level processes (functions) (e.g. logistical process, marketing processes). Based on the nature of these processes, each can have a few to dozens of fewer level processes, as shown in Figure 3-4. The later processes usually decompose into a number of sub-processes and, depending on the nature of every sub-process, may involve sub-sub-processes and even sub-sub-sub processes to any arbitrary depth. However, at the lowest level process hierarchy, activities can be set; activities, according to Wolf (2003), represent the smallest sub-process that can be described.

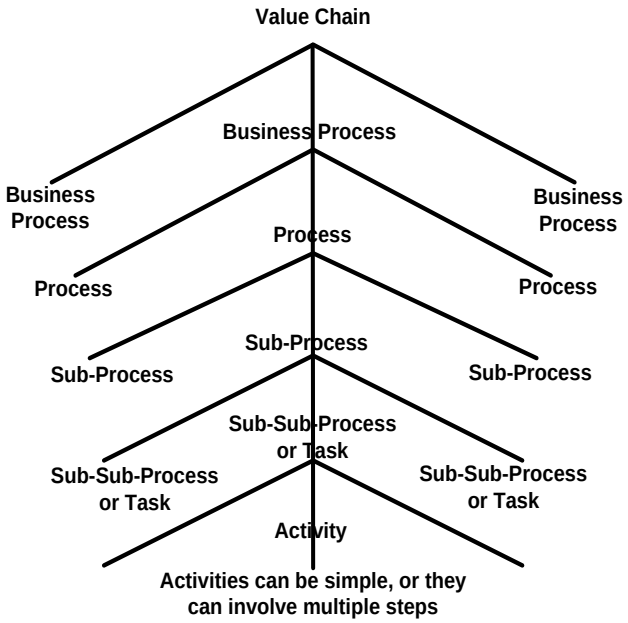


Figure 3-4: The BPTrends process hierarchy

Source: Wolf (2003)

3.4 Business Process Orientation's Benefits, Concept and Implementation Approaches

The emergence of the internet, rapid IT development during the last two decades, and the liberalisation of international trade have all led to an increase in global competition and diverse customer needs (Shtub & Karni, 2010; Ivanko, 2013; Sivusuo & Takala, 2016). The question of how some organisations have managed to survive and grow under such an environment has attracted wide interest amongst management practitioners and researchers. Seminal researchers,

such as Porter (1985), Hammer and Champy (1993), Harmon (2003), McCormack (2007), and more recently vom Brocke and Rosemann (2015) and Trkman *et al*. (2015) argue that organisations can survive, succeed and enhance their overall performance through focusing on improving their business processes (BP). Focusing on business process means viewing and managing the organisation as a combination of highly integrated processes, not as collected functional areas (Hammer & Stanton, 1999; Sever, 2007) and being oriented towards processes, customers and outcomes, as opposed to hierarchies (McCormack, 2007; Skrinjar & Trkman, 2013; Nadarajah & Kadir, 2016). Such an organisation, according to Kohlbacher (2010), is also usually known as a 'process thinking/view organisation', 'process centered organisation', 'process focused organisation', 'process enterprise'; and 'horizontal organisation'. However, this way of thinking or viewing of an organisation has been generally described by McCormack and Johnson (2001) as a Business Process Orientation or BPO.

Organisations worldwide have reached the conclusion that processes are at the core of today's and tomorrow's competition (Willaert *et al.,* 2007) and their effectiveness and efficiency mainly depend on the harmony and accuracy of the flow of their core business processes (Zaheer *et al.,* 2010). Adopting a business process view has indeed become a mandatory requirement for any organisation striving to excel (Looy *et al*., 2011). Baloh *et al*. (2008) and Skrinjar *et al*. (2008) consider a focus on BP as a best practice management paradigm correlated to organisational performance results. It enables organisations to think and manage their businesses collectively as one unit with the aim of enhancing their efficiency in meeting customer needs and expectations (Nadarajah & Kadir, 2016). Increasing evidence from empirical studies show the strategic value of adopting a process view. Lockamy and McCormack (2004) found that companies that establish strong guidance for their business processes can reach higher levels of organisational performance and have a better work environment based on much more cooperation and less conflict. Meanwhile, Kohlbacher (2009) stated that BPO is positively associated with customer satisfaction, product quality, delivery speed and time-to-market speed. Furthermore, Bronzo *et al*. (2013) stress that BPO can have a significant role in value creation and in improving companies' performances; they state that the concept can be translated as a set of 'core capabilities' that may drive a company to a superior organisational performance and a sustainable competitive advantage. A study conducted by Ladeira *et al.* (2016) on 469 Brazilian companies from different industrial and service sectors, revealed that business process orientation positively impacts over the organisational performance.

McCormack and Johnson (2001, p.21) define the BPO of an organisation "*as the level at which an organisation pays attention to its relevant (core) processes (end-to-end view across the borders of departments, organisations, countries, etc.)*". In other words, a BPO is about how to organise the organisational activities, jobs, structure, measures, rewards and resources around the horizontal process in a way that increases the overall performance and ensures value to customers. Similarly, DeToro and McCabe (1997) argue that moving towards process management requires not just the employment of a set of process techniques and tools, but changing the way of thinking. Willaert *et al*. (2007) also explain that a company transformation toward business operation management does not only affect the logical relationships of the business processes, but also is required to assign new and different roles and responsibilities for the managers and employees of the company. This shift in the employees' roles would affect the organisational structure and force the company to change it in a way that makes it more suitable for the new roles. Reviewing the literature reveals that there is a consensus amongst researchers regarding the main dimensions of a business process oriented organisation (McCormack, 2007; Skrinjar *et al.*, 2010; Kohlbacher & Reijers, 2013; Nadarajah & Kadir, 2016). These dimensions, as identified by McCormack (2007) and empirically proved by Skrinjar *et al.* (2010), include:

1) A process view of the business thorough documentation, and an understanding from the top to the bottom and from the beginning to the end of a process within the organisation;
2) Process jobs, which define the tasks and roles are required to operate and perform processes;
3) Process owner, a process owner should be assigned for each end-to-end process to be responsible for its improvement and success;
4) Structures that match these processes;
5) Management and measurement systems that direct and assess these processes;
6) Customer focused, empowerment and continuous improvement oriented values and beliefs (culture) that are embodied in all components.

However, conducting change management to move away from the traditional functional management system to implement process principles into an organisation's operation is still seen as a big challenge (Skrinjar & Trkman, 2013). In fact, over the last four decades, several approaches have been suggested to implement change management and increase BPO within organisations. Yet, the most popular approaches in this field are; Total Quality Management (TQM), Business Process Reengineering (BPR), Benchmarking, Lean and finally Business

Process Management (BPM) (Armistead & Machine, 1997; Zhang & Cao, 2002; Rohloff, 2009; Bronzo *et al.*, 2013; Trkman *et al*., 2015). These approaches are presented in the following subsections.

3.4.1 Total Quality Management TQM

To counter the intense competition of Japanese companies, by the beginning of 1980s Western companies realised the importance of changing their traditional way of doing business and adopted a more flexible organisational approach concentrating on continuous improvement; as such, they began to introduce their own quality initiatives (Yang, 2012). These new initiatives in quality control and management were developed in the 1980s and 1990s to form what became known later as Total Quality Management (TQM) (von Rosing *et al.*, 2015a). Inmon and Linstedt (2015 p.161) define TQM as a "*management philosophy that consists of organisation-wide efforts to install and make permanent a climate in which an organisation continuously improves its ability to deliver high-quality products and services to customer*". Managing quality throughout all the operational stages, from planning and design through self-inspection to continual process monitoring for improvement opportunities, is considered a core concept in TQM (Radnor, 2010)

The term TQM, according to Khanam *et al.* (2013), includes three important semantics: Total indicates that quality is the responsibility of all individuals engaged in the processes; Quality means meeting customer requirements exactly as they expect; Management implies the commitment and support of senior executives to quality principles. Siddiqui and Rahman (2007) describe TQM as a customer-centric approach involving a set of management policies that aim to deliver quality, expand the business and its profits by continuously controlling and improving processes, deploying policy and managing people. Thus, processes, systems, people and management are the four key change components promoted by TQM (Erdogan *et al.*, 2005). Consequently, organisations that adopt TQM as a tool to improve their performance are indeed engaged in, inter alia, incrementally improving operations, increasing personnel participants, redesigning and optimising processes, implementing competitive benchmarking, assessing outcomes constantly and establishing strong relationships with suppliers (Singh & Smith, 2004).

TQM aims to improve an organisation's competitiveness and performance without making major changes; therefore, it is deemed an inefficient tool in obtaining radical results (Erdogan *et al.*, 2005). However, TQM can also improve productivity through avoiding rework, reducing

waste and customer complaints (Siddiqui & Rahman, 2007). Moreover, it seeks to enhance morale by involving employees in the decision-making process and improving their work environment quality. However, the implementation of TQM takes time and effort besides the cost required for training people on TQM principles can be quite high (Toomanian & Mansourian, 2009). Erdogan *et al.* (2005) also claim that most TQM initiatives have failed in achieving solutions beyond organising documentation and information transfer. Accordingly, TQM does not seems to be particularly efficient tool in implementing organisational changes in the dynamic business environment of today.

As concluded from Chapter Two, a step change improvement in IQGCCs' performance can be achieved through focusing on improving their core business processes. However, meeting this objective requires of these organisations to adopt a transformational organisational change in their management systems to move away from the current traditional management system dominated by hierarchy, centralised control and bureaucracy to employ process thinking. TQM, as discussed hereinabove, is an evolutionary and lengthy process improvement tool that aims to improve an organisation performance incrementally without making notable or big changes into its current organisational management system. In this context, TQM is not the appropriate approach required to produce an urgent step change improvement in IQGCCs' performance.

3.4.2 Business Process Reengineering (BPR)

Historically, organisations depended on dividing work into small repeatable tasks to ensure their success. This method of work might have facilitated local optimisation, but often negatively affected the overall performance (Sungau *et al.,* 2013). By the 1990s many American company owners recognised that their traditional thinking around doing business was no longer able to achieve success, and that they had to make a radical change in their organisations to be more flexible, responsive and customer-oriented. Introduced by Dr. Michael Hammer in the 1990s, Business Process Reengineering (BPR) was one of the most important techniques to make step change improvements in organisations' performances (von Rosing *et al.,* 2015a). BPR is based on making a one-off big radical change in an organisation's core business processes and redesigning the organisation's other elements, such as organisational structures, IT, employees' roles and responsibilities, performance measurement and award systems in line with, and supporting, the operational processes (Hesson *et al.,* 2007). Therefore, BPR should be considered a strategic, cross-functional change that cannot succeed without integrating other aspects of management (Weerakkody *et al.,* 2011).

Hammer and Champy (1993, p.32) define BPR as a "*fundamental rethinking and radical redesign of core business process to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service and speed*". Thus, the focal point of the BPR methodology is to redesign and evaluate the operational processes from a customer-centric perspective. It concentrates on the organisation's core competencies and processes to catch up with, or maintain, the best practices required to secure success and stay ahead of the competition (Weerakkody *et al.*, 2011). Yet, rather than adjusting the existing processes, structures or technology, BPR seeks to build organisations from scratch based on a simple question, "*If you were to create the organisation today, how would it look like?*" (Rizescu & Tileaga, 2016, p.143). In other words, BPR change needs to be driven by vision rather than through an understanding of the current situation (Weerakkody *et al.*, 2011).

According to Rizescu and Tileaga (2016), the BPR technique can be implemented to improve the entire organisation or a single department. Basically, a large portion of BPR effort is oriented towards one or more goals, such as the elimination of non-added value activities to streamline the process and strengthening cooperation between people engaged in performing the processes. During the 1990s, the BPR technique experienced wide acceptance among the practitioner community and was quickly adopted by thousands of organisations worldwide. Grint and Willcocks (1995) stated that, between 1992 and 1994, 55-70% of American and British organisations had used BPR to improve their performance. Several companies, such as General Motors Corporation, Procter and Gamble Corporation, American Airlines, Leicestershire Royal Infirmary, have achieved remarkable successes through reducing costs and time in addition to increasing efficiency, quality, and stakeholder returns on investment (Blyth, 1998; Hesson *et al.*, 2007; Francis, 2008; Ward & Uhl, 2012).

Nevertheless, studies revealed that 70% of BPR projects have failed to achieve their desired objectives (McAdam, 2000; Grover *et al.*, 2000; Dennis *et al.*, 2003; Cao *et al.*, 2003). BPR failure has been justified for many reasons. For example, BPR pays major attention to improving processes efficiency and technology, whereas, it disregards the human dimension as a critical factor for success (Erdogan *et al.*, 2005); benefits that would be obtained from a BPR initiative have been overestimated, while the risks involved in implementing it have been underestimated (Ward & Uhl, 2012); and taking a radical approach has caused the overlook of important organisational issues, such as the commitment of middle managers to the change (Hesson *et al.*, 2007; Weerakkody *et al.*, 2011). BPR is also criticised for being very risky and cost ineffective, over-trusting in technology solutions, and one-off initiatives with limited

strategy alignments and long-term perspectives (Erdogan *et al.*, 2005; Francis, 2008; Eugene & Judipat, 2015). Consequently, from the beginning of the 2000s the interest in applying BPR as a tool for organisational change has faded (MacIntosh, 2003). For all these weaknesses and risks associated with BPR, it is not recommended to employ this approach to bring about the transformational change required for IQGCCs.

3.4.3 Lean

Lean, which is one of the most famous business performance improvement approaches over the last decade (Peters, 2010; Jadhav *et al.*, 2014), has been adopted by various sectors under different names, such as 'Lean Production' (LP), 'Lean Thinking' (LT), 'Lean Manufacturing' (LM), and 'Lean Construction' (LC) (Putnik & Putnik, 2012). The term Lean was coined by Womack and Jones (1990, 1996) and cited by Radnor (2010), and Bortolotti *et al.* (2015); yet its main principles have roots back to the 'Toyota Production System' (TPS) that led Toyota to become the one of the largest automobile makers worldwide (Aziz & Hafez, 2013). It essentially means making businesses as simple to understand, execute and manage as possible (Ansah *et al.*, 2016). According to Putnik and Putnik (2012, p.250) the key concept of Lean could be simply described by "*doing more with less*". Ansah *et al.* (2016) profess that the key underlying idea of Lean is based on steady identifying and cutting out waste (muda) in processes along with focusing on things that add value to the customer. Lean is indeed seen as a radical alternative to the conventional approach of mass production and batching concepts to obtain the highest level of efficiency, quality, speed and cost reduction (Holweg, 2007; Rashid & Ahmad, 2013). It seeks to enhance business performance through streamlining, and continuously improving the operational processes. A Lean approach concentrates on increasing business value and removing the waste (Peters, 2010) by eliminating all non-added value activities and improving the overall value of the organisation's workflow (Chual *et al.*, 2010). Waste in this model means everything that does not add value, or, in other words, everything that the customer is not willing to pay for, such as overproduction, waiting, transport, over processing and defects (Melton, 2005).

The five core principles that Lean rests on are based on an assumption that organisations consist of a collection of processes rather than a number of functional silo departments (Womack & Jones, 1996; Radnor, 2010; Thirkell & Ashman, 2014). These principles, as listed by Radnor (2010, p.19) and Ansah (2016, p.1609), are:

1) **Value specification**: precisely identify the value desired by the customer. It is also important to specify who the customers are and how to meet their requirements;
2) **Value stream identification**: clearly identify all the steps in the processes (value stream) for each product, which accurately provide what the customer values and eliminate the wasted steps that do not create value to the customer;
3) **Continuous flow of product**: take actions that ensure a continuous flow in the value stream. This can be through standardising core processes around best practice to allow them to flow smoothly and effectively, so that they will free up time for creativity and innovation;
4) **Pull**: this means to produce only what the customer wants just in time. In other words, the value stream should be mainly triggered by the customer's demand; and
5) **Perfection**: always strive towards perfection through delivering what the customer wants and only wishes to pay for. This requires a continuous removal of waste in operational processes.

Although all five principles are significant to the implementation of Lean, the first element 'value specification' has been argued to be the most critical. According to Womack and Jones (1996), applying Lean techniques without correctly specifying the value required by the customer can easily lead to providing the wrong product or service. Moreover, Womack and Jones (1996, p.141) refer to three critical business activities that need to be looked at in specifying the value stream, namely "*product definition, information management and physical transformation*".

Indeed, in order to make their manufacturing higher value, more flexible and more productive, over the last decade several developing countries, such as Brazil, China, and India, have sought to adopt Lean production as an alternative approach to traditional low-cost, labour-intensive production (Panizzolo *et al.,* 2012). Moreover, despite the generation of Lean in the automobile manufacturing industry, many researchers, including Womack and Jones (1996), Koskela (2000), Laureani *et al.* (2010), Jadhav *et al.* (2014), Thirkell and Ashman (2014) and Ansah and Sorooshian (2017), have stressed that its principles are universal and can be applied by any industry. Accordingly, in the last two decades, numerous sectors outside of manufacturing, such as construction, healthcare, education, and services, have attempted to apply the Lean approach (Baines *et al.,* 2006; Esain *et al*., 2008, Aziz & Hafez, 2013; Thirkell & Ashman, 2014; Bortolotti *et al.,* 2015; Ansah *et al.,* 2016). Thus, as one of the new management philosophies,

Lean thinking has been introduced to improve the performance of the UK construction industry since the early 1990s, under the term Lean construction (Aziz & Hafez, 2013). Similar to the Lean production, the key objective of Lean construction is to better meet customer needs while using less of everything.

Nevertheless, according to Kadi (2010) comparatively few companies outside Japan have successfully implemented Lean methodology. It is alleged that 90%, or more, of UK organisations have failed to successfully implement Lean (Bicheno, 2009; Camagu, 2010; Bhasin, 2012). A survey conducted by Mohanty *et al.* (2007) reveals that Western organisations, particularly the US automotive industry, are striving hard to adopt the Toyota Production System with little success. Although their initial efforts reflect acceptable improvements in the organisation's performance, the majority have not been capable of sustaining a consistent performance nor achieving further enhancement. Similarly, the Indian industry, as insisted by Singh *et al*. (2010), is still facing difficulties in implementing Lean principles, and the full benefits from Lean have not yet been observed. Such failure in implementation can be attributed to several factors; however, many studies show that the key Lean implementation challenges relates to the lack of understanding and communication of Lean's philosophy and techniques, the failure of organisations to adopt a Lean culture, and insufficient commitment from top management (Bhasin & Burcher, 2006; Bhasin, 2012; Shang & Pheng, 2014; Thirkell & Ashman, 2014). Furthermore, Bhasin (2015) argues that implementing Lean principles requires a favourable external climate. According to Bhasin, implementing lean is not possible, for example, in places where infrastructure, such as transportation infrastructure, energy supply, and internet and communication facilities, are poor, or when the society has an insufficient work culture. Similarly, Davies (2015) emphasises that the implementation of Lean should only be embarked upon when there is sufficient confidence about the organisation's supply chain.

In terms of Iraqi QGCCs' external climate, despite 15 years of political change in Iraq and the removal of economic sanctions, the security situation remains unstable and not much has been achieved in the reconstruction of Iraq's infrastructure. Terrorist attacks can happen anywhere and at any time resulting in the cutting off of supply chain lines and the disruption of works. Infrastructure in various sectors is still suffering from severe shortages. For example, electricity is unstable and there is a wide gap that reaches 8,000 MW between what is demanded and that which is provided (Rasheed, 2016); moreover, the banking sector is also mistrusted and

underdeveloped where modern services, such as online banking and electronic money transfers, are almost non-existent (Zulal, 2012); finally, transportation nets and communication system are still poor. From their establishment until now, IQGCCs, have never experienced any internal management system beyond the traditional bureaucratic hierarchical system. It is, therefore, expected that an understanding of Lean philosophy and the successful application of its principles and tools would be very difficult if not impossible. Considering the aforementioned challenges and requirements of a Lean implementation, it seems that in light of their internal and external climates, IQGCCs are not yet ready to implement Lean principles.

3.4.4 Benchmarking

Benchmarking is an effectiveness business management improvement technique that has been widely used to improve companies' performances in several areas (Tian & Ketsaraporn, 2012). The term 'benchmark' has originally been borrowed from land survey terminology, which refers to a standard mark utilised as a reference point for levelling other points. In the management field, benchmarking is defined by Kelessidis (2000, p.3) as "*the process of improving performance by continuously identifying, understanding, and adapting outstanding practices and processes found inside and outside an organization (company, public organization, university, college, etc.)*". It is an approach to measure and improve an organisation's performance through comparing its practices with the best practice recognised in its industry (Poskey, 2017). Thus, by systematically identifying and studying the highest standards of excellence for processes or products, as well as the best business practices and winning strategies of others, an organisation can accelerate its own progress to reach those standards and best practice and thereby improve its performance (Radnor, 2010; Tian & Ketsaraporn, 2012). Yet, according to Kelessidis (2000), benchmarking should be driven by the needs of customers' and the internal organisation.

The process of implementing a benchmark comprises five phases. These phases, as described by Monczka *et al.* (2016), include:

1) **Planning**: aims to determine which process to benchmark, the benchmark target, and the data required;
2) **Analysis**: includes collecting and analysing data to identify the performance gap between the source company and the recipients;
3) **Integration**: comprises all the preparations taken by the recipient for implementing improvement actions;

4) **Action**: involves carrying out and implementing improvement actions; and
5) **Maturity**: includes the continuous monitoring of process performance and drawing lessons for continuous improvement.

Moreover, the concept of benchmarking, according to Radnor (2010), can embrace different types. These mainly include:

1) Process benchmarking that concentrates on the work processes and operating systems, such as bidding processes, procurement processes, recruitment processes, etc.;
2) Performance benchmarking assesses the competitive position of a company in comparison to other competitors. This can be achieved through comparing product prices, quality, delivery time, and so forth;
3) Strategic benchmarking looks at winning and the most successful strategies that have enabled firms to become very successful and lead their marketplace.

According to Nayab (2010), the implementation of benchmarking would open organisations' minds to new ideas and place them in a continuous improvement mode that opens the doors to beat competitors. Other researchers, such as Kelessidis (2000), Stapenhurst (2009), Attiany (2014) and Ruddy (2017), profess that organisations can experience several benefits in adopting benchmarking, including increased productivity, improved competitive advantage, and reduced production cost and operation cycle time. Simultaneously, it has been criticised as being time, cost and effort consuming and particularly difficult to achieve best practices (Elmuti & Kathawala, 1997; Kelessidis, 2000; Radnor, 2010; Ruddy, 2017). However, Hesson *et al.* (2007) assert that transformational change in an organisation usually emerges from the implementation of world-class practices through benchmarking. In fact, several studies show that benchmarking external best practice will result in producing a step change or radical improvement in performance of the recipient organisation (Povey, 1998; McAdam, 2003; Jones & Kaluarachchi, 2008; Tian & Ketsaraporn, 2012; Bourne & Bourne, 2016; Sirotkina *et al*., 2018). This would lead to conclude that producing a step change improvement in IQGCCs' performance will require at the first place capturing and understanding the current good practice operational processes implemented by large construction companies during delivering their projects under traditional procurement to be a benchmark for facilitating the analysis and improvement the current practices of IQGCCs.

3.4.5 Business Process Management (BPM)

Business Process Management (BPM) is one of those approaches that have been proposed to implement business process principles into an organisation's operation (Skrinjar & Trkman, 2013). However, according to Rohloff (2009), this approach incorporates many aspects of other aforementioned approaches (TQM, BPR, Lean); therefore, it has been seen as the most comprehensive, well-known and widely used approach in practice (Rohloff, 2009; Bronzo *et al.*, 2013; Trkman *et al*., 2015). vom Brocke and Rosemann (2015, p.ix) declare that BPM is "*a comprehensive consolidation of disciplines sharing the belief that a process-centred approach leads to substantial improvements in both [the] performance and compliance of a system*". Indeed, the significance of BPM in practice is increasing. Over the last few years, BPM is ranked as one of the top priorities in most surveys (Skrinjar & Trkman, 2013). Several reports published by leading analyst firms, such as Gartner and Forrester, have revealed that BPM has been one of the major concerns of top management over the past few years and will remain so in the upcoming years (Das *et al.*, 2012). Many chief information officers have classified business process improvement as being of super significance in improving an organisation's performance (Johnson & Levien, 2011) and have listed BPM at the top of their business priorities every year between 2007 and 2010 (Gartner, 2010).

BPM aims at strategically evaluating the processes undertaken by a company and continually improving the effectiveness and efficiency of operational processes with a view to cutting costs, increasing quality and improving productivity and competitive advantage over other companies within the same business field (Meidan *et al.*, 2017). Indeed, BPM has the potential to impact on organisational performance by improving cycle-time, reducing cost, increasing revenue, enhancing customer satisfaction and supporting any other metric deemed significant for generating value (Vuksic *et al*., 2013). According to Bai and Sarkis (2013) BPM can accelerate organisational processes, cut used resources, boost productivity and efficiency and improve competitiveness for organisations. It concentrates on the development of more flexible organisations that coordinate their staff based on their capabilities (Attaran, 2004).

Lee *et al*. (2007, p.592) define BPM as "*a general term for the services and tools that support explicit process management (such as process analysis, definition, execution, monitoring and administration) including support for human and application-level interaction*". Skrinjar and Trkman (2013, p.48) consider it the structured, analytical, cross-functional, continuous improvement of a company's operations. Whilst, according to Vuksic *et al*. (2013, p.614), BPM refers to "*aligning processes with the organisation's strategic goals, designing and*

implementing process architectures". From the perspective of vom Brocke *et al*. (2014, p.189), BPM is a "*discipline combining business and IT perspectives with the ultimate goal of improving an organisation's business operation"*. Defining BPM as a discipline distinguishes it from a methodology. A discipline, according to Rock and Dwyer (2016), is a form of training that generates a pattern of behaviour, which is 'process-thinking', in this case. In contrast, a methodology is a particular approach comprising principles or rules which structure specific procedures that are required to grasp various situations or solve different problems within the range of a certain discipline. Lean and Six Sigma are examples of the continuous process improvement methodologies.

The aforementioned definitions show that BPM is a combination of techniques and tools supported by information technology and other resources (such as, people, software programs and regulations) in order to optimise operational processes in line with organisational strategic goals. In their definitions above, most authors stress the restriction of BPM to operational process (core business processes). However, organisations still need to be aware of all types of their processes in order to create a fully integrated system. Definitions also reflect that BPM has a repeated lifecycle involving various phases in support of operational processes rather than a project such as BPR. These phases, as Dumas *et al.* (2013) describe, include: Process identification; Process discovery; Process analysis; Process redesign; Process implementation; and Process monitoring and controlling (depicted in Figure 3-5). Brief descriptions of each of these phases, defined by Dumas *et al.* (2013), are provided below.

1) **Process identification**: aims at presenting problems with the business, identifying processes relevant to the problems, delimiting the scope of these processes and how they are related to each other. The outcome of this phase is either a new process architecture that provides a holistic view of the processes in an organisation and their relationships, in case this an organisation that has not engaged in a BPM initiative before, or an updated process architecture if the organisation has already engaged.
2) **Process discovery**: in this phase, the current status of the relevant processes is documented and mapped using one or more 'as-is' process mapping techniques.
3) **Process analysis**: during this phase problematic points and challenges inherent in the current as-is processes are identified and documented. The outcome of process analysis is a collection of issues that need to be addressed through redesigning or improving processes.

4) **Process redesign**: the key aim of this phase is to identify the improvements and changes required on the processes in order to resolve the problematic points discovered in the previous phase and thus allow the organisation to achieve its set performance objectives.

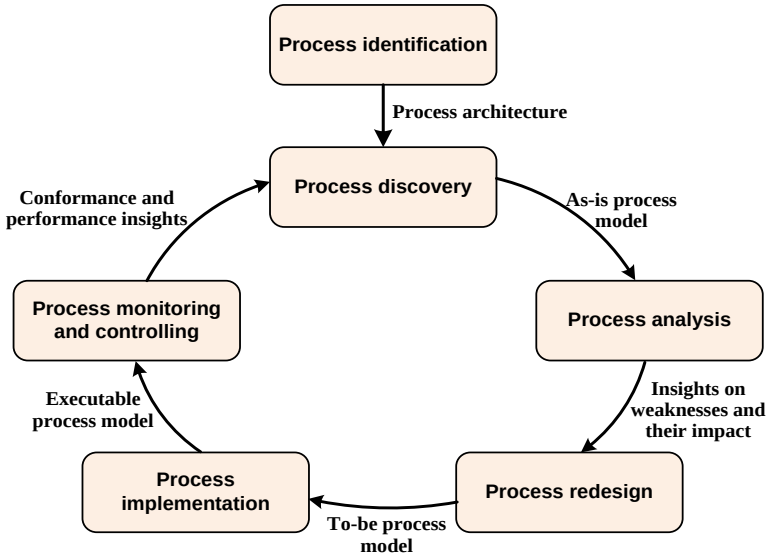


Figure 3-5: BPM lifecycle

Source: Dumas *et al.* (2013)

5) **Process implementation**: the goal of this phase is to implement the changes required to move the organisation's way of work from the current practices ('as-is' processes) to 'to be' processes. This would also include the development and deployment of IT systems required to enhance the 'to-be' processes.
6) **Process monitoring and controlling**: in this phase, the data related to the performance of the redesigned processes is collected and analysed to determine the performance of the new processes with respect to their performance measures and performance objectives. The phase also includes undertaking corrective actions to address any bottlenecks, deviations or errors identified in the intended behaviour. As a result, new problems in the business may arise in relation to the same or other processes, which call for a repetition of the cycle on a continuous basis.

Thus, BPM is concerned with how to manage business processes on an ongoing and continuous basis, and not just with the one-off big radical change, such as BPR advocates (Armistead & Machin, 1997). Moreover, it is based on the idea of building on and transferring for what already exists and not starting all over from scratch, as proposed by BPR (Krafzig *et al.*, 2005). Hence, BPM presents an organisation with significantly less risk, and more importantly, less up front

expenditure (Swetaanand, 2011). It enables the business process to be streamlined and for redundancies to be eliminated through improving business agility, flexibility, visualisation, control and accountability. It seems that the principles of BPM are similar to the aims of Lean production in creating value to customers, reducing costs, and continuous improving operational processes (Lee *et al*., 2007). However, it goes beyond the initial, cost-centred focus presented by Lean to service managers in recognising new revenue opportunities and non-monetary value-creation options, such as trusted, sustainable, and flexible processes (vom Brocke *et al*., 2014).

Consequently, many organisations and leading companies worldwide have adopted this approach in order to increase their effectiveness and efficiency, and deliver business value on an ongoing basis and thereby enhance their performance and competitive advantage (Krichmer, 2011; Tang *et al.,* 2012; vom Brocke *et al*., 2014; Meidan *et al.,* 2017). The widespread acceptance of the BPM, both in practice and academia, and its ability to accommodate deferent process improvement techniques together at the same time alongside its other features, all have encouraged the researcher into adopting it as a platform to improve the performance of Iraqi Quasi-Governmental Construction Companies (IQGCCs). However, the scope of this study will be limited to examining and analysing the current operational processes adopted by these companies and proposing a new redesigned operational process, which aims to streamline the current practice and thereby enhance the overall performance. In other words, the research will be limited to the first four phases of BPM. Moreover, Benchmarking technique will be used as the main tool within the scope of BPM to promote the transformational organisational change required to make a step change improvement in IQGCCs' performance.

3.5 Documentation and Mapping 'As Is' Processes

A prerequisite for carrying out any dramatic improvement in organisational performance based on BPM is to have a clear understanding of the organisation's core business processes. This could be achieved through mapping and examining the current 'as-is' operational processes (Abeysinghe & Urand, 1999; Weske, 2012; Dumas *et al.*, 2013). Process mapping is defined by Marrelli (2005, p.40) as, "*the step-by-step description of the actions taken by workers as they use a specific set of inputs to produce a defined set of outputs*". It is a simple tool used to facilitate an understanding of the activities and tasks involved in a business process by means of displaying these activities and their inputs, sequences, performers or actions taken by the performers and related outputs in a visual format (Stolzer *et al*., 2011). Malega and Bialkova

(2012) consider process mapping as the most significant activity in a process analysis and evaluation. It is an intermediary step to process improvement (Klotz, 2008). Macheridis and Nilsson (2006) argue that identifying and visualising processes and the interactions between them are critically important, especially for multi-project organisations, such as construction companies. This is because it represents the starting point to classify, organise and improve project processes in order to shape the management of these organisations in an effective way.

Construction companies may seek to document and map existing processes in order to improve their business process performance in a dynamic market. Such an exercise enables construction companies to concentrate more on value creation, waste elimination and thus improve efficiency (Lee *et al*., 2007). This meaning is also given by Taylor and Randall (2007) when they describe process mapping as a powerful method of carefully identifying and analysing problems, and promoting solutions within the different organisational layers through involving and enabling individuals from various departments and levels to work together as a team. From an extensive review of the literature regarding process mapping, it has been observed that the documentation and mapping of an organisation's current process can help improve a business in numerous ways. These may include:

1) Facilitating communication through developing a common understanding of existing states and helping employees view their work from a process standpoint (Phillips & Simmonds, 2013);
2) Allowing organisations to manage materials, information and people in a more integrated way (Lindfors, 2003) by identifying the responsibility for the processes (Malega & Biakova, 2012);
3) Attracting new customers to help facilitate the formation of partnerships with others in its market sector, or the implementation of IT to its core business (Al-Atawi, 2005);
4) Identifying and understanding the existing problems in current practices can help prevent repeating these problems in the new process (Morris & Dyson, 2012);
5) Providing a performance baseline, which facilitates the measurement of the value of the new process (Morris & Dyson, 2012);
6) Giving a clear picture of where little value is added to the process, and identifying areas where value-adding activities may be introduced, thus eliminating non-adding value activities and maximising those that add value to the process (Lindfors, 2003);
7) Helping in identifying where and when the bottlenecks and constraints can occur in a process (Phillips & Simmonds, 2013).

Moreover, construction companies may need to document their existing process in order to make work practices more transparent (Wright & Yu, 1998). This is particularly important for companies to be able to effectively adapt with various diverging practices in the management of construction projects. Developing technology and the need to use IT systems may also trigger the documentation of existing organisational processes. The application of such systems can be very difficult or even impossible without a business process map showing the key information and communication channels. Identically, the installation of any across function software, such as enterprise resource planning software, requires intimate knowledge of business functions and their processes in order to achieve the ultimate objective for which it has been set up (Conger, 2011).

However, in order to map their business processes, companies need techniques to support them. Several methods and techniques have been developed over the last decades to facilitate mapping and modelling processes and the structuring of information, such as Activity Decomposition Models (ADM), Data Flow Diagram (DFD), Integration DEFintion Modelling (IDEF), and Business Process Model and Notation (BPMN). Every process technique has its strengths and weaknesses (Aguilar-Saven, 2004). To highlight these strengths and weaknesses, the following subsections are dedicated to discussing the most common and widely utilised process modelling techniques in practice.

3.5.1 Activity Decomposition Models

As mentioned in section 3.3.3, a process can be hierarchically classified into several levels. Activity decomposition models is one of the process mapping techniques that is used to structure business processes hierarchically in a logical way presenting successive levels of detail (Lewis, 2016). It illuminates the breakdown of the processes performed by an organisation, functional area, or project to help identify all these processes and their underlying sub-processes and activities, and thus understand the relationships and dependencies between them (Kupersmith *et al.*, 2017). Therefore, the model starts with a process at the highest level of the hierarchy, which is usually known as a parent. The parent process is then decomposed into a number of sub-processes or as sometimes called children, or threaded processes, which in turn are also decomposed into further lower level producing activities, or known as elementary business processes (Fatolahi *et al.*, 2007; Al-ajam, 2008). An example of the activity decomposition model is depicted in Figure 3-6.

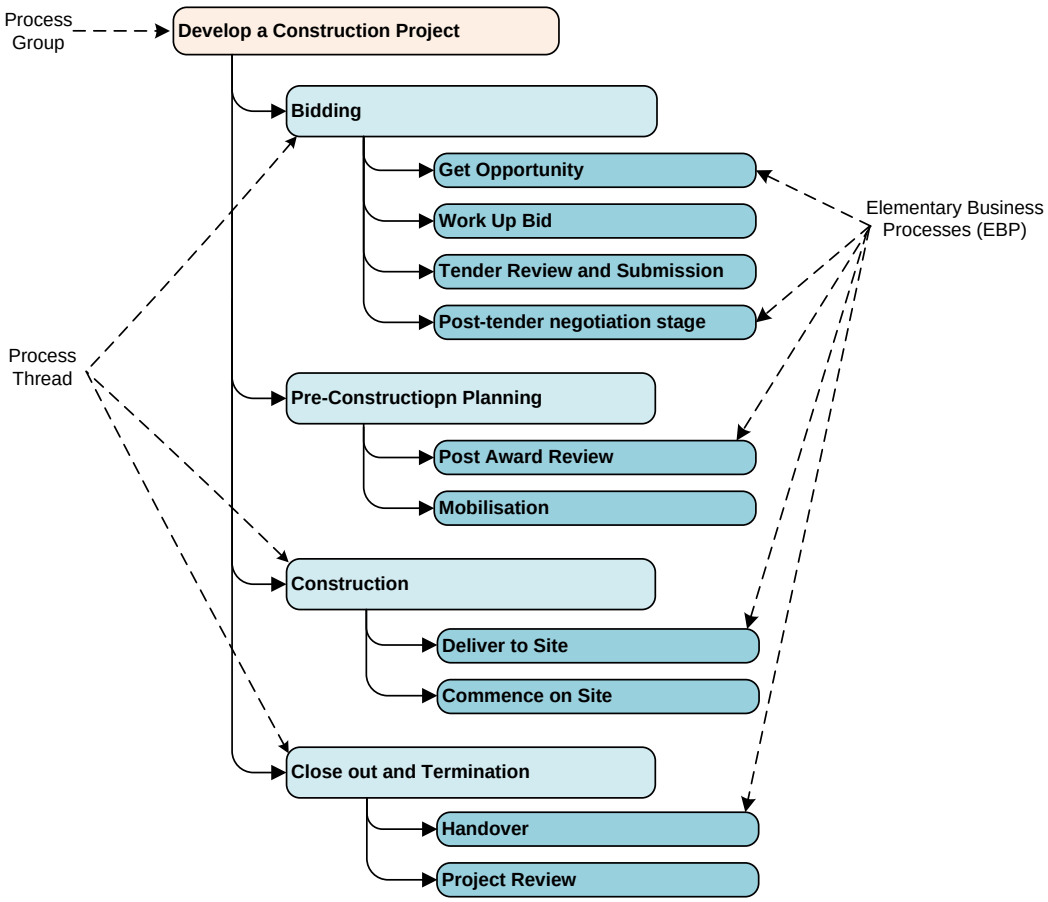


Figure 3-6: Example of an Activity Decomposition Model

Nevertheless, the activity decomposition model has been criticised as lacking time notation, unable to reflect the roles and responsibilities of people involved in performing processes, or the inputs and outputs and constraints imposed on processes (Al-ajam, 2008). Moreover, it does not provide a solution or sequence of processes, but rather gives stakeholders a snapshot of the big picture of their organisation's business processes and how they are related to each other (Kupersmith *et al.*, 2017). Thus, it can be concluded that the activity decomposition model is a useful technique that can be employed to identify processes at the early stages of process modelling, such as the brainstorming stage.

3.5.2 Data Flow Diagram (DFD)

The Data Flow Diagram (DFD) is a highly effective process modelling technique that is usually utilised in the preliminary stages of systems or programmes analysis to facilitate an understanding of the existing systems/programmes and to redesign them as required (Donald & LeVie, 2000; Chen, 2009). It visually shows the information flow and transformation through a system (Dixit & Kumar, 2007). DFD graphically presents the types of data that can be input into and taken from a process, where such data would come from and go to, and where it should

be stored (Al-Ahbabi, 2014). To achieve this, DFD employs four graphical symbols, namely: process, information flow, data store and finally external entity, as demonstrated in Figure 3-7 (Dennis *et al*., 2014).

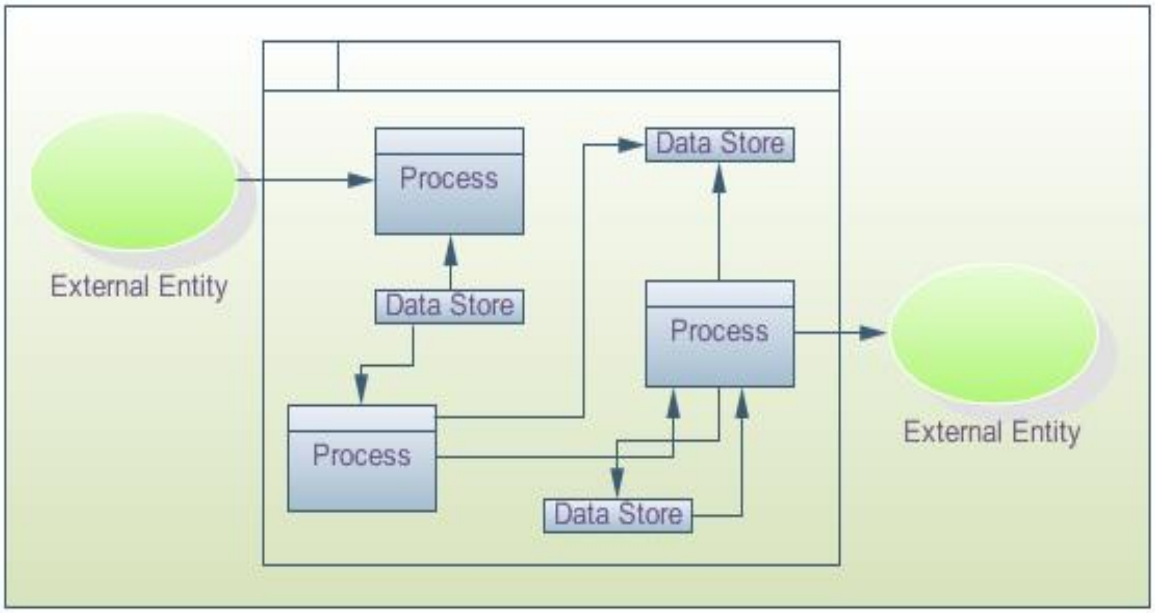


Figure 3-7: Concept of Data Flow Diagramming (DFD)

Source: Edraw (2017)

According to Ibrahim and Yen (2010, p.98):

1) A process can be an activity or a function that is executed for a specific business reason;
2) An information flow is a single piece of data or a logical collection of several pieces of information that move between the entities, processes and data stores;
3) A data store is a collection of data that is stored in some way for the purpose of using them later within processes;
4) An external entity is the source or destination of information. It can be a person, organisation, or system that is external to the system but interacts with it.

Moreover, DFD supports the decomposition feature to depict the details of processes and information flows. The context diagram represents the highest-level of DFD of an organisational system, which illustrates the overall system as a single process with the external entities that interact with the system and the major data that moves from and into external entities (Dennis *et al*., 2014). Yet, to obtain more detail regarding the system requirements, the context diagram can be decomposed into a lower-level diagram, which is known level 0 DFD, and each process on level 0 DFD can be further decomposed into the next lower-level diagram,

and thus for each process on every subsequent lower level, until capturing the information and details needed (Ibrahim & Yen, 2010).

However, using DFDs for analysing large systems can be cumbersome, time-consuming, and difficult to translate and read by programmers (Donald & LeVie, 2000). Additionally, it does not provide information on the sequence of operating the processes nor on who would be responsible for executing those processes (Chen, 2009). Therefore, it can be seen as an information modelling tool rather than a process or procedure modelling technique.

3.5.3 Integration DEFinition Function Modelling (IDEFØ)

IDEFØ is a modelling technique used mainly in generating 'functional maps' in process mapping (Ekung *et al.*, 2014). It was developed from the well-established graphical language of Structured Analysis and Design Technique (SADT), which was originally presented by Ross in 1977. IDEFØ offers a valuable structured graphical framework for describing and enhancing business processes since it is developed to model the decisions, activities and processes of an organisation or system (Oakland, 2014). According to Laguna and Marklund (2013) an effective IDEFØ model can work as a communication and analysis system tool at the same time. As a communication tool, IDEFØ helps in providing simplified graphical devices that promote domain expert involvement and facilitate consensus decision-making. As an analysis tool, IDEFØ is deemed as a useful technique in organising the scope of an analysis, particularly for a functional analysis, in a highly structured way. It helps system modellers to; identify what a process does; what functions are needed to be performed in that process; what is required to execute those functions; what means should be used to perform them; and what are the right and wrong aspects in the current system. According to Tangkawarow and Waworuntu (2016), IDEFØ is considered a powerful tool for documenting and analysing the current state (as-is model) of an organisation system's functions and their mechanisms as well as for identifying the desired requirements and functions for the future system (to-be model). Therefore, it is not surprising to find such a tool widely used in business process re-engineering (BPR) efforts, business process improvement (BPI) projects and the integration of process information. In particular, it is supported by a range of software programmes, such as Microsoft Viso, RFFlow and Edraw Max, that facilitate its application (Oakland, 2014).

A typical diagram of IDEFØ modelling language consists of a number of boxes that represent functions in the system and arrows that describe the relations between those functions. Figure 3-8 below shows a typical function in the IDEFØ diagram.

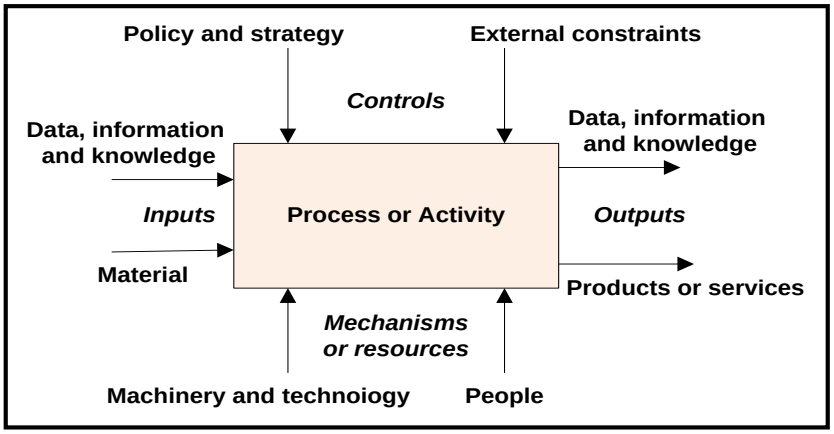


Figure 3-8: IDEFØ model language

Source: Oakland (2014)

According to Aouad *et al.* (2013) and Oakland (2014):

1) A function can be an activity, process, action or transformation that is usually identified by a verb or verb phrase to describe what must be accomplished;
2) Arrows on the left side of the box are inputs that can be information and/or material resources. Inputs are transformed or consumed by the process or operation inside the box to create outputs;
3) Arrows on the right side are the outputs produced by the function. They can be information and/or material used as inputs for other processes or as the final product or service for the customer;
4) Arrows at the top are controls that dictate and specify the transformation conditions required for a process to generate the correct outputs. Controls can be any internal or external constraints, such as roles, specifications, regulations, and so forth; and
5) Arrows from the bottom of the box represent the process mechanisms, which can be people and/or machines needed to perform the process.

Moreover, IDEFØ models are built on the basic idea of a hierarchical structured analysis. A single box represents the whole system, or the main function, with its surrounding arrows placed at the top of the hierarchy and labelled as A0, as shown in Figure 3-9. This box is then broken down or decomposed into more functions (high level processes) and labelled as 1, 2, 3, etc. Each of these functions can also be decomposed further into more processes and sub-processes. The top-down decomposition process exposes more and more detail of the system under analysis with every level of the hierarchy. The decomposition process can be continued to create more children, or detailed diagrams, for each function or any given level (Yong-qiang *et al*., 2008; Aouad *et al*., 2013; Oakland, 2014).

However, IDEFØ is criticised as being unable to capture the sequences of individual processes, lack of time dependency and a weak information representation since it only uses a simple textual description to present the information. Therefore, IDEFØ is considered an unsuitable tool for modelling information flows (Al-Ajam, 2008; Wu, 2012). Other weaknesses of IDEFØ include its incapability to depict the locations of decision-making points or to answer why individual processes occur (Sedlak *et al.*, 2011).

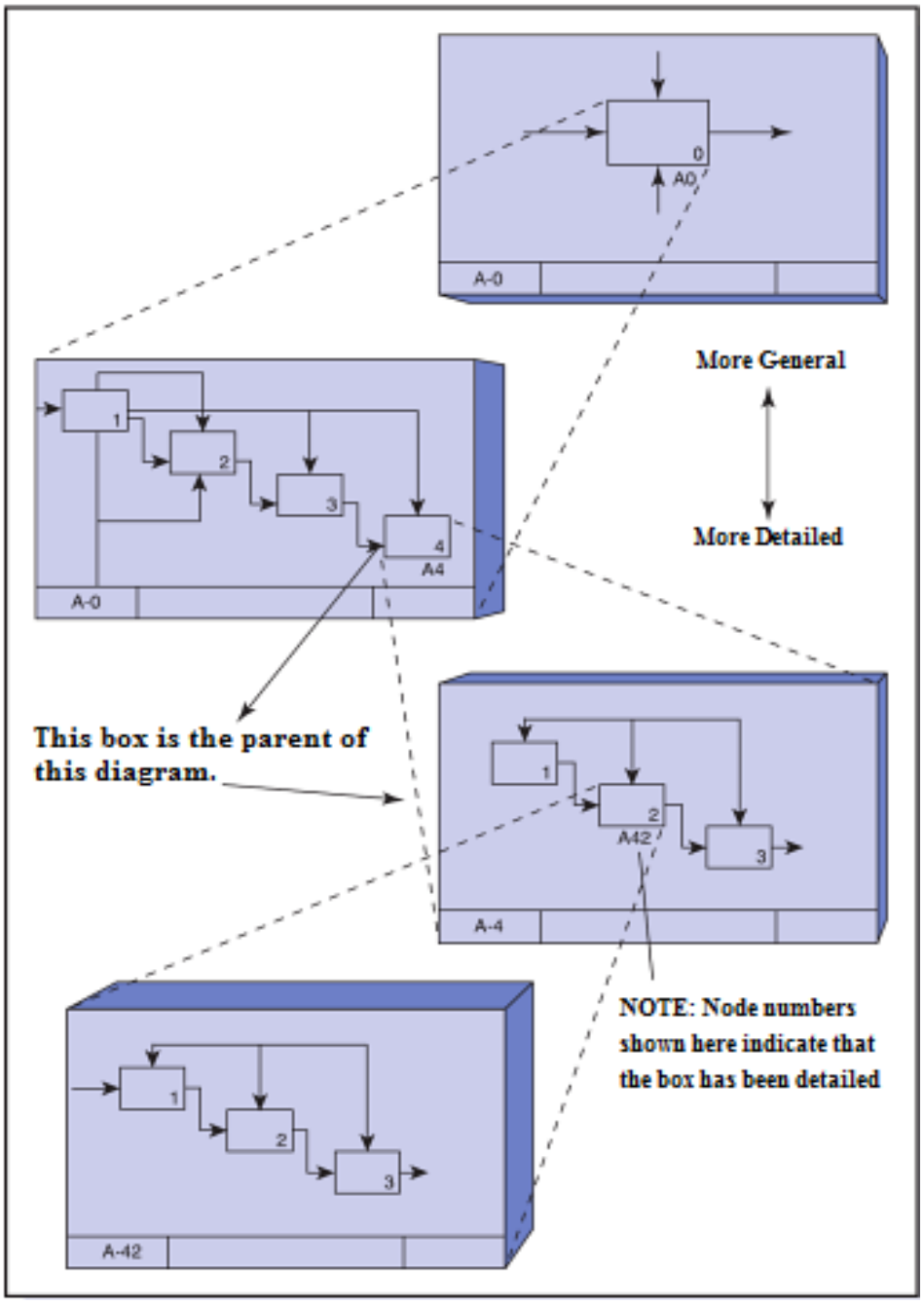


Figure 3-9: Decomposition of IDEFØ structure

Source: Oakland (2014)

3.5.4 Business Process Model and Notation (BPMN)

Business Process Model and Notation (BPMN) is a widely used graphical notation modelling technique for the specification business processes (Rospocher *et al*., 2014). It is developed as a standard modelling language for depicting the end-to-end flow of a business process in a Business Process Diagram (BPD) and based on traditional flowcharting representation tools (von Rosing *et al*., 2015b). Therefore, it allows the encoding of activities and the coordination of their sequence in explicit ways, as well as clearly showing the control and flows of information between various stakeholders involved in performing these activities (Object Management Group [OMG], 2011; Tangkawarow & Waworuntu, 2016). BPMN is indeed the result of an idea of a number of modelling tools vendors to standardise graphical notation and produce a single modelling technique that covers many types of modelling (OMG, 2011). The major objective was to provide a notation that is easily understandable by all stakeholders engaged in developing, implementing, and managing business processes including the business analysts, technical developers, and business managers (von Rosing *et al.*, 2015b). Accordingly, BPMN can be seen as a common modelling language, which helps bridge the communication gap that usually takes arises between business process design and implementation (OMG, 2011; von Rosing *et al.*, 2015b).

According to OMG (2011) and Rospocher *et al.* (2014) a BPMN diagram is generally composed of two sets of graphical elements: the Core Elements Set, which includes the basic elements required to represent the key features of most business processes, and the Extended Elements Set, which composes auxiliary graphical and non-graphical elements to support the core elements in the modelling of more complex business processes. The Core Elements Set is formed of four simple groups of elements, as listed below and depicted in Figure 3-10:

- **Flow Objects** which are used to define the behaviour of a business process and comprise three objectives;
    - ✓ **Events**, for representing something that happens,
    - ✓ **Activity**, for representing work to be executed,
    - ✓ **Gateway**, for representing the control flow of processes.
- **Connecting Objects** are employed to connect the flow objectives in a diagram to generate the basic skeletal structure of a business process. This category includes three types of connecting objects;
    - ✓ **Sequence Flows**, for reflecting the sequence in which activities are undertaken,

- ✓ **Message Flow**, for showing the movement of messages between business performers,
- ✓ **Associations**, for presenting any additional information and data attached to flow objectives.

- **Swimlanes** are employed as a tool to organise activities into different visual categories with the aim of better demonstrating the responsibilities and capabilities of the various functional areas. BPMN supports two types of swimlanes:
  - ✓ **Pool**, which is used to describe participants in a process,
  - ✓ **Lane**, which is a sub-partition of a pool to organise and categorise activities.

- **Artifacts** represent any additional number of Artifacts added by a modeller to a diagram as appropriate for the specific context of the business process being modelled. Yet, there are three standardised Artifacts supported by BPMN, including;
  - ✓ **Data Object**, for representing information processed and/or produced by activities,
  - ✓ **Group**, for reflecting the informal grouping of activities within the same category,
  - ✓ **Text Annotation**, for showing descriptive textual notes.

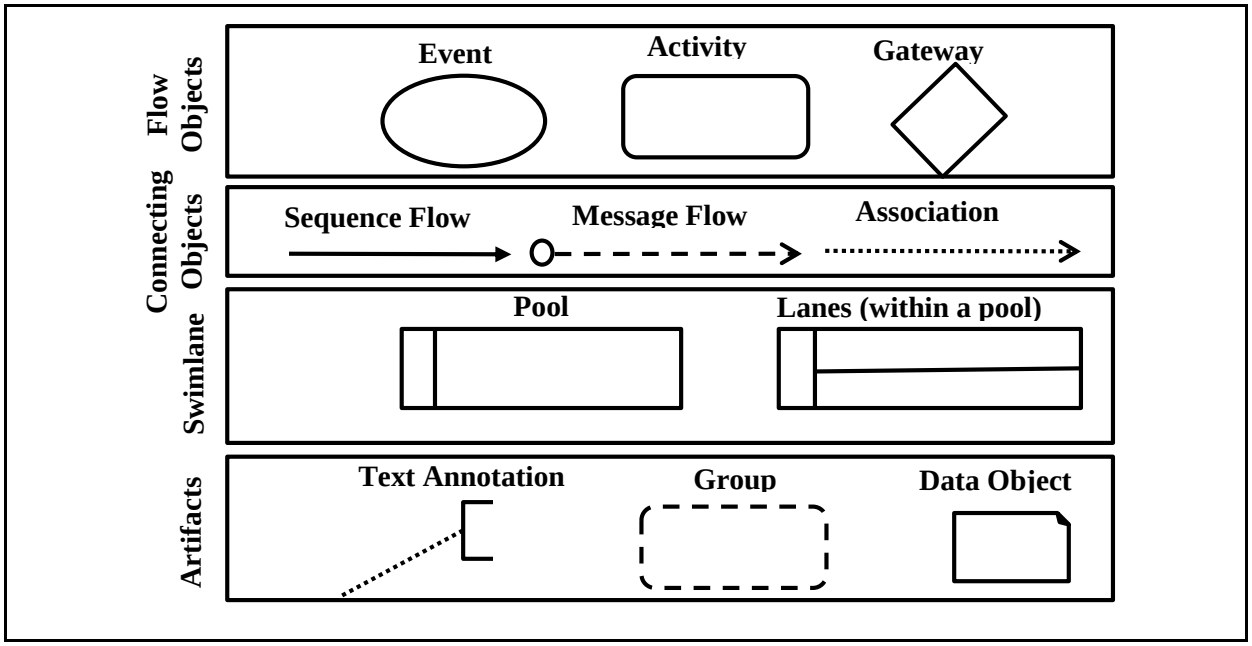


Figure 3-10: The core element set of BPMN

Source: Rospocher *et al.* (2014)

Moreover, a typical diagram of a business process modelled using a BPMN technique is illustrated in Figure 3-11, whereas lists of the most extensively used of the BPMN extended modelling elements with their concepts and notations, as described by (von Rosing *et al.*, 2015b), are presented in Appendix A.

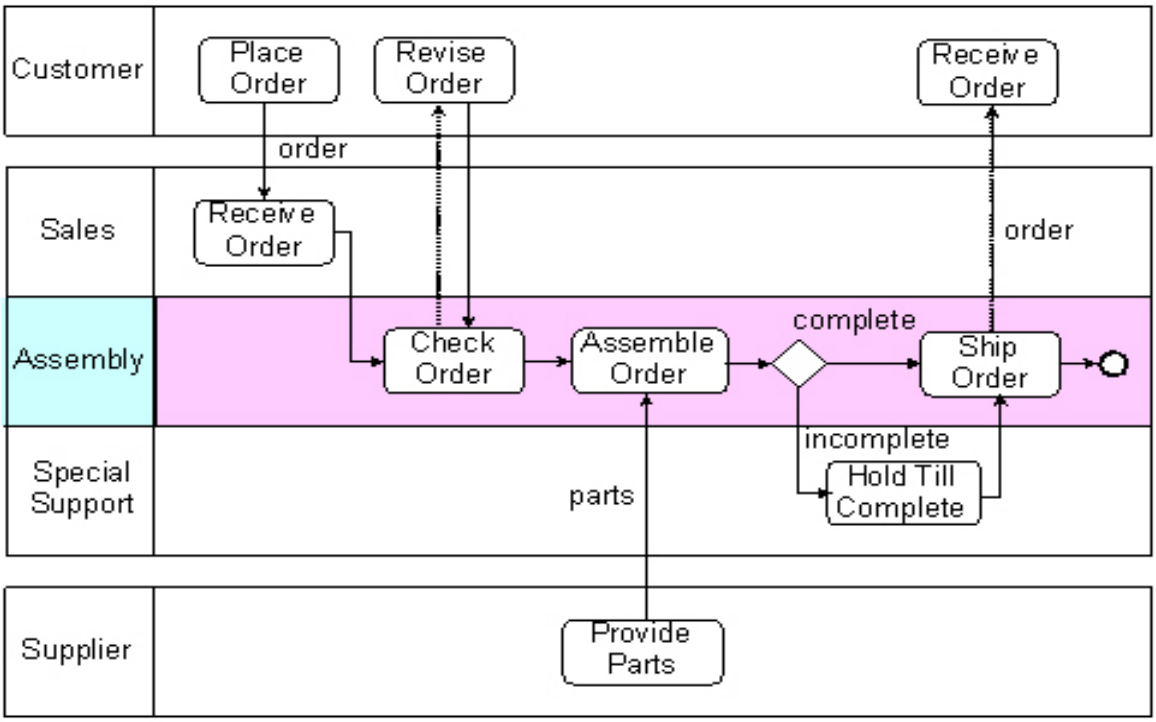


Figure 3-11: A typical Business Process Model and Notation (BPMN) diagram

Source: Harmon (2010)

Although the advantages of BPMN are mentioned above, this technique has been criticised as being more difficult to use than other techniques, such as IDEFØ. BPMN has more than 100 symbols which makes learning it a challenge. As such, learning to use or read it requires substantial training on two levels: learning the language, symbols, and tools themselves, and then training how to use them in modelling (Earls, 2012). Tangkawarow and Waworuntu (2016) point out that there is ambiguity and confusion in sharing BPMN models, as various notations can be used to model the same process and a single process map can comprise excessive, irrelevant and mixed levels of detail. Moreover, BPMN is considered less structured than other technologies, such as IDEFØ, since it does not support a numbering system or another explicit context that clearly shows the address of a modelled process within the structure of the organisation. Furthermore, BPMN does not support the representation of business rules, controls and resources graphically, which mean that they are often ignored in process mapping workshops.

3.5.5 Selecting the Most Appropriate Process Mapping Technique

It is evident from the discussion above that every process mapping technique has its advantages and disadvantages. Selecting the most appropriate technique or a combination of two or more is mainly dependent on the purpose of modelling, the system being modelled, the availability of supporting software, the modeller's experience and knowledge in the modelling technique and any time constraints (Aguilar-Saven, 2004; Al-Ajam, 2008). Koskela (1994) argues that the tools used to model a construction process should have two important criteria: 1) enough breadth to cover a wide range of various processes and their interaction, and 2) enough depth to include all important basic constructs, such as process flows, inputs, outputs and participants. Besides, a process modelling technique should be capable of accurately depicting the construction processes and at the same time be easy to use and understandable by all people engaged in designing and implementing processes (Sweet & Schneier, 2013).

Indeed, the key purpose of mapping the current operational processes adopted by IQGCCs is to capture 'as-is' adopted processes and identify their main problematic points with the aim of refining them. In light of the modelling techniques discussed above, the Activity Decomposition model can be seen as an appropriate technique for the early stages of process mapping in order to identify and understand the hierarchy of IQGCCs' operational processes, whereas, both IDEFØ and BPMN can be used to map the current process in more detail. However, as detailed earlier, IDEFØ is more structured and easier to use and understand by stakeholders than BPMN. Moreover, IDEFØ is a widely accepted and applied technique in modelling the construction processes (Koskela, 1994; Cooper *et al.*, 2005). For instance, this technique was used in developing the Generic Design and Construction Process Protocol (GDCPP) to improve the construction process in the UK (Kagioglou *et al.*, 2000). Lindfors (2003) also employed it to generate an 'as-is' process model describing the exit house building process in one of the major Swedish construction companies. Yong-qiang *et al.* (2008) used the same technique as a tool to develop an integrated information management system for construction projects; whilst, Ekung *et al.* (2014) employed it to map the operational processes of heavy engineering projects in Najeria. Additionally, the researcher's experience in dealing with IDEFØ and the software programme that supports it is much better than with other modelling tools. Accordingly, the IDEFØ process modelling technique has been selected as a key tool to map the 'as-is' operational processes of IQGCCs, while the Activity Decomposed model is a supported tool to provide more clarity regarding the hierarchy and decomposition of processes.

3.6 Designing and Modelling the Business Process

Designing and modelling business processes are two essential parts of a BPM management concept. According to the Association of Business Process Management Professionals [ABPMP] (2009), process design activities concentrate on the intentional, thoughtful design of how end-to-end business process is undertaken in order to deliver value to customers. This may include designing the processes performed, their sequence, time and location, the actors involved in executing them and the approach used in documenting. Process design, indeed, defines what the organisation expects the process to be by answering questions, such as: what is required, who is responsible, and how, when, and where to control and execute a certain end-to-end business process. Segatto *et al.* (2013) claim that in a BPM lifecycle, initial design activities may look at standardising or automating current ad hoc activities, while more mature design activities can focus on a redesign or radically changing a process, or incremental improvements designed for optimisation. In fact, the aim of this study goes beyond standardising the current practice of IQGCCs to make a step change improvement in their operational processes. However, Zairi (1997) stresses that designing the business processes should be inspired by the best practice to secure achieving the superior performance. Thus, an extensive literature review has been conducted to identify world-class processes that need to be adopted by construction companies under traditional procurement in order to improve their overall performance. This will be presented in Chapter Four.

Nonetheless, business process modelling includes the generation of representations of current or suggested business processes through documenting the entire a process's activities and their sequence with the aim of providing value to the customers (ABPMP, 2009). This is not to be confused with business process mapping, which is mainly concentrated on documenting the current processes to show how work is done, but not necessarily how it should be done. Business process modelling concentrates more on the improvement of business processes through in-depth analysis and the elimination of inefficiencies and bottlenecks (Al-Ahbabi, 2014). According to vom Brocke and Rosemann (2010), the aim of a process model is to grasp working procedures at a sufficient level of detail that allows the successful achievement of their envisioned tasks. Thus, process models can be used as aid tools for analysing aspects, such as cost, resource utilisation or process performance, as well as for automation (Segatto *et al*., 2013). Based on the type of business and the purpose of modelling, a process model can be developed by employing a single modelling technique or a combination of these techniques (Al-Ahbabi, 2014).

3.7 Business Process in Construction

The purpose of this section is to highlight how the notion of adopting process thinking in the construction industry arose. It also aims to address research conducted in this area and the main initiatives proposed to map and improve the construction process.

3.7.1 The Need for Process Thinking in the Construction Industry

Despite the construction industry's recognition of the value of optimising its processes, which occurred as early as the 1970s, the real awareness of the importance of applying the process concepts in the industry significantly increased after the mid of the 1990s (Alshawi, 2007). Two major reports published in the 1990s in the UK helped to set the scene to commence serious efforts to reform and map the process of the construction industry, both nationally and internationally (Harty *et al.,* 2016). The first report was conducted by Latham (1994) and published under the title of '*Construction the Team*'. Latham emphasised the need to change industry practices through establishing guidance on best practices, embracing process improvement, and changing legislation towards arbitration with the aim of increasing efficiency and removing the wasteful, adversarial climate, and bureaucratic practices prevalent in the construction industry (Latham, 1994). Latham's report suggests that significant problems within the construction industry could be solved by the utilisation and formulation of effective construction processes. He argued that applying such measures would, in turn, lead to significant cost savings and increased productivity. Following on from Latham's report came the '*Rethinking Construction*' report by Egan in 1998 that re-affirmed the recommendations proposed by the former report. Egan (1998) stated that 10% of construction cost and time, and 20% of a project's defects can be annually reduced by focusing, particularly, on improving the construction processes.

Likewise, in Hong Kong, the '*Construction for Excellence*' report published by a Construction Industry Review Committee (CIRC) in 2001, considered the constant improvement of the construction production process as a key driver to bring about better value to customers in the Hong Kong construction industry. In Australia, Sidwell *et al.* (2004) noted that the traditional thinking characterised by fragmenting and differentiating the construction industry structure was a major factor hindering the improvement. Therefore, they strongly advocated re-engineering the construction delivery process to orientate towards process thinking.

The aforesaid review reports highlight a number of significant challenges preventing the construction industry from achieving significant improvements. These challenges include, but

are not limited to, the complexity of the design and construction process, the fragmented nature of the industry, and the uniqueness of the end products. Reports also recommended diverse solutions to resolve those challenges and enhance the efficiency and performance of the industry. Amongst the recommendations proposed by the reports, are several common and consistent points. These points are as follows:

1) Construction should focus on improving its process through employing process thinking as an alternative approach to functional thinking;
2) Construction has to foster an extensive partnering approach between the various stakeholders involved in implementing a construction process. This can be, for instance, through building long term partnerships or establishing multidisciplinary teams to carry out the various tasks;
3) Instigating systems for learning from experiences to capture good practice and avoid reapplying harmful ones;
4) Encouraging the construction industry to learn from the experiences of other industries and benefit from them to improve its performance.

Interestingly, these aspirations are still on the agenda of those interested in improving the construction industry process today (Harty *et al.,* 2016).

3.7.2 Research in Construction Process

The call to adopt process thinking in the construction industry has been met with mixed responses from practitioners and researchers. Whereas some have advocated learning from the experiences and good practices that are successfully adopted and implemented by other industries, such as manufacturing, software and services (Egan, 1998; Cooper *et al.,* 2005; Akintoye *et al.,* 2012), others reject such recommendations arguing that the construction industry is unique, and good practice borrowed from other industries would not be appropriate (Halpin & Riggs, 1992; El-Gohary & El-Diraby, 2010). However, both sides have agreed that the good practice adopted by other sectors can be successfully exploited, if it is properly adapted to the new situation (Jeong *et al.*, 2006). Considering this consensual view, researchers have sought to investigate and explore the process of construction from different angles and perspectives. Some researchers have concentrated on mapping the entire, or parts of, the construction process cycle (Kagiglou *et al.,* 1998; Lindfors, 2003; Matsumoto *et al.,* 2005; Cho *et al.,* 2010; Song & Choi, 2011; RIBA, 2013; Antunes & Gonzal, 2015). Others have focused on process measurement (Aoieong *et al.,* 2002; Grant & Jame, 2006; Backlund *et al.,* 2014) and

the integration of information technology in the construction processes (Zhu & Augenbroe, 2006; Alshawi, 2007; Haron, 2013; Cherian & Kumaran, 2016; Eadie & Perera, 2017). Other broader themes include Lean construction (Koskela & Ballard, 2006; Koskela, 2011; Shang & Pheng, 2014; Ansah & Sorooshian, 2017), concurrent engineering (Ling, 2002; Sapuan & Mansor, 2014; Chai *et al*., 2016; Moon *et al*., 2017), and agile construction (Sertyesilisik, 2014; Mostafa *et al*., 2016).

However, research that particularly focuses on the core business processes adopted by construction companies under traditional procurement is somewhat limited. Some of the limited research available in this area has focused on: identifying factors affecting the bid/no bid decision and mark-up value (Egemen & Mohamed, 2007; Enshassi *et al*., 2010; Takano *et al*., 2014), the bidding process (Brook, 2008; CIOB, 2009), techniques used in programming and monitoring the construction processes (AlSehaimi *et al*, 2009; Aziz & Hafez, 2013; Koskela *et al.*, 2014) and the planning process (Zwikael, 2009; Reginato & Alves, 2012). Other related research will be covered in Chapter Four.

3.7.3 Initiatives to Map and Improve the Construction Process

Over the last three decades, a number of initiatives and models have been launched to map and improve the process of construction with a view to adding value to the customer, enhancing the efficiency and productivity, reducing defects and increasing the profitability and performance in construction. Some of these initiatives are explained below.

3.7.3.1 The RIBA Plan of Work

In 1964, the Royal Institute of British Architects [RIBA] launched the first version of the RIBA Plan of Work, which was one of the first documents that promoted process thinking in the construction industry (Poon *et al.*, 2003; Al-Atawi, 2005). For over half a century, the RIBA Plan of Work has represented a standard method of operation for building design and construction, and remains widely accepted as an operational model throughout the industry not just in the UK, but also on an international stage (Essa, 2008; RIBA, 2013). Indeed, it has been a bedrock document for the architects' profession in particular, and for the construction industry generally (Al-Ahbabi, 2014). Through using it as a process map and a management instrument, the RIBA Plan of Work has been deemed a shared framework for organising and managing building projects. Moreover, it has been employed to provide work stage reference points that are used in a large number of contractual and appointment documents and best practice guidance (RIBA, 2013).

Rather than being strategically driven (RIBA, 2013), the RIBA Plan of Work has been incrementally amended and improved over time in response to changes in circumstances (for example, developments in design team organisation, regulatory regimes and innovations in procurement arrangements). The latest version of the document was released in 2013, as shown in Figure 3-12. The new generation of the RIBA Plan of Work is characterised by incorporating sustainable design principles, and providing the infrastructure to support Building Information Modelling (BIM). It also promotes integrated working between project team members, including the construction team, and offers more flexibility to match procurement approaches to client needs (Pasquale & Sharpe, 2015).

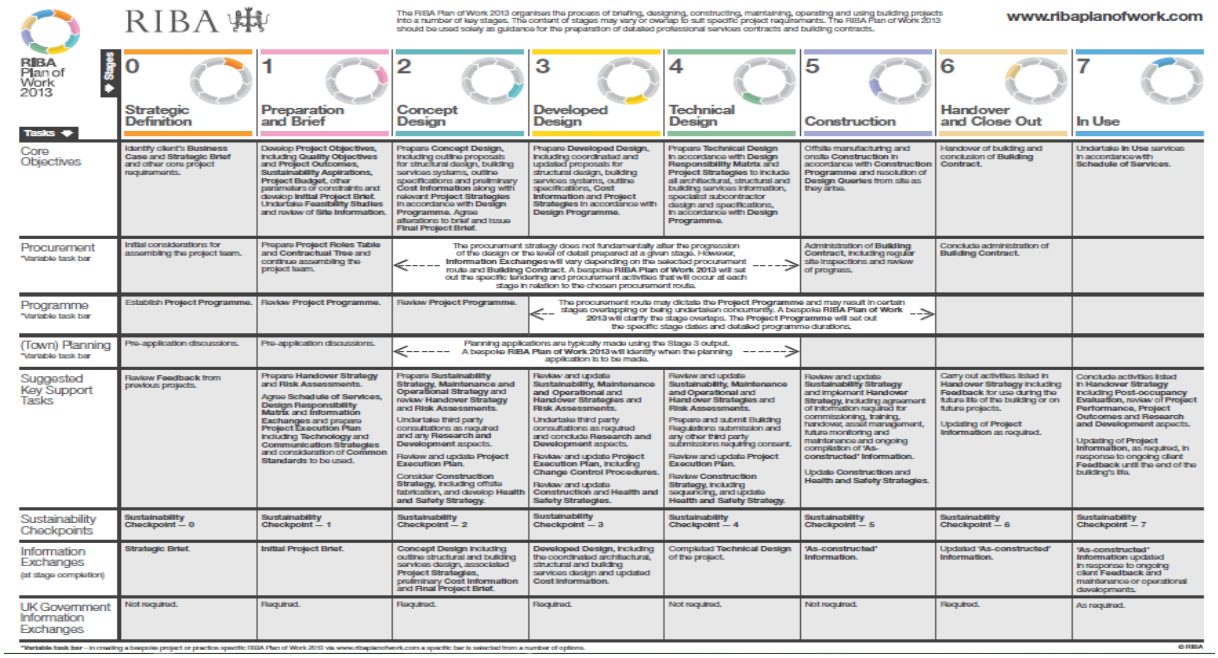


Figure 3-12: RIBA Plan of Work 2013

Source: RIBA (2013)

The RIBA Plan of Work 2013 divides the project lifecycle into eight stages that are defined by numbers 0-7. It also consists of eight task bars that can be classified into three types: fixed, variable, and selectable. The fixed bars ensure consistency across all RIBA Plan of Work 2013 documents. The variable bars are those containing options specific to a practice or a project's specific Plan of Work. Meanwhile, the selectable bars are those that can be switched on or off in order to produce a focused and bespoke practice or project version that suits clients' needs. The plan also details the tasks and outputs required at each stage; however, these tasks may vary or overlap to suit specific project requirements. The main aspects of the RIBA Plan of Work 2013 can be summarised as follows (RIBA, 2013, p.4):

1) Acts across the full range of sectors and project sizes;
2) Provides straightforward mapping for all forms of procurement;
3) Integrates sustainable design processes;
4) Maps Building Information Modelling (BIM) processes, and;
5) Provides flexibility in relation to (town) planning procedures.

Nevertheless, in practice, the RIBA Plan of Work has been criticised for being developed from the architect's perspective, for missing a brief description of the roles and tasks of other stakeholders involved in a project, such as the client tasks, which need to be undertaken at the beginning of a project. Other marked weaknesses include: condensing all the mobilisation and construction activities into a single stage; less detail than the former 2007 version; its flexibility and customisability is very limited; and the definition and naming of work stages do not reflect the terminology that is used by the industry (Poon *et al.*, 2003; Essa, 2008; Sinclair, 2013).

3.7.3.2 OGC Construction Procurement Framework

The Office of Government Commerce (OGC) was an independent office of the UK Treasury, established in 2000 to support government efforts in obtaining best value from its spending through driving up policy standards and guidance on best practice in procurement, projects and estate management (Woods, 2011). The OGC Gateway Project Review Process is one of the initiatives that was launched by the OGC in 2001 to help and guide public organisations, whose business is mainly based on projects, on how best to ensure that their programmes and projects are successful (OGC, 2007). It provides a means of highlighting risks and controlling the progress of a project from one stage to the subsequent ones, with a view to securely delivering projects according to the agreed quality, within budget and on time at their best whole-life value, and thereby achieving the value for money (Garrett, 2016). It is designed to examine the readiness of projects and its likelihood for successful delivery at six key decision points across the whole project lifespan through independent practitioners from outside the project (Cartlidge, 2015). The project key stages and its six gateway reviews are illustrated in Figure 3-13.

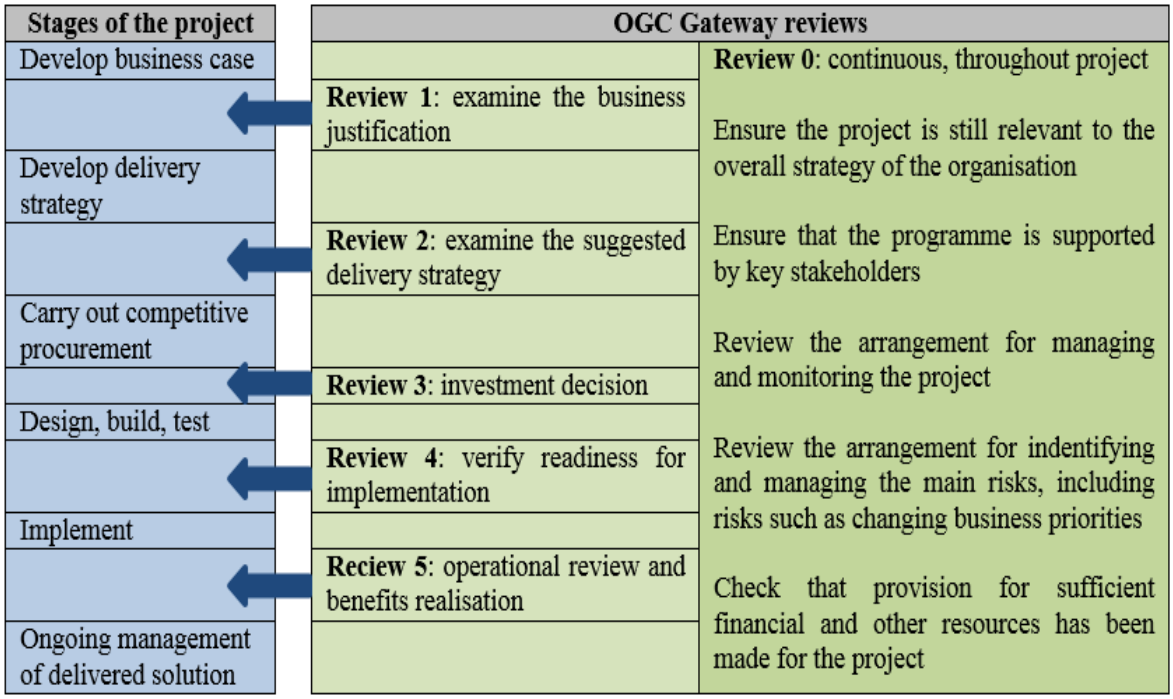


Figure 3-13: The OGC Gateway (TM) Process

Source: Garrett (2016)

As illustrated in Figure 3-13, it is proposed that Gateway Review 0 (Strategic Assessment) should be undertaken continuously across the project. This is important to ensure that the original business case on which the project was predicated remains valid. Meanwhile, other gates are designed to be conducted at certain points of a project lifecycle.

In 2003, the OGC published a guide called Project Procurement Lifecycle, which is the third guide of the core set of documents that aim to achieve excellent procurement in construction. The guide provides a generic framework that integrates the construction project procurement process with the Gateway Review Process, as depicted in Figure 3-14. The project procurement lifecycle covers the entire life of a project from the inception through to design and construction, operation and finally re-use or disposal, based on the client's perspective. The framework represents a step-by-step process map that illustrates where and when key decision points are to be made; what should be done and when; who is usually involved; which information is required to manage the project; and what should be delivered at each phase of the project (OGC, 2003).

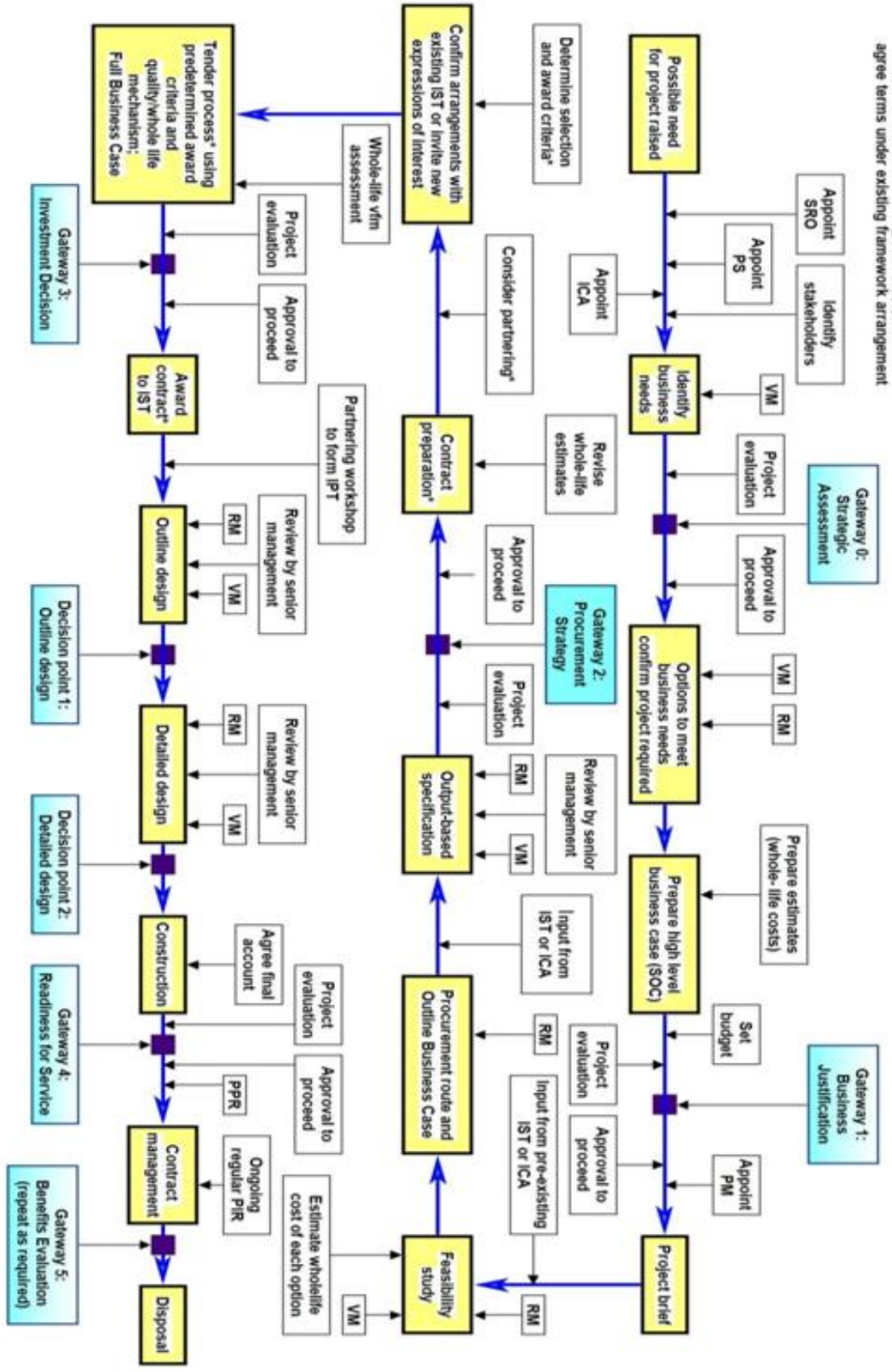


Figure 3-14: OGC framework for construction procurement

Source: OGC (2003)

Indeed, the integration of the Gate Review with the procurement process offers independent guidelines to the Senior Responsible Owner (SRO) on how to achieve their business aims by giving assurance that:

1) People with appropriate skills and experience are deployed on the project;
2) All the stakeholders covered by the project fully understand the project status and the issues involved;
3) The project is ready to progress to the next stage of development or implementation; and
4) There is visibility of realistic time and cost targets for the project. (Salford Royal NHS Foundation Trust, 2007, p.170)

However, it is important to mention that the construction procurement framework has been developed from the client perspective. Therefore, most of the defined tasks, decisions points, roles and responsibilities are conducted by, or related to, the client and their employees. Meanwhile, little detail has been given regarding the tasks and roles of other stakeholders, particularly the contractor organisation, which is the major concern of this study. Additionally, although the reviews have not been designed to be part of the stage approval process, recommendations from Gateway reviews, according to OGC (2003), may need to be addressed before issuing an approval to commence the next stage; thus, resulting in the creation of hard gates that prevent overlapping and synchronisation between the various stages' processes and thus reducing the work flexibility.

3.7.3.3 Structured Process Improvement for Construction Enterprises (SPICE)

SPICE is a process improvement model particularly designed to enhance construction organisations' process performance through mapping out potential improvement paths in an incremental manner (Sarshar *et al.*, 2000; Siriwardena *et al.*, 2005). Originally, the SPICE model is built on a TQM philosophy; thus, it is structured to advocate continuous process improvement based on a 'many small steps' improvement methodology rather than a one-off radical transformation initiative, as shown in Figure 3-15 (Jeong *et al.*, 2006).

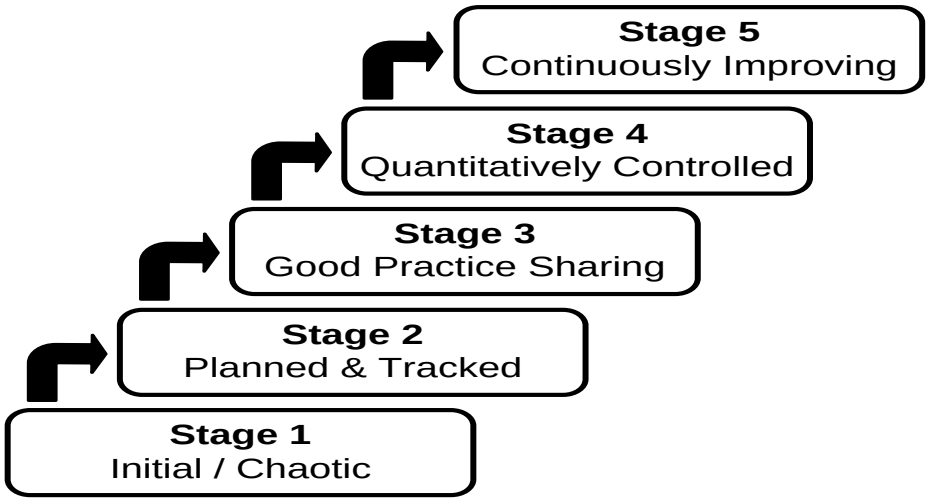


Figure 3-15: SPICE maturity model

Source: Jeong *et al.* (2006)

According to Harty *et al.* (2016) the model was developed to address the absence of guidelines in the construction industry that are required to assess or benchmark improvements and performance across the organisations. Therefore, it can be seen as a practical management diagnostic and improvement tool that helps construction organisations to comprehend and improve their level of process capability in terms of the maturity of their product development processes (Siriwardena *et al.*, 2005). The model provides five maturity levels, which form the base for continuous process improvement. These maturity levels act as a scale to evaluate the capability of both individual processes and the overall process of construction organisations (Jeong *et al.*, 2006). Additionally, they provide guidelines on how to prioritise the improvement process. Each level, except level 1, consists of a number of key processes that guide an organisation as to what it should focus on in order to improve its processes (Perera *et al.*, 2017). Success in applying each key process would lead the organisation towards stabilisation in an important part of the construction process and thereby enable it to predict the results of that process. In comparison, the effective and continuous improvement of an organisation's performance can be achieved by following the steps in the model. However, it is important to mention that an organisation can only be at a single level at any specific time. For example, if an organisation is at level 2 and applies some of the key processes of level 3 or 4, it is still deemed at level 2 until it adequately achieves all key processes within level 2 (Finnemore *et al.*, 2000; Siriwardena *et al.*, 2005; Jeong *et al.*, 2006).

Nevertheless, all case studies regarding the implementation of SPICE have shown positive results supporting the concept of SPICE. Yet, the model has gained a little traction in the

construction industry since it has failed as a process improvement tool to provide the expected results of organisational change and it is considered slow and ineffective (Erdogan *et al*., 2005; Nesensohn *et al*., 2014).

3.7.3.4 The Generic Design and Construction Process Protocol (GDCPP)

Process protocol was developed by researchers from the University of Salford, (Uk) in cooperation with a number of experts from the manufacture and construction sectors. (Kagioglou *et al.*, 1999). It was designed with the aim of providing a comprehensive process map to streamline and improve the processes involved in the design and construction of a project. Thus, it is developed to comprise a common set of definitions, documentation and procedures, which together form a solid basis that allows for various stakeholders engaged in a construction project to work together seamlessly (Kagioglou *et al.*, 1999). Through employing manufacturing experience as a reference point, the GDCPP, as professed by Cooper *et al*. (2005), maps the whole construction project process from recognising or emerging client's needs to the operations and maintenance of the final product. Therefore, it can be considered as a road-map that guides parties involved in a construction project to how the processes of the project have to work in order to enhance the efficiency and effectiveness of the design and construction of projects (Al-Ahbabi, 2014). Moreover, according to Aouad *et al.* (1998), many tangible benefits can be realised from the implementation of the process protocol, such as waste and cost reduction, reducing the duration of projects, and enhancing communication methods and channels.

Accordingly, Process Protocol, as shown in Figure 3-16, was based on a number of key principles, which aimed to resolve the challenges inherent in the construction industry. Those principles, as explained by Kagioglou *et al.* (1999, p.5), included:

1) **Whole Project View**: the processes should cover the entire lifecycle of a project from the recognition of client's need to the operation of the finished facility;
2) **A Consistent Process**: the application of a consistent process across a project's lifecycle could significantly mitigate the problems encountered by temporary multi-organisations (TMOs);
3) **Progressive Design Fixity**: adopting the 'stage-gate' concept established in manufacturing processes to ensure a consistent planning and review procedure across the process. 'Hard' and 'Soft' or 'Fuzzy' gates were applied to control and validate each process at every phase before the next phase proceeded;

4) **Co-ordination**: in order to overcome the poor co-ordination issue amongst construction project stakeholders, the Process Protocol encouraged the establishment of multidisciplinary teams in the early stages of the construction process;
5) **Feedback**: involving the phase gate reviews facilitating a means to attain feedback from each gate, which allows recording the project experiences throughout the process and thus using such data to inform later phases and future projects. The GDCPP also comprised using a Legacy Archive concept, which acts as a central repository for storing, maintenance and exchange information generated through the various phases of the process.

The Process Protocol model consists of an X and a Y-axis. The X-axis represents the design and construction process, which is divided into ten different phases. These phases are grouped under four main stages that reflect the project's lifecycle from the client's perspective. It also involves soft and hard gates inserted between phases. Soft or fuzzy gates are semi-transparent and allow activities to progress without being overhauled. However, hard gates are introduced where decisions to be made after finalising all requirements and deliverables have a profound impact on the project as a whole and hence prevent progression to other stages if these requirements and deliverable are not met; this maintains 'Progress Fixity' (Kagioglou *et al.,* 1999). Meanwhile, the Y-axis includes the project participants who are grouped into specific 'Activity Zones' according to their primary responsibilities. Activity Zones are multi-functional and embrace structured sets of activities and processes that drive the work towards a common goal. These Activiy Zones include: "*Develop Management, Project Management, Resource Management, Design Management, Production Management, Facilities Management, Health and Safety, Statutory and Legal Management, and Process Management*" (Kagioglou *et al*., 2000, p.149).

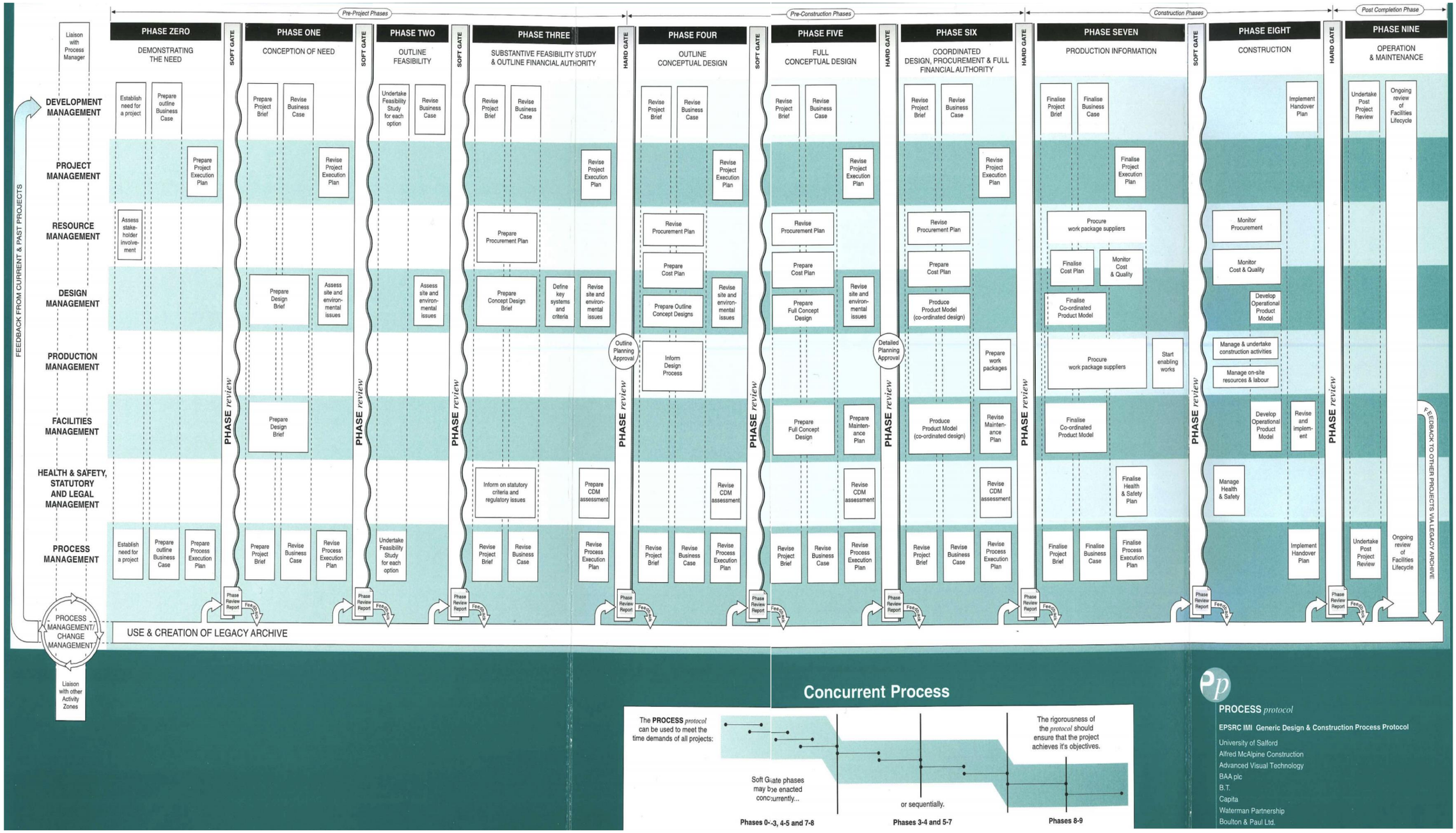


Figure 3-16: Process Protocol Map

Source: Kagioglou *et al.* (1998)

3.7.4 Reflection on the Construction Process Research and Initiatives and the Need for Adopting Process thinking in IQGCCs.

Through the previous sections, references to the most important areas covered by construction process research have been made. Yet a number of initiatives and models proposed to increase the process view in the industry have also been discussed. Interestingly, most of the research and initiatives have been developed to improve the construction project processes through providing systematic ways and guidelines that enable the various parties involved in the projects to work in a more collaborated and integrated environment. Moreover, they have generally been either designed from a client's or architect perspective's perspective. In contrast, little attention has been paid to study or improve the structure of business processes employed by construction companies during delivering their projects (Serpell & Diaz, 2016).

Moreover, although this global orientation attempts to adopt business process principles in the construction industry, in terms of Iraqi context, such efforts have not yet been introduced, particularly in relation to Iraqi Quasi-Governmental Construction Companies (IQGCCs). Despite the paucity of studies on the management systems used by Iraqi organisations in general, and almost none with respect to IQGCCs, evidence from the few studies available reveal that Iraqi government organisations are generally still managed through the old traditional hierarchical and bureaucratic system (Gunter, 2013; Naji & Abass, 2013; Abdulrazzaq & Mohammed, 2014; U.S. Department of State, 2015). This has been further confirmed in IQGCCs through an empirical exploratory study conducted by Al-Obaidi and Higham (2017).

The traditional system, as explained earlier, has become old and unable to cope with the challenges of the new business environment, such as those facing IQGCCs nowadays. Accordingly, in order to survive and succeed, IQGCCs must move away from the traditional functional model towards business process orientation, which can be seen as the most appropriate way to improve their performance and competitive advantage. Yet the lack of a framework or systematic way for managing and continuously improving the business process in full at the core of these companies, means such change is hard to achieve in practice. Finnemore *et al.* (2000) assert that, without a standard process model, with time companies would not be able to repeat or coordinate benefits and measure their performance. Similarly, a senior manager of an Iraqi QGCC, interviewed by the researcher, argued that the absence of a clear systematic strategy or roadmap driven by senior management can subsequently lead to a

situation whereby each individual project is managed solely on the experience and characteristics of the appointed project manager. Magloff (2017) also professes that a process framework can provide guidelines to a company's core business processes, standards, procedures for managing workflow, and employees' roles and responsibilities.

Accordingly, it seems there is an urgent necessity to develop an organisational business process framework to address the challenges inherent in the IQGCCs' current practices, and facilitate a step change improvement in their performance through employing business process principles. Moreover, the developed framework would provide the IQGCCs' managements with a roadmap to streamline and continuously improve their companies' core business processes through suggesting tools to enhance the cross-functional integration, decision-making, quality of processes outputs, and practice documentation, and share them across the organisation. This will be covered in Chapter Four; however, the next section will explain the impact of changing business process on organisational design and present the features of the most frequently employed organisational structures with their advantages and disadvantages.

3.8 Process and Organisational Structure

The structure of an organisation is an instrument that defines and arranges the formal roles, responsibilities, authorities, lines of communication and reporting in an organisation (Johnson *et al.*, 2015). It determines the job positions, relationships amongst them and accountabilities for delivering the processes and various activities (Andrews, 2012). As mentioned in section 3.4, organisational structures are one of the key dimensions of the business process orientation (BPO) and might always be seen, as Skrinjar *et al.* (2010) states, as a critical element in the success or failure of an organisation's efforts to adopt business process thinking. Indeed, shifting to adopt process thinking and making a firm process oriented will not just impact on the logical relationships of the business processes but also on the roles and responsibilities of employees involved in employing those processes (Willaert *et al.*, 2007). In other words, changing an organisation's processes will call for the assignment of new and different roles, authorities, and accountabilities for employees, and thereby a new organisational structure will be needed to fit the new processes' requirements.

Generally, during the last three decades, organisations have tended to become less hierarchical and more decentralised (Acemoglu *et al*., 2007). Many companies and organisations, known as 'Command-and-Control' organisations due to their adoption of rigid and centralised structures, have radically transformed and restructured to decentralised organisations (Alberts & Hayes,

2006; Post, 2007; Wang, 2011). This particularly arises in AEC (Architecture, Engineering and Construction) firms because they are generally project-oriented organisations where new and more flexible structures are required to fit with new ways of thinking regarding project management (Bresnen *et al*., 2005; Wang, 2011). This view has been supported by Willaert *et al.* (2007, p.8) who clearly reports that the "*traditional departmental organisation chart cannot support a process-centric organisational view*". Skrinjar *et al.* (2010) mention some of the most important characteristics of a process organisational structure, which include:

1) Organising work around core processes;
2) Flatter organisational structures (fewer levels of hierarchy);
3) Teamwork;
4) Employee empowerment;
5) Jobs that involve heterogeneous tasks and activities, not just work;
6) Process ownership. (Skrinjar *et al.*, 2010, p.8)

Indeed, process-oriented organisations attempt to design their employees' responsibilities horizontally as much as possible and around their core business processes (Hammer, 2007; Palmberg, 2010; Khosravi, 2016). However, this does not necessarily mean that an organisation has to be designed completely horizontally (Willaert *et al.*, 2007; Glavan & Vuksic, 2017), because such an exercise usually leads to the generation of conflicts with the driving principle of specialisation that should also be considered (McCormack *et al.*, 2003; Daft, 2013). Therefore, the organisation's top management has to find a way to combine the advantages of both the vertical and horizontal structures, and create a balance between them (Skrinjar *et al.*, 2010). Willaert *et al*. (2007) also highlights that companies that attempt to be process-oriented, still need to establish their process architecture based on a hierarchical structure. Whereas, a high level (executive) process owner is responsible for conducting high level processes, the sub-processes that are decomposed from the high-level processes, should be managed and controlled by a hierarchical infrastructure of process managers. Nevertheless, in order to develop a good understanding regarding the various common organisational structures adopted by construction companies, and to identify their most important advantages and disadvantages, general features, and where and when they can be used successfully, these forms have been studied and are explained in the following sub-sections.

3.8.1 Functional or Programmatic Organisational Structure

A functional organisational structure is the most common, classical and traditional type structure (Anumba *et al.,* 2002). It is based on a hierarchical structure where roles and responsibilities are very strict and divided according to the company's specialist functional units, such as marketing, engineering, human resource, legal, and finance (Johnson *et al.*, 2015). Each unit or department has a group of people with similar skills and knowledge working together and using similar tools and techniques to undertake closely related tasks in order to perform a critical function (Bobera, 2008). The control and coordination under this model is from the top-level management, where a departmental senior manager has formal authority and power over most resources within his department (Johnson *et al.*, 2014). Figure 3-17 represents a typical organisational chart for such a functional organisation.

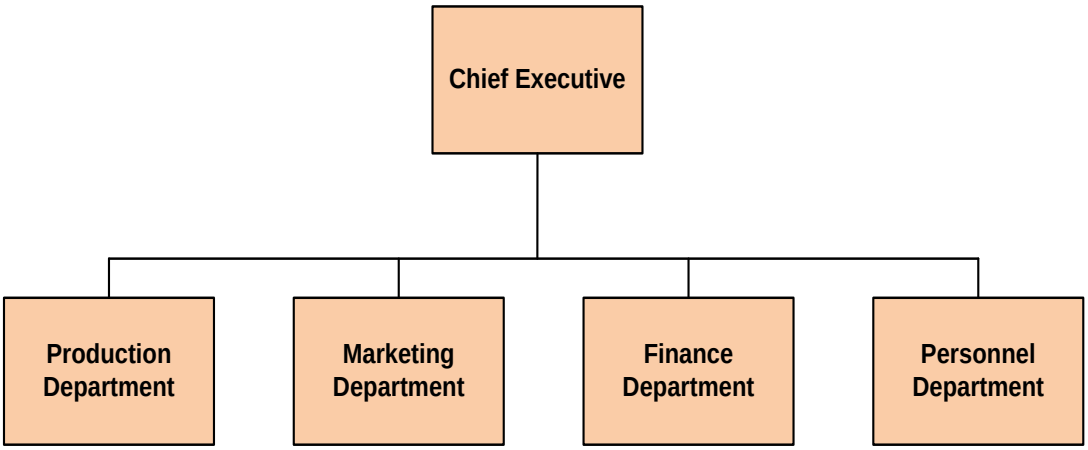


Figure 3-17: Typical functional organisational structure

The functional model is more appropriate for technically oriented management rather than product or business oriented ones (Gupta, 2009). Moreover, it is usually adopted by small companies, start-up organisations or by those who have a single programmatic focus (retained narrow) and when there is no need to manage across diverse product ranges or over a large geographic area (The Bridgespan Group, 2009; Johnson *et al.*, 2015). The main advantages and disadvantages of the functional structure are summarised in Table 3-2.

Table 3-2: Advantages and disadvantage of the functional organisational structure

Author	Advantage	Disadvantage
Johnson *et al*. (2015, p.233)	Executives in touch with all business operations.	Senior managers overburdened with routine matters.
	Reduces/simplifies control mechanisms.	Senior managers neglect strategic issues.
	Clear definition of responsibilities.	Difficult to cope with diversity and adapt to changes.
	Specialist at senior and middle management.	Coordination between functions difficult.
Bobera (2008, p.5)	Maximum flexibility in the use of staff.	The client is not the focus of activity and concern.
	Individual experts can be utilised by many different projects.	The functional divisions tend to be oriented toward the activities particular to their function.
	Specialists in the division can be grouped to share knowledge and experience.	Occasionally, no individual is given full responsibility for the whole process of a product.
	It serves as a base of technological continuity when individuals choose to leave their functional area.	There are often several layers of management between the project and the client.
	The functional division contains the normal path of advancement for individuals whose expertise is in the functional area.	There is a tendency to sub-optimise the functional areas.

3.8.2 Divisional Organisational Structures

In the divisional organisational form, companies are separated on the basis of geographical areas, types of products or services, as shown in Figure 3-18. Each division contains various functions and departments, such as marketing, legal, sales, manufacturing, which work together in order to perform a specific project or produce a particular product for a specific customer. Therefore, this system needs to group people with different knowledge and skills together (Johnson *et al.*, 2014).

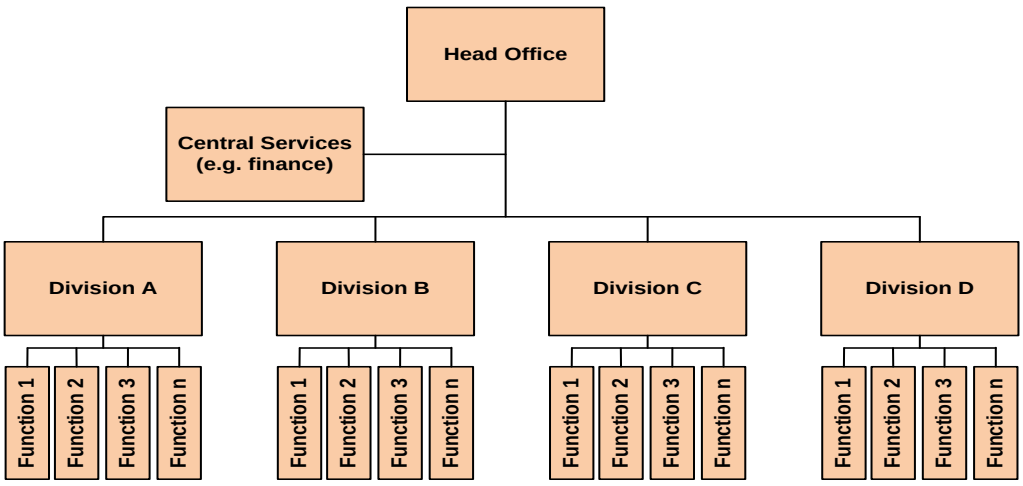


Figure 3-18: Divisional organisational structure

This type of structure also known as multi-division form (M form). An organisation, that adopts this structure, gives its divisions a great level of decentralisation and independence in managing their different resources, excepting financial resources, which often remain held by the parent organisation (centre) in order to guide and control these divisions (Lavender, 2013).

Tran and Tain (2013) report that such an organisational form, which is characterised by decentralisation in decision-making and relying on formal rules and policies, is more appropriate for companies that operate in a complex and rapidly changing environment. According to Gupta (2009) and Lavender (2013), the M form has become widely used by large construction companies that aim to extend their business scope. The main advantages and disadvantages of the purest type of divisional structure are listed in Table 3-3.

Table 3-3: Advantages and disadvantage of the divisional organisational structure

Author	Advantage	Disadvantage
Johnson *et al.* (2014, p.439)	Flexible (add or divest divisions).	Duplication of central and divisional functions.
	Control by performance.	Fragmentation and non-cooperation.
	Specialisation of competences.	Danger of loss of central control.
Bobera (2008, p.6)	The division or project manager has full line authority over the division or project.	There is a need to ensure access to technological knowledge and skills that results in an attempt by division managers to stockpile equipment and technical assistance.
	The lines of communication are shortened.	Pure project groups seem to foster inconsistency in the way in which policies and procedures are carried out.
	Developing a high level of commitment from members	Does not encourage employees to feel of being part of a large company.
	Enhancing the ability of making swift decisions.	Developing an alienated feeling amongst the technical people within different divisions.

3.8.3 Matrix Structure

The matrix structure can be considered a simultaneous combination of two different structural dimensions. For instance, an organisation can combine employees from various functions (marketing, production, information technology) under different production divisions or geographical territories (Bobera, 2008; Johnson *et al.*, 2015). In this form, employees usually have two lines of reporting and are responsible to managers from two different dimensions (Johnson *et al.*, 2015). Figure 3-19 represents an example of an organisational matrix structure.

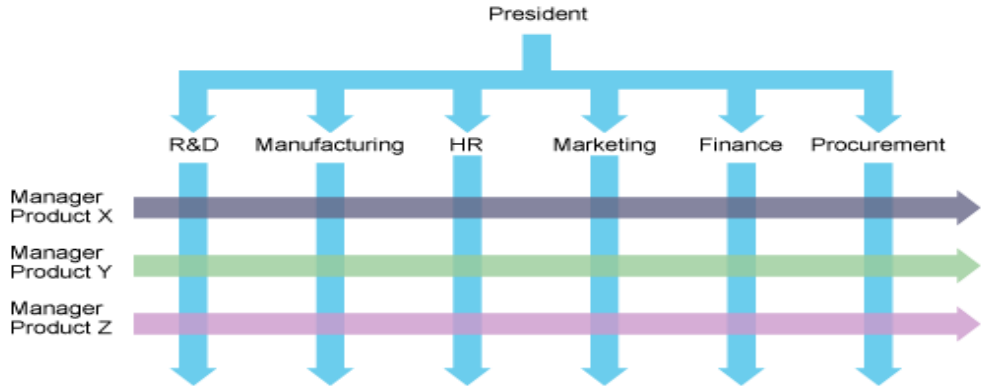


Figure 3-19: Matrix structure

A matrix organisational structure is more useful for organisations operating globally, because it can mix the local and global dimensions of experience. It is also recommended for companies that have products or projects that require the integration of inputs from various dimension fields; for example, the installation of a plant may need to engage part time experts from the maintenance department in solving problems relating to sophisticated technology (Bobera, 2008).

According to the Bridgespan Group (2009), matrix organisations are usually considered structural tools to solve linkage problems; however, the management of organisations under such organisational form can be too complex. Table 3-4 summarises the most significant advantages and disadvantages of the matrix structure.

Table 3-4: Advantages and disadvantage of a matrix structure

Author	Advantage	Disadvantage
Johnson *et al.* (2014, p. 441)	Flexible (mixing different dimensions together).	Length of time to take decisions.
	Integrate knowledge.	Unclear job and task responsibilities.
	Allow dual dimensions.	Unclear cost and profit responsibilities.
Bobera (2008, p.8)	Allow a better company-wide balance of resources to achieve goals.	High degrees of conflict.
	The various dimensions have reasonable access to the reservoir of technology in all areas.	The movement of resources amongst dimension units may foster political infighting.
	The product or project is the point of emphasis.	The balance of power amongst the unit managers is very delicate.

3.8.4 Project-Based Structure

Many organisations depend on project teams with a defined lifespan to deliver their businesses. A project based structure is one where a full work team is created for every single project as an

autonomous unit with a project manager placed at the top (Lock, 2014). The members of a project team are usually drawn from various units within the firm or assigned from the market. The project manager is given great power and a direct line of authority over their project team (Stare, 2011). Figure 3-20 shows an example of a project-based structure.

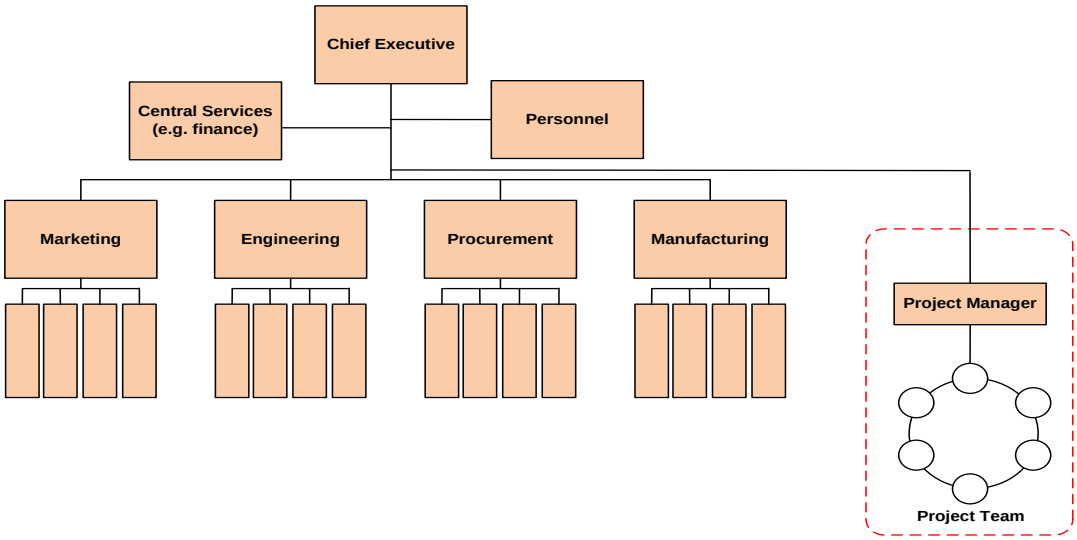


Figure 3-20: Project-based structure

According to Johnson *et al.* (2014), this type of design can be more suitable for organisations that are responsible for providing large and expensive goods or services, such as construction projects, information systems, films or when the time required to deliver an event or project, is limited; for example, delivering sporting events or engaging in a consulting agreement. Table 3-5 captures the main advantage and disadvantage of this structure.

Table 3-5: Advantages and disadvantage of a project based structure

Author	Advantage	Disadvantage
Lock (2014)	Promote the communications amongst team members.	
Johnson *et al.* (2014)	Highly flexible (set up and dissolved project team as required).	May hinder the accumulation of knowledge within specialisms.
	Accountability and control over project team is good.	May lead to ill-coordinated fashion amongst different projects.
Shaw (2011)	Allow to exchange knowledge.	Duplication of efforts and undermining the economic growth.
	Encourage project team members to work toward a common objective with clear responsibilities.	Can weaken the integration between the parent organisation & project teams
Bobera (2008)	Project team develops a high level of commitment from its members.	Increase the concern among project team members about "life after the project ends".
	Accelerate the decision-making process and facilitate the response to client's needs.	Enhancing the inconsistency in the way of carrying out the organisation policies and procedures.

3.8.5 Hybrid Organisational Structure

The organisational structures that have been discussed represent pure structure types. In reality, most organisations combine two or more structures with the aim of improving their effectiveness and to overcome the problems and negative points that can emerge as a result of adopting a single pattern (Lentz, 1996; Johnson *et al.*, 2014). For example, large construction companies are commonly organised into business units based on geographical distribution and/or specialist areas with a high level of decentralisation in decision-making and managing resources; however, some functions almost always remained centralised. These companies are neither pure multi-divisional, nor pure functional organisations; instead, they are called hybrid organisations (Lock, 2014).

According to Lentz (1996), a hybrid organisational structure allows companies to balance customer focus and economies of scale. In hybrid companies, most operating units that are responsible for securing or conducting business with the customers, are given a reasonable degree of authority and autonomy to shed bureaucracy and become more responsive to customers' needs and changes in the business environment. However, these companies also concentrate on economies of scale through centralising non-strategic units whose activities do not directly add value to customers, and these include the; human resource department, legal department, accounting department, and so forth. Thus, the hybrid organisational structure helps companies to focus on their overall direction, by avoiding the sub-optimisation of business units, that is often associated with decentralised companies, and promoting installation integrative processes across business units (Stokes, 2005).

Moreover, a hybrid structure gives an organisation the opportunity to share information and decision-making between the corporate headquarter departments and operating units (Lentz, 1996). Many functional organisations have realised that holding the entire decision-making authority at the centre level would lead to two outcomes: first, that whatever their abilities to make the right decisions, these may never be suitable or meet customers' requirements at the operating business level. Second, it could create bottlenecks in the decisions flow, which considerably affects efficiency (Sungau *et al.*, 2013). The management of divisional companies, on the other hand, recognises that focusing just on operating units may lose the harmony and coordination across the various business units and make them compete against each other for scarce resources, resulting in harming the overall organisational performance (Bobera, 2008). In hybrid organisations, the authority of decision-making is generally divided between the centre and the operating units. Meanwhile, the centre has the responsibility for drawing and

designing the overall organisational strategy, the operating units are concerned with making decisions related to marketing and production (Lentz, 1996).

In functional organisations, work is carried out by different functions and thus the workflow becomes a series of hand-offs between those functions. Yet, the focus of functional areas on their internal objectives and affairs would impede the coordination of action when a product goes through its sequential processes (Shtub & Karni, 2010). In contrast, concentrating work on a specific product to a specific market helps to maximise speed and flexibility in responding to customers' needs and business changes. However, it may also hamper cooperation and knowledge transfer among the business units through, first, preventing personnel from noting the opportunities for new services or products that can be existed somewhere in the space between business units. Second, the corporation may not develop corporate leaders as business units selfishly hold on to the organisation may not be able to develop corporate leaders since business production units selfishly work on controlling their high potential employees to sub-optimise their own needs (Johnson *et al.,* 2014). Nevertheless, hybrid corporations, according to Lentz (1996), move away from both of these workflow management arrangements by organising the workflow according to customer's needs. Work within hybrid corporations is completed by small teams embracing employees of different functional areas. This arrangement allows the workflow to be one continuous stream, improves the coordination between the functional areas and removes the boundaries between pieces of the value chain. Moreover, career progression in hybrid organisations also shifts away from the traditional view which sees that personnel should belong to a specific functional area or a business unit. Although functional specialists still exist in hybrid corporations, the concentration is more oriented toward developing core competencies that define the standards of leadership required for each managing position throughout the organisation (Lentz, 1996).

Nevertheless, the hybrid organisational structure has also a number of weaknesses as Chand (2015) argues. These include:

1) Conflicts between corporate departments and divisions;
2) Excessive administration overhead;
3) Slow response to exceptional situations. Chand (2015, para,7)

3.9 Information Technology (IT) and Process

According to Kung and Hagen (2007), a business process can be drastically improved by integrating appropriate IT support applications and process redesign. They found that such integration can significantly contribute to a reduction of the redesigned business process cycle times, improving the reliability of the process, and making process-related performance more visible. Willaert *et al.* (2007) consider that IT forms an essential element of the performance improvement programmes of companies. IT can adopt different roles at different stages of the process redesign, and in this context, Skrinjar *et al*. (2010, p.10) refer to the three main roles for IT namely: 1) creating new needs and opportunities (new products and services); 2) process redesign support; and 3) process execution support.

In regards to the construction industry, IT has been seen as an incentive to many BPR initiatives and the driver behind changes in the companies' processes across the project lifecycle (Kagioglou *et al.,* 1999). IT can be seen as an enabler that facilitates the effective implementation of the process through:

1) Facilitating integrating systems and sharing databases which enable providing information for many places from a single source, thereby reducing the cost, time and effort needed to follow and perform end-to-end processes (Presley, 2006);
2) Enhancing knowledge-based systems, which enable workers with general knowledge to undertake specialist activities and delegate decision-making to personnel in the way that supports organisational goals (Hendriks, 1999);
3) Providing effective and efficient communication means, which allow distributing of work and enable decentralised management of organisations (Yu *et al*., 2005);

Although, information technology is not the main focus of this research topic, due to its importance as an enabler and facilitator for any process redesign effort, it becomes incumbent on the researcher to consider the most significant solutions that are provided by IT to support the business processes in construction contracting companies throughout the project lifecycle.

3.10 Summary

This chapter has discussed the emergence of 'business process', 'business process orientation', 'process documentations and mapping', 'process modelling' and their rising role in enhancing business improvement in general and the construction industry in particular. The body of this chapter consisted of three major interrelated parts.

The first part was devoted to discussing the emergence of the notion of business process, the concept of business process, and its importance, elements, and types. The discussion then highlighted the concept of business process orientation, its role in improving the performance of organisations, and the main approaches used in the implementation the concept of business process. The discussion revealed that Business Process Management can be seen as the most appropriate approach to employ in order to increase business process principles in IQGCCs and thus produce a step change improvement in their performance.

Nevertheless, a prerequisite for performing any dramatic performance improvement using BPM, is to have a clear understanding of the organisation's core business processes; however, very little is known about how these IQGCCs operate, as there are no existing process maps or indeed directives on how processes should be undertaken. Accordingly, a number of documenting and mapping techniques have been explored and compared with the aim of identifying the most appropriate modelling technique that can be utilised in mapping a process. As a result, both the Activity Decomposition Model and Integration DEFinition Function Model have been selected to facilitate mapping and to visually present the best practice of construction companies, as identified from the literature in Chapter Four and the current practices employed by IQGCCs presented in Chapter Six.

The second part of this chapter discussed the growth of process thinking in the construction industry in particular, and explained its role in solving problems inherent in the industry. It also included a review of the main themes covered by construction process research, and key initiatives proposed to map and enhance the construction process. The third part explored the impact of changing business processes on the organisational structure. It also included an explanation and analysis of several types of organisational structure employed by construction companies with their key positive and negative features. Finally, the role of information technology in supporting business process was briefly explained.

The next chapter will focus on identifying and mapping the widely accepted current practice that are adopted by large contracting firms in delivering their projects under traditional contract form. These will include identifying the high level processes that need to be performed, the main participants involved in executing those processes and their responsibilities, how and when the critical decisions should be made, and who is involved in developing such decisions. Based on this, an organisational structure will be proposed to fit the business' processes and internal stakeholders' responsibilities.

Chapter Four – Current Industry Good Practices for Large Construction Companies under Traditional Procurement

4.1 Introduction

This chapter comprises two main parts; the first investigates and scrutinises the operational processes that need to be adopted by large construction companies to deliver their construction projects to the client under the traditional contract successfully. This is with the aim of:

1) Generating a generic process map through identifying the high level core business processes in construction companies;
2) Identifying the key roles and responsibilities of the various internal stakeholders involved in performing the business processes identified in item one above;
3) Identifying the key information required by the stakeholders to execute their tasks;
4) Identifying events and intervals in the contractor core business processes, where decisions and feedback are a prerequisite and conditional precedent to proceed to the next process, including how such decisions are made, and who is involved in developing them.

In comparison, the second part aims at:

1) Developing a theoretical organisational framework based on the data identified in items above and business process principles determined in Chapter Three. The developed framework would be a generic process roadmap for continuously streamlining and improving the operational processes of large construction companies; and
2) Proposing an organisational structure that fits and facilitates a performance of the identified core business processes in an effective and efficient way.

The information and the business process included in this chapter represent the good practices, as extracted from the literature review. Both the ADM and IDEFØ process modelling techniques have been adopted to map and visually present the business processes and their interrelationships. Meanwhile, the Generic Design and Construction Process Protocol (GDCPP) has provided a template to develop the theoretical framework. Moreover, the researcher has used Microsoft Office Visio 2007 software to facilitate the process mapping and drawing the framework.

4.2 Process Modelling Levels Zero and One

Construction companies are generally considered multi-project organisations, where managing projects is their core business process, as explained in section 3.3.3. Accordingly, a construction project can be seen as the highest level (level 0) in their operational process hierarchy that is represented by the concept diagram (A0), as shown in Figure 4-1.

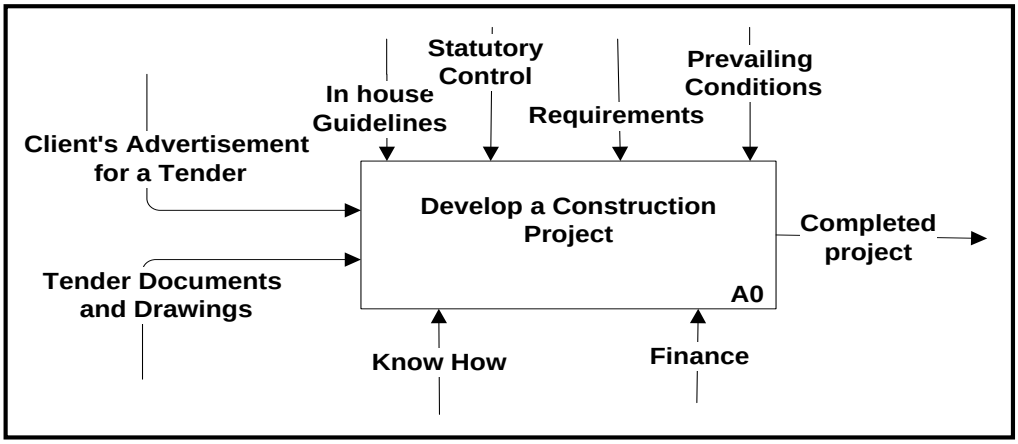


Figure 4-1: Context diagram for a construction project

Every project, not just those in the construction industry, has a beginning and an end, and passes through a number of sequential identifiable phases, in which it is 'born', it grows, it goes through to old age and it 'expires' (Bennet, 2003). These phases, or time segments, which are collectively known as the project lifecycle, provide organisation stakeholders and project teams better management control to achieve project success (Jaksic & Rakocevic, 2012).

According to the Project Management Institute [PMI] (2013), there is no a single best way to define an ideal project lifecycle. Some organisations have set themselves policies that standardise all their projects within only a single lifecycle, while others open the doors for the project management team to select the most suitable lifecycle for their projects. Nevertheless, organisations usually prefer to adopt lifecycles based on the common practices within their industry. A project from the contractor perspective can generally be divided into four main distinct phases, namely: Bidding; Pre-construction Planning; Construction; and Closeout and Termination (Bennet, 2003). Figure 4-2 depicts the decomposition of the process developed in level 0 using IDEFØ process modelling technique and represents process level one.

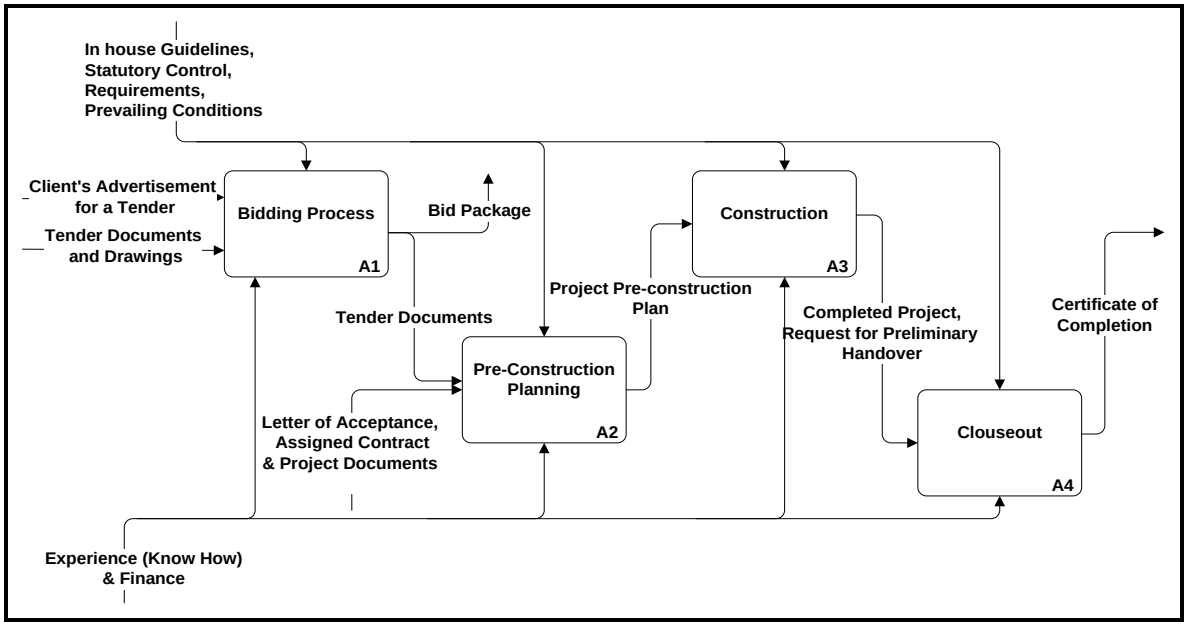


Figure 4-2: IDEFØ Level 1 the company operational process

Darnall and Preston (2012) explain that each phase within a project's lifecycle, comprises a collection of similar activities that has a quite loosely defined beginning and end. These phases are normally part of a general sequential process. Some form of technical transfer or handoff usually defines the transition from the prior to the next phase. Therefore, it is essential that outcomes or deliverables from each phase are checked for completeness and approved before commencing work on the next phase (Pandey, 2011). A deliverable is described by the PMI (2013) as a measurable, verifiable work product, such as a bidding report, project pre-construction plan, or work package. Some deliverables can be the end products or components of the end products provided to the customers or end users, whereas others are used by the internal customers in order to perform other activities (Burley, 2015).

However, Darnall and Preston (2012) state, that because the phases normally do not have clear-cut end dates, it is not uncommon for some activities in a subsequent phase to start prior to the approval of the previous phase deliverables, especially when the potential associated risks are seen low and acceptable. This exercise of overlapping phases represents an example of using the schedule compression technique, which is called fast tracking. Correspondingly, a decision can be made to close a phase and stop pursuing work on any other phases. For instance, when the project is fully accomplished or when the risks involved in continuing work on the next phases are deemed great and do not allow for the project to be continued. Moreover, the accomplishment of any phase does not necessarily include an authorisation to initiate the next. However, in order to produce a phase-dependent output for initiating the process group and to define what is expected for each phase, it is important that every single phase has its formal

initiating point, as shown in Figure 4-3. Meanwhile, ending any phase is commonly authorised after conducting a review of the phase outputs to ensure the expected objectives are met. These phase end reviews are usually called phase gates.

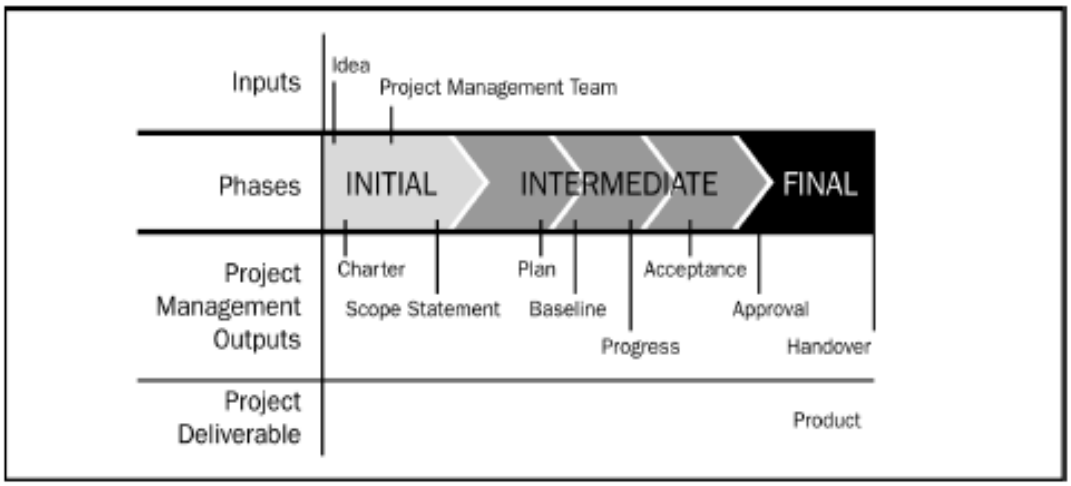


Figure 4-3: Typical sequence of phases in a project lifecycle

Source: PMI (2013)

According to the PMI (2013), an understanding of the lifecycle process is important since it allows stakeholders involved in developing projects to manage and control the various activities across the project life span through defining:

1) What technical work/activities need to be achieved in each phase; for example, in which phase should the architect's work be performed;
2) When the deliverables are to be generated in each phase and how each deliverable is reviewed, verified, and validated;
3) Who is involved in each phase; for example, concurrent engineering requires that the implementers be involved with requirements and design;
4) How to control and approve each phase. (PMI, 2013, p.20)

This view is further supported by Archibald (2003), who stresses that multi-project organisations can obtain super benefits through their efficient documenting and thorough understanding of the lifecycle process for every single project category. Archibald (2003) explains that the designing and documenting of the project lifecycle processes will:

1) Enable all concerned with creating, planning, and executing projects to understand the process to be followed during the life of the project;

2) Capture the best experience within the organisation so that the lifecycle process can be improved continually and duplicated on future projects;
3) Enable all the project roles and responsibilities, and the project planning, estimating, scheduling, monitoring, and control methods and tools to be appropriately related to the overall project lifecycle management process. (Archibald, 2003, p.41)

However, in order to provide better management and control, each phase can further be broken down into a number of stages, and each stage is aligned with one or more specific deliverables. The decomposition of these phases is presented in Figure 4-4. However, it is important to note that the achievement of the objectives listed in section 4.1 is unsuitable at this stage. Therefore, another level of decomposition of the ten processes marked by asterisks, as depicted in Figure 4.4, is important in order to capture all the organisation's key operational process throughout the project life span. The following subsections are designed to cover this issue.

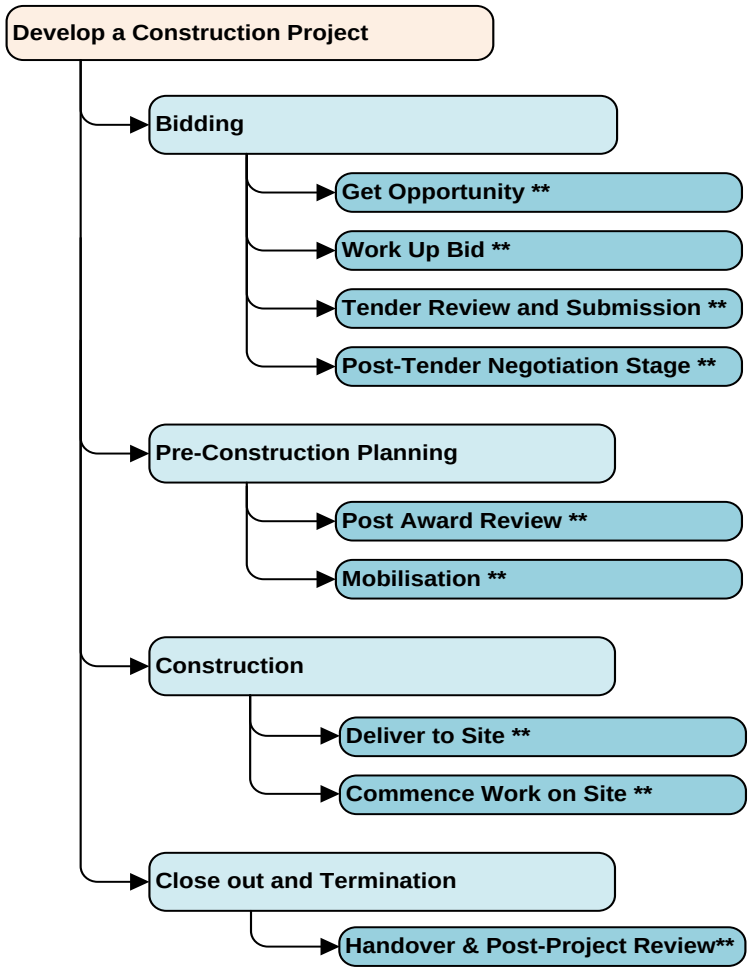


Figure 4-4: Activity Decomposition Diagram expanding the different phases' processes

4.2.1 Bidding A1 Process

The process of bidding is typically triggered by the company's needs for additional work and the receipt of an invitation for new work. It finishes with a formal acceptance and the submission of the required documents and securities, or rejection of that bid by the client and archiving the bid documents (The Chartered Institute of Building [CIOB], 2009). This process usually flows over a number of weeks; however, it may extend for some months when negotiations among the different contracted parties need longer time to reach an agreement. Figure 4-5 shows the decomposition of the A1 process into four processes (A1-1 to A1-4) by using IDEFØ. It is also important to mention here that the highlighted process, illustrated in the figure, is beyond the scope of this study, since it is related to the client's operational process.

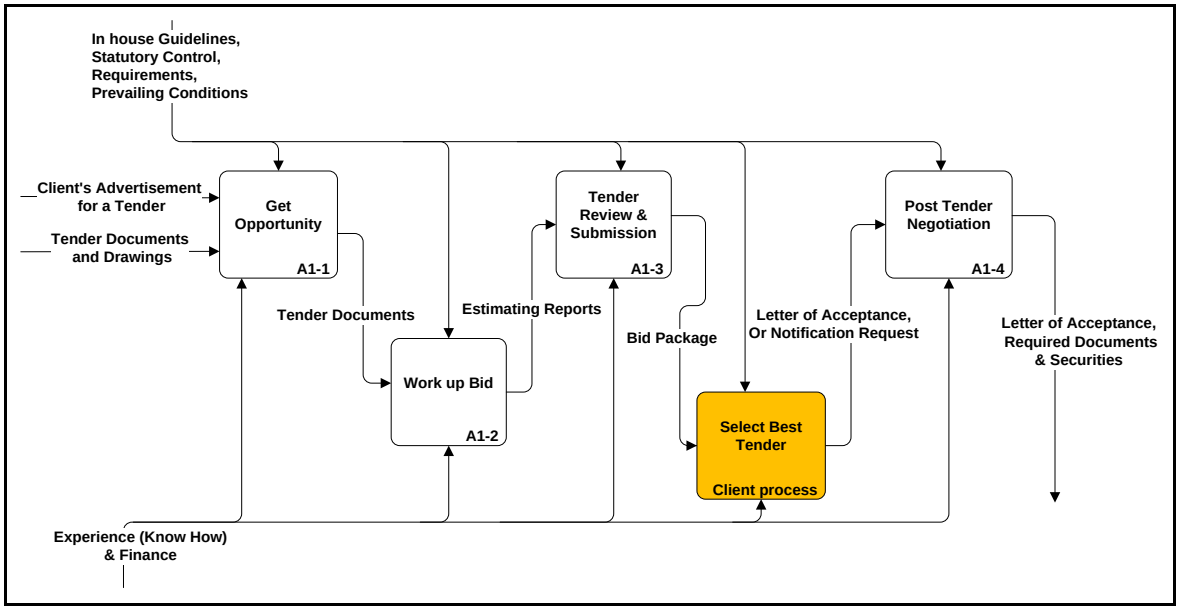


Figure 4-5: IDEFØ level tow A1 Bidding process

All the above processes are still at a high level of abstraction and do not yet focus specifically on the scope of modelling needed to capture all the organisation's key operational process. Hence, each of those processes will be explained and further decomposed in the following subsections.

4.2.1.1 Get Opportunity A1-1 Process

Construction companies, similar to those in any other industry, face fierce competition in winning a new opportunity for work. Contractors need to conduct a continual assessment of the need for additional work. This does not mean simply waiting for invitations to bid, but in such an aggressive business environment, commercial staff in construction companies are required to identify business opportunities in the geographical regions where their companies decide to

seek work. It is significantly important that contractors market their skills and convince potential clients that they have the ability, experience and knowledge necessary to undertake projects successfully and satisfy the client's needs and expectations. As Cooke and Williams (2009) assert, all construction firms should develop contacts and build a good relationship with prospective clients with a view of securing opportunities to future tenders for work and ensure that they are in the right place at the right time when the chance to negotiate a contracts presents itself.

However, the bidding process in the construction industry is usually very costly and always time and effort consuming (Brook, 2008). Therefore, contractors may not bear the expense of tendering for contracts without any thought as to the risk, the profit they can gain, or whether the type and size of work or contractual conditions are suitable. Consequently, it is extremely important that all construction companies develop their own selective tendering strategy at an early stage, so as to be on the tender lists for projects that they are keen to win, rather than wasting time, effort, and money by bidding for unattractive contracts. Indeed, developing such a strategy, according to Cooke and Williams (2009), can improve the contractor's bid-hit ratio from 1 in 8 bids to 1 in 6 or better. Nevertheless, identifying the most suitable and attractive contracts needs the contractor's commercial employees to be alive to business opportunities through checking local planning registers and local voluntary and community sector networks and publications, reading official journals where the new projects are advertised, or by regularly exploring the potential clients' websites.

Commercial members of staff also play a vital role in helping clients by answering standard questionnaires about their company qualifications and providing them with all the information that they need to list their company on a tender list. Moreover, commercial staff usually assist in collecting the relevant data and information demanded by the estimators with a view to completing estimating the currently under preparation bids, and those that likely to proceed (Baldwin *et al.*, 1995).

Opportunities to tender can arrive in a contractor's office in different ways. However, a formal invitation to tender, which is sometimes called as an '*advertisement for tenders*' or '*notice to tenderers*', is normally communicated by either letter or telephone (Brook, 2008). An invitation to tender contains basic information about the projects, such as the name and owner of the project, the location and time where tender documents can be obtained, and their cost, the bid

deposit, and bonding requirements. It also can contain information regarding the magnitude of the project and the nature of its primary materials and estimated cost (Bennett, 2003).

Receiving an invitation to a new contract can be seen as the main input into the A1-1 process, which aims to evaluate the new opportunity and develop a decision as to whether to proceed with the bidding process or not. However, the decision on whether to bid for new work, at this stage, is still considered a big dilemma and one of the most critical decisions that has to be made by contractor companies (Wanous *et al.*, 1998; Egemen & Mohamed, 2007; Morren, 2014). Not bidding might result in losing an opportunity to: increase their profit, improve their organisation's position in the market, build a good relationship with the customers, and more. Nevertheless, as mentioned earlier, bidding for inappropriate contracts could cost contractors a lot of time and resource that could be used in more profitable projects. Consequently, before committing their organisations to a new project, contractors have to consider all the internal and external factors that can influence a bid/no bid decision (Bagies & Fortune, 2006). To understand how such a decision is usually made, the Get Opportunity (A1-1) process is further decomposed into five sub-processes, as shown in Figure 4-6.

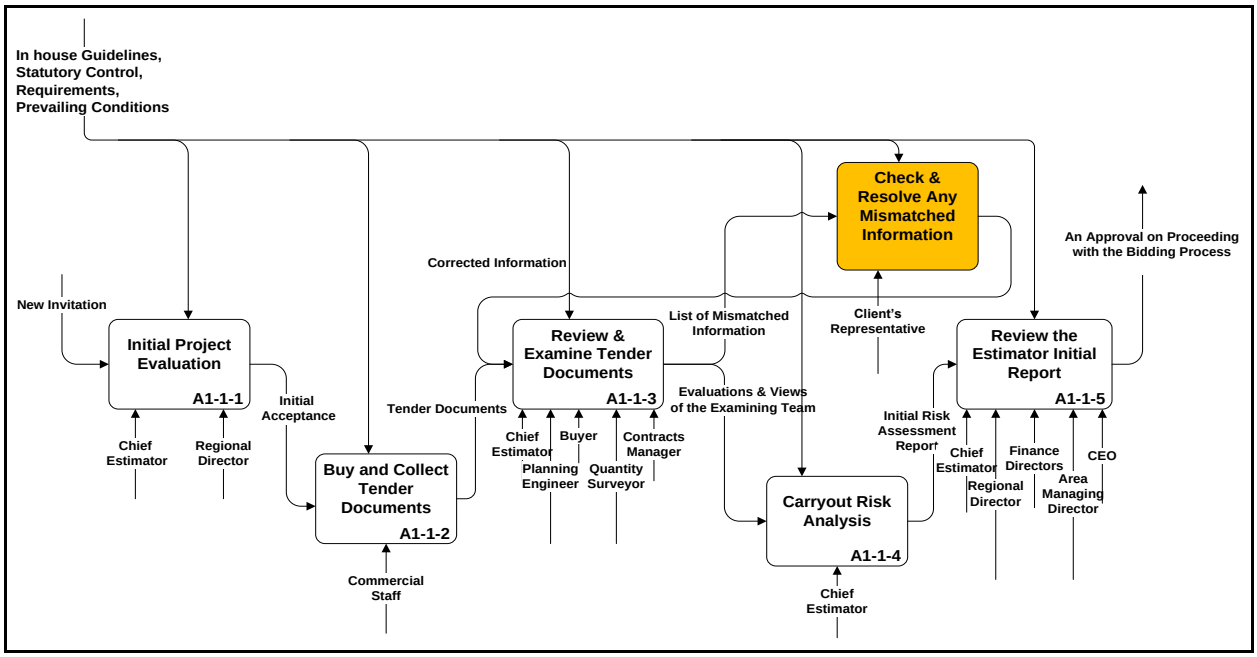


Figure 4-6: IDEFØ level three A1-1 Get opportunity process

A1-1-1 Initial project evaluation process

Based on the invitation information and other data that can be obtained from the client's staff or representative, an initial evaluation for every invitation at this stage is important to figure out whether it is aligned with the company's strategy and objectives. The initial evaluation for the

proposed project is normally conducted by the Chief Estimator (CIOB, 2009), whilst the pre-selection decision on whether to accept the invitation and proceed to buy the tender documents, is usually made by the Regional Director in consultation with the Chief Estimator (Harris *et al*., 2013). Several factors can affect the pre-selection decisions, and these might include the: reputation of the client, project type and size, tender conditions, availability of capital required, company workload, availability of time for tendering, estimating department workload, and location of project (Wanous *et al.*, 1998; CIOB, 2009). Indeed, responding to an invitation reflects that the contractor has a significant intention to submit a tender for work, yet there is still a further opportunity after buying all the contract documents to review them, in the light of the receipt of fuller information, whether to bid.

A1-1-2 Buy and collect tender documents process

After accepting the invitation to bid, it is now the responsibility of commercial staff to buy and collect the tender documents and drawings at the designated date, time and place.

A1-1-3 Review and examining the tender documents process

The first activity within this process directly starts after receiving the tender documents through checking whether the tender documentation conforms to the project information given in the invitation letter. If the Estimator finds any discrepancy in the project information, contract's conditions, programme or other areas, the tendering authority should be reported accordingly (CIOB, 2009). Hereafter, the contractor's Chief Estimator will need to examine the tender documents in detail in order to determine whether such discrepancies are so seriously significant as to discourage tendering process. However, if the initial inspection confirms that all the project documents and information conform with the information enclosed in the invitation letter, then the contractor members, including a Planner, Buyer, Designer, and the Contracts Manager, can examine these documents in detail (Brook, 2008). Examining tender documents basically aims to identify and analyse all factors associated with a new tender and their impact on the organisation's objectives and strategy in the short and long term. During this process, the Estimator, or Bid Manager, is responsible for coordinating and ensuring that all viewpoints of members who examine the tender documents are considered.

Indeed, there are several interrelated factors that need to be weighed up during this stage. Many studies and surveys have been conducted in different countries over the past decades to determine such factors. In their survey of 400 of the top general contractors in the United States, Ahmad and Minkarah (1988) identify 31 factors affecting the bidding decision. Most of these

factors are subjectively evaluated criteria, such as the type of job, location, size of job, need for work, and so on. Comparably, Shash (1993), who conducted a survey of 300 top contractors in the UK construction industry, identified 55 factors characterising the bid decision-making process. Abdelrazig (1995) also uncovered 37 factors influenced by the 'bid/ no bid' decisions in Saudi Arabia. By using an analytical hierarchy process, Abdelrazig (1995) worked on developing computer software, called Expert Choice, which aims to assist contractors in making bid/no bid decisions. Meanwhile, in the Syria construction industry, Wanous *et al.* (1998) identified 38 factors that affect the bid/no bid decision and ranked them according to their degree of importance to contractors. Other studies with similar results have been conducted in other countries, such as, Canada, Australia, Singapore, Northern Cyprus and Turkey (Fayek *et al*., 1998; Fayek *et al*., 1999; Dulaimi & Shan, 2002; Egemen & Mohamed, 2007). Finally, Enshass *et al.* (2010) carried out a comprehensive literature review regarding the factors that impact bid/no bid decisions and came up with 73 factors that can affect such decisions in the Palestine construction industry. These factors were classified by Enshass *et al.* (2010) into four categories, namely, the: contractor's related factors; client's characteristics; contract and project characteristics; and external environment, as listed in Appendix B.

A1-1-4 Carryout risk analysis process

When considering all organisation members' views who examined the project information and evaluated the bid/not to bid factors, an analysis of risks will be carried out by the Chief Estimator to identify the main potential risks and assess their impact on the organisation, the probability of occurrence, and how they can be managed (Harris *et al*., 2013). As a result of this process, an initial report with a realistic appraisal will be produced by the Chief Estimator to enable the management team to make the decision on whether to proceed with the bid.

According to the CIOB (2009), the decision on whether to bid, should be made by the company's senior managers at a meeting where the management team will review the general project information and initial report produced by the Chief Estimator. The members, who are normally involved in this meeting, are: the Chief Executive Officer (CEO), the Area Managing Director, the Regional Director, the Chief Estimator, the Finance Directors, and senior members of the estimating and planning teams. If the decision is to decline the invitation, the contractor should then return the tender documents to the client's representative. But, when the decision is to accept the invitation, the client needs to be informed that the bid will be submitted and the contract team has to quickly establish a bidding strategy (Brook, 2008).

4.2.1.2 Work-up Bid A1-2 Process

The work-up bid process generally pertains to all processes and activities required to develop, manage and produce a bid proposal. The contractor's decision to bid normally triggers the process, which ends with the production of the estimating reports. However, in order to facilitate the management and control, the A1-2 process has been decomposed into a number of sub-processes, A1.2.1 to A1.2.10, as illustrated in Figure 4-7.

A1.2.1 Prepare tender programme process

Indeed, managing and developing a bid proposal can typically be seen as managing a small project (Caithness, 2014). As in any project, it has a predefined deadline for submission, a scope that needs to be clearly understood, a process to be followed, and resources that are needed to execute and manage the process. Therefore, the activities and tasks required to complete the estimate, should be programmed carefully and a schedule of key dates established in order to monitor the tendering process in an effective way (Harris *et al*., 2013). This is because mistakes in, or the mismanagement of, the bidding process can often be costly for a contractor. For example, if the bid team members do not follow the predefined procedures, the contractor might miss the submission date, and worse can happen, as Cooke and Williams (2009, p.87) state, when, "*the contractor might lose money should the tender be successful*".

Harris *et al*. (2013) argue that the programming of estimating activities has to be completed after having decided to tender. According to the Code of Estimating Practice (CIOB, 2009), the Planning Engineer in conjunction with the Chief Estimator or Bid Manager is responsible for preparing a fully resourced critical path network of the estimating activities, showing the activities along with their durations, sequence and timings required for the completion. However, Brook (2009) explains that, because most tenders have similar activities, many construction competent companies have developed a system of pre-tender procedures and the Bid Manager will be responsible for defining the key dates and delegating the tasks to the different personnel involved in the tendering process.

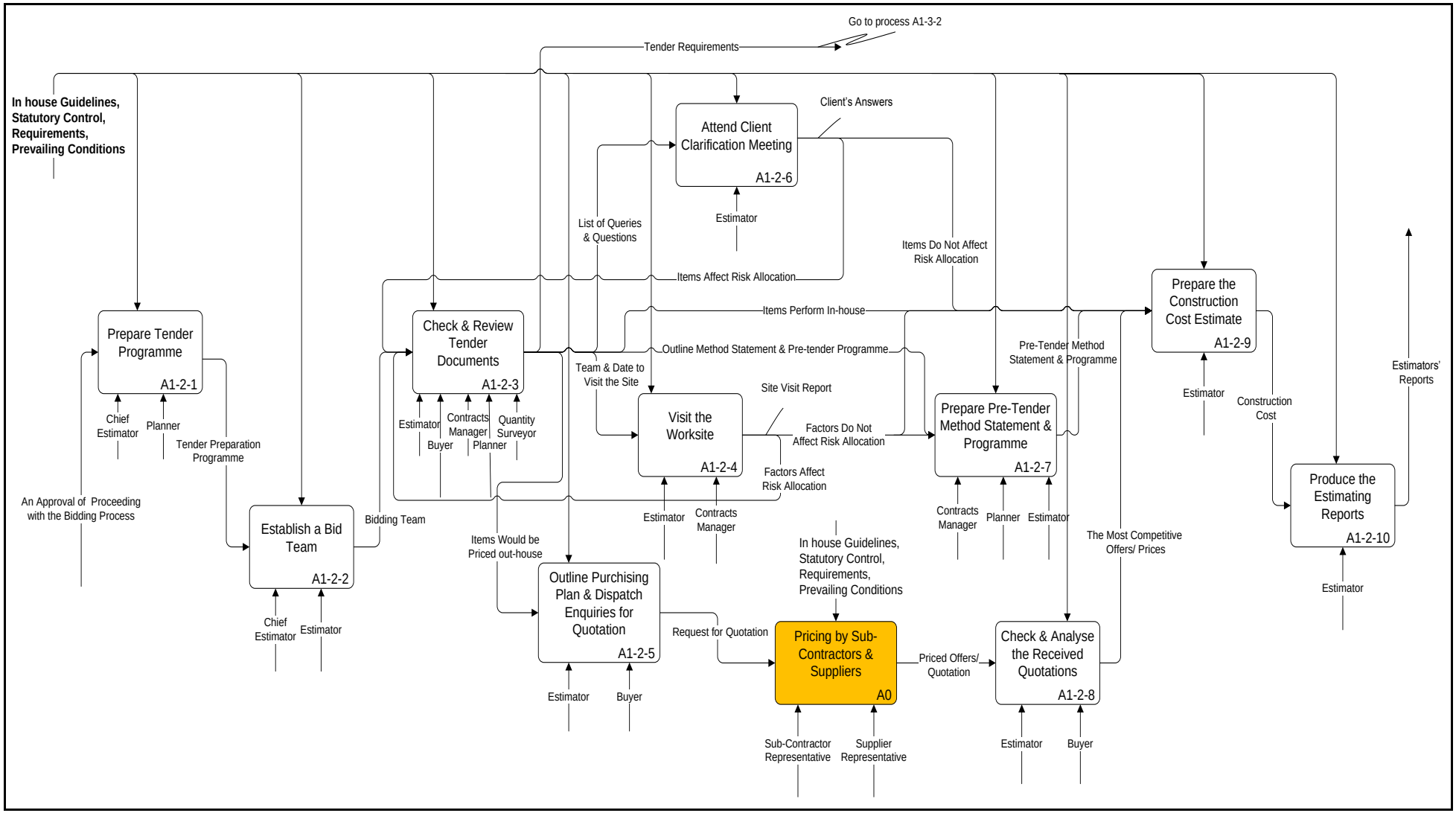


Figure 4-7: IDEFØ level three A1-2 Work up bid process

Whatever the scenario, it is vital that all people involved in the tender process confirm that they can provide the required data and perform their activities in accordance with the agreed timetable. Figure 4-8 illustrates a programme of tender activities, highlighting the main tasks included in the tendering process, their periods, and the key people engaged in this process.

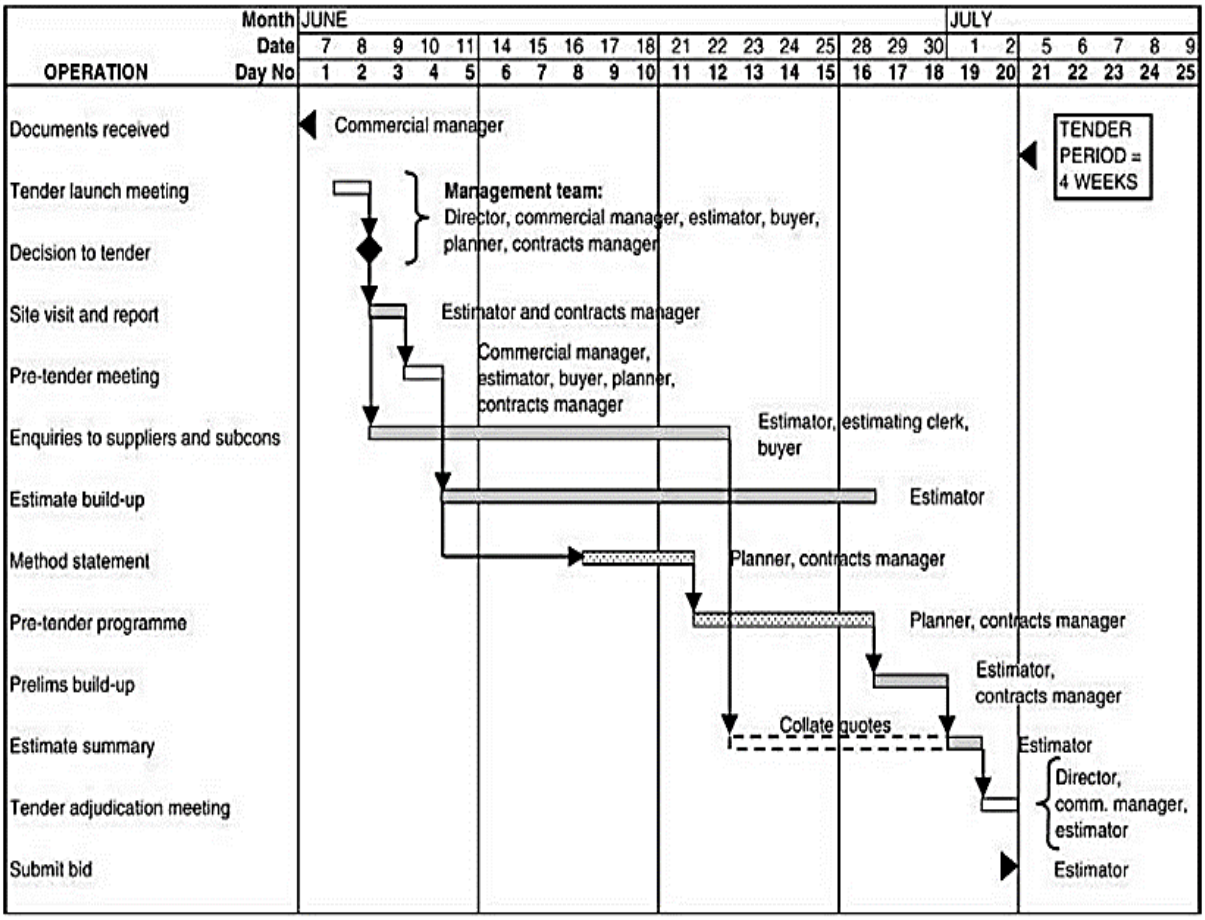


Figure 4-8: Programme of tender activities

Source: Cooke and Williams (2009)

A1-2-2 Establish a bid team process

Following the company board of directors' decision to tender, an Estimator is promptly assigned by the Chief Estimator to manage the tender and prepare the estimate (Brook, 2008). The assigned Estimator should conduct a comprehensive reading of the tender documents with the aim of developing an understanding of the proposed project and its requirements. In light of the tender requirements, a decision can then be made about the personnel included in the bid team. The Center for International Private Enterprise [CIPE] (2014) emphasises that a successful bid team should embrace a combination of employees that can bring various views, expertise, and skills to the formulation of the best solution, and proposal documentation. Cooke

and Williams (2009) argue that, in large construction companies, the bid team is generally comprised of: an Estimator, who works as a coordinator and team leader, and a Contract Manager, Buyer, Planner and Commercial Manager or Quantity Surveyor. In addition to those personnel, the International Association for Contract and Commercial Management [IACCM] (2011) explains that a bid team should also involve advisors from other departments, such as the legal, finance, and human resources.

Nevertheless, according to both Brook (2008) and IACCM (2011), the structure of a bid team and the roles of its members vary from one company to another and mainly depend on the type, size and complexity of the proposed project. For instance, some companies prefer the Estimators to take responsibility for abstracting the materials and sub-contract packages from the tender documents, and then asking the Buyer to prepare and coordinate the despatch of the enquiries and documents to suitable suppliers and sub-contractors, whilst other companies choose to restrict the implementation of this process in the estimating department. Yet reviewing the literature regarding the management of the bidding process, authors, such as Brook (2008); Cooke and Williams (2009) and IACCM (2011), contend that a successful bid team generally has to involve people who are able to handle the rules presented in Figure 4-9.

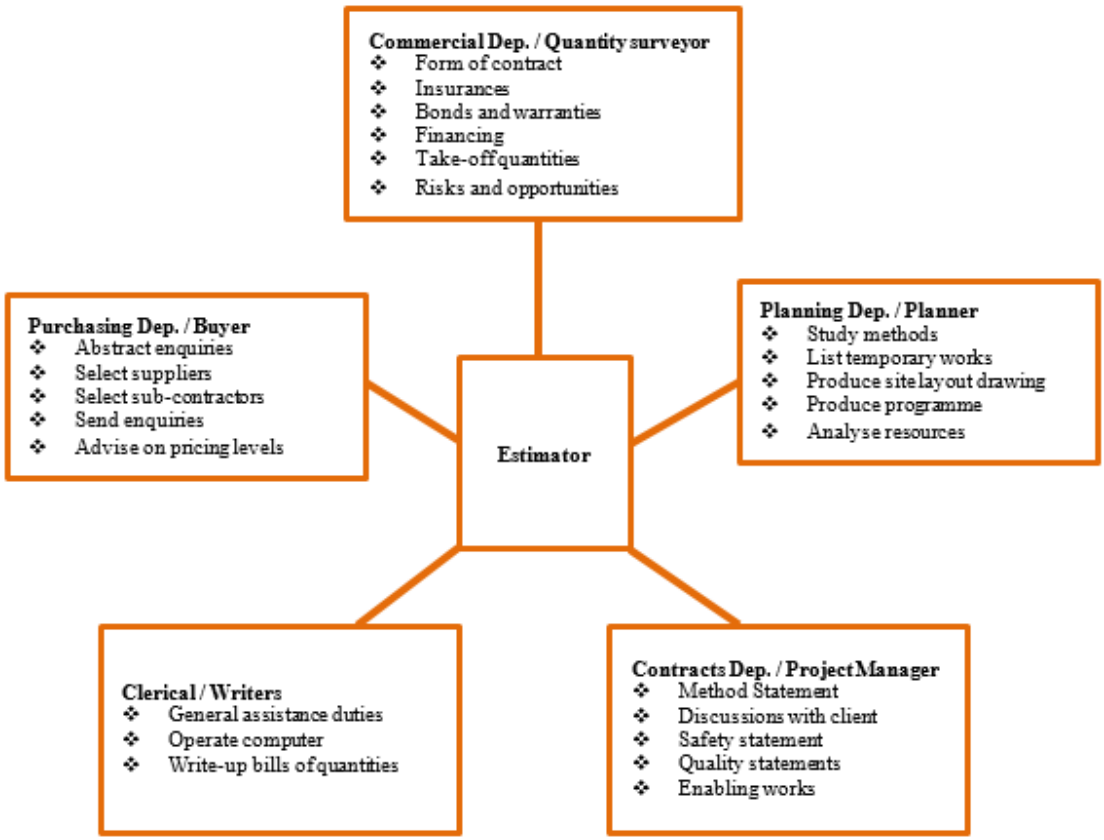


Figure 4-9: Roles of the main bidding team members

A1.2.3 Check and review tender document process

A check must be made by the Estimator to ensure that all the contract documents have been received, the related drawings are of the revision, and noted and assessed in terms of their suitability for the estimate. Such examination is also important as it helps the Estimator to indicate which documents that each member of the bid team should specifically review and read (CIPE, 2014).

After distributing the tender documents and reviewing them by the bid team, it is the responsibility of the Estimator to coordinate with the all team members to identify and establish a list of any anomalies, missing information or queries that need to be formally raised with the client or its representative. It is also essential for the Estimator, if possible, to review the client's answers to queries reported by other contractors, because such issues can influence the work's cost or risk assessment (CIOB, 2009). This can be done through visiting the client's representative office and/or through attending the client clarification meeting, which is depicted by A1-2-6 process in Figure 4-8.

Moreover, according to Cooke and Williams (2009), one of the key decisions that has to be made at this early stage by the Estimator, in coordination with other team members, is to decide on which packages or items of work that will be subcontracted. Harris *et al*. (2013) also report that the Estimator is responsible, through examining the tender documents and drawings, for extracting and quantifying all the construction materials required for executing the work by the contractor. Those packages and construction materials are then established in lists that coordinate with the in-house Buyer as an input to the A1-2-5 process.

A1-2-4 Visit the work site process

A visit to the work site should be made once a review of the contract documents and drawings is completed (Brook, 2008) and before the commencement of pricing (Cooke & Williams, 2009). The Code of Estimating Practice (CIOB, 2009) emphasises that such a visit has to be conducted in parallel with the preliminary assessment of the project and the establishment of a provisional method statement and programme for the construction activities. According to Harris *et al*. (2013), the visit is normally made by the Estimator and perhaps other members of the bid team, such as the Planner and the Contracts Manager.

The site visit can provide a great opportunity not just to assess the physical aspects of the site, but also to examine the general locality and establish links with all the local organisations that

might be necessary to deal with in order to complete the project. Typically, these can involve: local labour organisations; materials suppliers; construction companies or sub-contractors; and other local authorities that are perhaps able to provide any information regarding the local conditions and characteristics (Baldwin *et al*., 1995; Brook, 2008; COEP, 2009).

Cooke and Williams (2009, p.89) list a number of factors that need to be considered during visiting a work site for their direct influence on the contractor's tender price. These factors include:

1) Access to the work-effect on construction methods;
2) Access restriction affecting the utilisation of plant;
3) Site topography, ground conditions and groundwater levels;
4) Distance to local tips for the disposal of material;
5) Provision of site security;
6) Restrictions imposed by adjacent building and services.

As a result of the site visit, in coordinating with the Planner and the Contracts Manager the Estimator usually produces a report, or set of notes, that describes all the project site aspects, conditions and the potential risks. However, according to Cooke and Williams (2009), many large construction companies have developed a standard site visit report pro forma to use as a checklist during the visits with the aim of ensuring that important data is not overlooked.

A1-2-5 Outline purchasing plan and dispatch the requests for quotation process

The A1-2-5 process is usually performed by the in-house Buyer and involves all the activities required to establish an initial purchasing plan, prepare and send out requests for quotations and enquiries of work items that need to be subcontracted and other required material to the most suitable and qualified subcontractors and suppliers. Such requests, according to Brook (2008), should be sent together with copies of their relevant documents and drawings, and generally include information regarding the type and nature of the work, the required specifications, work site conditions, return deadline date for quotations, and the expected start date and duration of the work. Some sub-contractors or suppliers respond and return their quotations as soon as they receive the enquiries, some during the return period or just with the return date deadline, whilst others do not respond at all. However, it is usually a part of the Buyer's duty to coordinate with the sub-contractors in order to obtain the required answers on enquiries and quotations before or on the return date deadline (CIOB, 2009).

A1-2-7 Prepare a method statement and pre-tender programme process

A method statement is a written description of how work packages will be executed with detail about the type of labour, plan required and a pre-tender programme (Brook, 2008; Harris *et al*., 2013). However, the shortness of the tender period does not often allow for contractors to delve into the detail of all ways that will be followed in construction, and to describe them in the method statement. Therefore, as Cooke and Williams (2009) state, it is important for the tendering purpose, to prepare what they call it a pre-tender method statement, which is a simple outline document reflecting the contractor's general approach to the construction methodology but with little detail.

Pre-tender method statements are particularly important for both the Estimator and the Planner. For the Estimator, it represents the base on which the estimate is built, and a baseline that the Estimator can use to assess the cost of any alternative proposal. The Planner needs this document to programme the project tasks and activities (Brook, 2008). Consequently, it is essential, that the Estimator and Planner work closely and consult with the Contracts Manager and Plant Managers, to reach an agreement on the outline of the construction method at this stage of the tendering process (Cooke & Williams, 2009; Harris *et al.*, 2013)

A pre-tender programme is another significant document required by the Estimator and Planner to agree on the outline (Baldwin *et al*., 1995). The pre-tender programme shows the overall time for the project, the sequence of the key activities and their durations (Harris *et al.*, 2013). Based on the information provided by the pre-tender programme documents, the Estimator can calculate and price the labour and plant resource required throughout the project life span. Such information is also essential to the adjudication panel to judge the plans and methods proposed to manage risks related to the project (Brook, 2008; Cooke & Williams, 2009).

A1-2-8 Check and analyse the received quotations process

After receiving quotations from the various sub-contractors and materials suppliers, a check and comparative analysis should be made by the Estimators and/or the Buyer to these quotations. According to Harris *et al.* (2013), a check for the received quotations is needed to ensure that the quality and quantity of work or materials correspond to the specification of the tender documents and they can be performed and delivered as required by the construction programme. Moreover, attention should also be paid to the contractual obligations with the potential subcontractors, which must be satisfactory for all parties.

Following the quotation checking, a comparative analysis of prices must be made to select the most competitive offers. To do so, the Estimator may need to make adjustments for variances in the quotations received. For instance, this might include making allowances for items not priced, qualification to the price, discounts allowed and facilities required from the main contractor for offloading, hardstandings, access, and so forth (Cooke & Williams, 2009).

A1-2-9 Prepare the construction cost estimate process

The key role of an Estimator is to calculate and determine the costs required to execute the works as described in the contract documents. This cost will be adjusted by senior management in consultation with the Estimator and other bid team members, later during the adjudication meeting, to determine the final tender price (Harris *et al.*, 2013). However, at this stage the focus is usually on identifying the sources of costs associated with the construction works and how to determine them.

The cost of construction can generally be divided into two types: direct and indirect costs. Direct costs, according to the Construction Cost Estimating Handbook published by the Department of Defence of the United State (2011), are those which can be attributed to a single task of construction work. These costs usually involve:

1) **Material costs**: the cost of material, as Harris *et al.* (2013) mention, represents above 50% of the overall cost for any project in the construction industry. Therefore, cutting any percentage of these costs can bring a sizeable increase in profits. This also reflects the importance of estimating the material costs in any tender, since any inaccuracy in the estimate might affect the outcome of the tender and the profitability of the subsequent contract (Harris *et al.*, 2013).

   The Estimator, in order to develop the cost of the material, normally depends on various sources of information. These mainly include: the current quotations from vendors and suppliers; historical costs and quotations; a materials database; commercial pricing sources, and the manufacturer's price lists (Cooke & Williams, 2009). The cost of materials must include all the other costs required for shipping, transportation and unloading, storage, test, and so forth. The Estimator should also take into account the percentage of waste and damage in construction materials by adding an allowance for each material;

2) **Labour cost**: is generally calculated for the principal categories of labour required to perform the construction tasks. These might include general labour, craftsman, tradesmen, etc. The labour cost is usually determined by calculating the 'all-in' rate for each source of labour, which is an hourly rate covering all wages and emoluments paid to the operative, all statutory costs incurred, sick pay, holidays and inclement weather allowances, and non-productive overtime (COEP, 2009). Therefore, developing a rich database that can provide accurate data regarding the contractor's crew combinations, productivity, pay rates, and so forth, might be considered a critical factor, not just to succeed in the tender proposal but also to succeed in the whole company. An Estimator's experience, on the other hand, is another key source used in estimating and calculating the labour cost. Other sources of data that can be used to estimate labour cost, as mentioned by Cooke and Williams (2009), include: labour outputs provided by subcontractors; output data obtained from price books and work study observations;

3) **Plant cost**: the tender work programme and method statement, as mentioned earlier, should establish the contractor's requirements for plants. These might involve identifying specific plant items needed for work, their basic performance, and the duration for which the plants are needed (COEP, 2009). The hourly or weekly cost of each plant can be determined by the Estimator, either through the internal calculation from first principles, which is usually made in coordination with the plant department and Contracts Manager, or through the hire's quotations. The quotations for hire can be obtained from the internal plant department rates, or from the contractor's plant subsidiary, or they can be collected from an external plant-hire company (Brook, 2008; Harris *et al.*, 2013). Cooke and Williams (2009) also emphasise the experience of the Estimator and the Contracts Manager as one of the major sources in estimating the plant costs. Moreover, they propose other sources for determining such costs, namely: random plant outputs from the site; manufacturer's output data; and the company database, regarding the plant productivity. In getting the required operation duration of plants and their hourly or weekly costs, the Estimator now can estimate the total costs of plants over the whole project lifecycle;

4) **Subcontractor cost:** is the total cost to the main contractor for the work carried out by subcontractors. This cost can be obtained from the subcontractor quotations.

Indirect and the contract preliminaries costs, on the other hand, are those which are usually known as distributed costs because they cannot be attributed to a single task of construction work. In other words, they represent the costs that do not form part of the permanent work (Cooke & Williams, 2009). These costs generally include all the site overhead costs, such as site supervision, cleaning the site and clearing rubbish, temporary site accommodation, on-site services and power, bonds and insurances, and general plant and equipment (Brook, 2008; COEP, 2009). In addition to their experience, the Estimator often receives advice from the Contracts Manager and senior management when estimating the overhead costs. The contractor database is also considered an important source that can provide the Estimator with vital information about the costs of the preliminary items (Harris *et al.*, 2013).

A1-2-10 Produce the estimating reports process

Having estimated all the direct and preliminary costs, a set of reports is prepared by the Estimator to be considered by the senior management at the bid adjudication meeting. According to Harris *et al.* (2013, p.232) these reports commonly involve:

1) A brief description of the project;
2) A description of the method statements;
3) A list of the unusual risks inherent in the proposed project and have not been adequately covered by the contract's conditions;
4) A list of unresolved problems;
5) Notes regarding any major assumption used in the preparation of the estimate;
6) An assessment of the expected profit of the project;
7) Any relevant information regarding the market and industrial conditions.

Moreover, in order to develop a full understanding of where the most important cost elements lie within the project, the Estimator must undertake an analysis of the construction costs (Baldwin *et al.*, 1995). All the costs of work included in the analysis should then be reported to senior management in cost reports, which usually provide, as Harris *et al.* (2013, p.232) state, the details of:

1) The main categories of labour that are required to perform the contract,
2) The main construction materials, their quantity and costs to carry out the project;
3) The main contractor's plant allocated to rates and in preliminaries;
4) The main contractor's own subcontractors;

5) The sums for nominated subcontractors;
6) The sums for nominated suppliers;
7) The provisional sums and day works;
8) Contingencies;
9) The amount included for attendance on domestic and nominated subcontractors;
10) The amounts included for materials and subcontract cash discounts.

Reports should also show the total hours of work and the costs for each category of labour, the total quantities for materials and their costs and total hours or weeks for each major item of plant. According to Cooke and Williams (2009), this analysis is essential to ensure that the resource totals involved in the estimate agree with those that were calculated by the Planner and that any difference is reconciled.

The COEP (CIOB, 2009) also advocates the calculation of the cash flow for the contract based on a range of assumed mark-ups, since this will give senior management an indicator for which rate of mark-up the project will be cash positive and what it will be not. This will facilitate the selection of the most appropriate mark-up for the project. Producing the estimating reports paves the way for the tender process to enter into a new stage, which is the tender review and submission stage (A1-3 process). The core processes conducted during the tender review stage are presented in the following section.

4.2.1.3 Tender Review and Submission A1-3 Process

An agreement on the final bid price should be settled before securing approval to submit the bid documents to the client. The final bid price for a construction project can generally be determined by applying the following equation:

$$\text{Bid} = [(\text{Direct cost estimate} + \text{Project preliminaries}) + \text{Mark-up}]$$

The previous stage of the tender process dealt with the activities required to estimate and determine the first term of the above equation. However, in order to reach the final bid price, the contractor needs to make a critical decision regarding the value of the mark-up that should be added to the estimated cost of the project. The mark-up includes all the allowances needed to cover the company or head office overheads, risks, and profit. Deciding on the mark-up value is usually the responsibility of the company's Board of Directors. After making a decision regarding the right mark-up, it will be the Estimator's responsibility to prepare the required bid documents for submission. Thus, the key processes involved in this stage are to: 1) settle final bid price; 2) prepare the bid document; and 3) document and submit the priced tender with all

the required documents. These processes, including their main inputs and outputs and the key people involved in performing them, are depicted in Figure 4-10.

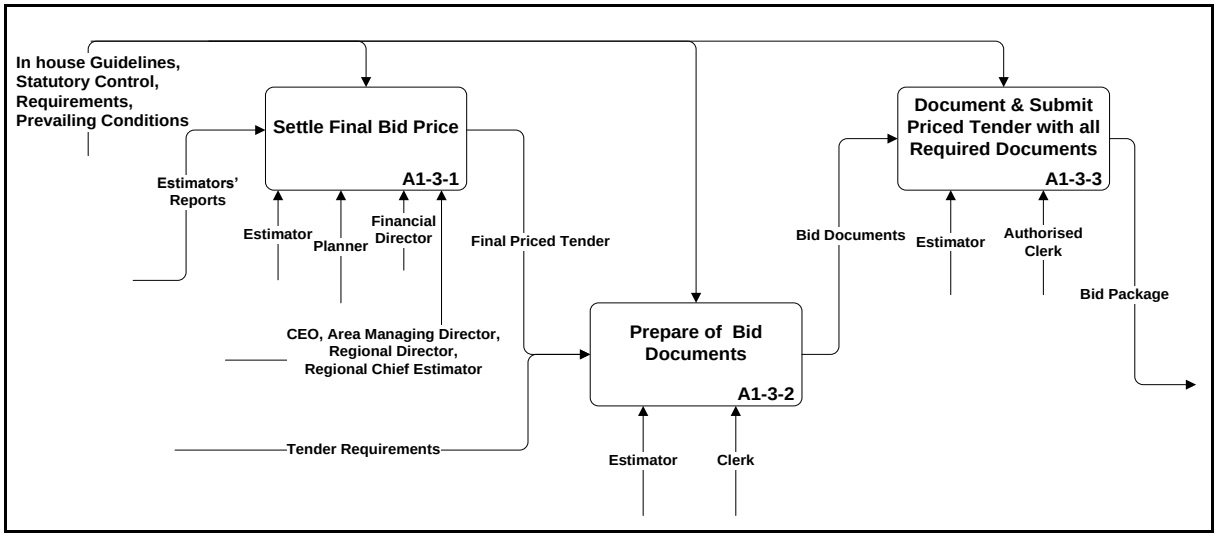


Figure 4-10: IDEFØ level three A1-3 Tender review and submission process

A1-3-1 Settle final bid price process

Settling a final bid price process is normally triggered by receiving the Chief Estimator or Bid Manager's set of estimating reports that are prepared by the Estimator, and closed by determining the final bid price. In large construction companies, the process can generally be decomposed into three main activities, as follows:

1) **Review and examine the Estimator's report**: in order to eliminate any possible errors in the Estimator's calculations for the construction cost, a detailed examination is conducted into all the rates, quotations, methodology used in the calculation, work programme and method statement. This is usually done during a meeting that includes the bid team members and is chaired by the Chief Estimator (CIOB, 2009). Based on the meeting recommendations, the required adjustment on the Estimator's reports will be made and a date to attend the adjudication meeting will be agreed.

2) **Settle the adjudication meeting**: the main aims of this meeting are to satisfy senior management that the estimate is adequate, and to settle the right value of the mark-up after reviewing the Estimator's reports and considering all commercial matters and risks (Harris *et al.*, 2013). According to Baldwin *et al.* (1995), the adjudication meeting is usually held by the senior management of the company and attended by all members who have made a major contribution in developing the bid proposal. This group of staff is sometimes known as the tender adjudicating panel (Harris *et al.*, 2013).

During the adjudication meeting, an assessment is made of whether the estimated costs of the work comply with the tender requirements. The commercial and technical matters are also reviewed to ensure, for instance, that the pre-tender work programme, methods of construction, and any other underlying assumptions are logical and acceptable (COEP, 2009). Therefore, as Cook and William (2009) declare, it is common that the Estimator and Planner, at the adjudication meeting, will be closely questioned about:

1) Plan and labour requirements;
2) Plant and labour outputs or productivity;
3) Site overhead requirements.

As a result of the review, adjustments may have to be made through adding or deleting certain resource items. However, due to time constraints at this stage, on many occasions such adjustments to the construction costs are usually accommodated in the form of lump sum additions or subtractions to the direct cost total (Baldwin *et al.*, 1995; Harris *et al.*, 2013).

After considering all the tender information, the contractual and technical risks identified in the tendering process, the construction time allowed, and methods available, the adjudication panel then has to decide on the desired mark-up. The mark-up is the allowances added to cover:

- **Company overheads**: which is the cost needed to keep the contractor's organisation in business and provide head office services to all the current projects. The costs required to operate the estimating or research and development departments are examples of such costs. According to Brook (2008), the forecast of the company's overheads is usually produced by the Financial Director based on the previous financial records and published cost indices of the company, taking into account the main factors that can affect the amount of these expenses. These factors, as Baldwin *et al.* (1995, p.87) mention, include the: anticipated turnover; market conditions; staff salaries, and the change of the interest rates. Therefore, having a good database to save such information (the annual company's overheads and factors associated with these overheads) and retrieve them at any time, is important to any company that seeks success.
- **The profit**: companies, in general, must generate profits in order to ensure their survival and expansion. It is the responsibility of the company directors and senior

managers to identify the minimum profit required by their company at the start of each financial year (Harris *et al.*, 2013). Baldwin *et al.* (1995) argue that the level of profit could be determined by considering all the demands placed on the profit earned. They summarise these demands under the following headings:

1) The dividend payable to shareholders on equity capital;
2) The monies required for re-investment;
3) The interest payment due on borrowed capital; and
4) Anticipated corporation tax.

- **Risk**: during the tender process, the Estimator has to identify all the possible risks inherent in the project. These risks are summarised in the risk report, which briefly shows the probability of occurrence for each risk, the degree of its impact on the project, and how to manage it. It is now the responsibility of the Directors to assess the commercial significance of these risks during the adjudication meeting, and determine what allowance should be added to cover any uncertainty (Brook, 2008).

3) **Produce the final bid price**: when the adjudication panel has reached a decision on the value of the mark-up, it is then the Estimator's duty to adjust the prices on the bill of quantities to produce the final tender price that will be submitted to the client. According to Baldwin *et al.* (1995, p.91) this can be done by one of these methods:

    1) Increasing all the bill item prices by a single percentage;
    2) Including a lump sum addition of monies as an adjustment item; or
    3) As a combination of both.

A1.3.2 Prepare of bid documents process

Having agreed on the final bid rate, it is essential to physically prepare and complete all forms and documents required to be submitted to the client. These documents normally include: the form of tender, covering letter, a priced bill of quantity documents, a work programme, method of construction allowed and so forth (Brook, 2008). The Estimator, with the help of a clerk from the estimating department, usually does this.

A1-3-3 Document and submit priced tender with all required documents process

The process embraces all activity required to document and submit the priced tender with all the required documents to the client by an authorised employee.

4.2.1.4 Post-Tender Negotiation A1-4 Process

Each contractor who submits a tender will usually be eager to know the result of their bid as soon as possible, in order to establish a plan for the construction phase of successful bids, or to archive the bid documents and reassign resources engaged in unsuccessful bids (Brook, 2008). As the COEP (CIOB, 2009) states, tenders should be opened promptly and all the tenderers, except the three lowest bidding prices, should be immediately informed that their bids have been unsuccessful. The contractors of the second and third lowest bids should be informed that their bids were not the most favourable; however, they can be re-considered if it is decided to make further improvements on their offers. Tenderers should also be notified promptly about any errors in computation within their submitted tenders and any further information required. To develop a better understanding of how contracting companies usually tackle such issues, the A1-4 process has been decomposed into a number of sub-processes. These processes may include, but are not limited to, the processes depicted in Figure (4-11).

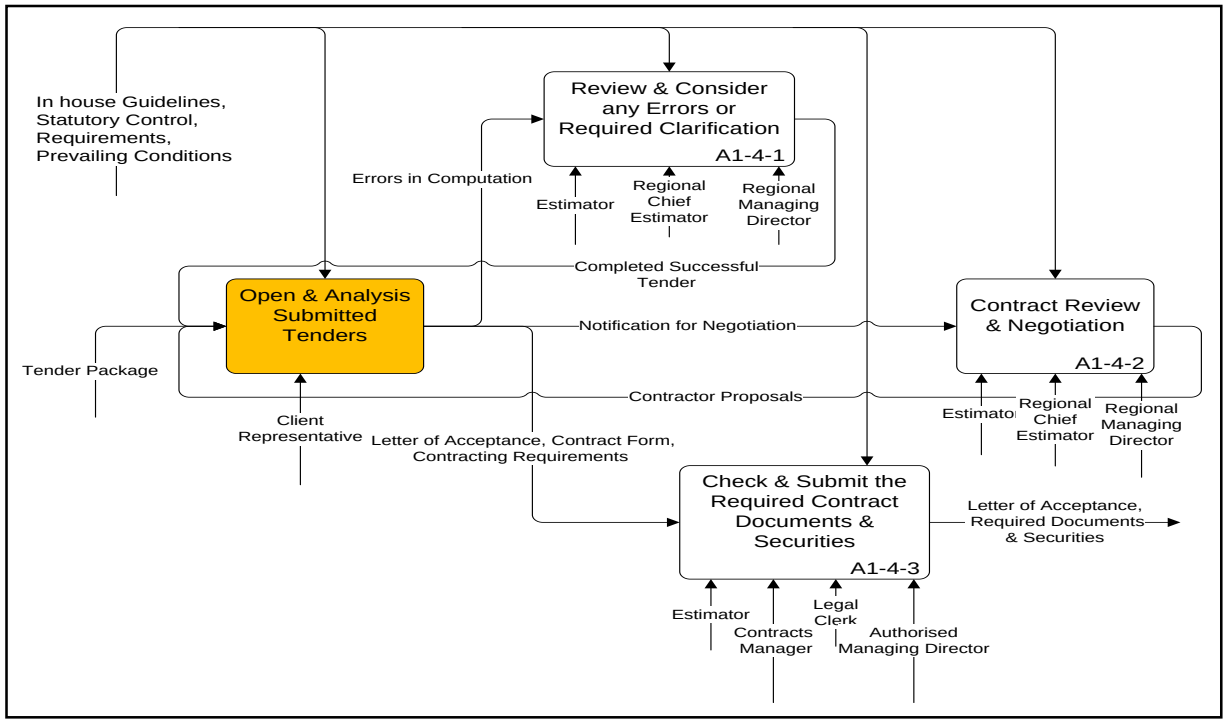


Figure 4-11: IDEFØ level three A1-4 Post-tender negotiation process

A1-4-1 Review and consider any errors or required clarification process

Estimators should be ready to respond to any request for more information, clarification or notification regarding errors in computation within the submitted tender. For errors, as the COEP (CIOB, 2009) details, the contractor may have to elect one of three options: confirm the original figure on the submitted tender; withdraw the tender; or amend it to correct genuine errors. It is the Estimator's responsibility to determine to which extent these errors affect the

tender price and consult with management in order to take the right decision. In case the contractor chooses to amend their offer and the amended bid is no longer the lowest, the client will then examine the lowest bid in more detail and this may be preferred.

A1-4-2 Contract review and negotiation process

Another approach that may be adopted at this stage is to negotiate the possible changes in the tender. This is particularly important when the lowest, or best value, submitted bid exceeds the client's budget. The process that usually follows to tackle this issue, can either continue through proposing changes in the design that reduce the scope and specification of the works, or recommending value engineering costs, such as using less expensive, alternative building materials (CIOB, 2009).

A1-4-3 Check and submit the required contract documents and securities process

When a contractor's bid has been accepted, the client's representative will then send an acceptance letter with the associated contract price to the winning contractor. However, before signing the actual contract documents, the contractor (through his Estimator and in coordination with staff from other departments, such as legal, commercial and contracts) needs to check and review all documents enclosed with the acceptance letter. This is important to ensure that these documents reflect the exact content of those used to prepare the tender. Any required documents stated in the letter of acceptance, including the submission of any required bond or securities, should then be prepared for submission to the client (Al-Ajam, 2008; CIOB, 2009). By submitting these documents, the bidding process or bidding phase can be considered to have ended. The next phase will be the pre-construction planning which generally deals with the most important processes and activities that should be completed before commencing any actual construction work on the site.

4.2.2 Pre-Construction Planning A2 Process

Pre-construction planning, which is also sometimes known as execution or pre-job planning, is the planning that is carried out to prepare a construction project for implementation (Rojas, 2009). The pre-construction planning phase includes all processes that generally take place between the acceptance of the contractor for a construction contract and the beginning of the construction work on site (Bennett, 2003). Indeed, some of these processes have already begun during the preparation of the tender and others will continue for days and weeks after commencing the execution of the fieldworks. However, the vast majority of planning processes

need to prepare and set the stage for assembling the project on the site, and are performed during the aforementioned duration.

The importance of pre-construction planning, according to Zwikael (2009), manifests through the establishment of a framework which directs the project team, once the construction work has physically commenced, as to what should be performed, when it should be performed and what resources need to be used in order to achieve the project objectives successfully. Rojas (2009) summarises three key goals that can be obtained from this process, and these include:

1) Reducing any uncertainty through planning the project in an efficient and standardised way that ensures all required resources, such as construction materials, money, plants, will be available to complete the project by the agreed time and within budget;
2) Establishing the systems that will be required to efficiently manage and control the various works of the project, such as the system required for purchasing, delivery and storage for the different construction materials; or that which is used to programme and track the project activities; plus, other processes to facilitate managing the project successfully;
3) Organising the construction work for successful fulfilment and worksite management.

The pre-construction planning process begins promptly on the award of the contract. The contractor, depending upon the magnitude of the project, may have several days, weeks, or months to plan the commencement of work on site (Cooke & Williams, 2009). The details of the processes that are undertaken during this phase may be varied from one company to another, or even from one project to another within the same company based on the time available for planning, the company's policies, and the characteristics of the project itself. However, literature, such as that by, Russell and Taylor (2003), Kerzner (2006), Zwikael and Globerson (2006), Cooke and Williams (2009) and Rojas (2009), refer to some common practices and processes that should be executed in order to develop a pre-contract project plan. These processes, according to the researcher, can be distributed over two main stages, namely: the Post Awarding Review; and the Mobilisation, as illustrated in Figures 4-4 and 4-12. The following subsections explain these stages and their relevant sub-processes in some detail.

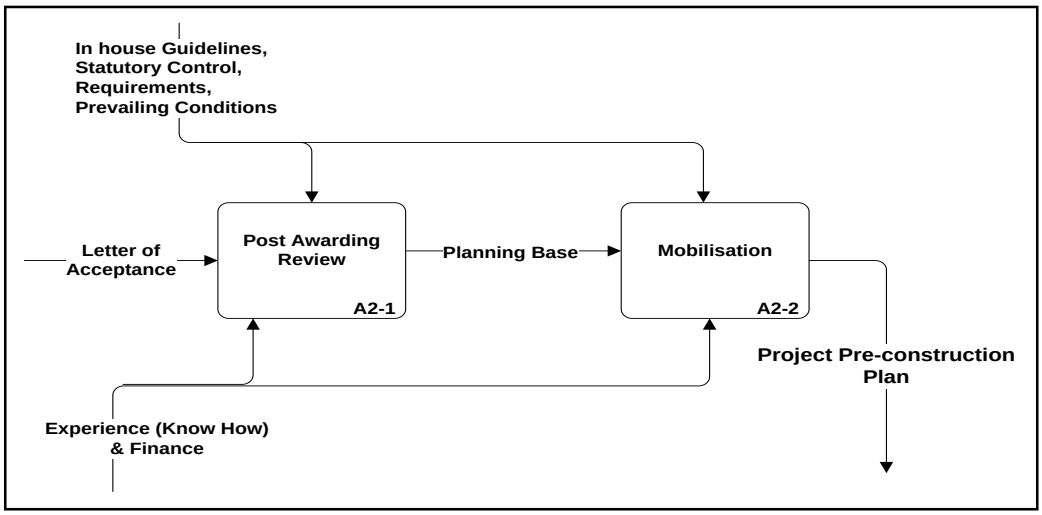


Figure 4-12: IDEFØ level tow A2 Pre-construction planning process

4.2.2.1 Post Awarding Review A2-1 Process.

Prior to commencing the work on the awarded project, a series of preparatory actions should be undertaken by the contractor's organisation with the aim of establishing a solid base for planning the project in hand. To grasp how such bases can be established, the A2-1 process was decomposed into more manageable sub-processes as depicted in Figure 4-13.

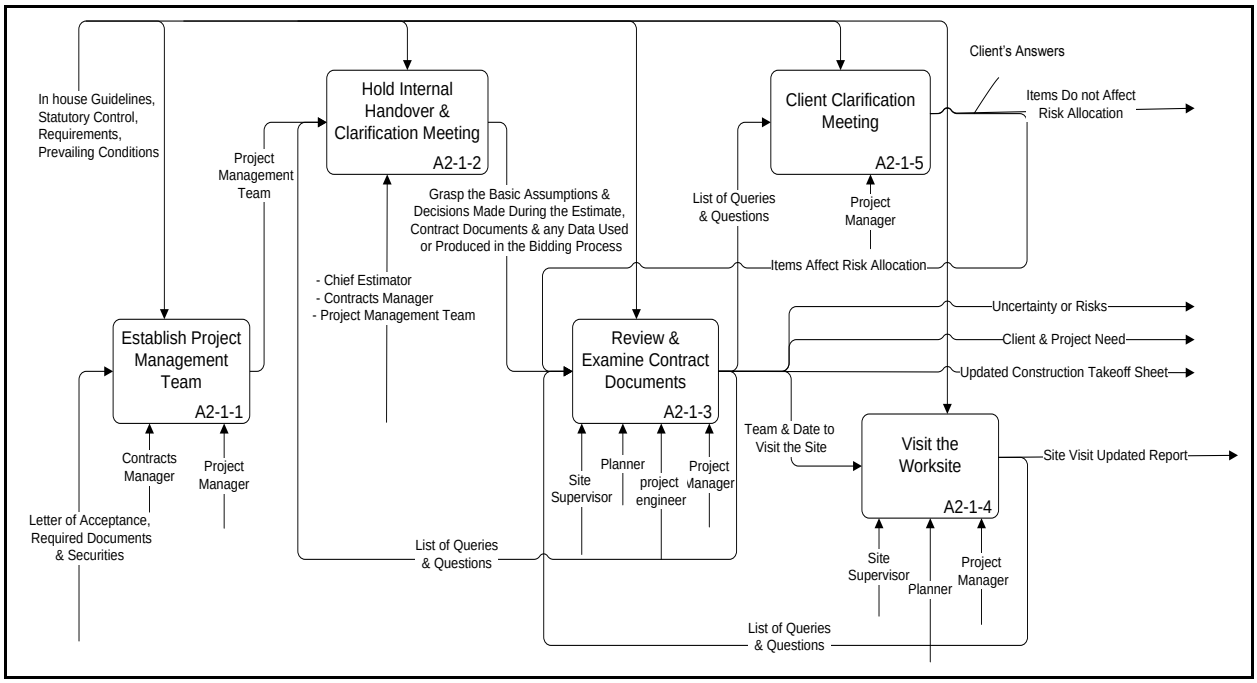


Figure 4-13: IDEFØ level three A2-1 Post awarding review process

A2-1-1 Establish project management team process

Rojas (2009) insists that establishing a project management team is one of the most important processes that should be undertaken by the senior management immediately after awarding a

contract. Establishing of this team is usually the responsibility of the Contracts Manager in co-ordination with the heads of various company departments. Project management team usually involves key personnel who will be responsible for setting up the project's pre-construction plans and managing the work during the construction phase. Therefore, the members included in such a team mainly depend on the type and size of the project (Bennett, 2003). However, according to Rojas (2009), a typical project management team can include: a Project Manager; Project Engineer; Site Supervisor; Administrator Assistant; Accountant; Buyer; Planner; Safety Director and the Estimator who was responsible for estimating the project costs.

A2-1-2 Hold internal handover and clarification meeting process

Having established a project management team, an internal pre-contract handover meeting will be held by the management team with the view of transferring knowledge between the Estimators and other project management team members (CIOB, 2009). Such a meeting can provide an opportunity to discuss key decisions and assumptions were made at the time of estimating in relation to method statements, the pre-tender programme, the site layout, and suppliers and sub-contractors. Moreover, during this meeting all the documents and data used in the bidding process will be handed over to the Project Manager (Cooke & Williams, 2009).

A2-1-3 Review and examine contract documents process

Subsequent to the aforementioned meeting, a comprehensive and detailed review of all contract documents is important, especially by the Project Manager, Project Engineer and Site Supervisor. The review mainly aims to develop a full understanding of the project requirements and details. This can involve systems that will be set up and all the resources required to successfully fulfil the construction activities, including the construction materials, labour, equipment and plants (Cooke & Williams, 2009). Thus, a construction take-off sheet, which involves all the construction materials, plants and equipment required by the main contractor with their quantities and specifications, should be prepared and compared to those presented on the bid take-off sheet. Any major discrepancies have to be reviewed by the Project Manager and the Estimator, whilst the verified items will be handed to the Buyer in order to procure them (Rojas, 2009). It also services the Project Manager and his team to identify any uncertainties or risks embedded in the project within this review. Therefore, particular emphasis on examining the general and special conditions of the contractual agreement, the project plans, specifications, programmes, and method statement, is important at this stage (Rojas, 2009).

A2-1-4 Visit the work site process

Synchronized with, or promptly after finishing the document review, a visit to the site should be conducted by the Project Manager who would usually be accompanied by other staff, such as the Planner and Site Supervisor. The aim of the visit is to examine the existing general site conditions and compare them to the conditions presented in the drawings and those described in the specifications. This may include examining the site access, materials delivery routes, storage locations, car parks, and accommodation site and safety requirements. As a result of the document review and site visit, lists of questions, discrepancies and issues that require clarifying and solving will be created and submitted to the client's representative, Contracts Manager and/or the Estimator to be answered as quickly as possible (Rojas, 2009).

A2-1-5 Client clarification meeting process

This process aims to establish initial contact between the various project parties (client, designer, and contractor). It also provides a chance to open channels of communication for the distribution and exchange of information and to answer and clarify any queries or ambiguous issues related to the project. The meeting is usually chaired by an Engineer or Architect and attended by a client's representative, design team, and contractor Project Manager (Cook & Williams, 2009).

4.2.2.2 Mobilisation A2-2 Process

Having established a project management team and developed a better understanding of the project's requirements and scope, the project management team is now ready to develop a project baseline plan. This plan generally comprises a number of functional plans. Developing each of them means going through a specific sub-process, which, as a whole, generates what is widely known as a 'mobilisation' process. The decomposition of the mobilisation process is illustrated in Figure 4-14.

In fact, many of these processes have been launched during the tendering phase and their entire outputs checked and reviewed by the planning team during the previous stage. However, at the mobilisation stage, the concern will be on developing the products of these processes in more detail in order to form a baseline for monitoring and controlling the construction works. It is important to mention here that many of the processes at this stage are integrated, interrelated, and can concomitantly be performed. A brief description of these processes is as follows:

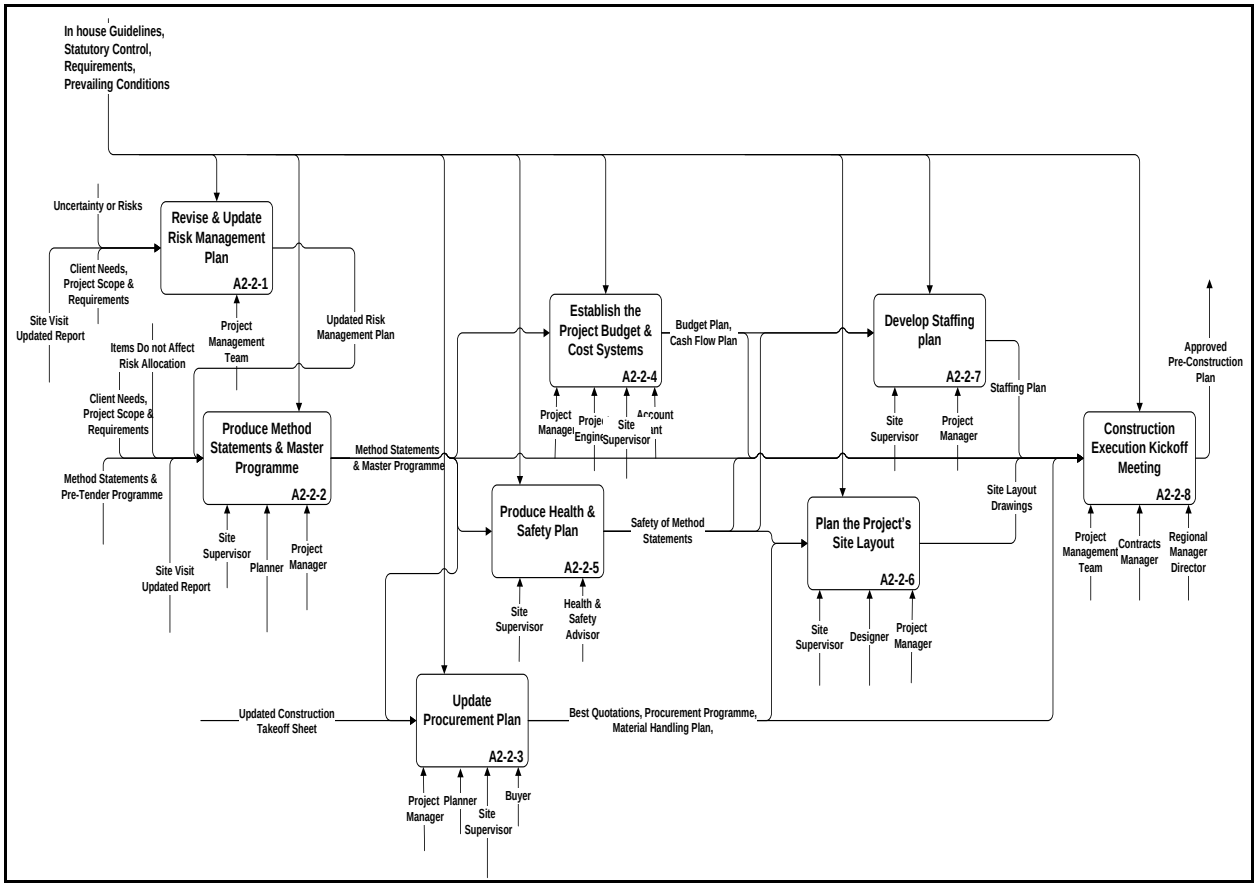


Figure 4-14: IDEFØ level three A2-2 Mobilisation process

A2-2-1 Revise and update risk management plan process

The Project Management Institute (2008) in the 'Guide to the Project Management Body of Knowledge' considers risk management as one of the nine knowledge areas required in managing construction projects. Project risk management involves the processes concerned with identifying, analysing, and responding to project risk, with a view of reducing the consequences of adverse events and maximising the result of positive events (Filicetti, 2008). A project risk management plan, according to Raydugin (2013), is a document that ties together the main components of a risk management system, namely the:

1) Organisational framework which includes a description of the project objectives and the challenges it may face, the responsibilities of the project staff, types and frequencies of risk review activities, and risk reporting and escalating;
2) Risk management process, which is an algorithm to identify, analyse, monitor, and handle all potential deviations from project objectives and baselines;
3) Risk management tools include determining the most appropriate tools required to support the risk management system.

The Committee for Oversight and Assessment from the U.S. Department of Energy Project Management (2005) emphasises that the risk management plan has to be an integral part of the project pre-construction plan that informs all the project stakeholders of the risks to the project, how they will be managed, and who will manage them across the project life span. From the contractor's perspective, it is a dynamic document that will usually be developed, as previously mentioned, by the Estimator at an early stage of the bidding process (CIOB, 2009), and revised and updated frequently immediately after each phase of the project lifecycle (Raydugin, 2013). The responsibility for managing project risk lies with all the members involved in a project; therefore, the writing of a risk management plan should be carried out in close coordination with representatives of project disciplines, such as the Planner, Buyer, Site Supervisor, suppliers and subcontractors (Raydugin, 2013).

A2-2-2 Produce method statements and master programme process

It is common nowadays, that contractors are required to produce a construction method statement as part of their construction documents (Lester, 2014). A method statement is basically an explanation of the contractor's proposed working methods and how the durations and sequence of operations presented on the master programme will be met (Cooke & Williams, 2009). According to Forster (2013), a method statement generally represents a basis from which the planning team calculates the duration of activities, and decides on the resources required to achieve the individual activities, plans and sequence activities in detail. It is also used later on site to guide the Site Manager on how the work should proceed. Therefore, it is important to be prepared in detail at an earlier point at this stage.

Preparing a method statement is normally done through breaking down the construction work into operations, and then deciding on the labour and plant required to perform each of these operations (Cooke & Williams, 2009). Forster, (2013) explains that the durations of these operations are calculated on the output of the gang that can be obtained from the company database and the experience of the Site Supervisor and other company members. Preparing the pre-contract method statement, according to Forster, (2013) and Harris *et al*. (2013) is the responsibility of the Project Manager, Site Supervisor and the Planner in consultation with the Contracts Manager, Plant Manager, and Temporary-works Designer.

After producing the construction method statement, it is now the planner's responsibility to develop a more detailed plan and programme for the project's time dimension (Springer, 2013). The result of this process will be a document known as the contract master programme, which

is considered an important management tool (Bennett, 2003). According to Cooke and Williams (2009), the contract master programme helps contractor management with deploying labour, equipment, and in procuring materials. Equally as important, it forms the basis for monitoring, and controlling the progress of the project as well as providing a baseline for the contractor's budgetary control and financial forecasting procedures. On the other hand, the contract master programme assists the client in monitoring the contractor's progress as the project proceeds and gives him a tool to assess his cash-funding requirements at the monthly payment stages.

Whatley (2014) emphasises that a simple contract master programme should show the major sections of the work and their main operations on site (including subcontractors' operations of work). This should clearly indicate the state and completion date for these operations with their planned sequence, and relationships between the related operations. Forster (2013) argues that several techniques, such as bar charts and network schedules, can be used to present the master programme; however, contractors usually tend to adopt the one which best suits their mode of operations and better serves their work.

Beside the master programme, it is a good practice for contractors to produce a target programme. A target programme, according to Cooke and Williams (2009), is especially used by the contractor to effectively compress the master programme into a shorter time period; this saves on time-related costs and releases resources sooner for the next contract.

A2-2-3 Review and update procurement plan process

As has been explained, it is important to establish the outline of the procurement plan at an earlier stage of the bidding process. Outlines of the procurement plan briefly include; identifying work packages, construction materials and plants needed for subcontracting or supply, determining the most qualified suppliers and selecting the most competitive quotations. Reviewed and updated procurement plans can be considered as a complementary process to that which has been begun at the bidding phase. According to Cooke and Williams (2009), this process commences with the Buyer and Project Manager evaluating all the suppliers' and subcontractors' quotations, and reviewing their qualifications. If the evaluation has shown that the quotations have covered and been obtained from the most important and qualified suppliers and subcontractors, the buyer would then need to request the 'best and final' pricing from the most competitive suppliers and subcontractors. Otherwise, more requests for quotations may need to be sent, which will then follow the same process previously explained in the bidding process (Rojas, 2009). However, Cooke and Williams (2009) also argue that, a part of some

construction companies' strategies is to ask suppliers and subcontractors to re-quote for the works after securing the contract.

The procurement policy for construction companies, as Palmer *et al.* (1995) claim, is generally based on a combination of five objectives, namely price, quality assurance, delivery schedule, supplier and subcontractor responsibility, and quantity control. So, the Buyer may face a real challenge to trade-off among these objectives while selecting the most appropriate offers. Nevertheless, a rich database, that provides accurate and updated information about the suppliers and subcontractors, in addition to the Buyer and Project manager's experience can be critical in analysing and selecting the most competitive offers (Bennett, 2003).

Negotiation of the contract price and conditions is also an important activity that is usually carried out by the contractor's Buyer; this activity is particularly important with those who have submitted the best value offers. Since such negotiation, as Rojas (2009) recommends, can save substantial costs through, for example, offering supplier discounts if materials are purchased in bulk rather than weekly, or through providing the subcontractor with new value engineering ideas that can reduce costs. Based on careful analysis and offer negotiations, the Buyer (in consultation with the Project Manager) should decide on all successful suppliers and subcontractors. The winning companies should be notified by telephone and the preparation of purchase orders and contracts for construction materials and equipment should immediately be set out. It is also significant to mention here, that procurement is a repeatable process that might continue to the end of the construction phase.

Moreover, after producing the contract master programme, the Buyer needs to work closely with the Planner to develop a procurement programme which should clearly show the procurement periods for each major component supplier or subcontractor (Cooke & Williams, 2009). Procurement periods are usually represented by bar lines on the programme, and each bar line has three milestones that respectively determine the dates of information requirement, order placement, and the commencement of the on-site operations. Yet, the procurement plan is not static, but is subject to revisions and updates as required during the construction phase.

Additionally, in coordinating with the Site Supervisor, the Buyer, according to Rojas (2009), needs to develop a material handling plan which includes setting up a process for ordering, receiving, staging and storing major materials and equipment on the worksite or at a storage location that considers the site layout plan.

A2-2-4 Confirm the project budget and cost control systems process

The contractor's priced proposal that was calculated during the tendering process, based on the quantity survey and cost estimate, will form the basis for the project budget and the system that will help the contractor in monitoring and controlling costs after the award and commencement of work on that contract (Bennett, 2003). Preparing a project budget embraces aggregating the estimated costs of individual schedule activities or work operations to produce a total cost baseline for monitoring and measuring the project performance (PMI, 2013). Thus, having an accurate set of estimated costs and construction programme can significantly facilitate the conversion of the estimated cost into a project cost budget.

Cash flow is another important part of the project financial planning for both the client and the contractor (Cooke & Williams, 2009). The project cash flow can provide the client with valuable information about when to expect payment requests and in what amounts. On the other hand, it allows the contractor's cash requirements to be planned, and gives contractors an indication of interim financing arrangements at certain points of the construction phase, which is particularly useful when revenues are not expected to cover expenses (Cui *et al.*, 2010). Cash flow can be considered an aspect of a financial budget that is presented in graphical form. According to the Project Management Institute [PMI] (2013), this graph, which usually takes the S shape, is based on a summary of the activities' estimated costs by period. Preparing this graphic can provide the contractor with a basis for tracking the overall costs as the project proceeds. Figure 4-15 illustrates the cost baseline, expected cash flow, and funding or cash requirements for a construction project.

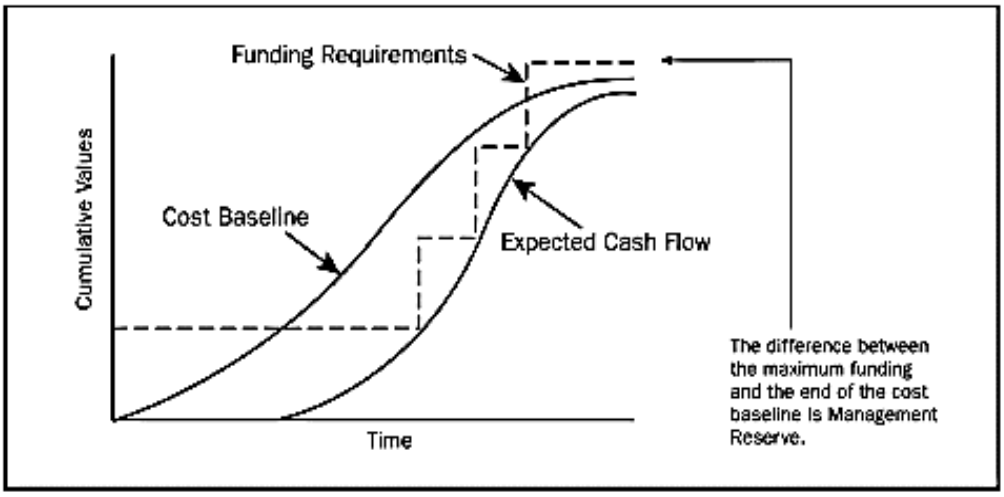


Figure 4-15: Cost baseline, cash flow, and funding display

Source: PMI (2013)

A2-2-5 Produce health and safety plan process

A good health and safety practice has generally become an integral part of good management. Therefore, as Cooke and Williams (2009) assert, successful managers should consider health and safety issues as an important matter that needs to be integrated into their planning and control strategy. A health and safety plan is firstly developed by the client's representative, who is also responsible for providing the contractor with all the specific health and safety information needed to pinpoint the possible hazards and risks that can be associated with the construction work (Hughes & Ferrett, 2011). At the tender stage, the contractor must consider this information and ensure that the tender price covers the cost needed to develop safe systems of working on site. After being awarded the contract but before commencing any work in the field, contractors should produce a health and safety plan that outlines the arrangements required to manage risks and coordinate the work on site (Hughes & Ferrett, 2011). Griffith and Howarth (2014, p.168) explain that such plan is usually developed by the Health and Safety Advisor and Site Supervisor, and should include, but it is not limited to:

1) The arrangements for ensuring the health and safety of all persons affected by the work;
2) The arrangements for the management of health and safety of the project and monitoring of compliance with health and safety law;
3) Information concerning welfare arrangements for the project.

A2-2-6 Plan the project's site layout process

Planning the project's site layout is a crucial sub-process within the pre-construction planning process that has an essential impact on construction cost, productivity, efficiency and safety (Ning & Lam, 2013). The site layout planning process includes identifying all the objects required to support and facilitate the construction activities, and determining their overall optimum sizes, shapes and location on the site of work (Said & El-Rayes, 2013). These objects themselves can be rather different from one project to another, as they are based on the type and size of the specific project. However, according to Andayesh and Sadeghpour (2013) they generally involve: temporary facilities (e.g. offices, and site accommodation); major plant and equipment (e.g. batch plant and tower crane); material storage areas (e.g. sand and gravel storage); and working areas (e.g. rebar cutting area).

As mentioned earlier, the Estimator in consultation with the Contracts Managers should identify the major project preliminary facilities and their budget during the bidding phase. At a later stage, it becomes the responsibility of the planning team, namely the Temporary-works Designers and Site Supervisor in consultation with the Project Manager, to plan the site in a

manner that will allow the construction activities to proceed efficiently and effectively, considering all the assumptions, objects, and budget established in the original estimate (Cooke & Williams, 2009). Bennett (2003) also states that establishing a site plan may need the referencing of the contract documents, the construction programme, local codes, safety standards and so forth. Kumar and Bansal (2015) explain that the outcome of this process is a set of documents that describe the site layout plan in writing and show it on 2D drawings. Yet, because the construction projects generally have a dynamic nature where many changes happen during the execution, a continuous update of these drawings is important in order to keep track of all facilities and ensure a safe construction site (Said & El-Rayes, 2013).

A2-2-7 Develop staffing plan process

The process of staffing project team members and organising the site of work is normally initiated at the mobilisation stage and continues throughout the construction process. The staffing process is concerned with all the activity required to organise project team members into effective relationships in order to secure the successful management and execution of the construction work on site (Bennett, 2003). These activities normally involve, but are not limited to: identifying and documenting project members' roles, responsibilities, authorities and reporting relationships; developing a staff acquisition strategy and resource calendar that describes who, how, and when people needed to carry out the various project activities should be acquired and released; acquiring essential team members, taking into consideration the resource calendar; improving the team members' competencies and interactions; and tracking their performance (PMI, 2013; Singh, 2015). Generally, the Project Manager is responsible for acquiring the required project team members in coordination with the contracts manager and assisting other staff, such as the Site Supervisor and Quantity Survey (PMI, 2013).

A2-2-8 Construction execution kick-off meeting

The holding of a construction execution kick-off meeting can be deemed as the final step of the pre-construction planning phase. This meeting aims to ensure that all pre-construction planning activities have been fulfilled, reviewed and are approved on the various project plans, such as the procurement plan, and to prepare construction team members for the project (Rojas, 2009). The meeting is usually chaired by the Project Manager and attended by all key members of the internal team who have developed the pre-construction planning, in addition to other external members, such as the client's representative, architect, subcontractors and suppliers (Rojas, 2009; Watt, 2014).

4.2.3 Construction A3 Process

Having established the pre-construction planning, the contractor is ready to commence the construction phase, which can be considered the longest and costliest phase within the operational process chain of construction companies. The essence of this phase is to physically execute and present the deliverables to the client for acceptance (Maley, 2012). The processes required to execute the project deliverables should be implemented according to the approved pre-construction plans. Therefore, contractors, during this phase, need to invest more effort to control and monitor different aspects of their project, managing resources effectively and coordinating the vital documentation and communication activities in order to, firstly, meet the client's requirements and satisfaction and, secondly, to achieve the project and company objectives successfully (Westland, 2006; Kim, 2011). However, works on site are usually commenced by preparing, delivering, and providing the essential facilities, materials, equipment and people needed to perform the construction works in an effective and efficient way. After establishing the main facilities on site, the build of deliverables can then be started. Therefore, the researcher suggests to divide the construction phase into two stages, namely: 'Deliver to Site' and 'Commence Work on Site'. These stages, with their relevant main processes, are featured in Figure 4-16.

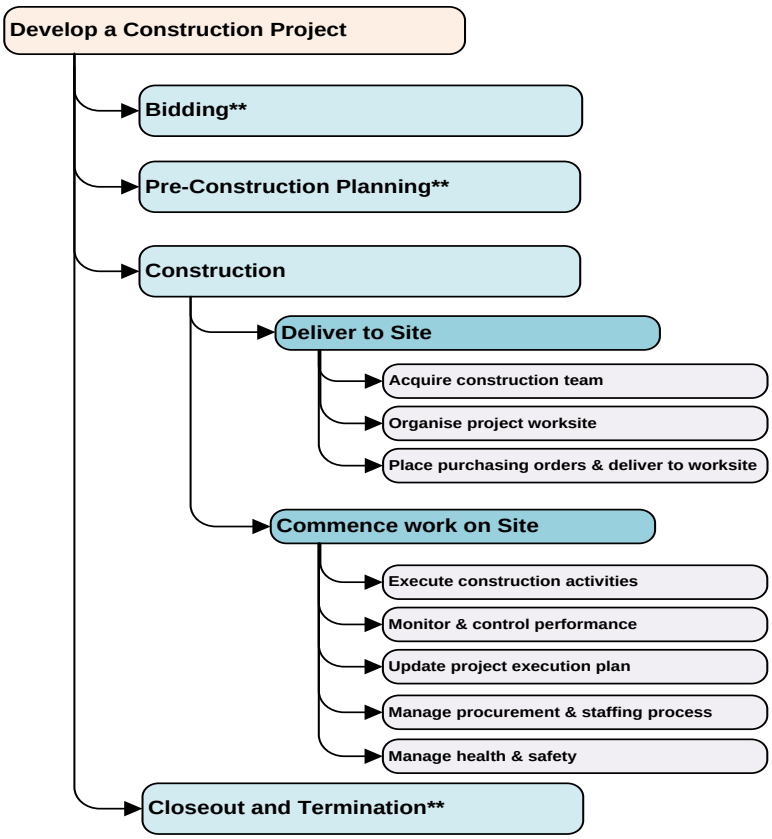


Figure 4-16: Activity Decomposition Diagram expanding construction process

4.2.3.1 Deliver to Site A3-1 Process

The Deliver to Site stage involves all processes that are undertaken to enable and facilitate the execution of project deliverables on site. These can include the processes of acquiring the construction team, organising the project worksite, and procuring the required materials, equipment, and work packages. The procurement and acquiring processes are normally started in the pre-construction planning and will continue during the construction phase. Meanwhile, those that need physical work are usually commenced in this stage and may continue to the end of the construction phase. Figure 4-17 depicts the decomposition of process A3-1 into its sub-processes, which are further explained in the following sections.

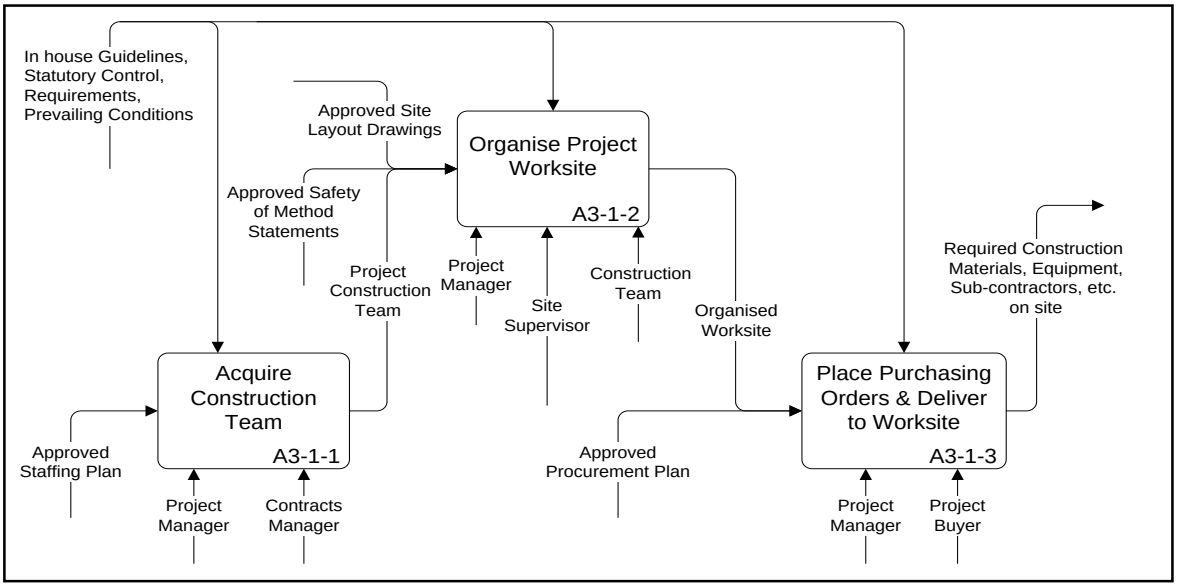


Figure 4-17: IDEFØ level three A3-1 Deliver to site process

A3-1-1 Acquire construction team process

Taking into consideration the staffing plan and company environment factors, it is the responsibility of the Project Manager, with assistance from the project management team, to acquire and organise the people needed to execute the project tasks on site. Acquiring the project team members is normally negotiated between the Project Manager and other functional managers or Project Managers; alternatively, they can be acquired from outside the organisation in cases where there is a lack in-house staff to complete the construction activities (PMI, 2013). The Project Manager is also responsible for assigning the roles, responsibilities, authorities, and reporting line to the different members within the project team and organising it in a manner that facilitates the achievement of the project objectives. The main outputs of the acquisition process are the assigned project team members and updated project staffing plan (PMI, 2013).

A3-1-2 Organise project worksite process

An essential process, as the contractor commences work on site, is to set up and organise the site in a way that allows the project activities to proceed efficiently and effectively. The overall responsibility for organising the work site rests with the Project Manager and his/her team (Hooker, 2013). The size, shape, and position of the objects needed to support the construction work should be performed according to the approved site layout plan. However, as mentioned, the project site layout is a dynamic plan that requires revision and updates during the progress of the project.

A3-1-3 Place purchasing orders and deliver to worksite process

Having produced and approved the procurement plan through the kick-off review meeting, it is then the responsibility of the Buyer to place orders to the subcontractors and suppliers as scheduled. Yet, it is important to mention that placing of subcontract orders will continue across the construction phase (Cooke & Williams, 2009).

4.2.3.2 Commence Work on Site A3-2 process

After, preparing and delivering the required facilities and resources on site, the contractor will be ready to commence the execution process with the aim of producing the agreed project deliverables as planned. Across this stage, the processes of executing, monitoring, controlling, and planning are seen as continuous interactive activities, as illustrated in Figure 4-18 (Virginia Information Technologies Agency [VITA], 2011). The stage finishes when all the agreed deliverables have physically been executed and accepted by the client. Yet, by the end of the execution process, a phase review is conducted to verify the completion of the project activities and that the acceptance criteria have been met before moving to the next phase.

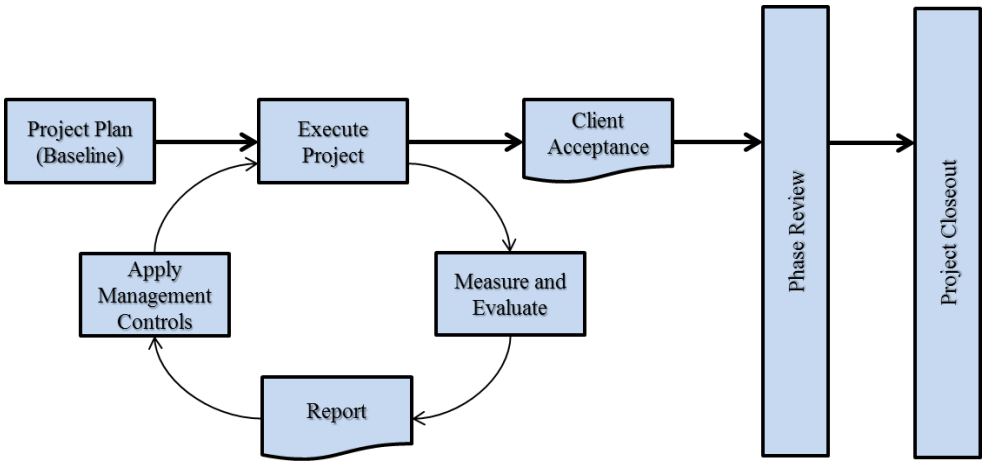


Figure 4-18: Construction phase main processes

Source: VITA (2011)

Additionally, the Project Management Institute [PMI] (2008, p.55) defines the project execution process as "*coordinating people and resources, as well as integrating and performing the activities of the project in accordance with the project management plan*". The definition clearly emphasises the importance of effectively managing people and other resources as a cornerstone to successfully achieving the desired objectives from the project. Accordingly, managing the procurement and staff process is one of the main processes that should be considered at this stage. Figure 4-16 shows the main sub-processes decomposed from the process of 'Commence work on Site'. These sub-processes are explained as follows:

A3-2-1 Execute the construction activities process

The execution of the project is simply the act of carrying out planned tasks and activities that lead to producing the project expected deliverables (McCormic & MPCS Consultant, 2010). Thus, the pre-construction planning can be seen as a road map that provides a common frame of reference for all the project team members and a basis for the successful delivery of projects (Hill, 2014). However, as Gardener (2008) argues, in reality, there is no plan that could be expected to cover all eventualities or can be performed with such precision; therefore, the project team members will always need to measure the project progress against the baseline plan and take the required corrective actions to control the performance.

Indeed, creating the project's physical deliverables is the most time and cost consuming process in a project (Westland, 2006). Whether the project is building a new hospital, constructing a highway or any other construction project, the majority of its available resource will be consumed on executing the actual deliverables, for acceptance by the client. Yet, the process undertaken to execute each deliverable will generally be different depending on the type of deliverable and project, worksite conditions, tools and techniques available, and so forth (Westland, 2006). Therefore, the description of such process cannot be achieved here in any real detail.

A3-2-2 Monitor project performance process

While the project task-teams are physically executing each deliverable, the Project Manager and other project execution members undertake a series of performance monitoring actions to measure and evaluate the activities undertaken. McCormick and MPCS Consultant (2010) state that performance monitoring generally involves the continual collection, analysis, and reporting of the project performance data and information required to provide the project team and other project stakeholders with information on the status of the project execution. Indeed, common

areas that need to be monitored, along with project operations, typically include the project schedule, costs, safety, work productivity and quality (PMI, 2013). Thus, in order to monitor these areas, different measurements or metrics are usually adopted by the project management team for comparing the actual with the planned performance of the project activities. Some common metrics that are widely used during project execution are presented as follows.

1) **Project Schedule**: monitoring the project schedule is an important function in ensuring the project's success, and requires updates to the as-planned schedule to reflect the current project progress status and to meet the project objectives (Lewis, 2011). Cooke and William (2009) assert that this function should be carried out periodically (weekly or monthly) by the Project Manager along with project management team so that comparisons and evaluations of current and as-planned progress can be made. In fact, monitoring the 'as-planned' against the actual activities' starts and completions produces a gap analysis and helps in identifying overall trends. According to McCormick and MPCS Consultant (2010), the status of the actual activities can be reported as a percentage of the 'as-planned' as follows: not started = 0%; started and in process = 1-99%; completed = 100%. They also explain that, for the purpose of the reporting period and for planning to date, other metrics are commonly used to capture the number of 'planned starts', 'planned completed', 'actual starts', and so forth.
2) **Cost monitoring:** The monitoring of project costs mainly aims to identify and report any work items that their actual costs are exceeding their budget costs, in order to take the necessary actions to bring those costs into conformance with the budget. It is also important to estimate the total cost of the project at completion, based on the costs record to date and expected costs required to complete the unfinished items (Bennett, 2003). Measuring and reporting project costs are the responsibility of the Project Manager; however, this activity is usually done by supporting Financial department and the Buyer (VITA, 2011). Harris *et al.* (2013) declare that capturing the actual construction costs for the reporting period required involve several metrics, such as; labour, services, material, subcontractors, equipment, and training. The budget variance for any work item can be determined by calculating the difference between the actual costs and planned budget of that item. Meanwhile, the percentage deviation from the budget plan is determined by applying the following equation (Mowen *et al.,* 2015).

% Deviation from budget plan = (Costing Plan – Actual Cost) / Actual cost × 100

3) **Quality**: quality is the third side of the Project Management Triangle, otherwise known as the Iron Triangle, that needs to be managed well by the Project Manager and project team alongside the other two aforementioned sides, time and cost (Horine, 2013). The Institute of Quality Assurance (2002, cited in Bennett, 2003, p.218) states that quality, in its broadest sense, can be defined as "*a degree of excellence (the extent to which something is fit for its purpose)*"; whilst in the narrow sense, the quality of a product or service can be seen as the extent to which that product or service conforms to its requirements, specification, and is free from defect or contamination, or simply provides a degree of customer satisfaction. Considering this definition, the project management team role in managing the project quality is to ensure that the technical requirements and specifications of the executed works comply with what is specified in the contract documents. This can be through following a series of steps that include planning, executing, monitoring and controlling the physical aspects of the work.

   The main processes involving the project management team in assuring quality, basically, compose both quality assurance and quality control (Bennett, 2003). Quality assurance, according to the PMI (2013), is the application of planned, systematic quality activities to assure that the members of the project are confident that the project will engage all procedures required to fulfil its requirements successfully. Thus, a contractor's quality assurance process may include, but are not limited to, all activities required to assure quality, such as suppliers and subcontracting selection, training programme and the various testing activities. On the other hand, quality control is about reviewing and monitoring specific project results, together with management and documentation practices, that are geared to ensure that project results comply with the relevant contractual requirements and identifying ways to eliminate causes of unsatisfactory performance (American Society of Civil Engineers, 2012; PMI, 2013). In this context, quality control can be seen as a part of quality assurance that covers two functions: the monitoring function, through reviewing work completed to see whether it meets the requirements, and the control function, by bringing any defective work into conformance.

   Despite this, the researcher has chosen to treat quality management mainly in the construction phase of the project lifecycle; however, it is worthwhile mentioning that the quality issue must be considered throughout the whole operational process. In fact, all processes, that have been described in the previous phases (estimating, and pre-construction) or those that will be explained within the closeout phase, are geared towards

assuring a quality product that conforms to contractual requirements and satisfies the internal and external customers, as suggested by the PMI in its definition for quality assurance. Meanwhile, the main quality control techniques, as Westland (2006) professes, are implemented during the actual execution of each physical deliverable.

4) **Work productivity**: measuring and reporting work productivity is also an essential activity that should be undertaken by the Project Manager along with other members of the project management team in order to evaluate whether the work is being executed within budget and time. The information produced from this activity is used to compare with the plan. This is with the aim of determining the percentage of the deviation in productivity and subsequently taking appropriate corrective actions if required.

A3-2-3 Manage procurement and staffing processes

As previously mentioned, both the procurement and staffing processes are continuous and repeated that begin at the pre-construction phase and continue throughout the construction phase. At this stage, the focus of the project management team is to manage these processes as planned. Thus, in terms of the procurement process, it is the duty of Project Managers, on-site staff and the Buyer to monitor, review, and document the performances of subcontractors and suppliers. It is important to take the required corrective actions, update the procurement plan, and establish a basis for future relationships with the subcontractors and suppliers (PMI, 2013). Moreover, as part of the management procurement process, the project management team is also responsible for monitoring payments to the subcontractors.

Similarly, the project management team is responsible for the managing staffing process. An important activity of this process that needs particular attention at this stage is the management of the project team members since this is considered a critical success factor for a project (PMI, 2013). The ‘manage project team members’ process can include monitoring and appraising the performances of the construction team’s members, identifying and offering the required training, solving conflict and other emergent human resource issues, providing feedback, updating the staffing plan to enhance performance, and documenting the lessons learned (Newton, 2015). According to the PMI (2013) and Newton (2015) the Project Manager is the main individual responsible for managing project team, yet this can occur with support from other on-site staff, such as Site Supervisors and in-office staff including the human resources department.

A3-2-4 Manage health and safety process

Even though health and safety does not represent a side of the Iron Triangle, such as time, cost and quality, the monitoring and control of health and safety is considered a significant issue in all modern construction operations (Hughes & Ferrett, 2012; Griffith & Howarth, 2014). The primary aim of monitoring health and safety performance, as Rose and Cohrssen (2011) explain, is to provide information regarding the progress and current status of the strategies, processes and actions utilised by a company to manage risks to health and safety. Since such information can serve in: pinpointing areas that need corrective action; establishing a solid ground for constant improvement; and providing rich data on how the health and safety system runs in practice and thereby sustaining the operation and development of this system and so the control of risk (Malshe & Sikchi, 2008). In their publication A Guide to Measuring Health and Safety', the Health and Safety Executive [HSE] (2001) identifies five critical metrics that should be measured well so as to reflect the status of the performance indicators. These include: the hazard burden; health and safety management system; failure-reactive monitoring; safety and healthy culture; and planning and implementation.

A3-2-5 Package completion review process

A package completion review meeting can be seen as a checkpoint to verify completion of the construction phase before commencing the closeout and termination process. At this meeting, a holistic review of all project agreed tasks are carried out by the Project Manager and his team to ensure that they have been completed as required and met the acceptance criteria (VITA, 2011; Watt, 2014).

4.2.4 Closeout and Termination A4 Process

Closeout and termination is the last phase in the project lifecycle. The closeout processes usually begin when the project is nearly complete, and the client accepts almost all the project deliverables, but there are still a number of activities and several responsibilities that need to be accomplished (Bennett, 2003). Some of these are physical activities that need to be completed on site (e.g. site clean-up, testing and starting up various systems), whilst others call for the issue and approval of several documents and paperwork (e.g. acceptance certificate, certificate for final payment). Figure 4-19 illustrates the main core business process involved in this phase.

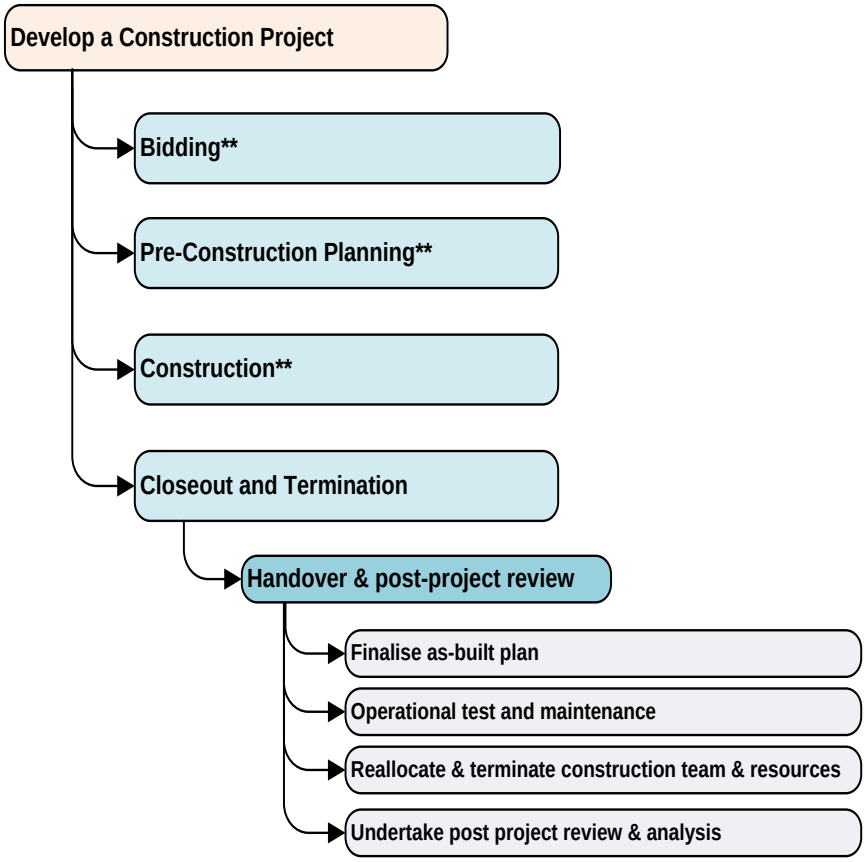


Figure 4-19: Activity Decomposition Diagram expanding the closeout and termination processes

A4-1-1 Finalise as-built plans process

The online Business Dictionary defines 'as-built' plans as "*a revised set of drawing submitted by a contractor upon completion of a project or a particular job. They reflect all changes made in the specifications and working drawings during the construction process, and show the exact dimensions, geometry, and location of all elements of the work completed under the contract*" (Business Dictionary, 2017). It is the responsibility of the project management team to maintain the recording and documenting of all changes to the contracted drawings, designs, specifications, and so forth during the construction process. Therefore, it is useful for the project management team, represented by the Project Manager, Project Engineer and Planner, to keep as-built plans current as the construction process proceeds (Bennett, 2003). These revised plans are important in determining the final quantity and thus the final required payment for the contractor. Moreover, the client or subsequent companies may also use them as a reference, whether for operation and maintenance works, or planning and executing future works (Konieczny, 2016). Accordingly, all the as-built plans with all supported documents should be finalised upon completion and a copy should be submitted to the client's representative.

A4-1-2 Operational test and maintenance processes

At the end of the project, the prime contractor is usually responsible under the contract for conducting a number of tests and initial start-ups under the operational conditions of various installed systems within the project, particularly concerning mechanical, electronic and electrical systems. These tests are often performed by the contractor project's task teams responsible for installing the systems, whether they are in-house staff or subcontractors, in the presence of the employer's on-site representative (Bennett, 2003). Yet any system that fails its test, has to be repaired and retested until it meets the satisfaction of the employer's representative. Moreover, the contractor would also be responsible for maintaining and repairing any defects and deficiencies in workmanship notified through the pre-final inspection or emerging during the agreed defects liability and final inspection (Ojo, 2010; JCT, 2016).

A4-1-3 Reallocate and terminate construction team and resources process

Although the reallocation and termination of the project team members and other resources may not be seen as an official process, it should be noted that, after completing the execution phase and producing the project required deliverables, the Project Manager in consultation with the Contracts Manager, are responsible for releasing the project members, who would be returned to their functional areas, reallocated to a new project, or their contracts terminated (Watt, 2014). This process would also include the release of other project resources, such as equipment, redundant materials, project offices, and facilities.

A4-1-4 Undertake post project review and analysis

Learning from past experiences and transferring the learned knowledge to improve other and future projects is an important element of quality management in that it enhances the continual improvement of the organisation (Watt, 2014). Accordingly, one of the most significant good practices that need to be conducted internally by the contractor is the comprehensive review and analysis of the entire range of practices adopted on every project. This helps in evaluating the organisation's performance and determining what it has learnt from such experiences so that they can be applied or avoided in the upcoming and/or similar projects (Bennett, 2003). Westland (2006) also argues that such reviews are extremely important in identifying whether the project actually has met the objectives and business benefits it expected to obtain. In other words, it gives a clear indication of whether the project was a success or a marked failure. It is recommended that this review and evaluation is undertaken by the Project Manager through a formal meeting with the key project team members and other related functional managers. The discussion and analysis during this meeting should cover issues related to nature of project

members' relations, practices and methods adopted in executing: on-site coordination, subcontractors' and suppliers' performances, safety issues, cost control and schedule issues, relationship with the client's representative, project quality control issues, and project risks assessment system matters (Bennett, 2003; Watt, 2014). Moreover, a number of members may be asked to provide written analysis and evaluation regarding the issues discussed during this meeting. Whereas, the Project Manager would be responsible for compiling the report alongside other associated reports, such as cost, schedule, subcontractors performance evaluation report; this forms part of the company's historical record.

The post-project review and analysis is considered the last process within the closeout and termination phase and the whole lifecycle of the project from a contractor perspective under the traditional procurement form. Thus, by completing this process, a complete cycle of the operational process for a construction company has been completed. The next section will present this study's theoretical transformational organisational framework, which is developed as a benchmark and guideline for promoting a step change improvement in IQGCCs' performance.

4.3 The Proposed Theoretical Transformational Organisational Framework

Cooper (1994, p.3) strongly asserts that a fundamental element to succeed every company is to have a "*formal blueprint, roadmap, template or thought process for driving a new product from the idea stage to market launch and beyond*". Without developing a formal structure and systematic way for delivering new projects, companies can easily lose their trajectory towards their desirable results as a result of forgetting or neglecting key steps. In the same vein, Lee (1998) declares that the most successful organisations are those that have developed and maintained a high-level or generic process and adapted it to fit their particular needs with every individual project. Meidan *et al.* (2017) also consider that defining and managing a set of good practice guidelines or a formal business process framework is an essential mechanism for any company that seeks to increase its return on investment and improve its performance.

As discussed in Chapter Three, over the last three decades several process initiatives, maps and models have been introduced in the construction industry; however, none have been specifically designed to improve the processes adopted by large construction companies through delivering their projects under traditional procurement. Furthermore, neither have efforts to map or optimise the core business processes of IQGCCs been undertaken. Therefore, there is necessary to synthesise a framework, which can be seen as a roadmap for streamlining and continually optimising the core business processes of these companies. It is expected that the implementation of this framework into IQGCCs will bring them qualitative attainment backup required to make them profitable and commercially viable organisations, and thereby achieving the main objective for which these companies were established under the Iraqi legislation.

The proposed theoretical framework, which will be explained in the following subsections, has been synthesised through the literature reviews, as presented in section 4.2 and Chapter Three. Indeed, the main elements of the business process orientation, namely the process view, process job, process owner, empowered task teams and process continuous improvements identified in chapter three under section 3.4, have been taken as a platform to develop this framework. In section 4.2, the core business processes for a construction company have been captured along with the key people engaged in performing these processes, the most essential events and decisions occurring throughout the process, how such decisions are made and who should be involved in developing them. The Generic Design and Construction Process Protocol (GDCPP) launched by the University of Salford, has then been employed as the key template to synthesise all the main elements identified under section 4.2 and thus form the new proposed framework.

The principles behind this are that the Y-axis represents the main drivers and controllers of the core business process, whereas X-axis represents the time scales or phases and stages of a project based on the contractor's perspective, and under a traditional contracting form. Figure 4-20 depicts the process employed in developing the theoretical transformational organisational framework proposed to improve the performance of IQGCCs.

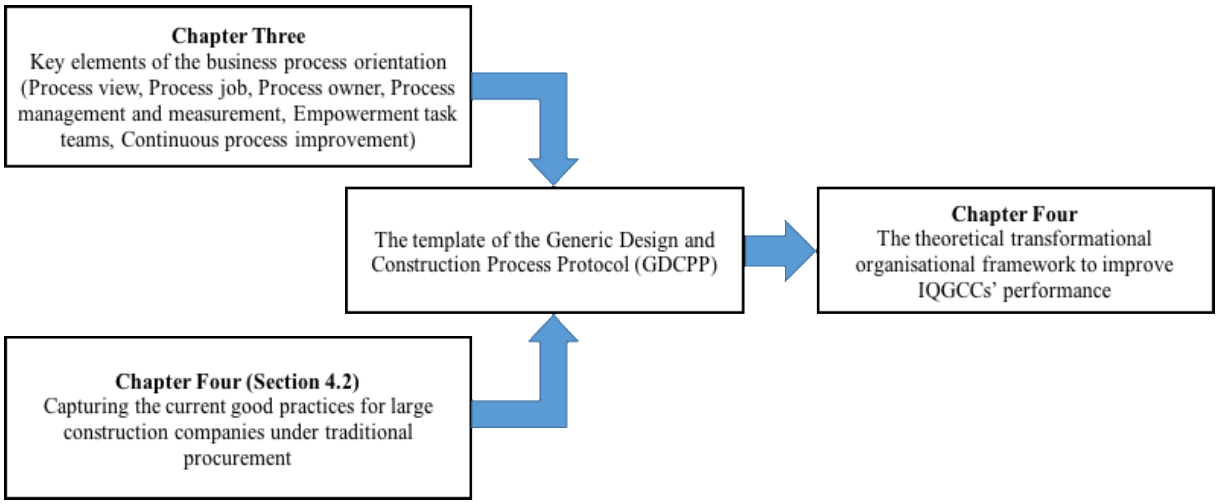


Figure 4-20: The process employed to develop the proposed theoretical transformational organisational framework

4.3.1 The Aims and Concept of the Proposed Theoretical Transformational Organisational Framework

The aim of this framework is to produce a step change improvement in IQGCCs' overall performance and thus making them commercially viable without the need for the governmental support. This is through providing them a systematic way to streamline their operational processes and an approach to facilitate the shift in their thinking from doing business with a functionally-oriented focus to one based on core business processes. Accordingly, the concept of the proposed theoretical framework has been based on the following:

1) A need for a framework that streamlines the operational business process through providing a complete road map that guides the different internal stakeholders involved in the operational process as to: what is required from whom, when, for which purpose, who are the process owners, who is responsible for making the critical decisions, and who controls the stage gates;
2) A need to develop a set of common and adaptable principles (high-level business processes) that can be applied in a consistent and repeatable manner. This is important

to allow the management, control, measurement, and improvement in the operational processes from end-to-end and thereby enhance the organisation's overall performance;

3) A need to determine process owners who take the overall responsibility for managing and improving their related processes and are accountable for the results;
4) Defining a set of repeatable business processes will facilitate and encourage companies to use IT applications in support of their information management and allow them to integrate the existing practices and IT practice-support tools for systematic operation;
5) Standardising the business process will allow companies to realise and understand the actual roles, responsibilities, experiences, and efforts of the different internal stakeholders that are needed to undertake a certain activity, and to develop training programmes based on these needs;
6) A need for a framework that enhances employees' empowerment through giving employees a wide range of authority, resources and opportunities to manage their work and hold them responsible and accountable for the outcomes;
7) A need for a framework that fosters the synchronisation, coordination, and integration of work by involving and integrating the different relevant employees into the operational process from the earliest stages and across its lifespan in order to reduce errors and create the sense of ownership amongst stakeholders.

4.3.2 Assumptions Underpinning the Proposed Theoretical Framework

The framework was developed for large contracting, construction companies that have had repeated construction works under a traditional procurement form, namely the 'design-bid-build contract' and 'unit price' agreement. In accordance with such a contracted form, the winning contractor is responsible for executing the construction project within its agreed costs, timeframe and quality.

4.3.3 The Elements of the Proposed Theoretical Framework

The proposed theoretical transformational organisational framework comprises of the following key elements, as depicted in Figure 4-21.

1) **Project Phases and Stages**

   The theoretical framework has been divided horizontally into four main phases, namely: bidding, pre-construction planning, construction, and closeout and termination. These phases have been defined to represent the different time segments required to develop a

construction project from end-to-end based on the contractor's perspective. However, in order to provide better management and control of the business processes, each phase has further been split into a number of stages, as shown in Figure 4-21. The phases and stages presented in the proposed framework are equivalent to the operational processes level one and two, respectively as modelled and explained in section 4.2.

2) Process

Processes depicted in the framework represent the high-level or generic processes (level three) generated from decomposing the project stages (level two). Each process involves a set of activities executed in a coordinated way by a multifunctional team with the aim of generating information and/or producing deliverables for other processes. The core business process is designed to be conducted at two different organisational levels, namely the regional and the project level. The regional level is where the proposed responsibility for the bidding process lies, whereas the remaining phases of the process are proposed to be the responsibility of the project management team.

3) Internal Stakeholders

The framework has been designed to comprise the key internal stakeholders that are directly involved in undertaking the core business process. Stakeholders would be grouped under various functional areas according to their specialties. The functional areas are proposed as mainly allocated at the regional level to conduct specific activities and to be a source of specialists and centres for training. Yet, based on its size, type and complexity, every project may have one or more stakeholders from each of these functional areas who together represent the project management team, which is directly linked to the Project Manager. The framework has also been designed to show who should be engaged in executing the processes and when. This would ensure that the right people have the right information at the right time. Moreover, it would also facilitate the identification of roles, responsibilities, accountabilities, experiences and efforts required by the various employees involved in conducting the different processes, and what kinds of training they need in order to ensure the processes are undertaken in an effective and efficient way. It is important to mention here, that these functional areas are not necessarily departments per se, but rather that every individual department can be formed of one or more of these functional areas.

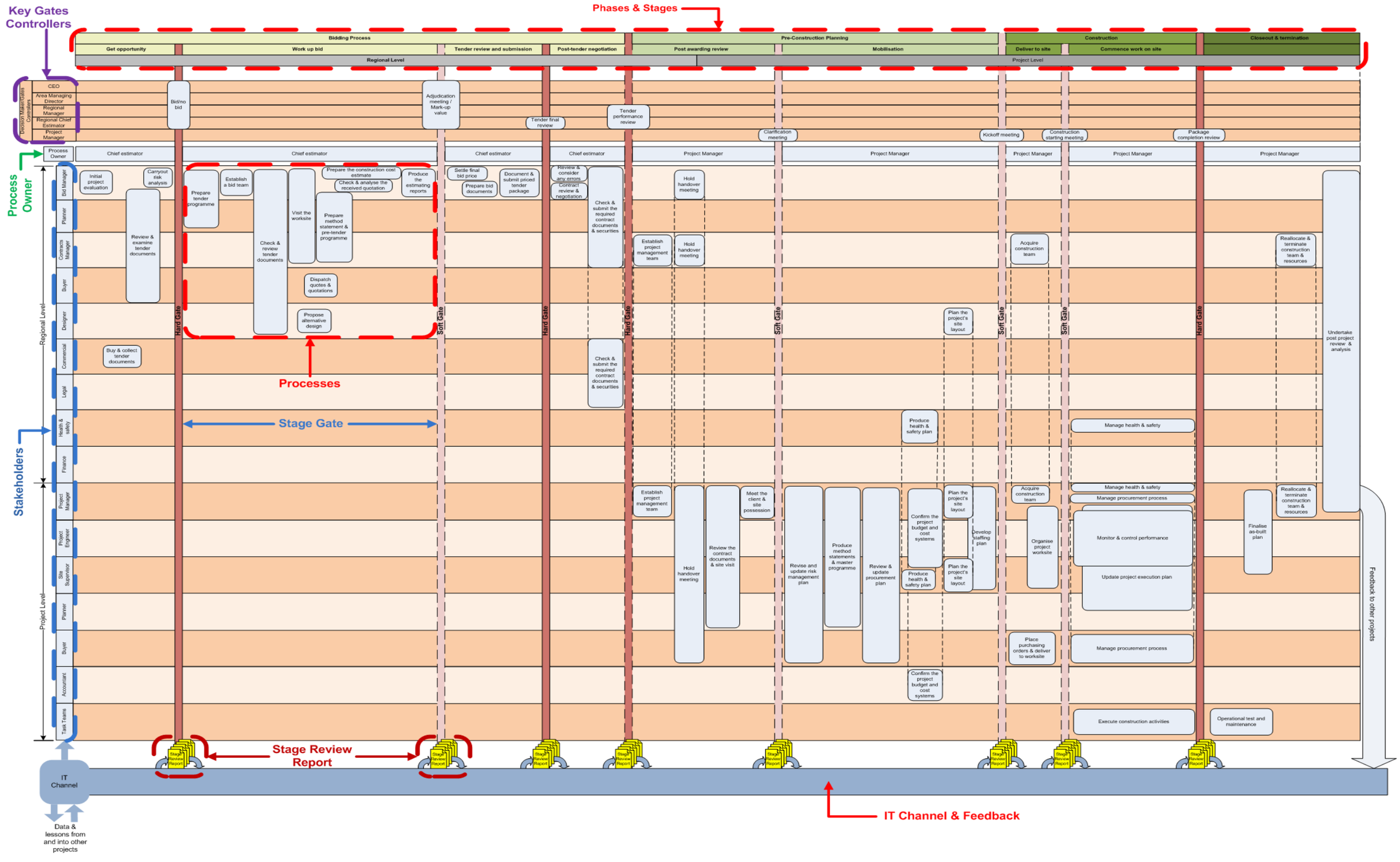


Figure 4-21: The proposed theoretical transformational organisational framework

4) Process owner

Two process owners have been identified and proposed as taking the overall responsibility for managing and improving the core business processes, namely the Regional Chief Estimator and the Project Manager. The Regional Chief Estimator is responsible and accountable for the whole bidding process, which starts by noting or receiving a tender invitation for a new project and ends by evaluating the bidding process performance and handing over all the documents and data used or produced in the bidding process to the Project Manager in case of a successful bid. In comparison, the Project Manager would take the responsibility for managing the rest of the operational process. It has also been proposed that the process owners have a great degree of authority and autonomy, whether in making decisions or in overseeing and managing resources concerning their processes. This has been visually represented in the proposed framework.

5) Stage Gate and Phase Review

Each stage of the proposed framework combines a number of business processes that should or must be performed. A stage gate acts as a quality control checkpoint at the end of each stage where preceding activities and expected deliverables are checked and reviewed before a decision is made to proceed with the subsequent stage. The framework has two patterns of gates, specifically the 'soft' gates and 'hard' gates. A soft gate authorises a conditional proceed to the next stage without first having to complete all the activities from the prior stage. Thereby, it reduces the waiting time by giving the flexibility to the process to flow into a certain stage, while at the same time providing an efficient tool to identify and note the activities that are not completed in time. In contrast, the hard gate requires that all of the prior stage's activities have been completed prior to issuing authority to proceed to the following stage.

6) Gate Controllers

In order to enhance the reliability and quality assurance of the decisions made at each stage gate, it is proposed that reviewing the process outputs at the end of each stage should be conducted through formal meetings. Such meetings can involve senior managers and employees from various functional areas. The proposed framework offers a guideline, which shows when and who should be engaged in making the critical decisions and controlling the various stage gates.

7) **Stage Review Report**

Following the phase review meeting, a stage review report should be produced. This report generally comprises the main deliverables of any work assessed, any decisions that have been made, and the compilation of all related information and documents generated by the stakeholders throughout that stage.

8) **IT channel and Feedback**

Stage review reports produced throughout the process should be stored and maintained on an electronic database. This would facilitate the recording, updating, accessing and use of the information and data generated during the execution of the business process later, as lessons learned that could improve the processes at any stage of the current and future projects. Such feedback allows the continued improvement of process through reapplying the successful experiences in the future practices and avoiding unsuccessful ones; thus, the continued improvement of the process can be ensured.

4.3.4 An Organisational Structure to Support the Proposed Theoretical Framework

As mentioned earlier in Chapter Three, changing an organisation's business process would result in changing the roles and responsibilities of people engaged in executing that process and thus the organisational structure needs to be redesigned to appropriate the new processes. In other words, the organisational structure should be reformed to ensure that employees' jobs are designed around the new business processes. Mapping the good practice core business processes for large construction companies revealed that these processes are generally performed at two organisational levels (regional level and project level) with engagement of the top senior management level in making critical decisions, such as bid/no bid and mark-up deacons. Accordingly, the organisational structure of these companies can be divided into three management levels namely: Organisational level/Top management level placed in the head office (headquarters), Regional level, and Project/Operational level, as illustrated in Figure 4-22 below.

It is also supposed that the organisation runs more than one business field or unit, such as roads, buildings, and so forth. Each of these business fields has a number of regional offices distributed in different provinces or geographical areas. Each regional office is headed by a Regional Manager; whereas the coordination between the various Regional Offices under the same business field is the responsibility of an Area Managing Director, who is placed at the headquarters and linked directly to the Chief Executive Officer (CEO).

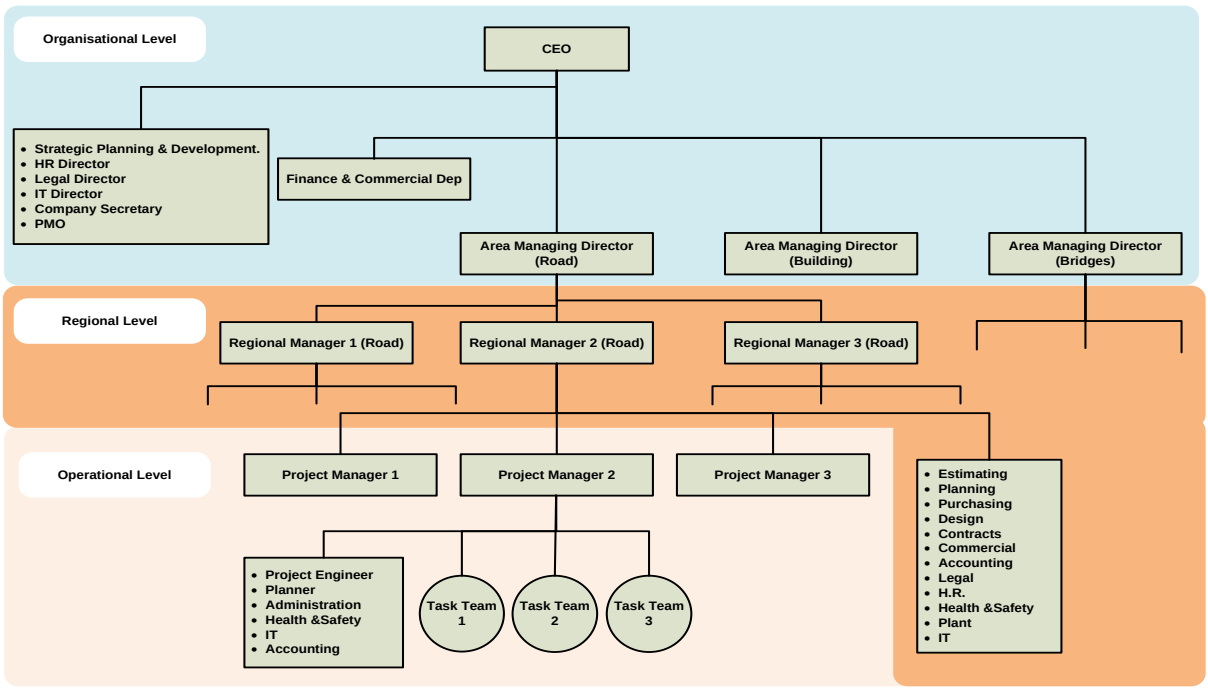


Figure 4-22: Proposed organisational structure

Moreover, it seems that a hybrid structure is the most appropriate organisational form to fit the processes of large construction companies. The top management level would comprise a number of functional areas that are mainly responsible for setting the general view, objectives and strategy of the company. This level is also responsible for monitoring the implementation of the company's strategy and the performance of various business units and their regional offices. Regional offices, on the other hand, and as discovered from mapping the process, are responsible for implementing the company strategy through their departments and projects. Each regional office should have broad authority to manage their resources independently away from the interventions of senior management in their daily business. However, it would be accountable for the results of their operational business. During the bidding phase, which is undertaken at the regional level, the Regional Chief Estimator would be the process owner. By adopting a strong matrix structure, the Chief Estimator would be responsible for creating a bid team that consists of representatives from the different functional areas at the regional level in order to perform all the activities of the bidding process including producing the bid proposal. At the project level, it was found that regional offices would be more suitable for adopting a project-based form where the Project Manager is the process owner with a high level of authority and independence in planning, managing and controlling a project's processes and resources with his team.

Finally, it is important to mention here that the proposed framework, and thus the organisational structure, should not be considered so prescriptive that creativity is restricted or suppressed; nevertheless, it has to be seen as both ongoing and planned but easily adjusted and tailored to fit the requirements of the company and its individual projects.

4.4 Summary

This chapter provided detailed process mapping and descriptive guidelines for a large construction company under the traditional contract form scenario. The most important outcome from this chapter is the development of a theoretical transformational organisational framework for improving IQGCCs' performance, and a proposed organisational structure to fit the new proposed processes. The chapter gave an explanation, to the highest level, of a construction company's core business process, as represented by a construction project and with the aim of dividing a project lifecycle into a number of phases and stages. Thereafter, a step by step description of the processes that were decomposed from the higher level processes was presented in order to identify the main people involved, when and how the key decisions are made, and who should be involved in their development. That was visually supported by modelling the processes using ADM and IDEFØ modelling techniques. Based on the mapped process, the theoretical framework was developed to act as a process map enabling construction companies to systematically manage and improve their operational processes. The next chapter will explain and justify the research methodology adopted in collecting and analysing the required research data.

Chapter Five - Research Methodology

5.1 Introduction

This chapter explores and discusses the philosophical and methodological research issues with a view to identifying the most appropriate methodology that can be used to address this research problem and achieve its objectives. The discussion involves clarifying the rationale and justifications for the selected research approach, strategy, nature of the required data, and technique to be used in gathering and analysing the field data. Finally, the chapter discusses the main actions undertaken to improve the validity and reliability of the research outcomes.

5.2 Research Methodology

Research methodology is the science of studying that aims to identify the most appropriate systematic ways to solve problems and gain knowledge. It studies the procedures, approaches and methods that can be used to explore, describe and explain the different phenomena in life (Rajasekar *et al.*, 2013). Saunders *et al.*'s (2016) model, that is now well known as 'The Research Onion' helps to facilitate an understanding of the research methodology components. Under this model, they classified research methodology into six stages, as illustrated in Figure 5-1.

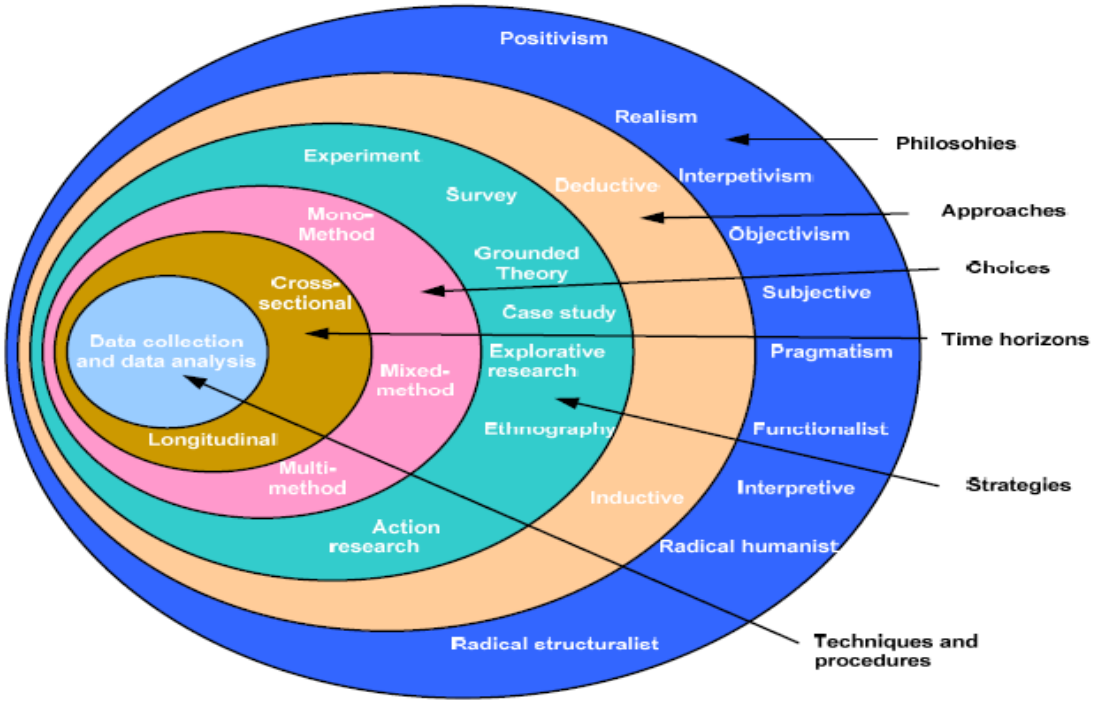


Figure 5-1: The Research Onion

Source: Saunders *et al.* (2016)

5.2.1 Research Philosophy

Saunders *et al.* (2011) explain that the research philosophy is the way in which researchers view the world. Johnson and Clark (2006) argue that the research philosophy has a fundamental impact on, not only what researchers do, but also on their understanding of what they are investigating. Therefore, researchers need to be aware of their philosophical commitment when making a choice of research strategy. Fellows and Liu (2015) identified two main philosophy disciplines, namely ontology and epistemology.

Ontology, according to Ritchie and Lewis (2005, p.11), denotes the, "*beliefs about what is there to know about the world*". Bryman (2012) identifies two ontological positions concerning social research, namely 'objectivism' and 'constructionism/subjectivism'. Bryman (2012, p.33) defines objectivism as an, "*ontological position that asserts that social phenomena and their meanings have an existence that is independent of social actors. It implies that social phenomena and the categories that we use in everyday discourse have an independent existence that is separate from social actors*". It is a stand that asserts that the purpose of knowledge is to describe the phenomena in which we live (Saunders *et al.*, 2016). However, on the opposite end, stands subjectivism or constructionism, which believes that social entities can, and should be seen as social constructions built upon the views, perceptions and actions of social actors (Dieronitou, 2014).

Meanwhile, epistemology, according to Creswell (2014), is an expression related to the theory of knowledge that explains 'how' an investigator knows about the phenomena and what knowledge should be obtained and accepted. The debate regarding epistemology generally focuses on two different inquiry paradigms, and these are 'positivism' and 'phenomenology/ interpretivism' (Easterby-Smith *et al.*, 2012). The main interpretation of positivism paradigm is that the phenomena exist externally and their properties can only be measured by using objective methods. Under this type of research philosophy, the investigator, and his/her subject research are seen as two independent entities (Scotland, 2012). Alternatively, the interpretive paradigm assumes that knowledge and meaningful reality are constructed and developed in a social context as a result of the interaction between individuals and the world they inhabit (Crotty, 1998). Therefore, the understanding of the social world can only be achieved through the perspective of the humans who are participating in it (Cohen *et al.*, 2007).

Revisiting the aim and objectives of this study reveals that the objectivism/positivism paradigm is not appropriate, because the phenomenon to be studied is how the operational processes of

Iraqi QGCCs can be improved, in order to enhance the overall performance and efficiency of these companies. This needs an understanding of the current operational processes employed by IQGCCs, the challenges associated with them, and then the applicability of the solutions proposed to improve those processes. Developing such understanding cannot be achieved by separating the research phenomenon (IQGCCs' operational processes and performance) externally, but instead should be built and improved through the perceptions and actions of social actors, such as employees, tools, rules, and so forth. Therefore, the researcher needs to understand, explore, develop ideas, and elicit opinions, views and perceptions from the top and middle level management of each company. Consequently, this research tends to be more subjectivist (Constructivist) in terms of its ontological position and interpretivist in terms of its epistemological position.

5.2.2 Research Approaches

According to Losee (2001) a research approach is the way to define the reasoning or logic of a study. Based on the existence and placement of hypotheses and theories, Saunders *et al.* (2009) distinguish between two key research approaches, namely deductive and inductive. A deductive approach leans toward positivism; it includes the development of a hypothesis or theory that is subjected to an accurate test (Saunders *et al.*, 2016). Deductive research tends to move from a broad area into more specific research areas. Therefore, a researcher, under this approach, usually starts with a theory to deduce one or more hypotheses and design a research strategy to test these hypotheses through confronting them with observations that either leads to confirming of these hypothesis or rejecting them (Snieder & Larner, 2009). Robson and McCartan (2016) identified five sequential stages that need to be followed in deductive research. These stages are shown in Figure 5-2.

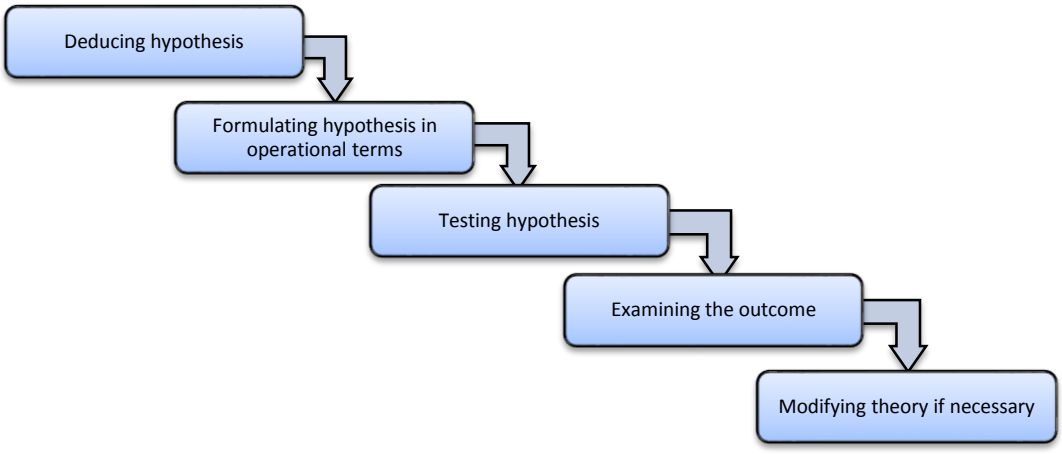


Figure 5-2: Deductive research sequential stages

In contrast, the inductive approach leans towards interpretivism and aims to provide a better understanding a social reality of individuals, communities and cultures. Investigators usually adopt this approach to study the behaviour, views, feeling and experiences of individuals, what lies at the core of their lives (Saunders *et al.*, 2016). In inductive research, theories are not usually applied at the beginning of the study; instead, the researcher starts with observation and data collection concerning the phenomena under study, and from this develops new theories and ideas (Bernard, 2011). The process of the inductive studies is shown in Figure 5-3.

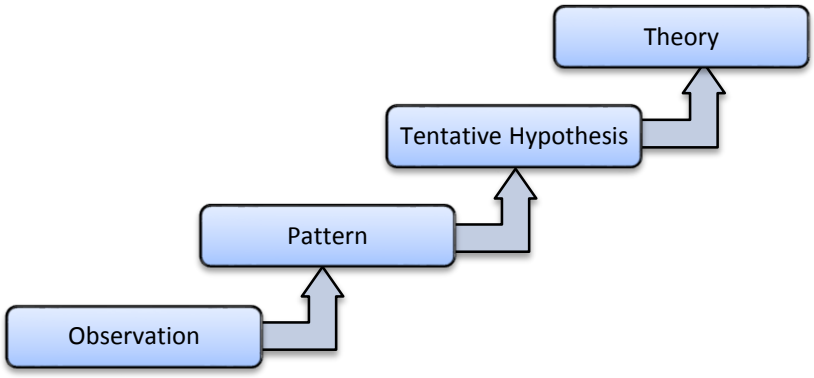


Figure 5-3: Inductive research sequential stages

Moreover, Creswell (2014) suggests that the deductive approach would be more appropriate for a topic that has rich literature, which can boost and justify the contents of hypothesises or a theoretical framework. In contrast, it would be more appropriate to adopt the inductive approach when the research topic is new and there is insufficient literature available. Table 5-1 shows the most important differences between the deductive and inductive approaches.

Table 5-1: The differences between deductive and inductive approaches

Deductive methods	Inductive methods
• Scientific principles • Moving from theory to data • The need to explain casual relationships between variables • The collection of quantitative data the application of controls to ensure validity of the data • The operationalization of concepts to ensure clarity of definition. • A highly structured approach • Researcher independence of what is being researched • The necessity to select samples to generalise conclusion	• Gaining an understanding of the meaning humans attach to events • A close understanding of the research context • The collection of qualitative data • A more flexible structure to permit changes of research emphasis as the research progresses • A realisation that the researcher is part of the research process • Less concern with the need to generalise.

Source: Saunders *et al.* (2009, p.127)

In spite of the rigid differences between deduction and induction, Saunders *et al*. (2016) strongly encourage their combination under the same study as a mixed method by employing the abductive approach which combines the process of both approaches. Following the above discussion, an abductive approach was implemented to accomplish the objectives of this research. Due to availability of a rich literature on the major areas of this research, it was possible to employ a deductive logic at its beginning with the aim of identifying the good practice operational business processes (core business processes), the main roles and responsibilities of internal stakeholders engaged in performing those processes, and the most appropriate organisational structure that can be applied to organise and structure different people within large construction companies. Consequently, a theoretical framework was developed as a benchmark for improving the performance of IQGCCs.

However, two other essential objectives of this study are to: 1) understand the current practices of IQGCCs and their inherent challenges, so the gap between current and good practice can be evidenced and reflected on; 2) conceptualise an organisational transformational framework aimed at making a step change improvement in IQGCCs performances through addressing the challenges and bridging the gap in the currently employed operational processes. Fulfilling these two objectives require the researcher to develop a good understanding of both the 'as is' and 'to be' processes of IQGCCs. Developing such an understanding cannot be achieved without studying these processes from the perspectives of different people engaged in executing them. As a result, an inductive approach has been utilised at the later stage of the study. According to Yin (2014) this allows for the collection of richer information and thus boosts the understanding of the researcher and positions him in a more natural environment where interviewees are free to express their ideas and provide their responses as a predetermined index is absent. Therefore, the abductive approach is justified for this research.

5.2.3 Methodology Choice

Saunders *et al.* (2016) argue that the determination of methodology choice is an important concern for the researcher. They also distinguish two major choices of methodology, which guide researchers in selecting the data collection techniques and corresponding analysis procedures; these are quantitative and qualitative. The fundamental difference is that the former tends to focus on numeric (numbers) data, whereas the latter usually concentrates on non-numeric (words) data (Creswell, 2014). Table 5-2 illustrates the main characteristics of these methods, as presented by Johnson and Christensen (2017).

Table 5-2: Main characteristics of quantitative and qualitative approaches

Theme	Quantitative research	Qualitative research
Scientific method	Deductive or 'top-down'. The researcher tests hypothesis and theory with data	Inductive or 'bottom-up'. The researcher generates new hypothesis and grounded theory based on field data
View of human behaviour	Behaviour is regular and predictable	Behaviour is fluid, dynamic, situational, social, contextual, and personal
Research objectives	Description, explanation, and prediction	Description, explanation, and discovery
Focus	Narrow-angle lens, testing specific hypothesis	Wide-angle 'deep-angle' lens, examining the breadth and depth of phenomenon to learn more about them
Nature of observation	Attempt to study behaviour under controlled conditions	Study behaviour in natural context, and/or the context in which the behaviour occurs
Form of data collected	Collect quantitative data based on precise measurement using structured and validated data collection instruments (e.g. closed-ended items, rating scales, behavioural responses)	Collect qualitative data (e.g., in-depth interviews, participant observation, field notes, and open-ended questions). The researcher is the primary data collection instrument
Nature of data	Variables	Words, images, categories
Data analysis	Identify statistical relationships	Search for patterns, themes, and features
Results	Generalisable findings	Particularistic findings. Representation of insider (i.e., "emic") viewpoint. Presents multiple perspectives
Form of final report	Statistical report (e.g., with correlations, comparisons of means, and reporting of statistical significance of findings)	Narrative report with contextual description and direct quotations from research participants.

Source: Johnson and Christensen (2017, p.32)

Saunders *et al.* (2016) also refer to the mixed approach as a third type of research methodology resulting from combining quantitative and qualitative techniques and procedures under a single study. Such a combination, as Johnson and Christensen (2017) argue, helps to combine the features of both approaches described above. However, the researcher mainly depended on a qualitative approach to conduct this research and achieve its objectives. Choosing this approach was based on the most appropriate philosophy and specific issues that need to be addressed in this research. Although this study concentrates on improving the performance of IQGCCs through improving the efficiency of their operational processes, this first requires the development of a deep understanding regarding the current operational processes along with their inherent challenges. From this it is then necessary to capture the amendments required on the proposed theoretical improvement framework to ensure it aligns with the context of Iraqi QGCCs. This makes the qualitative approach an appropriate choice since it allows the researcher to gather rich data and gain insight into the research problem. Domegan and Fleming (2007) emphasise that a qualitative approach helps to explore and grasp issues about a problem on which very little is known. It is designed to understand the phenomena within its context

from its social actors (Myers, 2013). Additionally, Amaratunga *et al.* (2002) profess that a qualitative methodology can be influentially employed to investigate any process in depth.

In contrast, a quantitative methodology is criticised as being unable to generate data that exposes the deep underlying meanings required to understand a social phenomenon or problem that is not well known (Creswell, 2014). The quantitative approach is more valuable for the testing of hypotheses and theories, with the aim of generalising the results obtained from analysing the data collected from a large sample that is assumed to represent reality (Myers, 2013; Saunders *et al.*, 2016); however, that is not the purpose of this study. Additionally, although using a mixed approach may add positive features for the research, the objectives could still be successfully achieved by employing only a qualitative approach.

Nevertheless, it is also worth to mention that each research approach comprises a number of data collection techniques and analysis methods. Thus, to answer the research questions, a researcher would either employ a single data collection tool alongside its compatible analysis procedures (mono method) or utilise more than one data gathering technique and analysis procedures (multiple methods) (Saunders *et al.*, 2016). Selecting the most suitable methods or strategy to accomplish the research objectives will be discussed in the following section.

5.2.4 Research Strategy

According to Saunders *et al.* (2016) a research strategy is a plan that guides an investigator or researcher as to how to find the right answers to the research questions. Yin (2014) distinguishes three main purposes of research, including: exploratory, descriptive and explanatory. Exploratory research is a quite useful tool to examine new insights about a topic of interest, to understand what is happening and to evaluate phenomena in a new light. Descriptive research, in comparison, is a means to provide an accurate profile of individuals, groups, and cultures. Meanwhile the aim of an explanatory study is to find and determine causal relationships between variables (Saunders *et al.*, 2016).

Saunders *et al.* (2016) also mention that certain factors that need to be considered in selecting the most suitable research strategy. These include: research questions and objectives; the extent of existing knowledge on the subject area; the amount of time and resources available; and the philosophical underpinnings of the researcher. Similarly, Yin (2014) proposes five key research strategies, namely: experiment, survey, archival analysis, history, and case study. Moreover, Yin also argues that selection of any research strategy should be based on three fundamental

conditions: 1) the type of research question posed; 2) the extent of control an investigator has over actual behavioural events, and 3) the degree of focus on contemporary, as opposed to historical, events. Both Yin (2014) and Saunders *et al*. (2016) emphasise that research questions and objectives are key tools to guide the researcher as to the most appropriate method for use in achieving the research aims and objectives. Hence, the research problem, aim and questions will be revisited hereinafter.

As discussed in Chapter Two, IQGCCs have faced much criticism due to their poor performance. Accordingly, the main aim of this research is to improve the overall efficiency and performance of IQGCCs, thus the primary research question for this study is:

How can the overall performance of Iraqi quasi-governmental construction companies significantly be improved and rectified to meet the current challenges in the Iraqi business environment?

Whilst the first secondary research question is:

1) How have some organisations managed to survive and grow under dynamic business environment, and what are the main factors, model, and techniques that can bring about a step change improvement in the organisations' performance?

Through implementing a qualitative research approach, a comprehensive review of the available literature revealed that a significant improvement in performance can be achieved through adopting a step change improvement promoted by the Business Process Management tools. Yet, it is critical to have a clear understanding of the current status of the organisation's operational processes and how they should be in order to succeed in any step change initiative that is based on process thinking. Accordingly, this led to the formulation of the rest of the secondary research questions, which include:

2) What are the current industry good practices that need to be adopted by large construction companies in delivering their projects under traditional procurement in order to achieve a high level of effectiveness and efficiency?
3) What are the current practices adopted by IQGCCs, and the key hindrances and challenges associated with those practices?
4) What are the required amendments and enhancements that should be made on the proposed framework in order to suit the IQGCCs' context and effectively improved their performance?

The above questions show the dominance of ‘how’ and ‘what’ in relation to the inquiry, and this provides further support that the qualitative approach is the most appropriate approach for this research. According to Creswell (2014) and Moore (2016), a qualitative approach is usually employed to find answers to the questions that start with why, how, and in what way. Moreover, such questions place the research within the exploratory research category. Yin (2014) argues that ‘what’ questions generally present two possibilities for research; the first type is exploratory and aims to develop pertinent hypotheses and to propose a framework or propositions for further inquiry, whilst the second type is about prevalence, which is a ‘how many’ or ‘how much’ line of inquiry. Revisiting the research questions above clearly shows that they lie within the scope of the former type of exploratory research.

An exploratory study, as Shields and Rangarajan (2013) profess, is generally conducted when the solutions to a problem are not clearly defined nor have enough knowledge to form conceptual distinctions or posit an explanatory relationship. It seeks to find out ‘what is going on here?’ (Schutt, 2012) and it is often used when data on the topic or a certain issue are scarce (Adusei & Dunyah, 2016). White (2010) declares that exploratory research usually depends on qualitative approaches, such as informal discussions with managers and employees and/or formal methods, for instance case studies, in-depth interviews and focus groups.

Yin (2014) explains that, unless about prevalence, exploratory studies can be conducted by using any of the aforementioned research methods (experiment, survey, archival analysis, history and case study). Yin (2014) and Saunders *et al*. (2009) both admit that, although the research questions would provide a valuable clue concerning the most suitable research method for adoption, researchers should also realise that there is usually an overlap among those methods. Accordingly, for some research questions, the option of selecting among research methods might indeed exist.

From the various research strategies, this study sought to engage two types of qualitative research methods on two distinct stages in order to answer the research questions. During the first stage, an exploratory case study was used with the aim of collecting the data and information required to document and map the ‘as is’ operational processes adopted by IQGCCs, so that the current status, performance improvement needs, and underlying performance challenges can be determined and better understood. Whereas, in the second stage of data collection, a one-on-one interview survey strategy was employed to test the applicability and validity of the theoretical framework proposed to rectify, streamline, and improve the

current processes of IQGCCs. From this, it should be possible to enhance their overall efficiency and performance. In other words, the first and second strategies were used to answer questions three and four listed above. Next subsections briefly describe the selected research strategies and provide justification for their adoption as opposed to other methods.

5.2.4.1 Case Study as a Research Strategy

A case study is a research strategy that is particularly appropriate for individual researchers who seek to explore a single event, phenomenon, or problem in its natural context through employing multiple research methods to obtain in-depth knowledge (Collis & Hussey, 2009). This has been further supported by Yin (2014, p.16), who defines the case study as, "*an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident*". Yin's definition outlines the scope and general features of case study research. The definition clearly declares that the phenomenon and context that in which it happens cannot always be distinguished in real-life. In comparison, the technical features of case study, as explained by Yin (2014), include: dealing with a contemporary distinctive event, relying on multiple sources of evidence, and benefitting from prior development of theoretical propositions to guide the data collection and analysis. In the same context, Herr and Gary (2014) confirm that a case study is generally a useful strategy when a researcher's concern is directed towards an exploration of the connection between an occurrence and the environment in which it is occurring, such as an event in a single or certain organisation.

Moreover, case study research can combine between both qualitative and quantitative data (Gerring, 2008; Yin, 2014), offering the investigator an opportunity to obtain a rich mix of data about the study. Despite these advantages, a case study strategy has some weaknesses; as Yin (2014) states, it suffers from a lack of rigor, bias, and difficulty in generalisation, time-consuming and generating large documents. Accordingly, it was recommended that a case study's quality can generally be enhanced by a number of validity and reliability tests that are common to empirical studies; these are internal validity, external validity, and reliability (Yin, 2014; Fellows & Liu, 2015). This will be discussed in section 5.2.7.

5.2.4.2 Justification Research Strategies

Yin (2014) professes that some researchers, academic departments, or particular fields of study may prefer certain methods over others. Fellows and Liu (2015) reference five strategies that can be considered specifically in the construction industry, and these are: action research,

ethnographic research, surveys, case studies, and experiments. Nevertheless, the research is positioned within a qualitative approach, and this would restrict the options to action research, ethnographic research, interview survey and case studies.

As described by Power and Naysmith (2005), action research is any research into practice that is conducted by people who are involved in that practice, with a view to changing and improving it through a process of identifying and solving its real-life problems. However, this type of strategy is not suitable for this research because of the time constraints and the limitations on the researcher's authority. Whereas, in ethnographic research, a researcher is required to interact and be part of the real-life environment of study in order to observe and understand his/her research subject in its natural surroundings (Myers, 2013). This research strategy has also been eliminated because the researcher did not engage in the real context of this research or become a part of it. Having rejected action research and ethnographic research as strategies, the researcher had two remaining options to answer the research questions, namely interview survey and case study. Yet, the researcher opted to select a case study as the research method, particularly, to answer the third research question above. To justify this choice, Yin's (2014) guide, illustrated in Table 5-3 has been employed.

Table 5-3: Relevant situations for different research strategies

Research strategy	Forms of research question	Requires control of behavioural events	Focuses on contemporary events
Experiment	How, Why?	Yes	Yes
Survey	Who, What, Where, How many, How much?	No	Yes
Archival analysis	Who, What, Where, How many, How much?	No	Yes/No
History	How, Why?	No	No
Case Study	How, Why?	No	Yes

Source: Yin (2014, p.9)

1) *The type of research question posed;*

As discussed in section 5.2.4, this study is dominated by the 'how' and 'what' questions that are posed in an exploratory way. A case study is a method that can be implemented within exploratory research (Yin, 2014). However, a case study is distinct from other methods by its ability to integrate various research methods and multiple sources of evidence together.

Indeed, the process of collecting the data required to document and map an organisation's business process usually calls to utilise more than one technique (Marrelli, 2005). Lindfors (2003) for instance, adopted document analysis and informal and formal interview techniques in order to gather the information required to generate the 'as is' operational process of a Swedish house building company. Thus, adopting a case study strategy would facilitate the use of multiple sources of data collection, such as interviews, document reviews, observations and so forth, allowing for the researcher to answer question three satisfactorily.

2) *The extent of control an investigator has over actual behavioural events;*
In fact, the investigator of this research has no direct, precise and systematic control over the actual behavioural events, such as that is required in an experimental method. In other words, the researcher has no control over the processes of IQGCCs, the conditions of interviewees during the test, nor any policies and regulations within the companies that will be tested. Indeed, it is impossible to deliberately separate the phenomenon of 'current practice and performance' (dependent variable) from its context, the 'various behaviours of construction companies and their personnel' (independent variables) in order to precisely investigate the direct impact of the operational business processes on the company's performance without the intervention of other factors, which are beyond the scope of the researcher's interest. In this context, adopting the case study method can also satisfy this condition.

3) *The degree of focus on contemporary, as opposed to historical, events.*
Yin (2014) claims that a historical research strategy is the preferred method to deal with the 'dead' past, when there is practically no access to relevant individuals to report what happened. As a result, the investigator must depend on primary and secondary documents, and cultural and physical artefacts as the key sources of evidence. However, this research deals with a contemporary phenomenon and its participants are alive and accessible. Therefore, in contrast to the case study strategy, historical research is not the preferred strategy to conduct this study.

Moreover, Proverbs and Gameson (2008) report that a case study is highly relevant to the industries that involve various types of businesses and organisations, such as the construction industry. This viewpoint has been supported by many researchers, such as Sexton (2007), Rezgui and Miles (2010) and Ribeiro and Fernandes (2010) who have substantiated through their studies, the applicability and suitability of the case study strategy for studies that involve construction companies. Chetty (1996) explained that employing case study research in a construction company context can lead to new knowledge and the generation of valuable

insights that could not be captured through other strategies, such as a large survey. A case study was also implemented as a main research strategy in developing the Generic Process Protocol developed by the University of Salford (Kagioglou *et al.*, 1999).

The above discussion clearly reflects the suitability of using the case study as a potential strategy to conduct research in a construction company context in general and exploring the current practices in particular. Therefore, this research strategy has been considered the most appropriate strategy to investigate, map and examine the current practice of IQGCCs. Yet, it is important to mention that the interview survey technique has been used as an essential data collection tool within the context of the case study in addition to other techniques, as discussed under section 5.2.5.

Nevertheless, in the second stage of the data collection, the interview survey strategy was used to test the applicability and validity of the solutions proposed through the theoretical framework to solve the challenges inherent in IQGCCs' operational processes and thus producing the final recommended transformational organisational framework for these companies. As explained, this research is qualitative in nature and the case study, along with the interview survey, are the most suitable strategies. However, according to Yin (2014), an important condition to employ a case study strategy is to use multiple sources of evidence with the aim of triangulating the obtained data, which cannot be achieved at this stage of the research. Proposing a process framework for Iraqi QGCCs, which for decades have embraced the functional-oriented system in managing their business, is considered a new initiative in this context. Therefore, with the exception of the interviews, other qualitative sources of data, such as documents and observation, are not available in testing the applicability and validity of the proposed framework in the IQGCCs' local environment. Accordingly, the interview survey strategy was selected to achieve this part of the study.

5.2.4.3 Selection Criteria of Case Study

As previously mentioned in section 5.2.4.1, the case study strategy has been criticised as lacking in rigor. Thus, the careful design of a case study is an important matter to overcome such weakness. According to Yin (2014), investigators can employ either a single or multiple case design to answer their research questions. A single case study is usually adopted in situations where there are no other similar cases available for replication. Nevertheless, the single-case design has also been criticised for being unable to provide a generalising conclusion, especially when the event under study is new or rare. This issue can be overcome through triangulating

the investigation with other research techniques in order to enhance the validity of the process. Whereas, the multiple-case approach is often utilised with real-life events that can be recognised in more than one case and show multiple sources of evidence for replication (Zainal, 2007).

According to AlSehaimi *et al.* (2012), there is no consensus concerning an appropriate number when adopting a multiple case study design. The selection of cases, as asserted by Yin (2014), should be guided by the replication of logic. In that, each case has to be seen as an experiment per se, whereas, subsequent cases are employed either to confirm or disprove former findings. The number of case studies investigated by the researcher, as explained by Yin (2014), usually depends on the similarities between the results. Obtaining similar results can be an indicator of data saturation; so adopting any further case study would not add any significant data. Yin (2014) also emphasises that a researcher should be very careful when choosing each case so that it either: (a) predicts similar results (a literal replication) or (b) predicts contrasting results but for anticipatable reason (a theoretical replication). Based on the researcher's experience and knowledge generated from work for one of the IQGCCs, he can predict that the results from studying the operational processes of selected IQGCCs cases will be similar. This is because all IQGCCs are subject to the same government regulations; moreover, all the selected cases belong to the same owner (Ministry of Construction and Housing) so it is expected that they are managed in a similar way despite the differences between their specialities. Accordingly, the selected cases are considered literal replications. To produce solid conclusions concerning the implementation of literal case replications, Yen (2014) proposes the use of two to three cases; thus the decision was to select three IQGCCs which are owned by the Iraqi Ministry of Construction and Housing, which should produce solid conclusions with a multiple case study design. The selection criteria of cases were mainly based on the research aim, objectives and context, which can be simplified as follows:

1) The selected organisations should be contracting companies owned by the Iraqi government, namely the Ministry of Construction and Housing;
2) The companies should be large in size and specialist in the construction industry;
3) The companies should also be willing to be part of this research and allow the researcher to acquire required data.

5.2.5 Data Collection

Saunders *et al.* (2009) assert that the processes used in the data collection and analysis have a significant contribution to the study's overall reliability and validity. Generally, there are two main types of data collection: primary and secondary. Primary data, as explained by Flick (2011), is that which is generally gathered or derived directly from first-hand experience. However, it is not necessarily directly produced by the researcher, but might be represented by a text, picture or even a behaviour that can be analysed. Therefore, primary data is the data that is being analysed as itself, rather than through the prism of another's analysis. Secondary data, according to White (2010), is the data that is gathered, analysed and made available by other researchers. These data can be derived from published and unpublished sources, existing records and documents, such as books, journals, reports, newspapers, and company archives. The importance of secondary data lies in the possibility of using it as supplementary data for reference purposes, for critical review analysis through comparisons and contrasts, or for adding further levels of information to support other data (Brodeur *et al.*, 2014). Moreover, secondary data are far less expensive to collect than primary data in terms of time, money and the effort involved; this is because they are already available and easy to obtain them (Aggarwal & Khurana, 2009).

Accordingly, secondary data was utilised in an early stage of this study with the aim of developing a good understanding regarding the research-related subject areas and answering the first two research questions. Thus, a comprehensive literature review was conducted through employing SOLAR Library Search, a facility offered by the University of Salford to search and access the resources available both in print and electronic form. Other database search engines, namely Scopus and Google Scholar were also used. Keywords such as "organisations' performance", "efficiency improvement", "improvement the organisation's efficiency", "business process elements", "business process orientation", "good practice in construction", "business process in construction", were used in searching the resources. Academic papers (journal and conference), books, official reports, and doctoral theses with these specific keywords in their titles and abstracts were briefly reviewed to identify the most relevant for in-depth study. The main yield of this exercise was the development of the theoretical framework, which can be seen as a benchmark and a guideline for improving IQGCCs' performances.

On the other hand, the primary data was also used to collect field data for the study. Bryman (2012) argues that the methods used in gathering the required data are largely dependent on the methodological approach and strategy adopted. As mentioned earlier, this research leans more

towards subjectivism-interpretivism, with a qualitative approach and two strategies (case study and interview survey) for respective be adoption at two different stages.

Gerring (2008) and Yin (2014) declare that adopting a case study strategy allows researchers to accommodate multiple data collection techniques, including questionnaires, interviews, documentation review, and observation. Observation is not appropriate for this study since it will not help the researcher to grasp how the operational processes are undertaken in IQGCCs. Moreover, it is more open to researcher bias (Saunders *et al.*, 2016). A questionnaire, which is a set of pro-forma questions distributed to participants in order to collect the required data, is also not suitable for this research as it does not allow the researcher to conduct an in-depth investigation or ask for the clarification required to build the whole picture regarding the current practices of IQGCCs and how they should operate. However, Saunders *et al.* (2016) profess that qualitative research most often embraces small samples, in-depth interview investigations, and qualitative data analyses. Interviews, whether are one-on-one or focus groups, are indeed recognised as a widely used technique in research that concentrate on mapping and improving business processes (Kagioglou *et al*., 1999; Al-Ajam, 2008; Morris & Dyson, 2012; Phillips & Simmonds, 2013; Ekung *et al.*, 2014). A document review is another data collection technique recommended by some researchers for use in documenting and understanding current processes (Al-Atawi, 2005; Al-Ajam, 2008; Zawawi, 2016).

Accordingly, a combination of one-on-one interviews, focus groups, and document reviews were selected to achieve the first stage of data collection represented by mapping and examining the current practices employed by IQGCCs. The main advantage of combining multiple sources of evidence is that the data sources can complement each other. Interviews with experts, for instance, will provide the researcher with an opportunity to ask for clarification about any limitations in interpreting the text in the documents reviewed. On the other hand, such a combination of data collection techniques, as suggested by Kumar (2014), may result in the emergence of a discrepancy in the information obtained. Therefore, it is important to triangulate the information obtained from the documents and interviews. The procedure adopted in selecting the sources of evidence and collecting the field data was designed carefully to achieve the objective of this stage. More detail about the procedure adopted in gathering the data are provided in Chapter Six. However, as explained in section 5.2.4.2, the interviews survey is the only strategy that can realistically and effectively answer the fourth question and thereby build up the conceptual framework designed to improve the performance of IQGCCs. Chapter Seven offers more information about the procedure adopted in gathering the data required for this aim.

5.2.5.1 Interviews

Interviews are a standard part of qualitative research that can be defined as a communicative process by which the researcher obtains data and information required for his investigation from an informant or individual (Kumar & Phrommathed, 2005; Naoum, 2012). The interview has a specific strength; it can yield information quickly and in a considerable amount. However, it also has a number of disadvantages (Yin, 2014). Interviews, for instance, are usually cost and effort consuming and subject to bias from the researcher or interviewees towards certain responses. Contemporary texts categorised qualitative interviews into different types, which are: structured; semi-structured; and unstructured (Fontana & Frey, 2005; DiCicco-Bloom & Benjamin, 2006).

A structured interview, according to Zhang and Wildemuth (2009), is an interview that has a set of predefined questions with a limited set of response categories that would be asked in the same order for all respondents. It is similar to any questionnaire survey, except that is administered orally rather than through pro-forma papers. This kind of interview generally allows little room for variation in responses, which prevents the interviewees from explaining their real views and the researchers from conducting a deeper investigation. Structured interviews are usually more suitable when the literature about the topical area is highly developed and the researcher has a thorough understanding of the phenomena at hand; however, this is not the case in this research. Although the literature regarding organisational performance and business process orientation is quite rich, this topic is still new in the context of the Iraqi construction industry. Therefore, the research needs to carry out an in-depth investigation in order to develop a full understanding of this topic and the possibility of its adoption and success in an Iraqi context. Thus, the structured interview technique does not seem to be an appropriate technique for this research.

In contrast, unstructured interviews often tend to be more informal, open ended, flexible and free flowing. They are more like an everyday conversation, where questions are not predetermined, however, there are often specific themes that the investigators want to cover (Corbin & Morse, 2003). An unstructured interview is defined by Punch (2009, p.174) "*as a way to understand the complex behavior of people without imposing any a priori categorization, which might limit the field of inquiry*". According to DiCicco-Bloom and Benjamin (2006), unstructured interviews are most helpful in building an in-depth understanding, especially for researchers who know little about their topics. However, this technique of data collection is not recommended when the researcher already has a basic

knowledge of his topic and wants to study specific aspects of it, or when the research goals are well-defined (Zhang & Wildemuth, 2009). This is because using such a method can present serious challenges, represented by: 1) the need for a significant amount of time to gather the required data and information; 2) the difficulty of controlling the type and direction of the inquiry questions and statements delivered during the interview; 3) the fact that the questions are not predetermined, but are usually generated during the interviews based on the special context for each interview. This can lead to produce very different responses across multiple interviews. Thus, it requires a great deal of effort to analyse the collected data systematically (Patton, 2002). For these reasons, the unstructured interview method has also been excluded from this research.

Semi-structured interviews are a widely used technique for in-depth data collection, which can be conducted either with an individual or in groups, and under a case study strategy. Semi-structured interviews can be productive and provide rich information and a better understanding of a phenomenon since the researcher can focus on the specific problems at hand, which leads to the generation of constructive suggestions from the interviewees (Shneiderman & Plaisant, 2005; DiCicco-Bloom & Benjamin, 2006). In this method, the interviewer predetermines a list of open-ended questions and specific subjects that need to be discussed and covered during the interview in addition to other questions that may emerge from the dialogue between interviewer and interviewee. Shneiderman and Plaisant (2005) list the main objectives of the semi-structured interview tool as follows:

1) Direct interaction with the social actors usually leads to specific, constructive suggestions;
2) Semi-structured interviews are good at acquiring in-depth data and understanding;
3) Few respondents are required to collect and generate rich and detailed data.

According to Zhang and Wildemuth (2009), a semi-structured interview is considered the most useful means of data collection when the literature about the topic under study is available, but the researcher wants to gain more insight about a particular event within its specific cultural context. Therefore, this data collection tool is usually associated with the interpretive research paradigm, where the participants in the setting of interest socially construct the reality. In fact, the semi-structured interview enables the researcher to understand the phenomenon of interest from the perspectives of people who are engaged in that phenomenon (DiCicco-Bloom & Benjamin, 2006). In light of the above discussion and the research phenomenon explained

earlier in section 5.2.1, it can be argued that the semi-structured interview is the best means that can be adopted to collect the primary data required to achieve the objectives of this research.

5.2.5.2 Focus Group

A focus group, according to Naomi (2009, p.28), is a "*form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs and attitudes towards a product, a service, a concept, an idea, or a service package*". It can generally be utilised as a stand-alone method to explore new fields of research and study topics well-known to the respondents, or used with other data collection techniques either to prepare a particular subject in a large project or to check and validate the results obtained from other data collection methods (Freitas *et al.*, 1998). In this research the researcher adopted a focus group technique at the first stage of the data collection. The aim of adopting this method was to validate and ensure that IQGCCs' current operational processes, which were mapped based on data collected through the semi-structured interviews, were correctly mapped and they reflect the company's current practices. Such a procedure is especially important in process mapping and recommended by several researchers, such as Marrelli (2005), Sagoo *et al.* (2009) and Damelio (2011). Nevertheless, as with other techniques, a focus group has its own advantages and disadvantages. Table 5-4 summarises the main strengths and weaknesses of this method, as reported by Krueger (1994) and Morgan (1996). Chapter Six provides more information about the procedure employed in conducting the focus group and the people involved in this exercise.

Table 5-4: Focus group advantages and disadvantages

Advantage	Disadvantage
• It is comparatively easy to drive or conduct • It allows to explore topics and to generate hypotheses • It generates an opportunity to collect data from the group interaction, which concentrates on the topic of the researcher's interest • It has high 'face validity' (data) • It is low cost in relation to other methods • It enables a rapid collection of data (in terms of evidence of the meeting of the group) • It allows the researcher to increase the size of the qualitative study sample	• It is not based on a natural atmosphere • The researcher has less control over the data that are generated • It is not possible to know if the interaction in the group he/she contemplates or not the individual behaviour • The data analysis is more difficult. The interaction of the group forms a social atmosphere and the comments should be interpreted inside of this context • It demands carefully trained interviewers • It takes effort to assemble the groups • The discussion should be conducted in an atmosphere that facilitates the dialogue.

Source: Krueger (1994) and Morgan (1996)

5.2.5.3 Documents Review

Yin (2014) considers archival and current documents as a significant source of evidence to rely on. Although interview was the primary technique used to gather data required to map and examine the current practices of IQGCCs, reviewing some accessible relevant documents and reports was also important to: firstly, understand the factors behind the challenges in practice, and secondly to increase the reliability of data obtained from the interviews. Some of the documents and reports were identified by the researcher through searching for official evidence regarding the performance of IQGCCs, yet the majority of them were advised by the expert interviewees. A number of official government reports for performance evaluation, particularly those published by the Iraqi Prime Minister Office and Iraqi Federal Board of Supreme Audit, were reviewed to capture the general performance for the companies under study. Whereas, others were necessary to recognise the authority distribution, barriers in operational process, and controls that govern the processes.

As part of the plan to access to the targeted field data source, the researcher requested permission from the Iraqi Ministry of Construction and Housing to conduct research with three specific companies from its owned construction companies, and the permission was granted. Although the permission facilitated the conduct of the interviews, as a part of the government system, IQGCCs still have a very strict policy regarding the control of documents, which greatly limited the researcher's accessibility to the companies' internal materials and files. The main reviewed documents and reports included: Regulations for Implementing Government Contracts, Federal Budget Law, annual financial audit reports, internal formal letters of powers granted, project contracts, announcement for new contracts, monitoring reports, and project execution programmes.

5.2.5.4 Selection of Respondents

Considering the limitations that prevent data collection from the entire population, Saunders *et al.* (2016) assert the importance of a correct sampling design and ultimately the importance of selecting the most suitable participants. They argue that, while selecting the sample mainly depends on the research questions and objectives, factors related to the availability of time, money, and accessibility to participants should also be considered in deciding the sampling technique. Rubin and Rubin (2012) declare that there is a radical difference between choosing respondents in qualitative interviews and in survey research. Whilst questionnaire surveys are more suitable for statistical research to give an overview of a particular phenomenon by

numbers or categorical answers of yes or no, qualitative interviews are employed to draw broader statements in response to more complex questions than yes or no, agree or disagree.

Saunders *et al.* (2016) identify two approaches to strategic sampling, namely: probability (random) and non-probability (non-random) sampling. Whilst both approaches are equally valid, Kumar (2014) explains that there is a fundamental difference between sampling in qualitative and quantitative studies. Within quantitative research, he argues the selected sample should represent the population under the study, namely, a random sample drawn from the population. Yet sampling in qualitative interviews is less significant; indeed, Kumar (2014) advocates the adoption of non-random techniques, which are subsequently utilised to obtain varied and comprehensive sets of information (Sandelowski, 1995).

As this study is looking to understand complex processes, that cannot be generalised beyond IQGCCs, the work, as justified previously, tends to be constructivist and therefore qualitative in nature. Accordingly, purposive sampling was adopted as a means to select the targeted participants throughout the whole study. Purposive sampling is a non-probability tool in which specific elements are selected in a non-random way from among the entire population to gain rich and specialised data (Kumar, 2014; Saunders *et al*., 2016). This tool for sampling aligns with the study's research philosophy and strategy, and because using a probability/random sampling technique in choosing the research respondents might not lead to the achievement of the study's objectives. Indeed, the researcher has a clear idea regarding the criteria of respondents that need to be involved in the study in order to achieve its objectives. Accordingly, all the respondents were chosen based on their experience, knowledge and role in their companies. During this exercise, the researcher sought to select participants from the different organisational management levels, different companies, and geographical regional offices. This was important in maximising the amount of relevant information and thus enabling the researcher to build a holistic picture regarding both the current status of operational processes followed by IQGCCs and the applicable solutions required to address the challenges inherent in those processes. Haigh (2004) claims that examining diverse perspectives from different organisational management levels, rather than only from the top level, is crucial in gaining the potential full benefits of evaluating any operational process. This is because such an exercise would help to draw a balanced picture that accommodates multiple views from different levels and thus reducing the risk of attribution biases (Jeong *et al.,* 2006). More detail regarding the background and numbers of respondents involved in the first and second stages of data collection are provided in Chapters Six and Seven respectively.

Saunders *et al*. (2016) argue that, for qualitative research, the sample size is an ambiguous issue and there are no rules governing the decision on this. Yet, because the generalisations will potentially be applicable to a theory rather than a population, the sample size is mainly dependent on the research questions and objectives (Suter, 2011). According to Patton (2002), in qualitative studies, the understanding and insights about events can be gained by doing more with the data collection and analysis skills than with the size of the sample. This understanding is echoed by Kumar (2014), who emphasises that the sample size for qualitative studies is not as crucial as in statistical studies. To address this issue, several research textbooks, including those by Kumar (2014) and Saunders *et al*. (2016), recommend continuing to gather qualitative data, for instance by conducting additional interviews until the data saturation point is reached. This is the point at which the additional data collected no longer provides new information or uncovers new themes. Identifying the data saturation point is a subjective matter based, fundamentally, on the researcher's judgement. Therefore, to facilitate the identification of a reasonable number of respondents that are likely to be needed in a qualitative study, Saunders (2012) offers guidance on the limits of non-probability sample sizes for different types of study, as demonstrated in Table 5-5.

Table 5-5: Minimum non-probability sample size

Nature of study	Minimum sample size
Semi-structured/In-depth interviews	5–25
Ethnographic	35–36
Grounded Theory	20–35
Considering a homogeneous population	4–12
Considering a heterogeneous population	12–30

Source: Saunders (2012, p.45)

5.2.6 Data Analysis

Walliman (2005) argues that there is no sense of the data without their analysis. This is particularly relevant with qualitative data, where, without the analysis, there would be merely a mass of senseless text resulting from a data collection process. Therefore, an important aspect of qualitative data analysis is to develop an in depth understanding of the meaning of the gathered data. To achieve this, researchers need to focus on the context and interpret what is experienced and reported by social actors and/or what is observed and reviewed by themselves (Schutt, 2012). According to Saunders *et al.* (2016), this is the process of drawing the answers to the research questions from the textual data collected. Qualitative data analysis is defined by Bogdan and Biklen (2007, p.159) as, "*working with the data, organising them, breaking them*

into manageable units, coding them, synthesising them, and searching for patterns". In this process, a non-routine, original, iterative, non-linear and complete manner is usually followed to analyse the collected data (Suter, 2011).

Although there are several methods that can be used for the analysis, Gray (2014) claims that there is no specific approach to analyse and narrate the qualitative data. Yet, Walliman (2005) emphasises that analysis methods should be linked to the specific objectives of the research and the nature of its problem. This research includes two stages of field data collection and analysis. A combination of thematic analysis approach and business process mapping techniques namely IDEFØ and ADM process mapping techniques were used to analyse the data gathered through the first stage, while the second stage was analysed using only a thematic analysis technique. As section 3.5 discussed a number of business process modelling techniques widely used in mapping 'as is' process, the next subsection is dedicated to explaining the thematic approach and justifying its use in this research.

5.2.6.1 Thematic Approach

According to Braun and Clarke (2006), thematic analysis is seen as an essential technique for qualitative analysis that can be employed across a range of theoretical and epistemological approaches. It is generally used to identify, analyse, and report patterns (themes) within the gathered data. Thematic analysis is a flexible and useful research tool that can potentially describe the research data set in a rich and detail manner (Boyatzis, 1998). Moreover, this approach can be associated with both inductive and deductive approaches (Vaismoradi *et al*., 2013). Elo and Kyngäs (2008) profess that it is useful to adopt such a method to test a previous theory in a different situation, or to compare categories at different periods. This view is supported by Sandelowski (2010), who states that a thematic approach can begin with a theory about the target event, or a framework for gathering or analysing the required data. Therefore, the initial coded categories and themes, for pattern matching that are used in the data analysis, would usually be derived from the literature and research questions.

A thematic approach, as argued by Kulatunga *et al*. (2007), is a type of content analysis, a wider data analysis method that comprises four different approaches including: word count, thematic/conceptual content, relational analysis, and referential. In a word count approach, the frequency of words in the text is counted with the assumption that the words mentioned most give an indication of the importance of concerns. In a thematic approach, the focus is on scrutinising text or sets of text to check the existence and occurrence of concepts or themes

(Colorado State University, 2017). Relational analysis, according to Colorado State University (2017), goes beyond the thematic approach to concentrate on examining the semantic or meaningful relationships between the concepts. Whilst in referential analysis, rather than focusing only on text, a researcher considers other kinds of languages, such as silence, emphasis, background information, and the ways that they produce meaning and facilitate the analysis of the complexity of language (Kulatunga *et al*., 2007).

As this study aims to produce a conceptual framework to address the current challenges in the IQGCCs practices and improve their overall performance based on the perspectives of experts from these companies. Thus, using a word count approach would not lead the researcher to generate the accurate concepts required to interpret the research phenomenon. Moreover, the relational and referential approaches are also irrelevant for this research, as developing relationships among the concepts are out of the scope of this research, and there is no intention to analyse language complexities. Considering the objectives of this study and the limitations and unsuitability of other analysis approaches, thematic analysis was selected as a preferable approach for analysing the data collected. This was, indeed, applied along with the business process modelling techniques.

5.2.6.2 Procedure Adopted in Analysing the First Stage of Data Collection

Through adopting a multiple case study strategy, the first stage of the field data collection included gathering information required to identify, map, and examine the current operational processes within three of the IQGCCs. During the interview sessions, respondents were asked to describe the key processes used by their companies through delivering their construction projects. This included describing the sequence of processes, people involved in performing them, when and how decisions are made and who was engaged in making them, along with the main problems inherent in the processes and negative impacts on the value chain flow efficiency. To analyse the data collected from this stage, both the business process mapping techniques and thematic approach were used. The analysis began with the intra-case analysis with the aim of mapping and visually presenting the operational process of each company under study. This then was pursued by a cross-case analysis for all the companies involved.

The intra-case analysis was related to analysis each case individually. The process of analysis started with the familiarisation with the raw data through listening repeatedly to the recorded interviews, transcribing them, and then reading and re-reading line by line the transcribed data for each interview. Consequently, the key business processes, their sequence, the people

involved in performing each process, the decision points and people responsible for making them were all identified and mapped using the IDEFØ process modelling technique. Maps generated within each case study then were compared to produce a more accurate and complete unified process map for each company. To validate and ensure that the unified process map is correct and reflects the company practice, a focus group session was conducted within each case study. Amendments and improvement notes from the focus group participants were directly made on the presented map. As a result of the focus group exercises, a final process map was produced for each case. A visual cross-case comparison between the generated process maps revealed that all the companies under study adopted quite similar processes in delivering their construction projects. Therefore, all the three maps were integrated into one holistic map using a similar template to that employed in developing the theoretical framework in Figure 4-21.

Having mapped the current operational process of IQGCCs, it was then examined with the aim of identifying the key challenges inherent in the processes. The examination process included identifying problematic issues in the processes along with their main causal factors, as reported by the interviews and document reviews, as well as through the issues emerging from comparing the current adopted practices to good practice that is identified through the literature review and presented in Chapter Four. As a result, the sets of challenges that beset the IQGCCs operational processes were highlighted and categorised under their causal factors.

5.2.6.3 Procedure Adopted in Analysing the Second Stage of Data Collection

The purpose of this stage was to collect and analyse the data required to examine and test the applicability of the proposed theoretical framework and new organisational structure in addressing the challenges within IQGCCs' core business processes. Aligned with the recommendations of Sandelowaski (2010) and Yin (2014), and by adopting a thematic approach, the proposed framework was used as a tool to facilitate the process of data collection and analysis. Accordingly, the key themes/nodes used in analysing the collected data were mainly derived from the theoretical framework along with the results obtained from the analysis of the case studies. However, due to the complexity of the framework, Nvivo 11, a data analysis software programme, was used to facilitate the coding process. Although Nvivo 11 helps to analyse data in a more precise, systematic, and organised manner, one of its weaknesses is that it does not properly support data in Arabic. To avoid this issue, all data were uploaded as PDF files and the Region Selection Mode was used in the coding.

Coding is the process of classifying and organising the data collected under their relevant themes in order to analyse them in a structured way (Robson & McCartan, 2016). Similar to the process in analysing the interviews at the first stage, described hereinabove, the researcher also began with the familiarisation step to develop a good understanding of the data and their key themes. By using the Mind Map tool provided by Nvivo 11, the researcher started by creating a mind map that graphically depicted the main phenomenon of the research (improving IQGCCs performance) at the centre and connected with lines to the main themes/factors impacting the performance. Each theme/factor was then connected with its relevant sub-themes/elements derived from the theoretical framework. Thus the mind map formed the basis for developing a more detailed themes/nodes hierarchy in Nvivo 11. Furthermore, through the process of coding the raw data into relevant sub-themes, more refined themes (sub-nodes in Nvivo 11) were recognised. The assigning of data into their relevant nodes and sub-nodes was based on the interpretation by the researcher of the texts. This was conducted by carefully examining the transcript of each interview with the aim of categorising the various statements and patterns under their most appropriate theme and then the nodes and sub-nodes. This process was carried out repeatedly where relevant statements reported by other participants were examined, coded and grouped under existing or new nodes and/or sub-nodes until the subject crystallised to achieve the study's objectives. Thereafter, the analysed data were structured and presented in a symmetric way, as depicted in Figure 5-4. As a result of this exercise, a conceptual transformational organisational framework was produced concerning the improvement of IQGCCs performances.

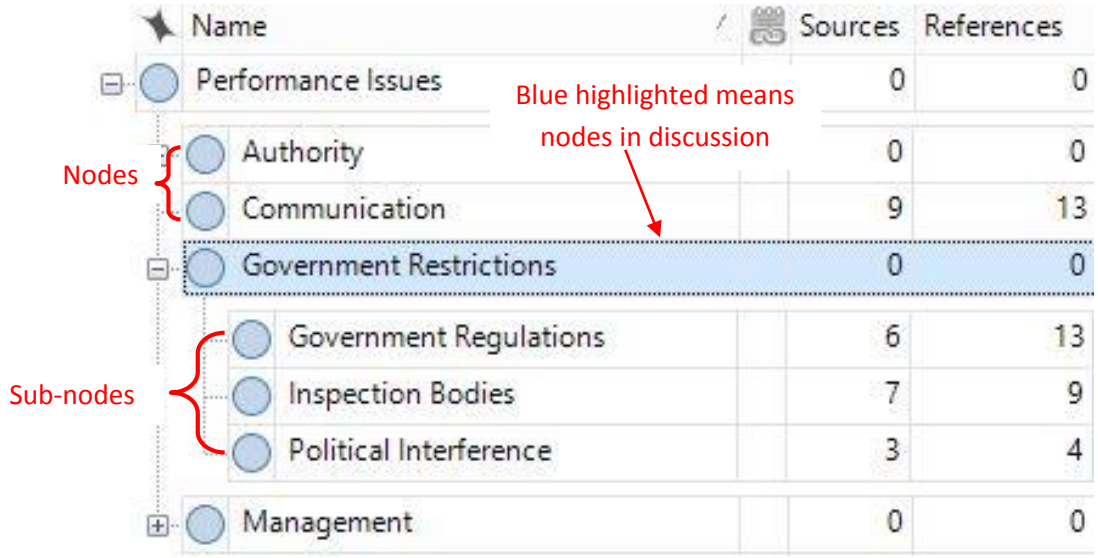


Figure 5-4: Example of data presentation using Nvivo 11

5.2.7 Validation of the Conceptual Framework

The conceptual framework developed from the second stage was mainly based on the literature review and perspectives of experts from IQGCCs. However, in order to reduce bias and acquire a broader confirmation regarding the conceptual framework's validity, credibility, and applicability in practice, a third round of semi-structured interviews was carried out. This round was conducted in May 2017 with specific participants, identified from different spectra interested in reforming Iraqi state-owned enterprises in general and IQGCCs in particular. They included two participants from higher education institutions who work on projects to reform Iraqi public organisations, a senior manager in the Ministry of Construction and Housing, which is deemed the official owner of most IQGCCs, and a senior manager who works for one of IQGCCs. The validation exercise ensured the credibility and applicability of the developed framework for IQGCCs, with consideration of the implementation issues. More details about the validation process are presented in Chapter Eight.

5.2.8 Validity and Reliability

As has been discussed in section 5.2.4.1, a case study, such as any other research strategy, has its potential strengths and weaknesses. In order to overcome the weaknesses, the case study quality needs to be enhanced through a number of tests. Yin (2014) points to four tests that are usually adopted with all social science methods, namely; construct validity, internal validity, external validity, and reliability. Construct validity is related to identifying the most appropriate operational measures that need to be employed in collecting the data regarding the study subject. Internal validity, which is mainly a concern for explanatory case studies, seeks to test whether the relationships between causes and effects have correctly been established and to check whether what has been identified as the cause actually produces what has been interpreted as the 'effect' or 'responses'. In comparison, external validity is about how to generalise the findings beyond the current case study (Yin, 2014). Whereas, according to Gibbs (2007), reliability is concerned with applying a consistent approach across different cases and focuses on eliminating errors and bias throughout the study. To address these issues, the researcher followed tactic recommended by Yin (2014), as depicted in Table 5-6.

Table 5-6: Actions taken to address the validity and reliability of the case study

Test	Case study tactic	Action taken	Phase of research in which tactic occurs
Construct validity	• Use multiple sources of evidence	• Participants selected from different management levels and geographical areas. Document review was used as an additional source of evidence to support the data obtained from interviews	Data collection
	• Establish a chain of evidence	• Interviews were recorded, transcribed, and analysed in real time	Data collection
	• Have key informants review the draft case study report	• The current process map produced for each case study was validated through a focus group session. Whereas, the final report of concerning the challenges was discussed with respondents engaged in the second stage of data collection	Composition
Internal validity	• Do pattern matching • Do explanation building • Address rival explanations	• This research is exploratory in nature, so the applicability of this test is not logical for such a study. Yet, a pattern matching tactic was used during the analysis to deal with 'inference' issues, thereby promoting the internal validity of the case study	Data analysis
External validity	• Use replication logic in multiple-case studies	• The multiple-case studies tactic was employed through selecting three Iraqi QGCCs that have similar criteria	Research design
Reliability	• Use case study protocol	• A set of guidelines was developed and documented to ensure the consistency of interviews. They outlined the interview questions, procedures, and rules governing the conduct of the researcher through the process of collecting and analysing data	Data collection
	• Develop case study database	• Database for organising and storing data collected and analysed was developed.	Data collection

Similar to the case study, the researcher took a number of actions to improve the validity and reliability of the results obtained from the interview in the second stage of the data collection and analysis. These actions were tabulated and presented in Table 5-7.

Table 5-7: Actions taken to address the validity and reliability issue in interviews

Test	Action taken	Phase of research in which tactic occurs
Validity	• Multiple participants from different companies and management levels were engaged. Interviews were recorded, transcribed, and analysed in real time	Data collection
	• The conceptual framework resulting from the second round interviews was validated through a third round of interviews (see Chapter Eight).	Composition
Reliability	• A set of guidelines that outline the interview questions, procedures, and rules governing the conduct of the researcher through the process of collecting and analysing data was developed and documented to ensure the consistency of the interviews	Data collection
	• A database for organising and storing the data collected and analysed was developed.	Data collection

5.3 Summary

This chapter explained and discussed the research methodology used to achieve the objectives of this study. Through employing the Research Onion Model, proposed by Saunders *et al.* (2016), the researcher discussed step-by-step the various components of the research methodology and the choices available within each component. This included providing justifications and explanations for each decision made to determine the most appropriate path for this research. Considering the research objectives and the phenomenon under study, the discussion revealed that this research tends towards subjectivism and interpretivism in its philosophical position; furthermore, it is qualitative in nature, and uses multiple case studies and a series of interviews as the most appropriate strategies to answer the research questions. Both one-on-one interviews and a focus group along with document reviews were recognised as the most relevant and applicable sources of evidence in collecting the data required to map and examine the current practice of IQGCCs. Whereas, ten one-on-one interviews with participants selected from four IQGCCs and at different organisational management levels, were used to test the applicability of the proposed framework and synthesise the conceptual organisational framework. A business process modelling technique and thematic analysis approach were used to analyse the data gathered. The next chapter will present the findings of the case studies.

Chapter Six - Mapping and Examining the Operational Processes of IQGCCs

6.1 Introduction

Chapter Four highlighted the current good practice operational processes required by large construction companies under traditional procurement in order to enhance their overall performances. Through conducting three case studies based on existing Iraqi Quasi-Governmental Construction Companies, this chapter aims to identify, map, and examine the current practices in terms of the 'as is' processes adopted by IQGCCs. The purpose of this investigation is to develop a better understanding of the operational business processes currently in use, and to identify the main challenges and barriers inherent within those processes.

Table 2-2 presents a summary of all Iraqi QGCCs and their associated affiliations with the main government Ministries. Three of these companies, which belong to the Ministry of Construction and Housing, form the basis of this research. The main rationale for this selection is based on the fact that the Ministry of Construction and Housing is considered a leader in the reconstruction efforts across Iraq. The Ministry is responsible for the planning and implementation of most of the infrastructure projects in the country. Consequently, it controls the largest number of QGCCs. Yet successive reports from governmental bodies, such as the Iraqi Prime Minister's Office (IPMO), and the Iraqi Federal Board of Supreme Audit (IBSA), have raised serious concerns about the poor levels of performance within all the QGCCs controlled by the Ministry (Wing, 2013; IFBSA, 2014; IPMO, 2015). The reports raise concerns about low productivity levels, inefficiency and ultimately the inability to generate profit. This forms the basis of the research and hence the need to investigate potential solutions to improve the efficiency and productivity of these organisations. The companies selected for this research are all large companies specialising in construction. The selected companies all have regional branches and focus on similar geographical areas of Iraq. This allows data to be collected under similar conditions and contexts.

The names of all companies, branches, and people involved in the research have been anonymised for ethical reasons. Nevertheless, the details of the operational processes, organisational structures, and other issues are accurate. The chapter first explains the procedure adopted in collecting the required field data. The background and general features of each

company are then presented along with the documentation, mapping, and examination of their respective operational processes.

6.2 Procedure of Data Collection

The methodology and procedures adopted in mapping and examining the current practice of three of IQGCCs were very similar and can be summarised as follows.

1) Literature review: an extensive literature review was carried out in order to establish a better understanding and knowledge regarding the current good practice business process that needs to be adopted by the large contracting construction companies under the traditional contracting form. Consequently, a theoretical organisational framework was generated to be a benchmark to facilitate the mapping, analysis, and improvement of 'as is' operational business processes implemented by IQGCCs.

2) Semi-structured interviews: between six and eight interviews were conducted within each company. Using non-random sampling, interviewees were selected from different organisational levels, as shown in Table 6-1. In total, twenty-one respondents were interviewed during this phase of the research.

Table 6-1: Distribution of the research participants

Company Name	Regional Office 1	Regional Office 2	Headquarter
C1	3	2	2
C2	3	3	2
C3	3	2	1

All respondents were engineers engaged in the operational processes associated with project delivery; each respondent was selected to ensure they have sufficient experience of working both in Iraq and for IQGCCs. For that reason, all interviewees have over 10 years' experience with their companies; Table 6.2 provides further detail regarding the interviewees' roles and years of experience. Held between December 2015 and February 2016, the interviews were semi-structured and, conducted in Arabic at the interviewees' places of work. The use of a semi-structured format allowed the researcher to adapt the literature review to develop a series of questions that formed the basis for the interview, a copy of the pro-forma interview questions employed at this stage of data collection is presented in Appendix C. Additionally, this structure allowed the interviewees sufficient freedom to explain how the current processes operate from their perspective, who is involved in undertaking them, when and how decisions are made, and the types and levels of information required. Each interview

lasted around one hour and all the responses were recorded and then transcribed verbatim within two to three days of the interview. The transcripts were then used to develop the initial 'as-is' operational processes maps.

Table 6-2: Details of participants

Participant Name			Current Role	Experience (years)
C1	RB1	C111	Project Manager	13
		C112	Deputy Regional Manager	23
		C113	Head of Engineering Section	14
	RB2	C121	Regional Manager	18
		C122	Deputy Regional Manager	16
	HQ	C1H1	Director of Projects Department	31
		C1H2	Engineer in the Project Department	19
C2	RB1	C211	Regional Manager	25
		C212	Deputy Regional Manager	22
		C213	Site Engineer	13
	RB2	C221	Regional Manager	30
		C222	Regional Estimator	26
		C223	Regional planner	29
	HQ	C2H1	Chief Estimator	33
		C2H2	Estimator	10
C3	RB1	C311	Regional Manager	15
		C312	Deputy Regional Manager	13
		C313	Project Engineer	10
	RB2	C321	Project Manager	20
		C322	Site engineer	12
	HQ	C3H1	Director of Estimating Div.	36
		C3H2	Senior Manager in the Projects Department	28

3) Follow-up discussions: after the interviews, and during the initial mapping process, there were numerous instances in which the researcher needed further clarification and discussion with the interviewees regarding specific issues that emerged while mapping. These included: further clarification regarding the sequence of activities, inputs and outputs, how decisions are made, and so forth;

4) Focus group interview: as a result of the three steps above, a process map was generated for each case study, using the IDEFØ technique. Thereafter, a focus group was conducted within each case study to validate and ensure that the process was correctly mapped and reflected the company's practice. Each focus group involved five participants from the population of engineers who had previously been interviewed, and lasted around one hour. During the interview, the researcher presented the mapped processes to the participants and asked them to offer any required amendments or improvements. Based on the participants' responses, a number of amendments were applied to produce the final map;

5) Document review: despite access to photocopied documents, this data source was limited for confidential reasons; however, the researcher was allowed to review some documents, particularly for case study one. These included: formal letters regarding the powers granted to the Department Directors, Regional Managers and Project Manager; priced tenders; monitoring reports; advertisements for new work; and the general government regulations and legislation regarding SOEs.

As a result of this exercise, a process map that depicts the operational process of each company within the study was produced. The next three sections present and discuss the case studies. Each section starts by providing an overview of the company's background. Thereafter, a description of the 'as is' core business processes, which are supported by IDEFØ drawings, are presented.

6.3 Case Study One

6.3.1 Company Background

Company one is a quasi-governmental construction contracting business, owned by the Iraqi Ministry of Construction and Housing. The company was established in 1988 with a capital grant of $14,250,000, and the aim of developing a specialist civil engineering firm to deliver major public sector funded civil engineering projects, including roads and bridges. The total number of personnel employed by the company at the time of the data collection (December 2015), was 2042 employees. Of this total, 1184 (58%) were appointed as official governmental employees on a permanent contract. The remaining 42% of the workforce (858 employees) were employed on temporary hiring contracts. Table 6-3 illustrates the distribution of employees based on their job titles and contractual arrangements.

Table 6-3: Employee categories – Company one

Category	Permanent Employees	Short Term Employees	Total
Engineer	211	34	245
Technician	166	51	217
Financial	101	4	105
Administrator	154	42	196
Craftsman	535	364	899
Unskilled	17	363	380
Total	1184	858	2042

The company operates a traditional hierarchical organisational structure, depicted in Figure 6-1. As a result, work is distributed across a range of different departments and sub-departments

(sections). Commands and instructions flow from the top level of the company, namely the Chief Executive Officer (CEO), down towards the department directors, section managers and their subordinates at various organisational levels. Under Iraqi law, CEOs of the various state-owned enterprises, organisations and companies, are appointed by an order from the Prime Minister's Office based on recommendations from Ministers. The CEO therefore only has the authority and power to manage the company in strict accordance with the Iraqi Regulations for Implementing Government Contracts, Federal Budget Laws, and specific instructions and directives issued by the Ministry.

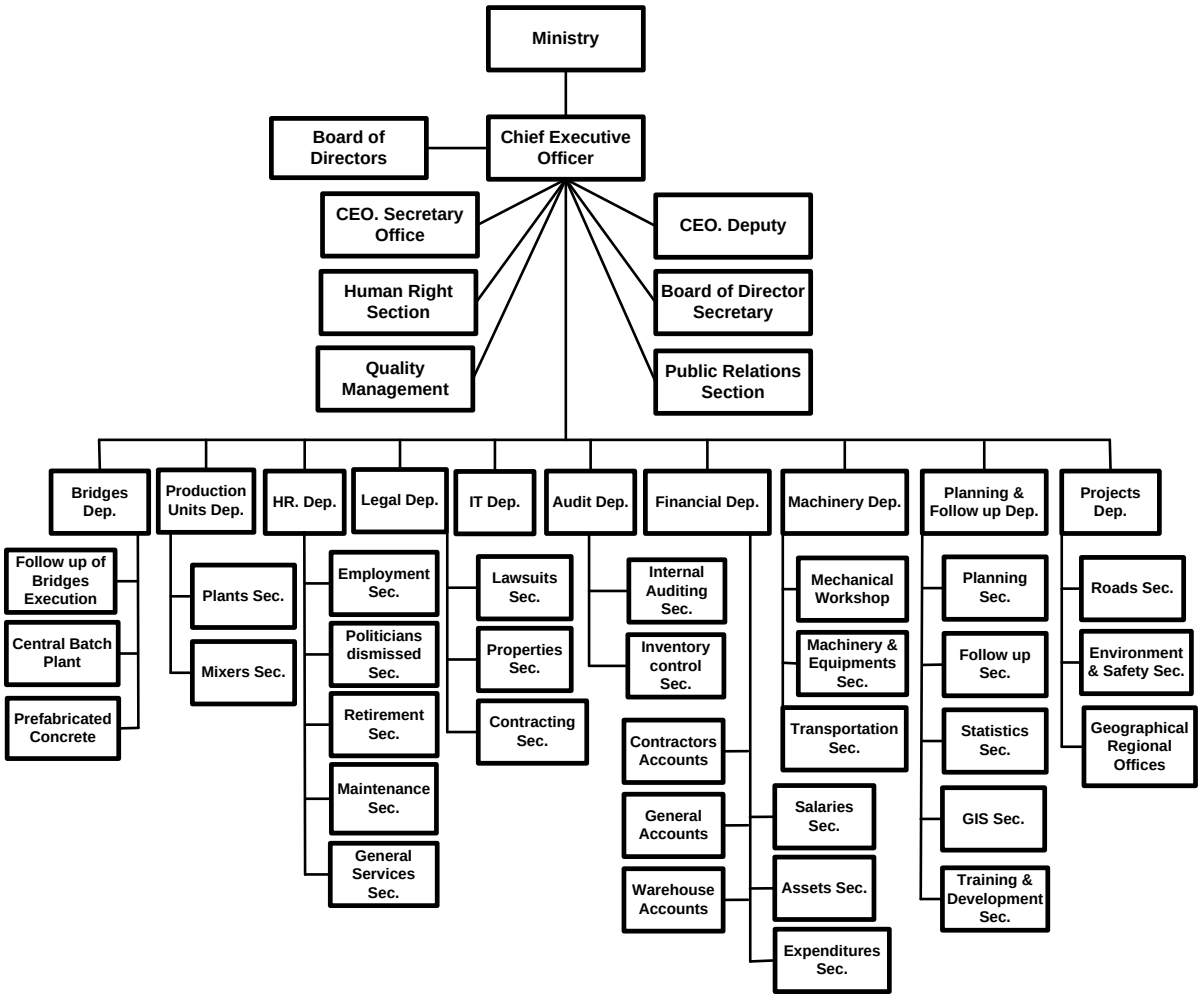


Figure 6-1: Organisational structure – Company one

In order to help obtain new projects and then execute and monitor them, the company has instituted seven geographical regional offices distributed around the country. As depicted in Figure 6-1, these regional offices are directly linked to the projects department. Every regional office is headed by a Regional Manager and has a number of functional areas, production units and projects, as shown in Figure 6-2.

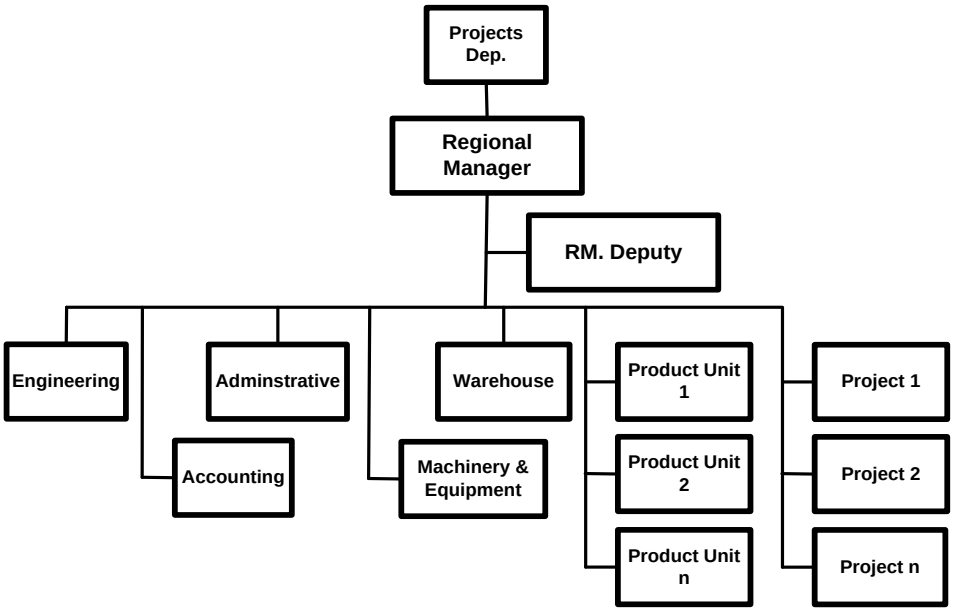


Figure 6-2: Regional office structure – Company one

Reviewing some finance auditing reports and performance documents showed that, between 2007 and 2015, the company completed nearly 90 projects with a total cost of up to $440 million. Yet, a report issued by the Iraqi Prime Minister's Office in 2015 revealed that the company made financial losses of up to $10 million during its business operation (IPMO, 2015). In this context, a financial audit, conducted by the Iraqi Federal Board of Supreme Audit (IBSA) (2014) evaluating 47 projects completed by the end of 2013, and identified that 22 (47%) of the projects evaluated made a financial loss. Moreover, the final outcome resulting from the operation of all these projects was a financial loss that reached to $8.96 million. It was also noted that most projects constructed by the company encountered significant delays, with delay periods often exceeding the upper limit allowed in the clauses related to the payment of delay penalties.

With the aim of developing a better understanding of the company's current practices and the issues that have led to such deficiencies in performance, the company's 'as is' operational business process has been explored, documented and mapped to allow the researcher to compare this to good practice operational processes depicted in the theoretical framework in an attempt to determine areas of process inefficiency and suggest amendments to working practices within the organisation.

6.3.2 'As is' Operational Business Process Analysis - Company One

Four main functions, namely: bidding, pre-construction planning, construction, and closeout, as depicted in Figure 6-3, are the components of the operational process adopted by the company in developing all their projects under the traditional contract.

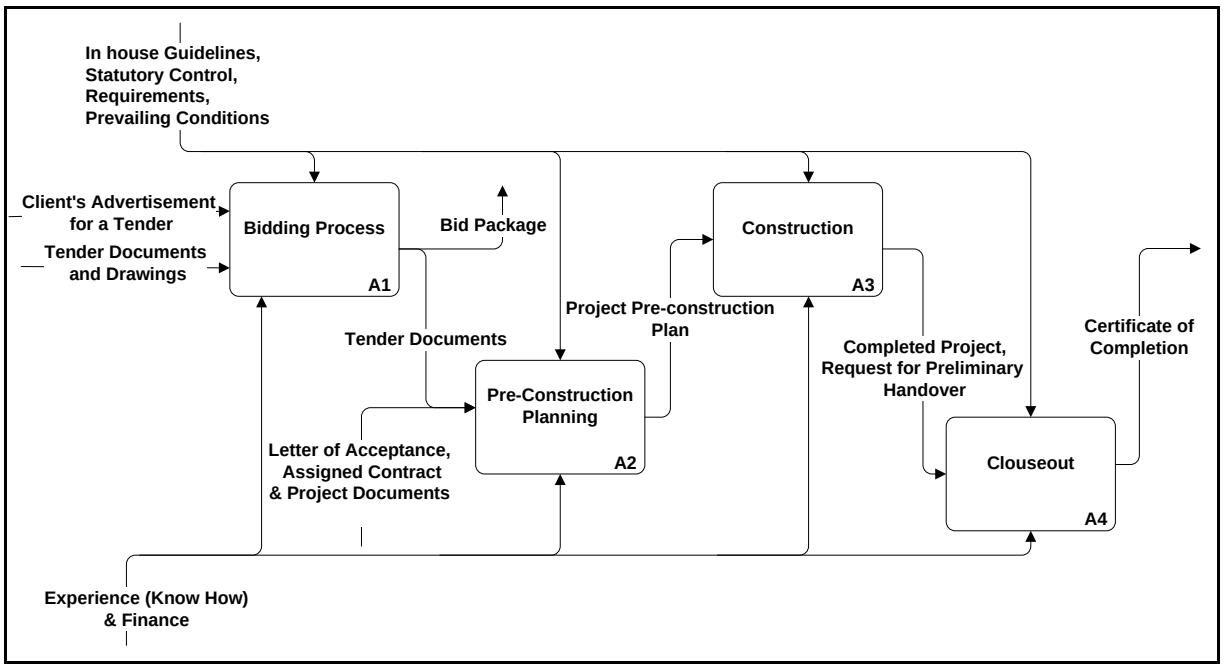


Figure 6-3: IDEFØ Level 1 The company's operational process - Company one

The operational business processes for this company are explored and analysed hereinafter in terms of the processes undertaken, their sequences and key inputs and outputs, and who is engaged in performing them. Whereas, the operational process that was documented and mapped in Chapter Four has been employed as a benchmark for the analysis of IQGCCs' current practice in an attempt to identify the causes of inefficiency within these processes.

6.3.2.1 Bidding A1 Process – Company One

As discussed in Chapter Four, the company's bidding process is triggered by their need for additional work and their response to an advertisement seeking tenderers. This phase of the process ends when the bid package is submitted to the client. Indeed, the Iraqi Regulations for Implementing Government Contracts require Iraqi governmental entities to adopt the open tendering procedure in contracting construction works. This is where an advert has to be placed in the public media giving notice that a contract is being tendered, with the aim of offering an equal chance to any contractor to submit a bid. It also gives the client's tender opening and tender analysis committees all the powers and responsibilities to review, and correct any calculation errors in the submitted tenders, and make recommendations without negotiation

regarding the award of contracts to the contractors who have the best value submitted tenders. Accordingly, mapping the current bidding process has revealed that the 'as is' bidding processes can typically pass through three high level processes (stages), illustrated in Figure 6-4, which are labelled: 'get opportunity', 'work up bid', and 'tender review and submission'. The decomposition of these processes is also shown in Figure 6-4; whereas, the details of their sub-processes will be analysed later in the chapter.

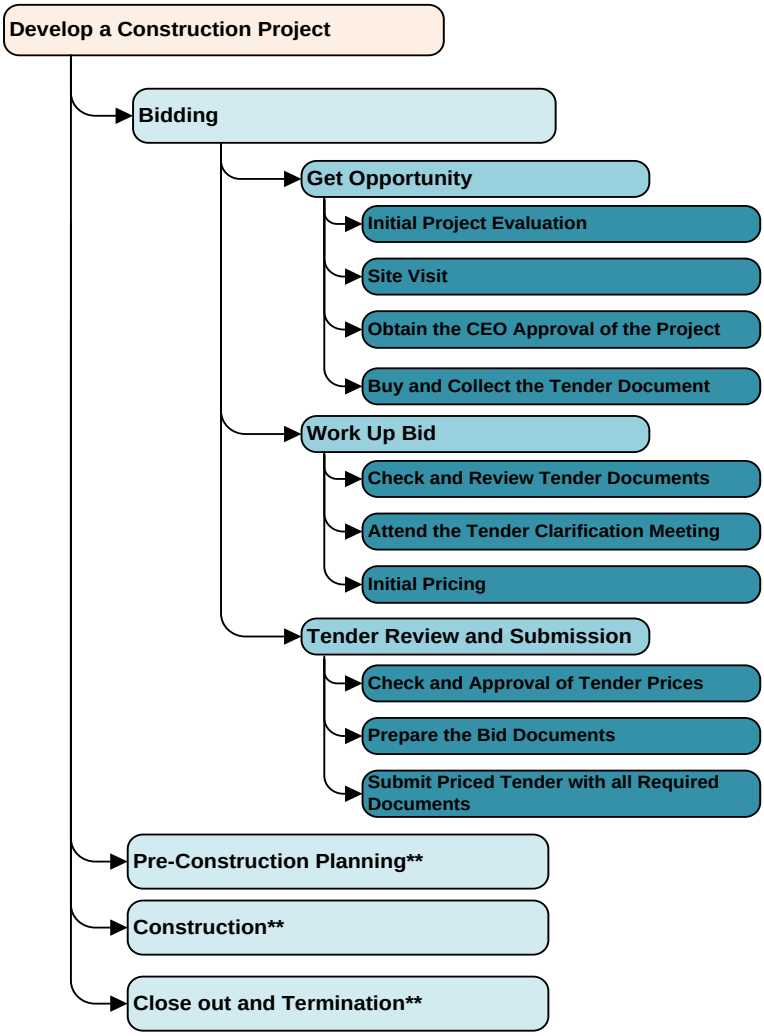


Figure 6-4: Activity Decomposition Diagram expanding the bidding process – Company one

6.3.2.1.1 Get Opportunity A1-1 Process – Company One

The company's A1-1 process can generally be decomposed into four sub-processes, as illustrated in Figures 6-4 and 6-5, and explained as follows.

A1-1-1 The **'Initial Project Evaluation'** sub-process is triggered by receiving or noting an advertisement for a new construction project, either by the Projects Department personnel at

the headquarters or the Regional Manager and his engineering staff at the regional level. The process, which is usually performed by the Regional Manager, aims to examine and evaluate the new opportunity to find out whether it is aligned with the company's experience and abilities. Yet a preliminary approval of the new project is preferably obtained from either the Area Managing Director (the head of the project department or the head of the bridges department) or the Chief Executive Officer at this early stage, even before visiting the project site. The outputs of this process are therefore either: (a) approval to proceed with the tendering process, assignment of people and establishment of a date to visit the worksite or (b) decline the project.

A1-1-2 The **'Site Visit'** sub-process is usually undertaken by the Regional Manager and/or his deputy and accompanied by an experienced engineer. The process aims to study site conditions and identify any obstacles or problems that could hinder work in the future. Information required at this stage is normally obtained through observation, contacting local people and the client's representative. Notes and photos are taken during the visit with the aim of examining them further in the office. The output of this process is a site visit report.

A1-1-3 The **'Obtain the CEO Approval of the Project'** sub-process represents the sub-process of obtaining the Area Managing Director's and CEO's authorisation for the purchase of tender documents. This can involve a discussion on the general information available about the project, such as: the size, type of project, its estimated cost and build period, the resource availability, site conditions, and so forth. Depending on the time allowed, such discussions are either conducted face to face or through sending a formal request to obtain the fees required to buy the tender documents. It is important to mention that the decision whether to buy the tender documents at this stage is equivalent to the bid/ no bid decision. The output of this process is the final decision made by the CEO regarding whether to buy the tender documents. In case the decision is to go with the bidding process, a signed formal letter should be issued from the CEO's office to the Finance Department as a permit to issue a cheque to purchase the tender documents.

A1-1-4 The **'Buy and Collect the Tender Document'** sub-process is usually performed by an authorised employee of the projects department, or by the regional office. The process involves all the activities required to coordinate with the financial department in order to issue a cheque needed to buy the tender documents, contact the client's representative in order to pay the tender's fees, and collect the tender documents at the designated date, time and place.

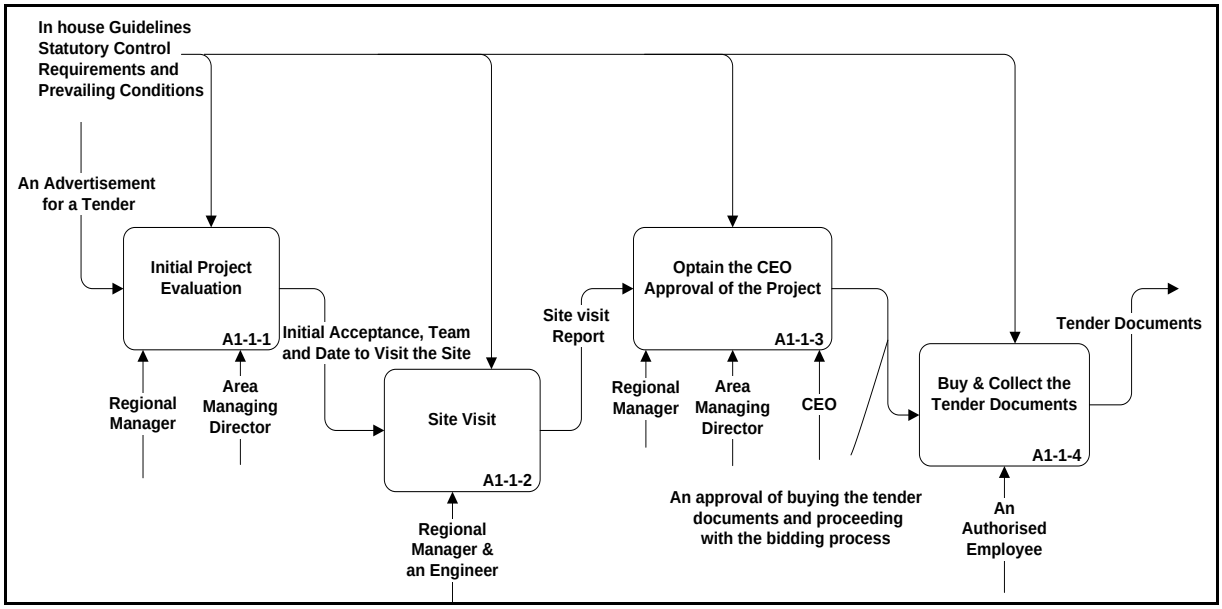


Figure 6-5: IDEFØ level three A1-1 Get opportunity process – Company one

6.3.2.1.2 'Work up Bid' A1-2 Process – Company One

This process begins when the tender documents are received and ends when the process of initial pricing is completed and the data is dispatched to the Projects/Bridge departments at the corporate headquarters for further checking. Figures 6-4 and 6-6 shows the sub-processes decomposed from the A1-2 process. These include:

A1-2-1 The **'Check and Review Tender Documents'** sub-process comprises checking and examining all tender documents and drawings with the aim of identifying the tender conditions and requirements, including any ambiguity in, or mismatch among, the tender documents, drawings, and bill of quantities. This is normally performed by the regional engineering section in coordination with the Regional Manager. The outputs of this process include: a list of queries/questions to the client, and a summary of all the construction materials, labour, time, and equipment required to execute each work item.

A1-2-2 'Attend the Tender Clarification Meeting' represents the sub-process of attending the clarification meeting managed by the client in order to answer any queries and questions that have arisen amongst the potential bidders. Attendance at this meeting is usually delegated to the engineer responsible for the engineering section, and during the meeting, notes are taken. Based on the answers, the output of the process might need to be reviewed further via the A1-2-1 process. This is particularly the case if the answers would affect the amount and cost of the work, or would proceed directly to process A1-2-3 when the answers just concern clarifications that do not affect pricing.

A1-2-3 'Initial Pricing' pertains to the process of calculating all the project direct, preliminaries, and indirect costs, as well as determining the mark-up value; this is usually performed by the same people involved in sub-process A1-2-1. The pricing of the different items is mainly done in-house, based on the experience of staff and their knowledge of the market. However, in certain cases, clarification regarding the prices of some items might be obtained by telephone or email from suppliers or vendors. The value of the company's final mark-up, recommended by both the company and Ministry, is approximately 20% of the contract value. The output of this process would be a draft of priced items (priced bill of quantities) with the price analysis details and the expected duration of the project.

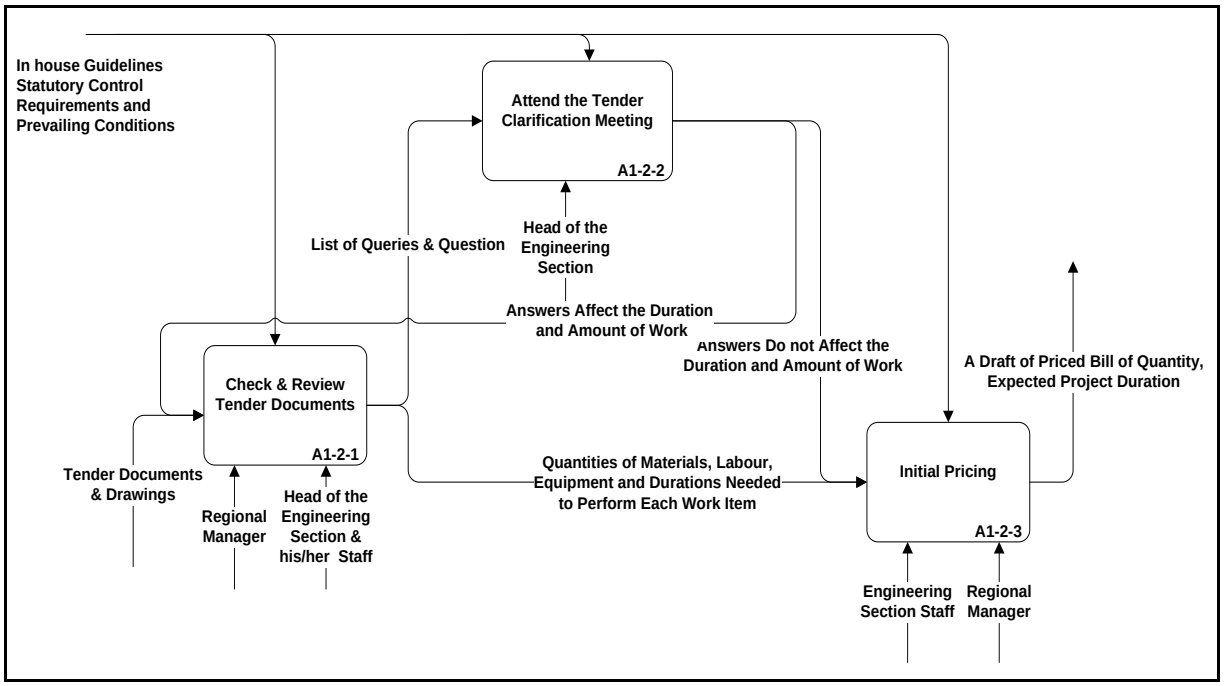


Figure 6-6: IDEFØ level three A1-2 Work up bid process – Company one

6.3.2.1.3 Tender Review and Submission A1-3 Process – Company One

The A1-3 process starts by receiving a draft of priced bill of quantity and finishes by submitting the tender package to the client's representative. The main aim of the process is to check the accuracy of pricing and obtain the CEO's approval of the tender's final price. In executing this process, the company usually follows three sub-processes, as depicted in Figures 6-4 and 6-7.

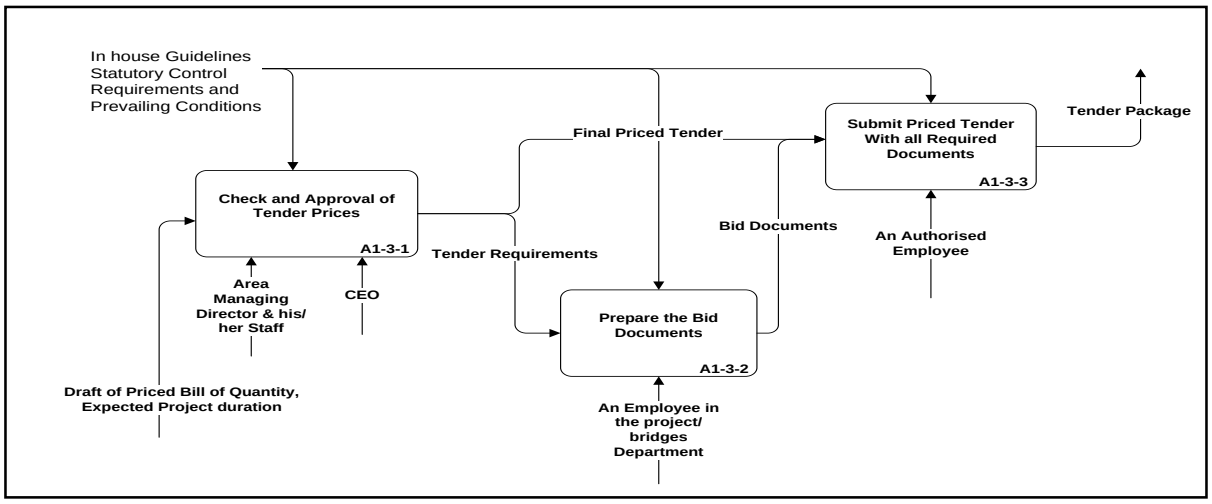


Figure 6-7: IDEFØ level three A1-3 Tender review and submission – Company one

A1-3-1 'Check and Approval of Tender Prices' is based on the project type, whether it is a bridge or road; this sub-process is normally performed by the bridges department or projects department at the company centre. It aims to review the tender documents and its requirements and check all prices estimated by the regional office staff and make the required corrections after discussion with the Regional Manager in order to reach the right prices. The discussion could either be held face to face at the company centre or via the phone. It is then the responsibility of the Area Managing Director to ensure the CEO's approval of the final tender price. Thus, the main output of this process would be the final priced tender and tender requirements.

A1-3-2 The **'Prepare the Bid Documents'** sub-process pertains to the preparation of all the documents required to be submitted with the priced tender. This can include: a certificate of experience; a list of similar works; a list of the company's equipment and machinery, and so forth. It is important to mention that the company, as a part of the governmental body, does not need to submit a letter of financial security with tender documents, as they have an exemption under the Iraqi Regulations for Implementing Government Contracts. An employee in the projects/bridges department performs the preparation of the bid documents. The output of this process is the bid documents.

A1-3-3 The '**Submit Priced Tender with all Required Documents**' sub-process includes the collection of all previously stated outputs into a single package and its submission to the client's representative on the designated date, at the pre-determined time, and place. Submitting the tender package can be regarded as the last activity in the bidding process. It is now the client's responsibility to open, review and evaluate the submitted tenders. The client's representative

directly corrects errors in the calculation of the contract cost without reference to the bidding contractor. The Iraqi Regulations for Implementing Government Contracts stipulate that any bid that exceeds a variance of +/- 5% of the client's estimated cost is automatically eliminated. The client is obligated to re-advertise the contract in cases where: none of the submitted bids are within the aforesaid estimated cost limits; or none of the bids have fully met the tender conditions; or the number of submitted bids falls below three. After evaluating all the submitted bids, the client's representative will issue a letter of acceptance with all documents and conditions required for contracting, to the preferred bidder.

6.3.2.2 Pre-construction Planning A2 Process – Company One

The A2 process is triggered when the letter of acceptance related to a submitted bid is received and ends by reviewing and ratifying the project execution plan by the projects/bridges department, planning department and the CEO sequentially. The purpose of the process is to establish and provide the main technical and administrative requirements for commencing work on the site. The pre-construction planning process can be decomposed into lower level processes and sub-processes, as illustrated in Figure 6-8.

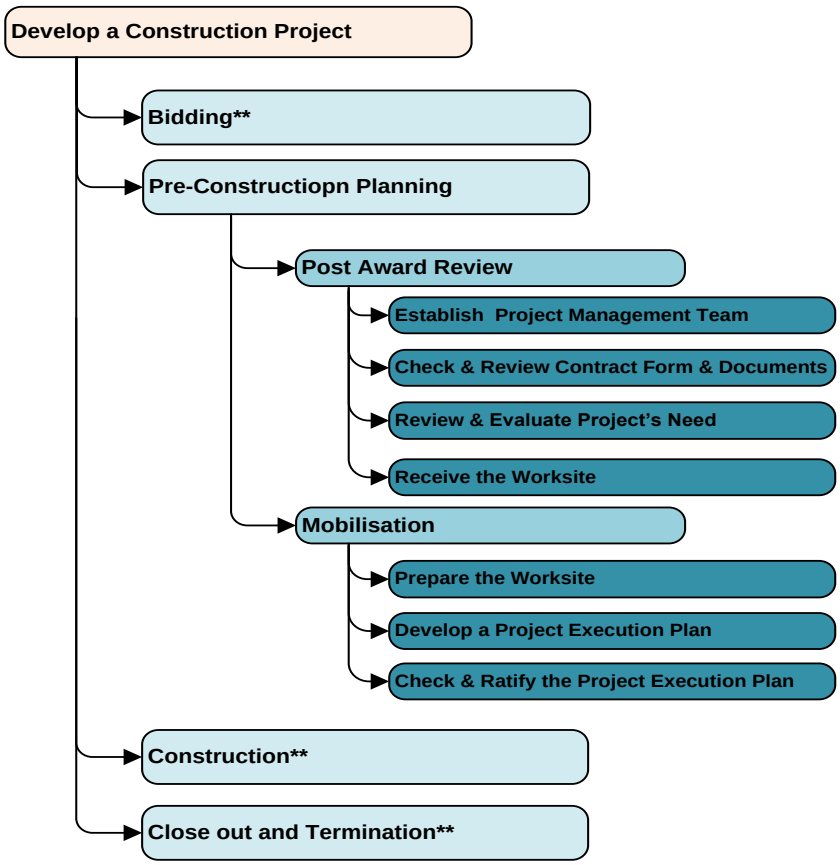


Figure 6-8: Activity Decomposition Diagram expanding the pre-construction planning – Company one

6.3.2.2.1 Post Award Review A2-1 Process – Company One

The A2-1 process generally aims to finalise the project contract and establish a base for developing a project plan and commencing work on site. The process, as identified through the interviews and focus group, embraces four sub-processes, depicted in Figure 6-9.

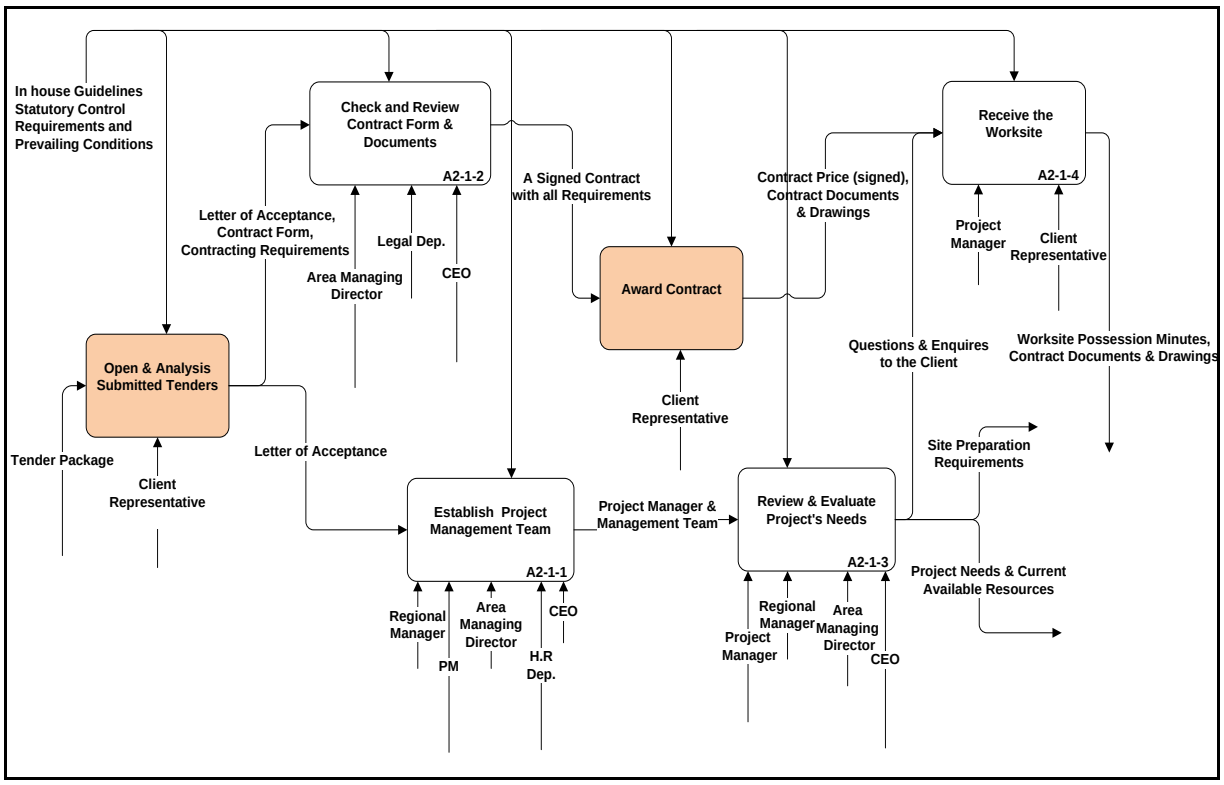


Figure 6-9: IDEFØ level three A2-1 Post award review – Company one

A2-1-1 The **'Establish Project Management Team'** sub-process promptly starts after receiving the client's acceptance of the company bid; therefore, it can be seen as the first activity within the A2-1 processes. However, it often continues even after construction works commence on site. This sub-process is usually undertaken by the Regional Manager and the Project Manager appointed or allocated to the project. The project team members are normally assigned from the personnel of the regional office, which is responsible for executing that project. However, in case there is a need for further staff, a formal letter outlining the required personnel would be sent to the projects/bridges department (Area Managing Director) with the aim of liaising with other Regional Managers first and then with the CEO to assign staff from other regional offices or from the market through additional employment. The project team often depends on the size and type of project; nevertheless, it commonly involves a Project Manager, Project Engineer, Foreman, Surveyor, Civil, Mechanical and Electrical Engineers, and Clerks. It is important to mention that the involvement of different people in undertaking

this process is sequentially based on their designated functions rather than their need to be collaborative. Moreover, the only accepted way of communicating among the different departments and regional offices is by formal letter.

A2-1-2 The **'Check and Review Contract Form and Documents'** sub-process generally aims to check and review all the documents and drawings attached to the acceptance letter to ensure that they correspond to what has been bid on. It also includes an examination of the contract conditions and the preparation of any requirements that need to be submitted to the client with the signed contract. During this process, the Area Managing Director is responsible for the technical checking, whereas the legal department is responsible for reviewing the legal issues involved in the contract. Thereafter, the contract form, with all its attachments, requirements, and notes recorded by the aforementioned departments, will be sent to the CEO in order to review and sign them. An authorised employee will then dispatch the contract package to the client's representative.

A2-1-3 The **'Review and Evaluate Project's Needs'** sub-process pertains to review the project documents and drawings with the aim of evaluating the project's needs and the resources required in undertaking it. This might also include a visit to the worksite in order to examine the site conditions in more detail and to note any problems, constraints or obstructions that can affect the work and that have not been listed in the first site visit and/or by the client. Performing these tasks is generally part of the Project Manager's responsibilities; however, these are always done in consultation with the Regional Manager. Any requirements that might be needed in preparing and organising the worksite, such as a temporary jobsite office, and hiring the equipment to clean and level the site, are also determined and reported in a formal letter to the Area Managing Director and CEO in order to secure their approval to hire or buy. Accordingly, the key outputs of this process would usually include a set of questions and enquiries that would be sent to the client, the requirements needed to prepare the jobsite, and an evaluation of all of the project's needs and resources to execute the works.

A2-1-4 The '**Receive the Project Worksite**' sub-process usually starts after signing the client's representative to the contract. This process includes a visit to the client's representative in order to discuss the issues that have emerged from reviewing the project documents and conducting a site visit, and to set a date for the acquisition of the worksite. The possession of the worksite is achieved through forming a joint committee that involves members from both the company and the client's organisation. This committee inspects the site and documents any obstacles and

barriers that have not been listed in the bill of quantities; they also seek to reach an agreement to resolve any problems that may hinder the handover of worksite. The Project Manager is generally the main individual responsible for performing this process, whilst the outputs of the process usually include the possession of the worksite by the company and receiving some documents and drawings regarding the project.

6.3.2.2.2 Mobilisation A2-2 Process – Company One

Indeed, interviewees reported that some activities associated with the mobilisation process can immediately start after receiving the acceptance letter. However, the majority of the interviewees, supported by the documents, revealed that the main activities of this process often start after receiving the project site, and the official commencement of the construction period. Figure 6-10 illustrates the decomposition of the A2-2 process through employing the IDEFØ modelling technique.

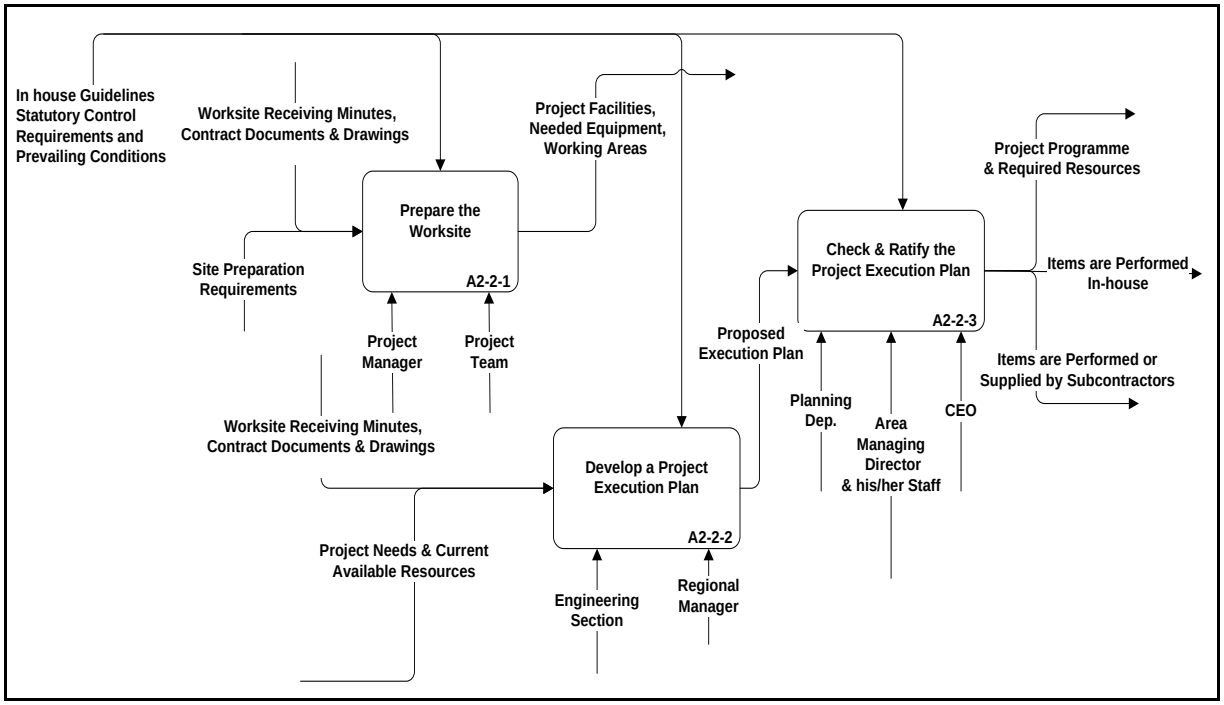


Figure 6-10: IDEFØ level three A2-2 Mobilisation – Company one

A2-2-1 The **'Prepare the Worksite'** sub-process is the responsibility of the Project Manager and their team. The activities of this process promptly begin after receiving the worksite. They often comprise: establishing a temporary office to manage the project, levelling the site ground, and locating the storage of materials and mechanisms based on the available areas and adequate security and protection.

A2-2-2 The **'Develop a Project Execution Plan'** sub-process mainly aims to develop a project's programme (master programme) and decide on work packages that will be performed in-house and those that will be subcontracted. The plan is usually developed by the engineering section at the regional office in consultation with the Regional Manager. It is then sent by a formal letter to the company headquarters in order to be checked and approved by the planning department and projects/bridges department.

A2-2-3 The **'Check and Ratify the Project Execution Plan'** sub-process is mainly performed by the planning department and the bridges/projects department at the company headquarters. The planning department is responsible for checking the proposed programme, whereas, the bridges/projects department is responsible for checking the work packages and obtaining the CEO's approval of the plan. Once the CEO's approval has been obtained, a copy of the project programme will be dispatched to the client's representative in order to secure approval and adopt it in monitoring the project's progress.

6.3.2.3 Construction A3 Process – Company One

As mentioned in Chapter Four, section 4.2.3, the key purpose of the construction process is to create physical deliverables that meet the contract's conditions and customer satisfaction. Analysing the data collected from case study one reveals that the construction phase employed by the company generally comprised one recognised stage which is "Commence Work on Site stage", as explained below.

6.3.2.3.1 Commence Work on Site A3-1 – Company One

Analysing the participants' responses and the documents related to a number of completed projects reveals that there is a considerable overlap between the activities of the pre-construction planning phase and the activities of construction phase. Indeed, due to the client's insistence on commencing construction works on site, the A3-1 process usually starts early, even before finalisation of the site preparation, project team and execution plan. Delivering the required workforce, equipment and construction materials, is usually done gradually and continues throughout the construction phase, based on a reactive strategy. It is, therefore, difficult to distinguish the 'deliver to site' process as a stage work that is recommended to proceed to the 'commence work on site' process and continue throughout the execution process based on the project execution plan, as explained in Chapter Four. As a result, the 'commence work on site' process can be seen as the only notable high-level process in the construction

phase. Yet, A3-1 process can be decomposed into four sub-processes, as depicted in Figure 6-11 and described hereinafter.

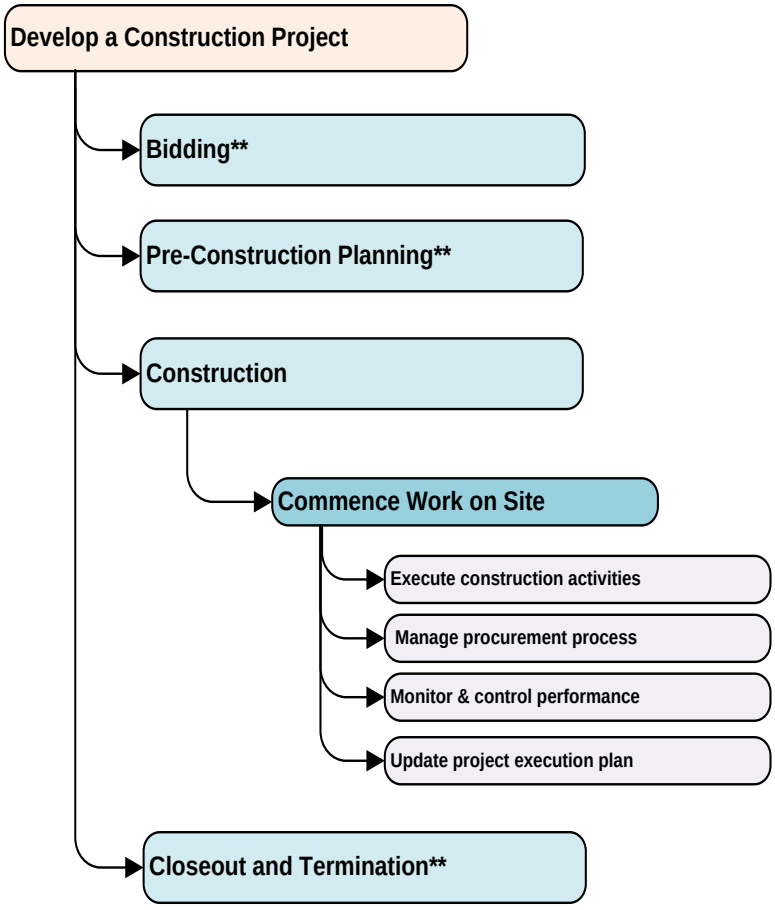


Figure 6-11: Activity Decomposition Diagram expanding the construction process – Company one

A3-1-1 The **'Execute Construction Activities'** sub-process is the act of carrying out planned tasks and activities that result in the production of the project deliverables. According to the interviewees, the process of executing construction activities directly begins after possessing and preparing the worksite. However, it ends with the client accepting the deliverables created. However, because the execution processes undertaken, each deliverable can generally vary depending on its type, the project worksite conditions, and the tools and techniques available; as such, the description of such processes cannot be achieved here in any real detail. Alternatively, the focus is shifted on the mechanisms adopted in implementation.

Commonly, two implementation mechanisms have been recognised as widely used by the company in its endeavour to build the required deliverables, and these are the in-house execution, and subcontracting, as depicted in Figure 6-12. The decision regarding which work

items should be subcontracted or implemented in-house is usually made while preparing the project execution plan. However, such a decision is often subject to modification throughout the construction phase, according to the work conditions and requirements.

In-house execution is typically conducted by the company's own staff and equipment and/or through hiring them from the local market on a daily basis. The construction materials, on the other hand, can either be provided by suppliers under formal contracts, especially when there is a need for large quantities of materials and when sufficient and appropriate storage spaces are available, and/or purchased directly from the markets under informal contracts by the purchasing committees.

Whereas, in terms of subcontracting, a subcontractor is often responsible for providing and assembling all the resources required to build certain deliverables that should meet the contract conditions, required specifications, and customer satisfaction. Figure 6-12 illustrates the mechanisms adopted by the company in producing the desired deliverables.

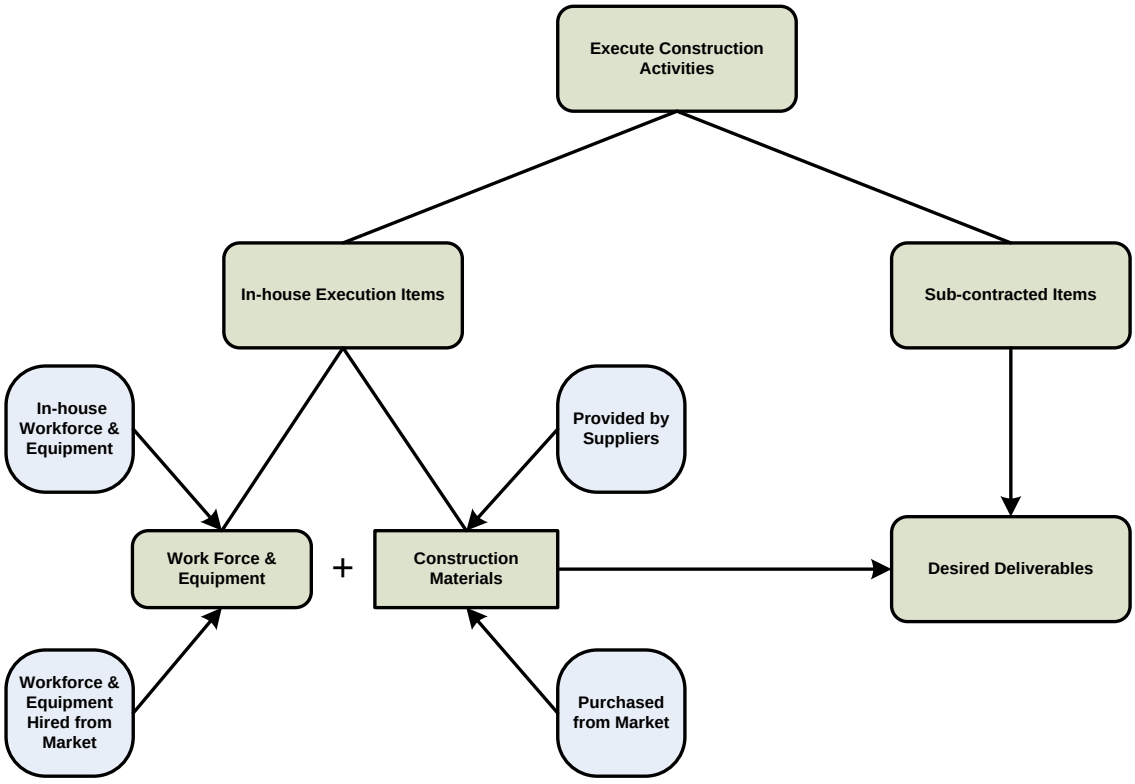


Figure 6-12: Mechanisms adopted to produce the desired deliverables – Company one

A3-1-2 The **'Manage Procurement'** sub-process aims to hire, purchase, and subcontract the resources required to build and/or facilitate the production of the desired deliverables. The process in general starts by establishing a number of committees from members of the project

management team, and these include the: hiring committee, purchasing committee, technical committee, and so forth. Furthermore, there are other central committees established at the headquarters. These include the tender opening committee and tender analysis committee that are mainly responsible for opening and analysing bids submitted by subcontractors and suppliers, or for auditing the prices of items listed in the transactions that are performed by various purchasing committees, such as the moderate prices committee. It is also important to mention that the company does not have a purchasing department, and all purchases are conducted through the purchasing committees distributed over the company's segments. The members involved in these committees, according to the Iraqi Federal Budget Law, have to be changed every three months. Meanwhile, the purchasing authorities provided for these committees are generally set by the CEO and should be in line with the Iraqi Federal Budget Law and the Ministry instructions.

Figure 6-12 shows that the procurement processes can be performed through two scenarios: 1) direct procurement via purchasing committees, and 2) subcontracting via formal contracts. Yet, the interviewees from this company reported that their company mainly depends on the second scenario in procuring the required construction materials and equipment, and in performing the construction works.

The subcontracting process, as depicted in Figure 6-13 A and B, starts by sending the Regional Manager a formal letter to the company's headquarters, including a request to subcontract a certain construction material or work item. Such requests are usually based on the Project Manager's and Plant Manager's monitoring reports regarding the work progress and material availability. This request is often examined and approved first by the Area Managing Director and then by the CEO. After obtaining CEO's approval for subcontracting, the staff of the projects department will work on preparing the specifications of the required material or work item, tender conditions, and all other information regarding the type, size, and place of work, including when and where the tender documents can be obtained, its cost, and the final date for submitting. Thereafter, this information is sent to the legal/contracting department to prepare the tender advertisement and to get CEO's signature on the final version for advertising. Moreover, the Iraqi Regulations for Implementing Government Contracts impose the open tender system on government bodies including IQGCCs. Under this system, all government organisations and companies are forced to place their tender advertisements in three well-known government newspapers, the company's advertising billboard, and web page for a reasonable time, which is usually from 2 to 3 weeks.

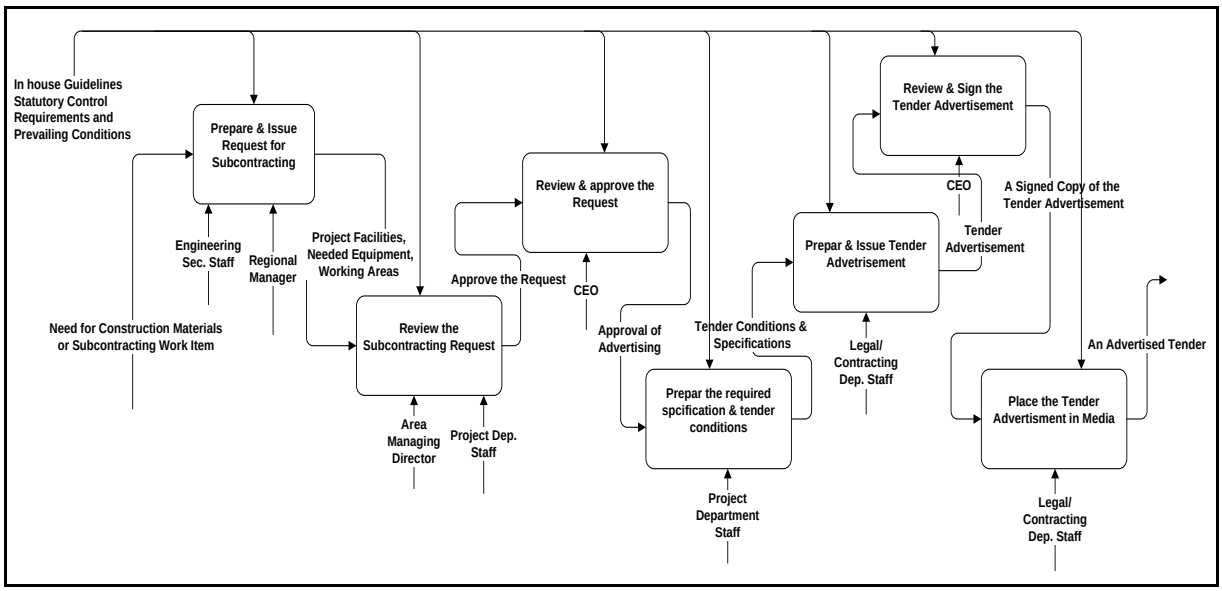


Figure 6-13 A: IDEFØ Subcontracting process – Company one

After submitting to the subcontractors or suppliers for their priced tenders, these tenders are firstly opened by the in-house tender opening committee in order to ensure that they meet the tender conditions. They are then examined and analysed by the tender analysis committee to determine and make recommendations regarding the best competitive bid. Based on the tender analysis committee's recommendations, the company's CEO will instruct the legal/contracting department to issue the acceptance letter to the owner of the best value submitted bid and start preparing the contract form. The CEO should sign the acceptance letter, and the winning bidder is usually given 15 days from the date of issue of the acceptance letter in order to complete all the documents required to sign the contract.

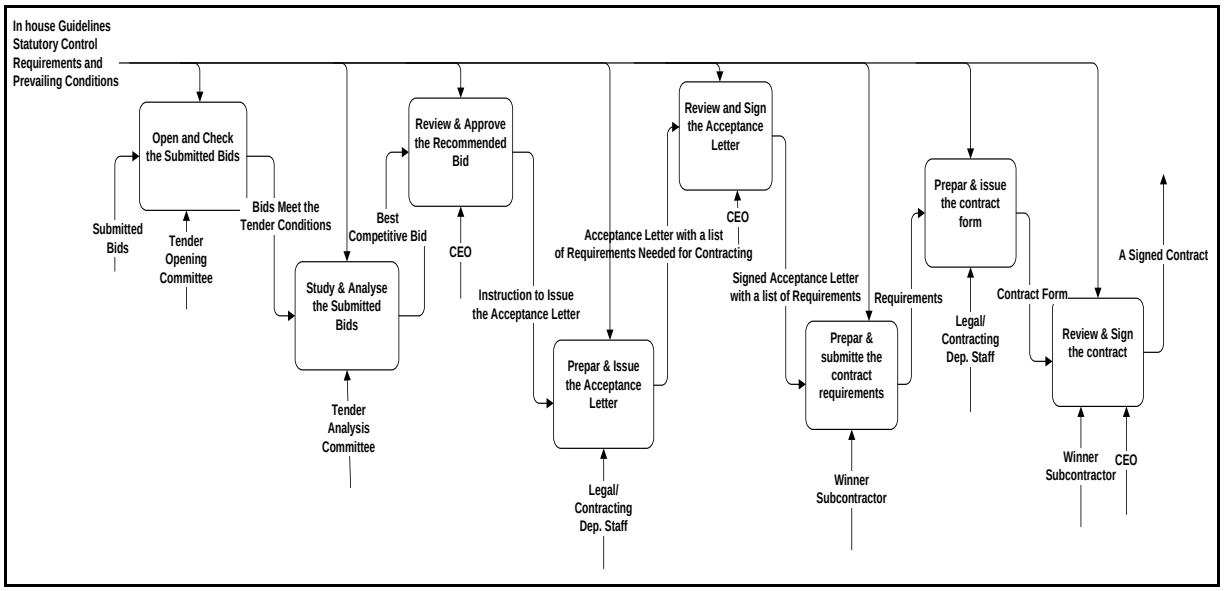


Figure 6-13 B: IDEFØ Subcontracting process – Company one

Meanwhile, the first scenario of procurement (direct procurement via purchasing committees) is often used when there is a need to buy materials in small quantities, such as backup materials for the mechanics, safety equipment, and stationery. The procedure includes providing the Project Manager with an advance payment. The Project Manager then takes the responsibility for allocating the money to the various committees within the project, according to their roles and importance. Through coordinating with the project team, the purchasing committee is responsible for supplying the required materials and preparing the paperwork for the purchase transactions, ratifying them with the Regional Manager, and then sending them to the company's headquarters for reviewing and auditing. Yet the purchasing authority provided to the Project Managers through such committees is limited and does not fit with the size of work, as will be explained and discussed later in section 6.7.3.

A3-1-3 The **'Monitor and Control Performance'** sub-process is mainly the responsibility of the Project Manager and Regional Manager. The process generally includes collecting, analysing, and reporting of the project performance data and taking the appropriate corrective actions required to bring back the project onto its planned track. Two performance metrics, namely quality and time, have been recognised by the interviewees as the major measurements used by the project team to monitor the performance. In terms of quality, all supplied materials and executed works are checked and tested from the client's representative and/or through a third party agreed by client and under their direct supervision. The progress of project activities and the percentage of completion are also measured and reported to the company headquarters, specifically the planning department, on biweekly, and monthly bases. The Project Manager, in coordination with the engineering section normally undertakes this activity at the regional office. Meanwhile, the project cost is usually monitored and controlled by the finance and planning departments at the company headquarters. However, according to the interviewees, the cost of projects within their company cannot be monitored and controlled accurately, since the budgets of different projects are not fully separated. This point will be explained further later under section 6.7.3.

A3-1-4 The **'Update Project Execution Plan'** sub-process includes reviewing and updating the baseline plan in light of the new requirements and changes that occur in the project scope. Conducting such an update is usually the Project Manager's responsibility in collaboration with the engineering section, the Regional Manager and the client's representative.

6.3.2.4 Closeout and Termination A4 Process – Company One

The closeout process, as reported by interviewees, usually starts when the completion rate in the entire project works reaches up to 90% - 95%, and finishes with end of the maintenance period and the turnover the project to the owner. Mapping the closeout process reveals that most of its sub-processes are performed by the client's representative; however, the company as a contractor is responsible for executing two key sub-processes, namely: 1) To correct and maintain any indicated deficiencies and defects; and 2) To reallocate and terminate the construction team and resources. Figure 6-14 illustrates the sub-processes grouped under the closeout process. However, the description of these sub-processes, from the contractor perspective, are presented as follows.

A4-1-1 The **'Correct and Maintain any Indicated Deficiency and Defects'** sub-process pertains to the repair and correction of any deficiencies and defects in the works, with the aim of making them acceptable by the client. The project team generally performs the sub-process as a response to the punch list prepared by the client's primary inspection committee. Similarly, as shown in Figure 6-14, both the A4-1-3 and A4-1-4 sub-processes are also triggered as a response to either a casual defect appearing during the maintenance period or a punch list produced by the client's final inspection committees. However, maintenance teams that are formed according to the type and nature of the defect for repair usually perform A4-1-3 and A4-1-4.

A4-1-2 The '**Reallocate and Terminate Construction Team and Resources'** sub-process includes all activities undertaken to re-assign and terminate the employment of the field, project management team, equipment, surplus materials, and any temporary construction office and facilities utilised by the project team. The Regional Manager in coordination with the Project Manager usually conducts this sub-process.

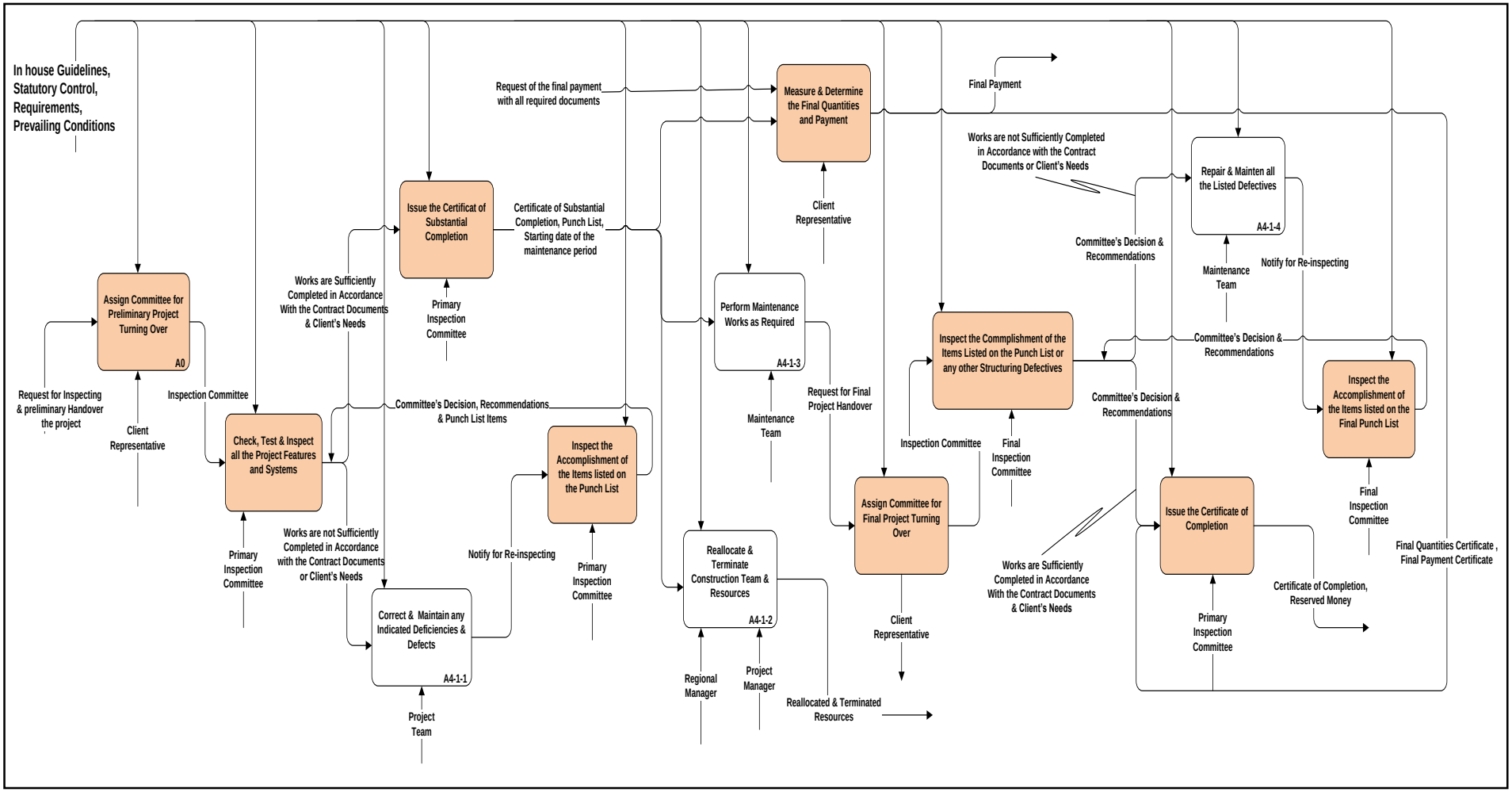


Figure 6-14: IDEFØ level three A4-1 Closeout and termination – Company one

6.4 Case Study Two

6.4.1 Company Background

The second case study was a general construction company owned by the Iraqi Ministry of Construction and Housing construction. The company was established in the late 1970s with a capital of $1,205,286. The business operation of the company covers a wide scope of fields. This includes designing and constructing: housing complexes; industrial and commercial general buildings; bridges and roads; water treatment and sewage plants; electrical power towers and stations. However, the building and bridge projects can be described as the two key business operational areas of the company. The company employs around 2218 employees, of which 97.7% are permanent official governmental employees, as shown in Table 6-4.

Table 6-4: Employees categories - Company two

Category	Male	Female	Total
Engineer	357	71	428
Technician	877	77	954
Administrator	74	64	138
Financial	45	24	69
Craftsmen	560	18	578
Short term employee	43	8	51
TOTAL	1956	262	2218

Figure 6-15 shows the organisational structure of the company, which is quite similar to Company one. Company two has nine key specialist departments, and every department is headed by a Director and comprises a number of functional sections. For each section, there is a Section Manager and a number of employees allocated to manage the work within their section independently and report to their Director. All departments are directly linked and report to the Chief Executive Officer (CEO), who is also the Chairman of the Board of Directors and has the highest authority in the company. In addition to the departments, some sections, such as the contracting section and quality management section, are also designed to be directly linked by the CEO, as illustrated in Figure 6-15.

The company also runs thirteen regional offices spread over various provinces. All regional offices are directly linked to the projects department at the company headquarters, and their main role is the implementation of the company's projects within their geographic areas. Each regional office is headed by a Regional Manager and divided into several functions. These

functions typically include: planning and follow up, pricing (estimating), administration, warehouse and accounting.

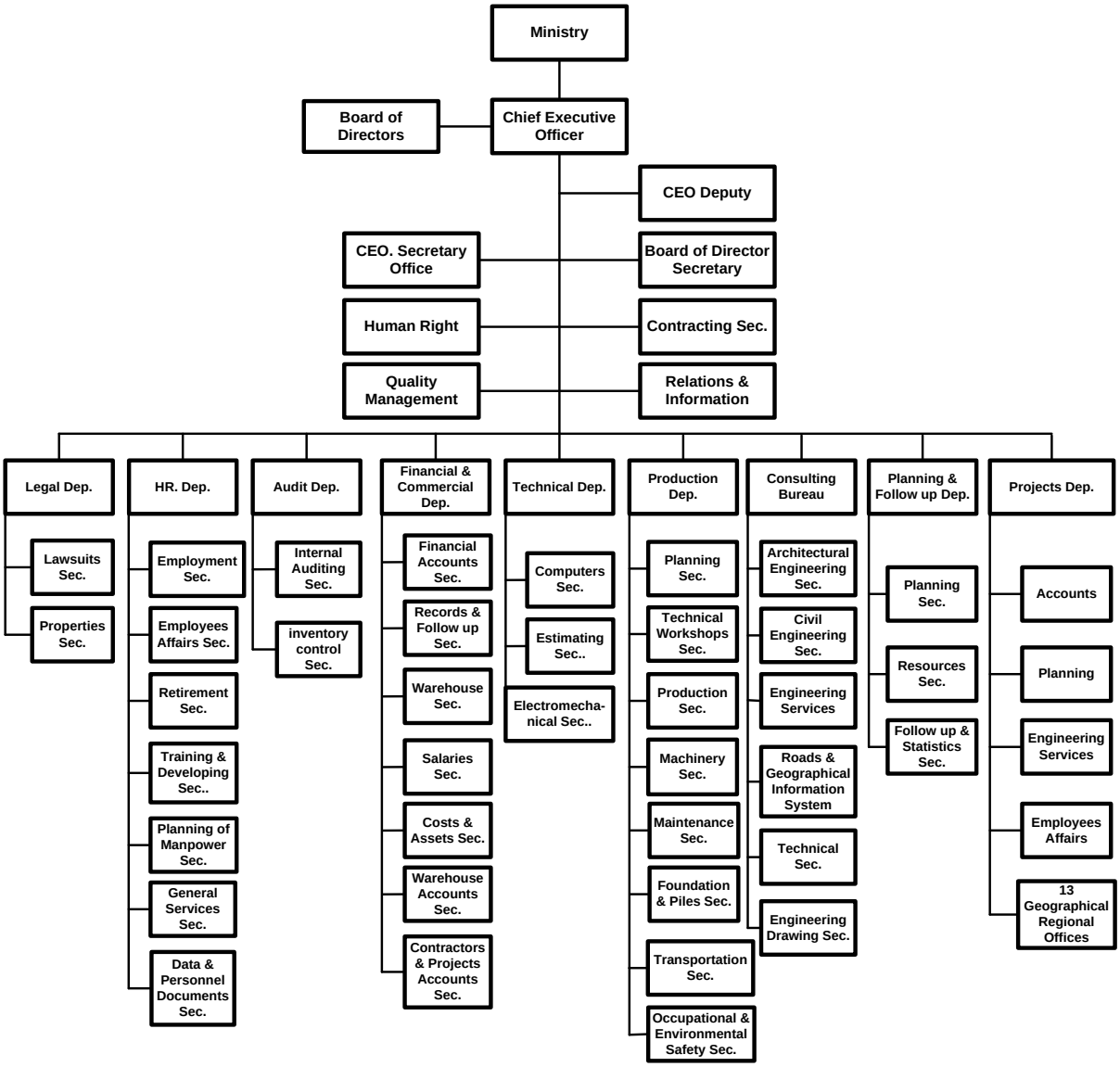


Figure 6-15: Organisational structure – Company two

Furthermore, the company has established a number of production units that provide both the company projects and public organisations of several products. These units include: carpentry and aluminium workshops; a plant for manufacturing caravans and iron structures; a workshop to produce electric panels; and asphalt and concrete plants. All these units are linked to the production department. The company is also characterised as having a consulting bureau, which combines highly experienced engineers from different spectrums. The bureau is mainly specialised in preparing the preliminary detailed designs and studies for a wide range of construction projects all over the country.

Over the last decade the company has completed nearly 200 projects with a total value of $650 million. However, a report issued in 2015 by the Iraqi Prime Minister Office reveals that the company has lost up to $20 million as a result of its business operations. Similarly, the Iraqi Federal Board of Supreme Audit (IFBSA) (2014) shows that 33 out of 99 projects that were completed by the end of 2013, were recorded as losing money; these were projects with overall losses of up to $17.8 million. Furthermore, as a result of its business operation over these 99 projects, the company's total losses totalled around $12.2 million. It has also been noted that most of the company's projects are not completed within the stipulated contractual durations. As a result, it is common for the value of liquidated damage to equal or even exceed the upper limit allowed for damages, which is 10% of the contract value as stipulated by the Iraqi General Conditions of Contract for Civil Engineering Works. The subsequent section is dedicated to mapping and analysing the core business process employed by this company with the object of understanding the key causes of such deficiencies in performance from the business process perspective.

6.4.2 'As is' Operational Business Process Analysis – Company Two

As described in Chapter Four and identified in case study one, the operational process of this company is also developed through four main functions, namely: bidding, pre-construction planning, construction, and closeout, as depicted in Figure 6-3. Following the same methodology adopted in case study one, the operational process employed by the company under case study two has been decomposed and explained in the subsequent sections.

6.4.2.1 Bidding A1 Process – Company Two

The company's bidding process is generally initiated when there is a need by the company for a new project and they have noted an advert for a construction contract of interest. However, it often ends when the priced tender, with all its requirements, is submitted to the client, or when approval to proceed with the bidding process cannot be obtained from the CEO. Mapping the current bidding process has revealed that this process can typically be decomposed into three high-level processes or stages. These stages, with their related sub-processes are illustrated in Figure 6-16; whereas, their details as described by participants are presented in the following subsections.

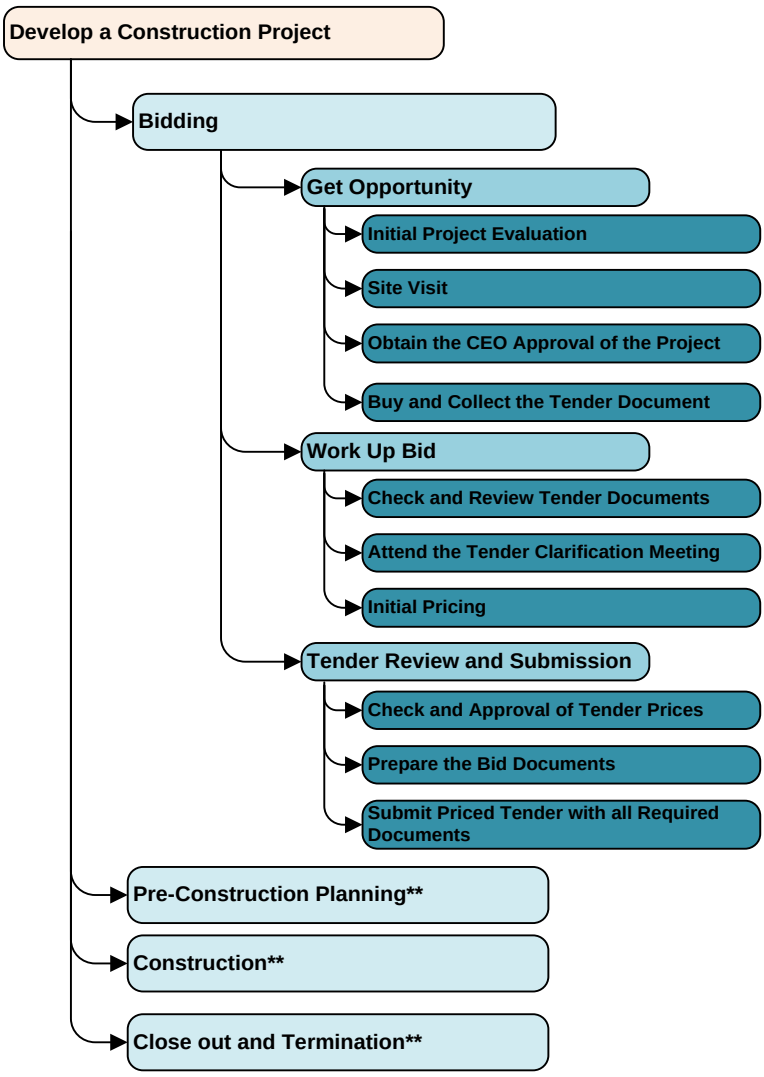


Figure 6-16: Activity Decomposition Diagram expanding the bidding processes – Company two

6.4.2.1.1 Get Opportunity A1-1 Process – Company Two

As depicted in Figures 6-16 and 6-17, the "Get Opportunity" process generally comprises four sub-processes including:

A1-1-1 The **'Initial Project Evaluation'** sub-process aims to examine and evaluate the initial information enclosed with the tender advertisement to determine whether the new opportunity for work is aligned with the company's experiences and abilities. Accordingly, noting an interesting advert for a construction contract is the key input to the A1-1-1 process. Meanwhile, the output of the process is a decision result, namely, whether to go with the bidding process and determine personnel and a date to visit the worksite or to decline it and look for another opportunity.

If the opportunity has been noted by the estimating staff at the company headquarters, the Regional Manager, or sometimes by the Chief Estimator, undertake this process. In both scenarios a preliminary approval of the new project is preferably obtained from the Projects Department Director or CEO at this early stage, even before visiting the project site.

A1-1-2 The **'Site Visit'** sub-process aims to gather more information about the new contract through examining the site conditions and identifying any obstacles or problems that could hinder work in the future. The process is often performed by the Regional Manager and/or his deputy and accompanied by an experienced engineer. The main outputs of the process are a site visit report, and a decision from the Regional Manager on whether to go with the bid process and work on obtaining the CEO approval to buy tender documents, or decline it and look for another opportunity.

A1-1-3 The **'Obtain the CEO Approval of the Project'** sub-process pertains to securing the approval from the Projects Department Director and CEO for a new contract and the purchase of tender documents. This can involve a discussion on the general information of the project, the site conditions, and the resources required and available. The discussion can either be face-to-face between the Regional Manager, Projects Department Directors, and CEO, or through sending a formal letter to obtain the top management authorisation on the project and to pay the fees required to buy the tender documents.

As identified in case study one, the decision whether to buy the tender documents at this stage is equivalent to the bid/no bid decision. Accordingly, the output of this process is the final decision made by the CEO regarding whether to buy the tender documents. If the decision is to go with the bidding process, a signed formal letter should also be issued from the CEO's office to the finance department as a formal permit to issue a cheque for the fees needed to buy tender documents.

A1-1-4 The **'Buy and Collect the Tender Document'** sub-process comprises all activities required to issue the cheque required to buy tender documents, contact the client in order to pay the determined fees, and collect the tender documents. The process is usually performed by an authorised employee from the estimating section or from the regional office. The outputs of this process are the tender documents and drawings.

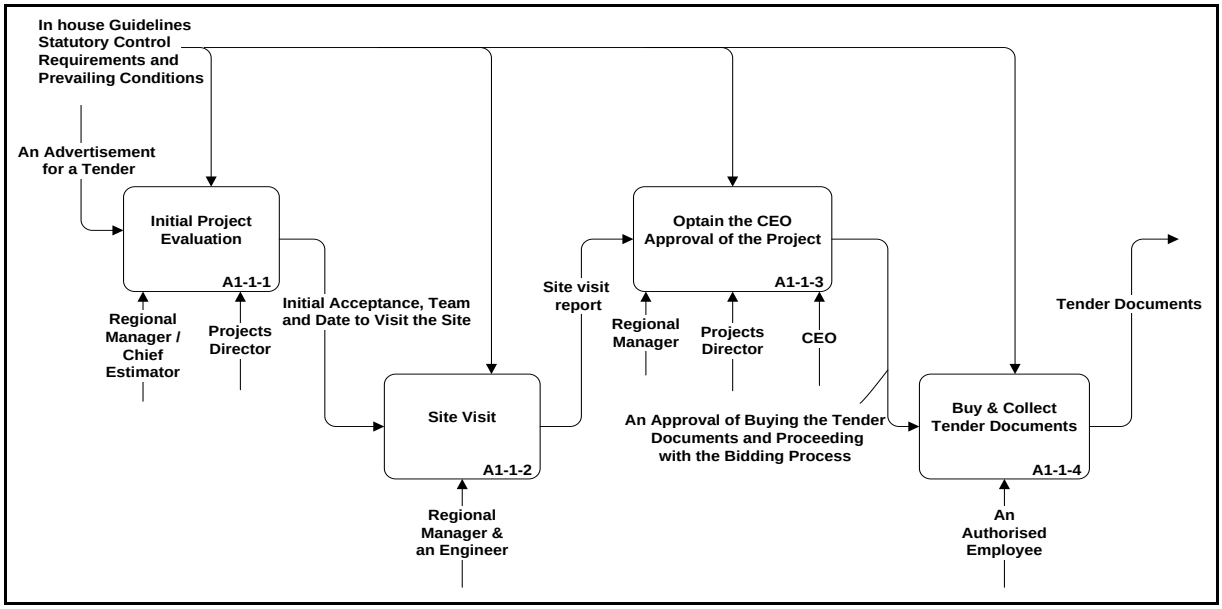


Figure 6-17: IDEFØ level three A1-1 Get opportunity process – Company two

6.4.2.1.2 Work up Bid A1-2 Process – Company Two

The A1-2 process generally aims to develop a bid proposal. The process commences by receiving the tender document and ends by producing a draft of the priced tender. Figure 6-18 illustrates the sub-processes decomposed from this process with their key inputs, outputs, and the people involved in their execution. Whereas, the description of these sub-processes is detailed as follows.

A1-2-1 The **'Check and Review Tender Documents**' sub-process pertains to the checking and examining of all the tender documents and drawings to ensure that there is no mismatch or ambiguity in the tender documents, drawings, and bill of quantity. It also aims to identify the tender requirements and conditions in addition to calculating the quantities of various construction materials, plants, and workforce required to execute the project. The Regional Estimator and their staff normally perform this task with direction from the Regional Manager. The main outputs of this process include a list of queries/questions to the client and a summary of all construction materials, labour, and equipment required to execute each work item.

A1-2-2 The **'Attend the Tender Clarification Meeting'** sub-process is usually part of the Regional Estimator's responsibility to attend the clarification meeting managed by the client in order to answer any queries and questions that have arisen amongst potential bidders. If the client answers can affect the amount and requirements for the works or contract conditions, the A1-2-1 process may need to be re-conducted in light of the modification; otherwise, the process will proceed directly to the process A1-2-3.

A1-2-3 'Initial Pricing' pertains to the process of calculating the entire direct, preliminary, and indirect costs for the project, as well as determining the mark-up value. Based on their experience and knowledge of the market, the process is usually performed by the Estimating Staff at the regional level in coordination with the Regional Manager. Moreover, the company has also developed a price book, which is frequently updated, in order to facilitate the pricing process and to make it more accurate. Yet, it is still common practice within the company that the Estimator contacts the most likely suppliers and vendors, either by telephone or email, to clarify regarding the prices of some items. Meanwhile, to cover the company overheads the mark-up value, as reported by most of the respondents, is often around 20% of the contract value, as recommended by the company and Ministry. Notwithstanding, the CEO is still the owner of the final decision regarding the mark-up value and this is mainly based on their desire to win the project. The outputs of this process are normally a draft of priced bill of quantity with the price analysis details and the expected duration of the project.

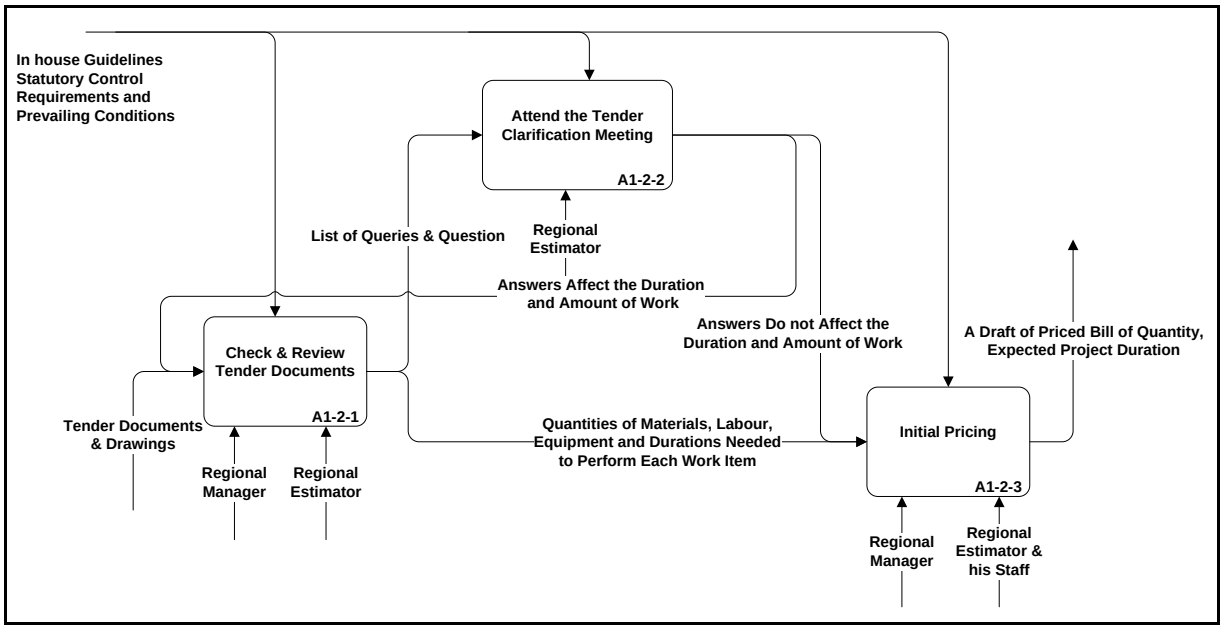


Figure 6-18: IDEFØ level three A1-2 Work up bid process – Company two

6.4.2.1.3 Tender Review and Submission: A1-3 Process – Company Two

The aim of this process is to check the pricing accuracy and finalise the bid proposal through obtaining the CEO's approval of the tender's final price along with the preparation of the tender requirements. Accordingly, the main input of the process is a draft of priced bill of quantity, while its key output is the tender package. Figure 6-19 illustrates the decomposition of the A1-3 process into three sub-processes with their main inputs and outputs, and the people involved in performing them.

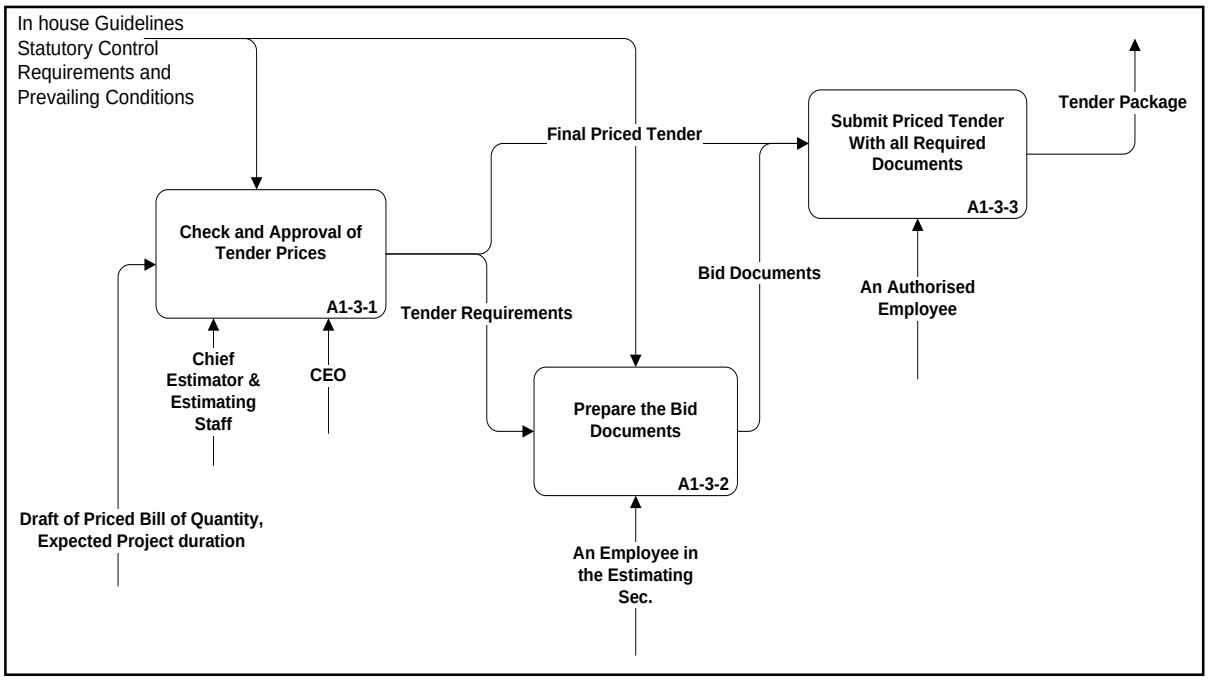


Figure 6-19: IDEFØ level three A1-3 Tender review and submission – Company two

A1-3-1 The **'Check and Approval of Tender Prices'** sub-process is often executed by the Estimating Section at the company headquarters. It includes a review of the tender documents and requirements, a check on all prices estimated by the regional office staff, and to make the required corrections after a discussion with the Regional Manager in order to reach a consensus about the most appropriate prices. The discussion is either held face to face at the estimating section or via the phone. It is then the responsibility of the Chief Estimator to secure the CEO's approval for the final tender price. Thus, the main output of this process would be a final priced tender and tender requirements.

A1-3-2 The **'Prepare the Bid Documents'** sub-process pertains to preparing all the documents that need to be submitted with the priced tenders. This can include: a certificate of experience; a list of similar works; a list of the company's equipment and machinery, and so forth. An employee in the estimating section prepares the bid documents, which is the output of this process.

A1-3-3 The **'Submit Priced Tender with all Required Documents**' sub-process includes the collection of all previously stated outputs in a single package and their submission to the client's representative. By submitting the tender package, the bidding process is finished and it is now the client's responsibility to open, review and evaluate all the submitted tenders. The next section will explain the key practices adopted by the company after receiving notification of winning the contract.

6.4.2.2 Pre-construction Planning A2 process – Company Two

The main aim of the pre-construction planning process is to establish and provide the key technical and administrative requirements that enable the construction work to start on the worksite. Analysis of the company's current practice showed that the A2 process immediately starts after receiving the notice of acceptance of the submitted tender (letter of acceptance) and ends when the proposed execution plan is ratified by the top management. Figure 6-20 depicts the activity decomposition diagram, expanding the A2 process. Meanwhile, the description of the decomposed processes and sub-processes are as follows.

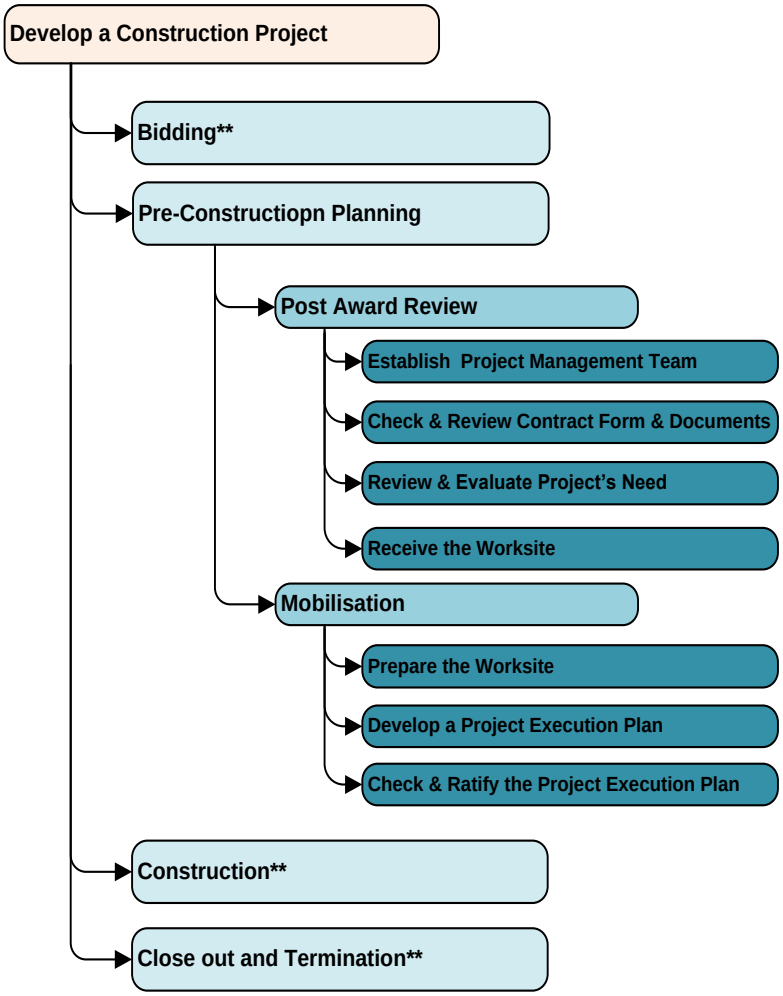


Figure 6-20: Activity Decomposition Diagram expanding the pre-construction planning – Company two

6.4.2.2.1 Post Award Review A2-1 Process – Company Two

Possessing the worksite and starting with the construction work, according to the interviewees, are usually not possible before the signing of the contract by both the client's representative and the contractor. Therefore, the A2-1 process aims at completing all contractual requirements,

the procedures related to possessing the worksite and establishing a good base to develop a project plan and other requirements necessary to start work on the site. The post award review process, as defined by the participants, is decomposed into four sub-processes, as depicted in Figure 6-21 and described below.

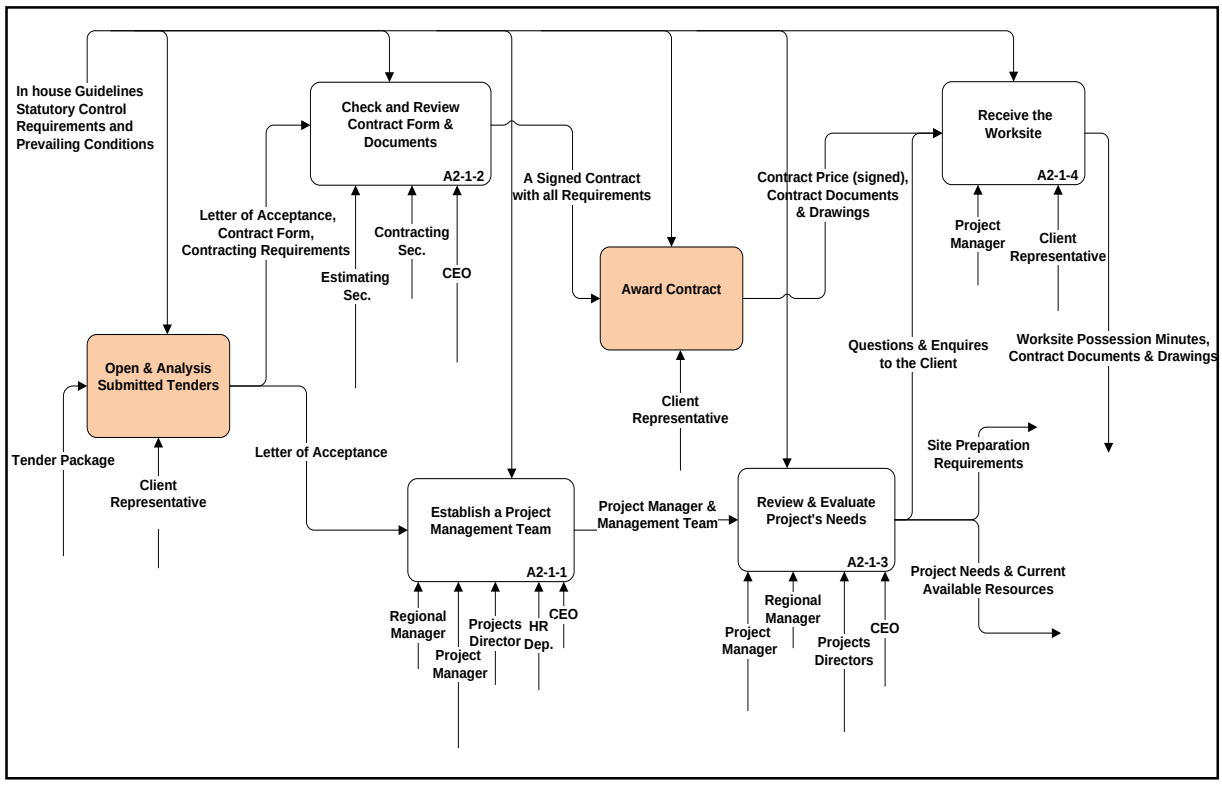


Figure 6-21: IDEFØ level three A2-1 Post award review – Company two

A2-1-1 The **'Establish Project Management Team'** sub-process pertains to all activities undertaken to assign a Project Manager and other staff required to manage the project. Appointing a Project Manager can be seen as the first activity within the A2-1 processes, which is performed immediately after receiving the tender acceptance letter. The appointment of a Project Manager is generally the responsibility of the Regional Manager. Whereas, the selection of project management team members is the responsibility of the Project Manager in coordination with the Regional Manager. However, in case the staff at the regional office are engaged with other projects, a Project Manager with his team would usually be allocated by the Projects Department Director from other regional offices after coordinating with their Regional Managers and obtaining the CEO's approval on the proposed project team. Similarly, if there is a need for additional employees on a project, a formal request for the required staff would be sent by the Project Manager to the Regional Manager and then to the Director of the Projects Department with the aim of obtaining the CEO's approval to assign the required staff from

other regional offices or the market. It is also important to mention that the process of establishing of a project management team can continue during the construction phase based on the project requirements and the company conditions. The output of this sub-process is the project management team, which usually includes a Project Manager, Engineering staff, a Quantity Surveyor, a Foreman and Clerks.

A2-1-2 The **'Check and Review Contract Form and Documents'** sub-process generally aims to check and review the technical and legal issues involved in the documents and contract form enclosed with the tender acceptance letter to ensure they correspond with what has been bid on. This is done sequentially, where the estimating section would first be responsible for the technical checking, whereas the contracting section checks the legal issues. The contract form, with all its attachments, requirements, and any notes recorded by the aforementioned departments, will be sent to the CEO in order to review and sign. Accordingly, the main outcome of this process is the signed contract with all its requirements.

A2-1-3 The **'Review and Evaluate Project's Needs'** sub-process is considered one of the first priorities undertaken by the Project Manager and his allocated staff. The process can be performed in conjunction with the A2-1-2 sub-process. It comprises all activities required to evaluate the project's needs and provide the key resources to prepare the worksite and start the works. Such activities generally include: reviewing the project documents and drawings; visiting the site with the aim of examining the site conditions in more detail and identifying any problems or constraints that can affect the site possession and/or construction works in the future; and identifying the current resources available at the regional office. Undertaking these activities is generally part of the Project Manager's responsibilities; however, they are always done in consultation with the Regional Manager. Accordingly, the requirements might include preparing and organising the worksite, which could entail, a temporary jobsite office, hiring equipment to clean and level the site, and so forth. These are also determined and reported in a formal letter to the Director of Projects Department and CEO in order to secure their approval to provide, hire or buy these requirements. Accordingly, the key outputs of this process involves a set of the requirements needed to prepare the jobsite, and an evaluation of all of the project's needs and resources required in the execution in addition to a number of questions and enquiries that have arisen for the client's representative.

A2-1-4 The **'Receive the Project Worksite'** sub-process pertains to all procedures that should be taken from the client's representative and contractor in order to hand over the worksite to

the contractor. The process usually starts after both parties have signed the contract. It is the Project Manager's responsibility to contact the client's representative and discuss all the ambiguous issues emerging from the A2-1-3 process and the procedure required to possess the site. The outputs of the process usually include a worksite receiving minutes and other documents and drawings regarding the project.

6.4.2.2.2 Mobilisation A2-2 Process – Company Two

The mobilisation process aims to establish the essential requirements that enable the project team to create physical deliverables on site. The process generally starts after officially possessing the worksite and finishes when the top management approve the execution plan. Responses from the interviewees revealed that the A2-2 process can be decomposed into three sub-processes, as illustrated in Figure 6-22 and described below.

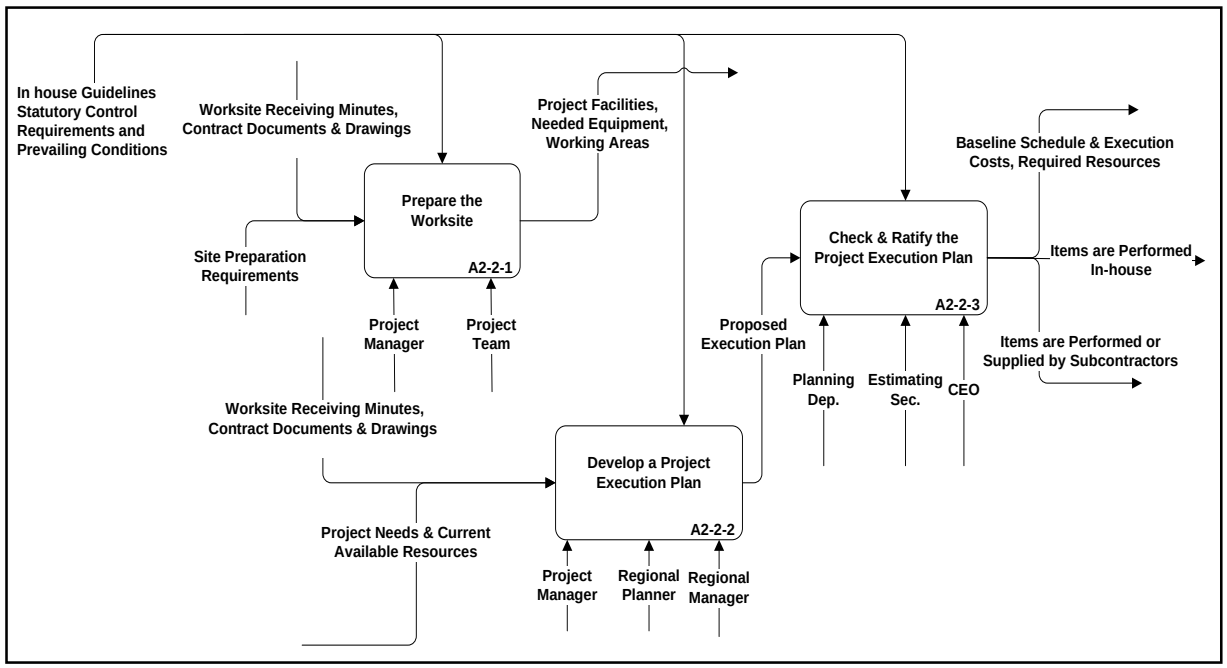


Figure 6-22: IDEFØ level three A2-2 Mobilisation – Company two

A2-2-1 The **'Prepare the Worksite'** sub-process comprises all activities undertaken by the Project Manager and his team in order to prepare the worksite and make it ready for the start of the construction works. These activities promptly begin after possessing the worksite and usually include, but are not limited to, establishing a temporary office to manage the project, levelling the site ground, locating the storage of materials and mechanisms based on the available areas, and providing adequate security and protection.

A2-2-2 The **'Develop a Project Execution Plan'** sub-process mainly aims to develop a method statement, which shows how the project will be executed and the cost required to: perform every work group; determine work packages that will be performed in-house and those which will be subcontracted; and produce the project programme (master programme). The Project Manager is the key individual responsible for developing this plan that will be further checked and revised by the Regional Planner and the Regional Manager. Accordingly, the output of this process is the proposed execution plan that will be sent through a formal letter to the company's headquarters to be reviewed and approved.

A2-2-3 The **'Check and Ratify the Project Execution Plan'** sub-process is mainly performed by the company's planning department and estimating section. The planning department is responsible for checking the proposed method statement and the programme; whereas, the estimating section is responsible for checking the cost required to perform each work item, and obtaining the CEO's approval of the plan. Once the approval is obtained, the construction works will be started on site, and a copy of approved plan will then be dispatched to the client organisation in order to be approved by the client's representative.

6.4.2.3 Construction A3 Process – Company Two

As reported by the company participants, the actual commencement of project's physical deliverables often starts after the CEO ratifies the project execution plan, and ends when the client's representative accepts all the deliverables stated. It has also been identified that, in order to build the required deliverables, the company generally follows similar processes and procedures adopted by case study one and depicted in Figure 6-11. These processes include: executing the construction activities; managing the procurement process; monitoring and controlling the performance; and updating the project execution plan.

A3-1-1 The **'Execute Construction Activities'** sub-process pertains to all activities and tasks performed by the project team in order to produce the project deliverables. Indeed, the construction methods and practices used in creating the desired deliverables, as mentioned earlier, are various; therefore, covering such practices cannot be achieved here. Accordingly, and similar to case study one, the focus is shifted to identifying and highlighting the most frequently used mechanisms in implementing the construction works.

Generally, both the in-house execution and subcontracting described in case study one and illustrated in Figure 6-12, have also been identified as the most frequent implementation mechanisms adopted by this company in creating the project deliverables. Yet, in-house

execution, as the most respondents reported, remains the preferred company way. In-house execution is typically conducted by the company's own staff and equipment and/or through hiring from the local market on a daily basis. The construction materials, on the other hand, will either be provided by suppliers under formal contracts or bought directly from the markets through purchasing committees under informal contracts. In fact, as the most frequently adopted company method, a description of the procedures followed in procuring the resources through purchasing committees will be provided in more detail in the following section.

A3-1-2 The **'Manage Procurement'** sub-process usually starts after obtaining the CEO's approval of the project team and ends with the completion of the construction works. Its aims include the hire, purchase, and subcontract of resources required to build and/or facilitate the production of the desired deliverables. As mentioned, procuring the required material is achieved either through subcontractors or by the company staff through purchasing committees. The procedures followed in subcontracting are similar to those have been identified and described in case study one. The reason for this is simply because most of these procedures are stipulated under the Iraqi Regulations for Implementing Government Contracts and Iraqi Federal Budget Law, and others are determined through the instructions and directives issued by the Ministry.

Similarly, the government's regulations and instructions determine the procedures that should be followed in procuring an item directly from the market through company staff. Accordingly, such procedures will be similar in all organisations working under a similar scope and environment, as is case with IQGCCs; this is indeed what has been identified within all companies under this study.

In terms of the in-house execution and direct purchasing through purchasing committees, the process starts by establishing a number of committees from the regional office and project staff. Each committee consists of three people; one is a head and the other two are members, but the CEO must approve all appointments. The head and members of a committee, according to the Iraqi Federal Budget Law, have to be changed every three months. These committees usually include: hiring committee, purchasing committee, technical committee, and so forth. Furthermore, in addition to the auditing section there is another central committee established at the headquarters that is mainly responsible for auditing the work of the purchasing committees; this is called the moderation committee. It is also important to mention here, that the company does not have a purchasing department, and all purchases are conducted through

purchasing committees distributed over the company's segments. The authorities of these committees are generally limited within the authority awarded to the Regional Manager or Project Manager by the CEO, which should be in line with the Federal Budget Law and the Ministry instructions.

After establishing the required committees and approving the execution plan by the CEO, an advance payment is provided to the Regional Manager/Project Manager in order to facilitate the commencement of construction works on site. The payment amount usually depends on the size and importance of the project and the liquidity available in the company. The Regional Manager/Project Manager then takes responsibility for allocating the money to the various committees within the project, in accordance with their roles and importance. In coordination with the project team, the purchasing committee is responsible for supplying the required construction materials that meet the required specifications, at reasonable prices, and at the given time.

The purchasing process is often triggered by the submission of a formal written request to provide an item, which is activated via the project team through the Project Manager. The request is first approved by the Project Manager and sent to the Regional Manager to obtain his approval. Thereafter, it is dispatched to the purchasing committee in order to contact the sellers or suppliers and obtain their offers. All obtained offers are then signed by the purchasing committee members and submitted with the original purchasing request to the Regional Manager. If the lowest offer is within the Regional Manager's permission for purchasing, an approval of the purchase would be given by the Regional Manager to obtain the required item. If it is not, the request with all related offers would be sent to the Director of Projects Department to be reviewed, approved, and then sent to the CEO for the same purpose. After securing the CEO's approval, it becomes the responsibility of the purchasing committee to re-contact the owner of the lowest offer to provide the required item. If the provided item is some construction material used to create a deliverable, then it has to be measured by the in-house measuring committee and then checked and tested by the client's representative to ensure it is compatible with the required specifications before being used. In comparison, if the item is, for instance, backup material for equipment, it has to be checked by the technical committee. Yet, all purchased materials have to be checked and documented by a warehouse clerk before they are used.

The purchasing committee is also responsible for preparing the paperwork related to every purchase transaction, and the ratification from the relevant committees in the regional office, including from the Regional Manager. Every ten to twenty purchase transactions are packaged together and sent to the company headquarters in order to be reviewed and audited by the projects department, moderation committee, and company auditor. After that, they are sent to the CEO in order to secure his agreement to pay the values of these purchase transactions. After getting the CEO's approval for payment, the package with the approval would then be sent to the finance department with the purpose of issuing cheques of the approved amounts. By issuing these cheques the process of purchasing can be regarded as finished.

A3-1-3 The **'Monitor and control performance'** sub-process aims to monitor and control the project's performance through comparing the actual and planned performances and taking the actions required to remedy any indicated deficiencies. As reported by participants, the Project Manager and the Regional Manager are the main individuals responsible for this process. However, this usually happens through supporting other functional areas, namely the regional planning section, planning department and projects department. As identified and described above, two major plans are developed by the company during the mobilisation stage. One is to manage the execution cost, and the other is to monitor the project progress.

Thus, the execution cost plan determines the cost required to perform every work group, such as the foundation works, building works, electrical and mechanical works, and finishing works. Accordingly, the planning department provides the Project Manager with the amount needed for the execution of these work groups based on the approved plan. The planning department is also responsible for periodically evaluating the project's cash flow, through comparing the total spending on the project with the total payments obtained from the client to date. The project team, on the other hand, is responsible for monitoring construction costs to ensure they do not exceed what has been planned for. Moreover, there are also committees and auditing bodies that have been created as a response to government regulations, whose main duties are to monitor and control the accuracy of purchase transactions.

Meanwhile, the Project Manager and Regional Manager, in coordination with the planning section at the regional office, usually monitor the progress of project activities. Periodically meetings, perhaps monthly, are held by the project team and chaired by the Regional Manager to discuss the project's progress, main problems and issues affecting performance, and how they can be solved or mitigated. Based on these meetings, corrective actions are taken to remedy

deviations. Reports of the project's progress are also sent to the planning department at the corporation centre, on biweekly and monthly bases. Such reports are required by the company and Ministry to evaluate performance. Meanwhile the quality of the performed works and supplied materials are directly monitored and controlled by the project team and the client's representative through conducting the necessary checks and tests to ensure that they meet the required specifications.

A3-1-4 The **'Update Project Execution Plan'** sub-process is usually executed by the Project Manager in consultation with the client's representative. It includes reviewing and updating the baseline plan in light of new requirements and changes that occur in the project scope.

6.4.2.4 Closeout and Termination A4 Process – Company Two

Similar to that which has been reported in case study one, the interviewees in case study two have also confirmed that the closeout process usually begins when the completion rate in the entire project construction works reaches up to 93% and ends with the completion of the maintenance period when the project is turned over to the owner. Figure 6-23 depicts the sub-processes decomposed of the A4-1 process, which are similar to those identified in case study one. This is because the main activities and steps of the closeout process are stipulated in the Iraqi General Conditions of Contract for Civil Engineering Works.

A4-1-1 The **'Correct and Maintain any Indicated Deficiency and Defects'** sub-process is generally performed by the project team as a response to the punch list prepared by the client's primary inspection committee. Thus, it aims to repair and correct any deficiencies and defects in the performed works to align them with the required specifications that meets the client's satisfaction. Likewise, both A4-1-3 and A4-1-4 sub-processes, as illustrated in Figure 6-23, are triggered as a response to either a casual defect that appears during the maintenance period, or a punch list produced by the client final inspection committees. However, A4-1-3 and A4-1-4 are usually performed by the maintenance teams formed according to the type and nature of the defect that needs to be maintained.

A4-1-2 The '**Reallocate and Terminate Construction Team and Resources'** sub-process is generally performed by the Regional Manager in coordination with the Project Manager. It aims to re-assign and terminate a project team, the equipment, surplus materials, and any temporary construction office and facilities utilised by the project team.

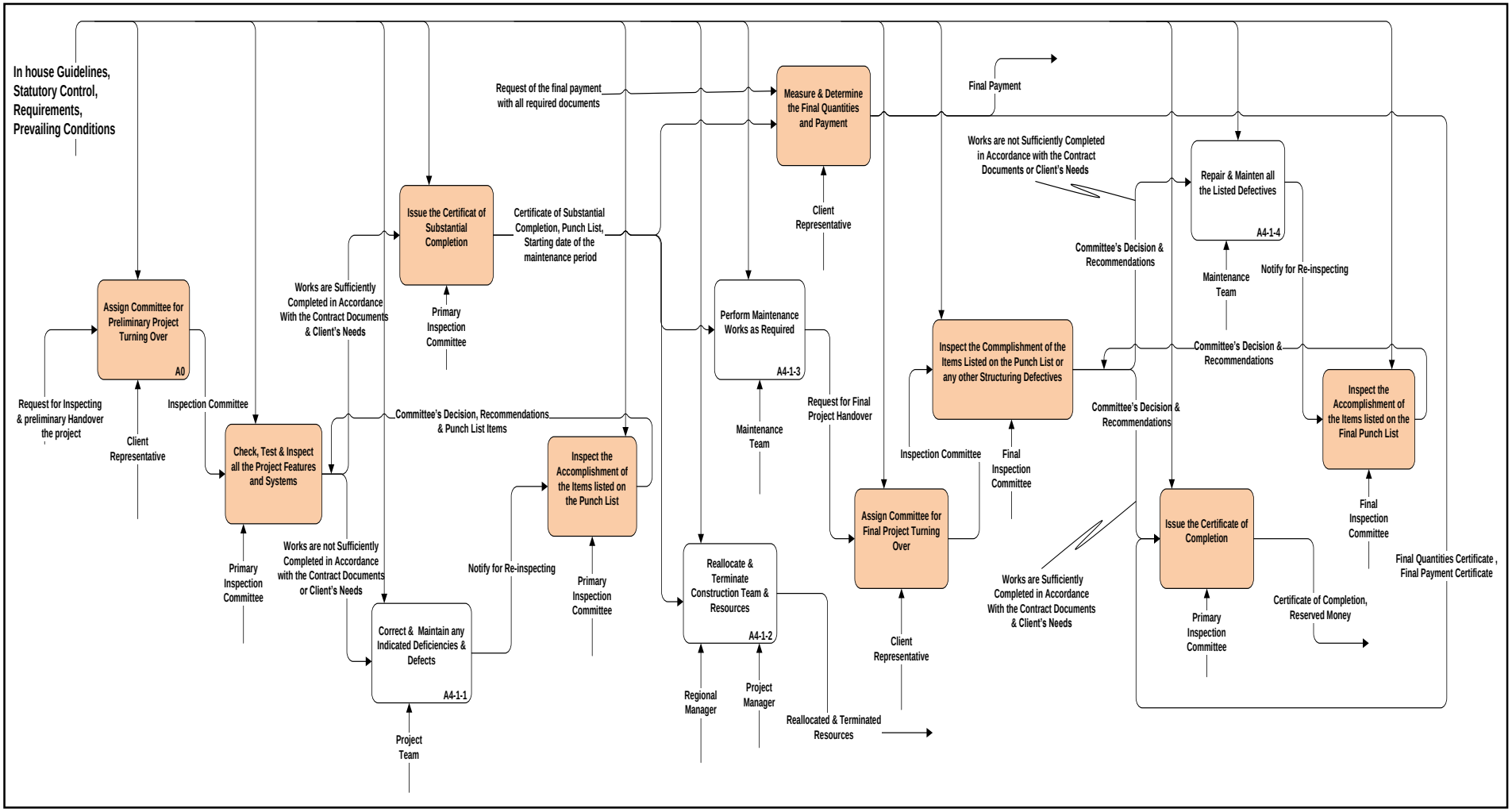


Figure 6-23: IDEFØ level three A4-1 Closeout and termination – Company two

6.5 Case Study Three

6.5.1 Company Background

The construction company for this case study specialised in building and bridge projects. These include implementing residential complexes, public buildings (ex-hospitals, schools, government offices, and so forth), concrete and steel bridges, sanitary projects, and electrical grids. The company was established in 1987, under companies' law No. 66, as one of the Iraqi Ministry of Construction and Housing companies. The total number of employees is about 1300, and more than 79% of them are permanent official governmental employees, as illustrated in Table 6-5.

Table 6-5: Employees categories - Company three

Category	Permanent Employees	Short Term Employees	Total
Engineer	172	17	189
Technician	220	13	233
Financial	95	4	99
Administrator	145	12	157
Craftsman	551	18	569
Unskilled	24	35	59
Total	1035	82	1306

Figure 6-24 depicts the company's organisational structure, which substantially corresponds with those adopted by the companies for case studies one and two. This is particularly true in terms of the specialist departments, functional sections grouped under these departments, reporting relationships, chains of command, and the distribution of power and responsibilities.

To facilitate the management of their projects over the largest possible area, the company has established six regional offices in six different provinces. This was also the case in both previous case studies; these regional offices are also headed by a Regional Manager, who links directly to the projects departments, which is located at the company's headquarters. Each regional office has an engineering section, administrative and accounting sections, a warehouse, and product units. Yet, all product units are linked to the product department at the company headquarters, despite the fact that some are managed by the Regional Managers.

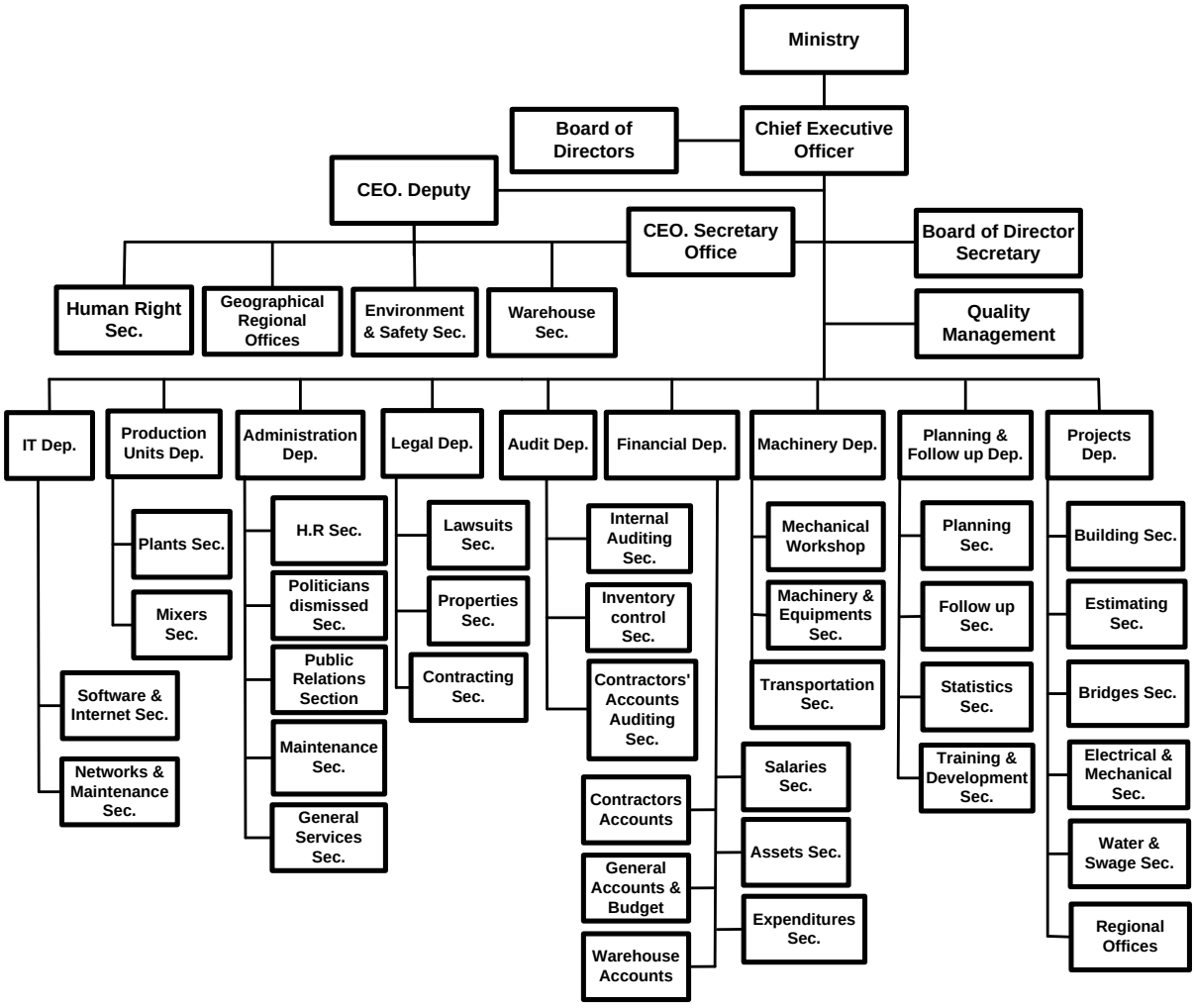


Figure 6-24: Organisational structure – Company three

The company documents revealed that, during the period from 2003 to 2015, the company completed about 190 projects. However, according to the Prime Minister Office's report (IPMO, 2015), the company has lost around $12 million as a result of its business operations during this period. This has further been supported within annual reports by the Iraqi Federal Board of Supreme Audit (IFBSA) that show the company's failure to generate profits from most of its projects. Table 6-6 provides a summary of projects completed by the company in 2012 and 2013 and the amount of profit or loss generated by them, as reported by IFBSA.

Table 6-6: Results of the company's business operations in 2012 & 2013- Company three.

Projects category	2012		2013	
	No.	$	No.	$
Projects achieved profit	3	500000	7	235000
Projects achieved losing money	14	- 3010000	13	-11928000
Total	17	-2510000	20	-11693000

Moreover, it has also been noted that there is a significant delay in completing most projects awarded to the company. In some projects, such delays might reach 30 to 50% of their actual duration. To understand how the company manages its core business process and determines the key associated problems and challenges, the company's operational process has been defined and mapped in the following sections.

6.5.2 'As is' Operational Business Process Analysis - Company three

Indeed, the analysis of data collected from the interviewees revealed that the company generally adopts an operational process similar to those employed by companies one and two with little differences in terms of people engaged in performing some of these processes. As a result, and in order to avoid repetition, the processes are simply listed and graphically presented along with their decomposed sub-processes through the IDEFØ modelling technique. As depicted in Figure 6-3, the operational process involves four key business functions, including: bidding, pre-construction planning, construction, and closeout and termination. The decompositions of these processes are as follows.

6.5.2.1 Bidding A1 Process – Company Three

The bidding process can typically be decomposed into three processes. These processes, with their main inputs and outputs, are depicted in Figure 6-25. Whereas, the decomposed sub-processes are presented afterwards.

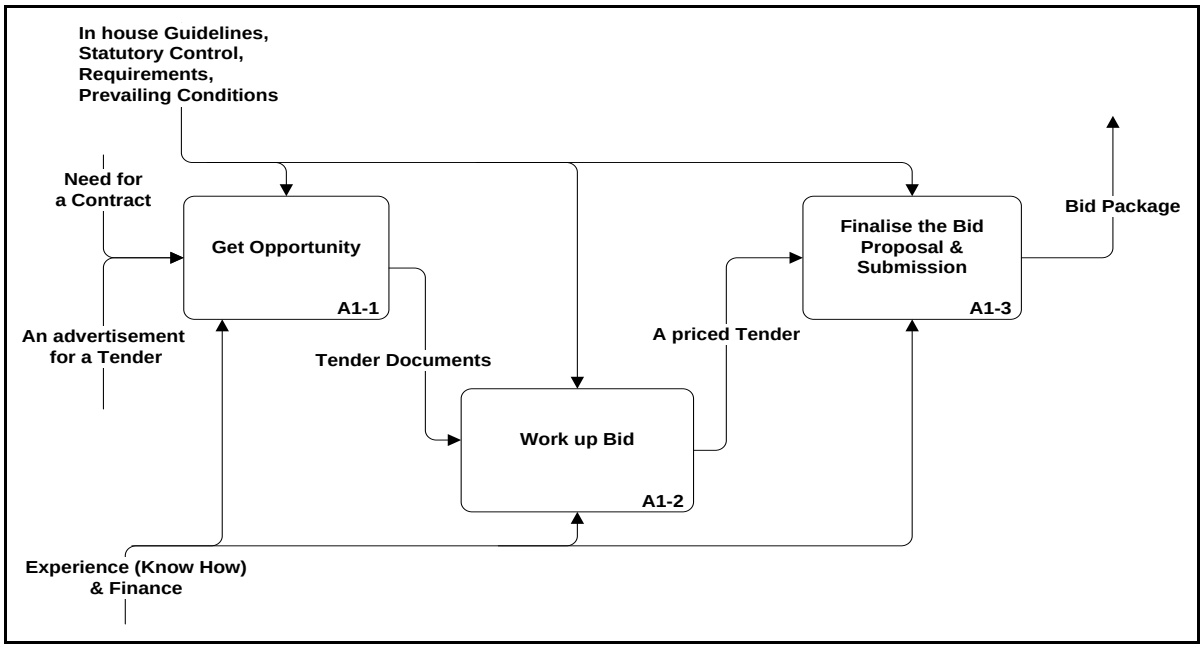


Figure 6-25: IDEFØ level two A1 Bidding process – Company three

6.5.2.1.1 Get Opportunity A1-1 Process – Company Three

The A1-1 process, as illustrated in Figure 6-25, is triggered by a need for new projects and by identifying an advert for new work. Meanwhile, it ends by either buying and collecting the contract documents or declining the current advert and trying to find a better opportunity. The process generally aims to evaluate the suitability of the new contract for the company and the aspirations of top management. Figure 6-26 illustrates the key sub-processes, decomposed from the A1-1 process, with their main inputs, outputs, and the personnel engaged in executing them.

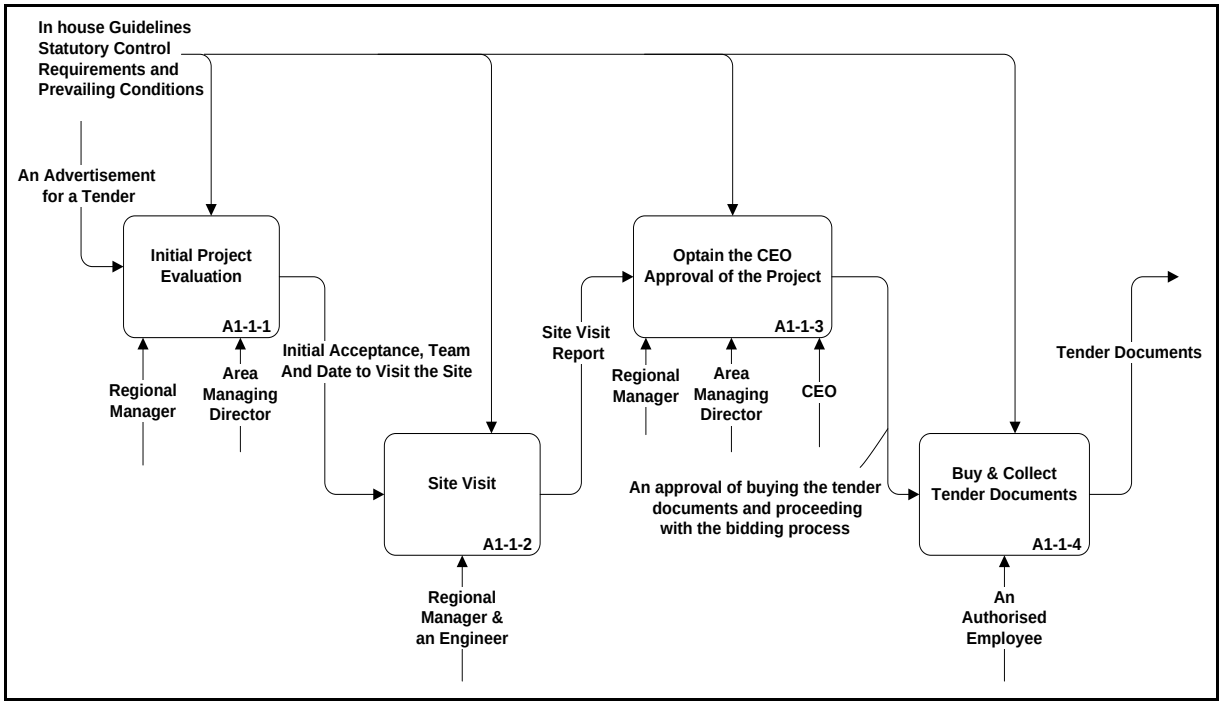


Figure 6-26: IDEFØ level three A1-1 Get opportunity process – Company three

6.5.2.1.2 Work up Bid A1-2 Process – Company Three

Interestingly, the major difference between the operational process adopted by this company and those adopted by the companies in case studies one and two, can be seen in the A1-2 process. Unlike the above two companies, after collecting the tender documents, they are directly sent to the estimating section at the company headquarters in order to estimate the contract cost and produce the final bid price. In other words, the regional staff are not responsible for estimating. However, recommendations regarding the costs of various construction materials and labour are usually obtained from the Regional Manager within the province where the project is to be established. Figure 6-27 depicts the sub-processes decomposed from this process with their key inputs, outputs and the people involved in performing them.

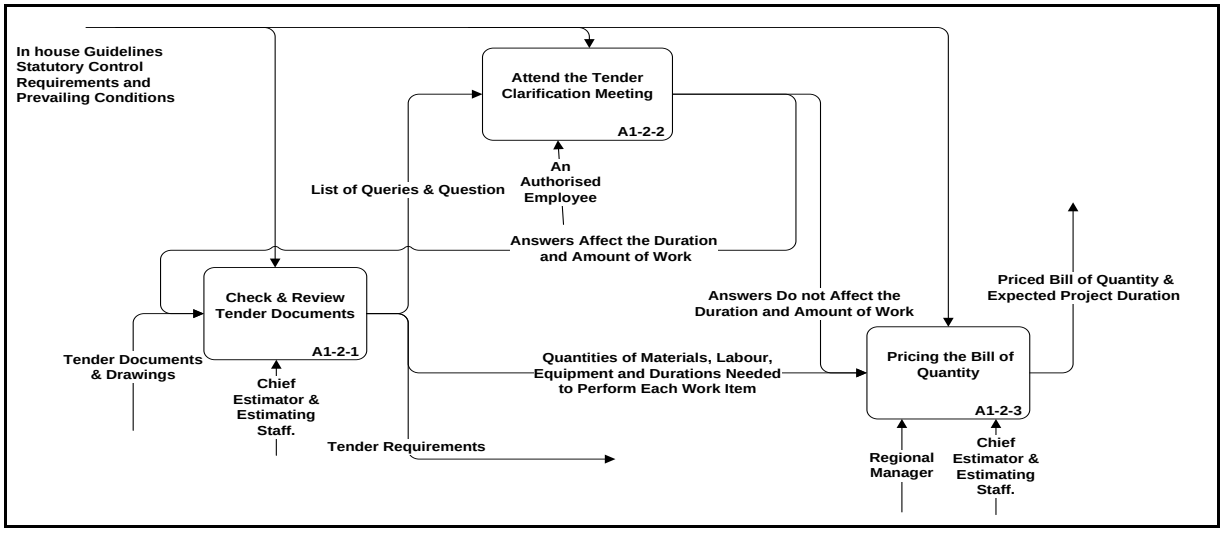


Figure 6-27: IDEFØ level three A1-2 Work up bid process – Company three

6.5.2.1.3 Finalise the Bid Proposal and Submission A1-3 Process – Company Three

The A1-3 process aims to finalise the bid proposal through obtaining the Projects Department Director's and CEO's approval of the tender's final price and preparing the tender requirement. Thus, the main input of the process is the priced bill of quantity, while its key output is the tender package. Figure 6-28 shows the key sub-processes grouped under the A1-3 process with their main inputs, outputs and people engaged in performing them.

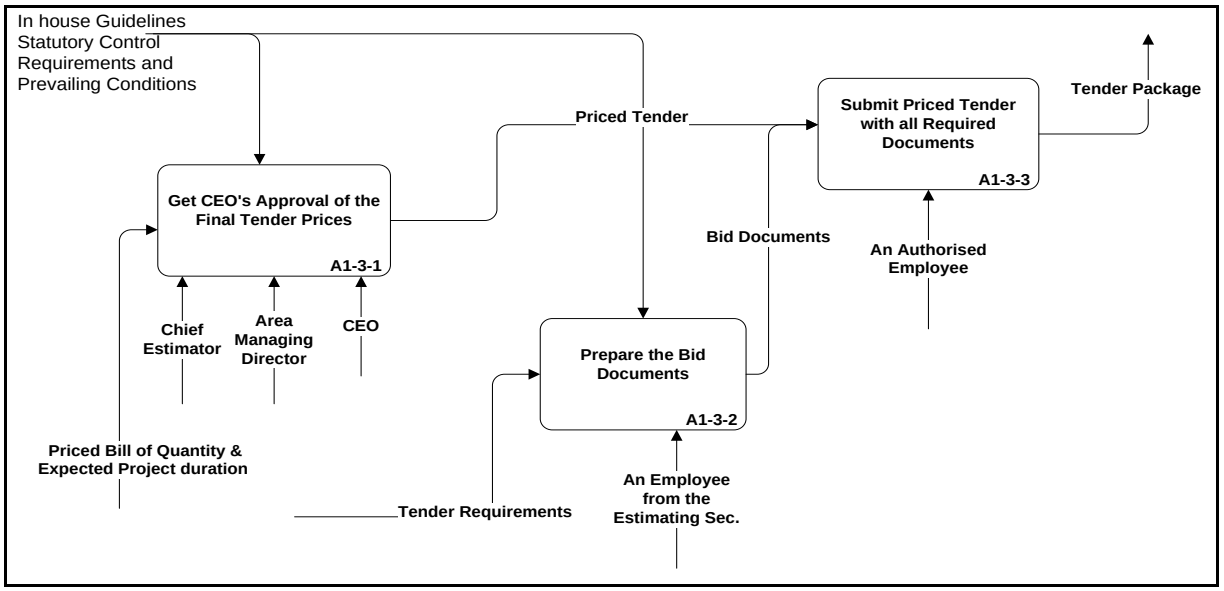


Figure 6-28: IDEFØ level three A1-3 Tender review and submission – Company three

6.5.2.2 Pre-construction Planning A2 Process – Company Three

As illustrated in Figure 6-3 the A2 process starts by receiving the acceptance letter and contract documents and ends by producing a project pre-construction plan. By using the IDEFØ

modelling technique, the A2 process has been broken down into two main processes, namely 'Post Award Review' and 'Mobilisation'. These processes, with their key inputs and outputs, are depicted in Figure 6-29.

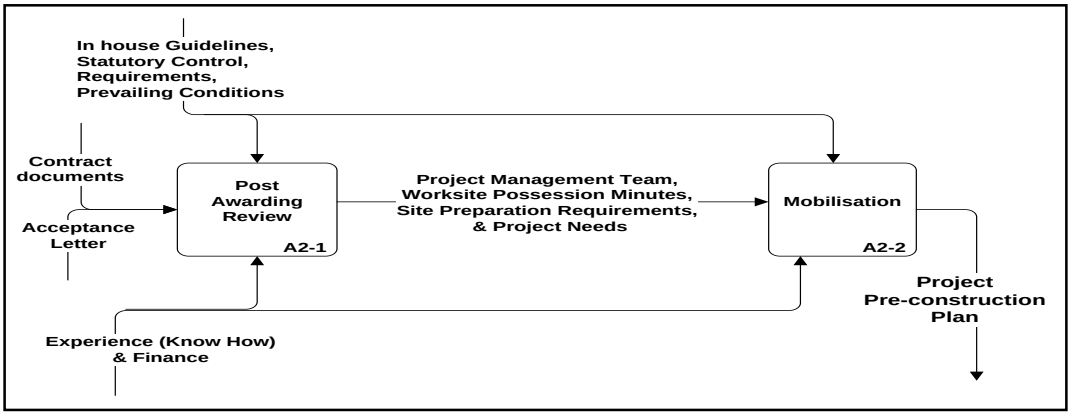


Figure 6-29: IDEFØ level two A2 pre-construction planning process – Company three

6.5.2.2.1 Post Award Review A2-1 Process – Company Three

As illustrated in Figure 6-29, the key inputs that trigger the A2-1 process are an acceptance letter of a submitted bid and the contract documents. Whereas the main outputs generated from the process usually include a project management team, a list of project needs, the requirements for the preparation of the worksite, and formal minutes concerning the worksite possession. The sub-processes affiliated to the A2-1 process are generally similar to those that have been identified in case studies one and two. These sub-processes with their main inputs, outputs, and the stakeholders involved in executing them are depicted in Figure 6-30.

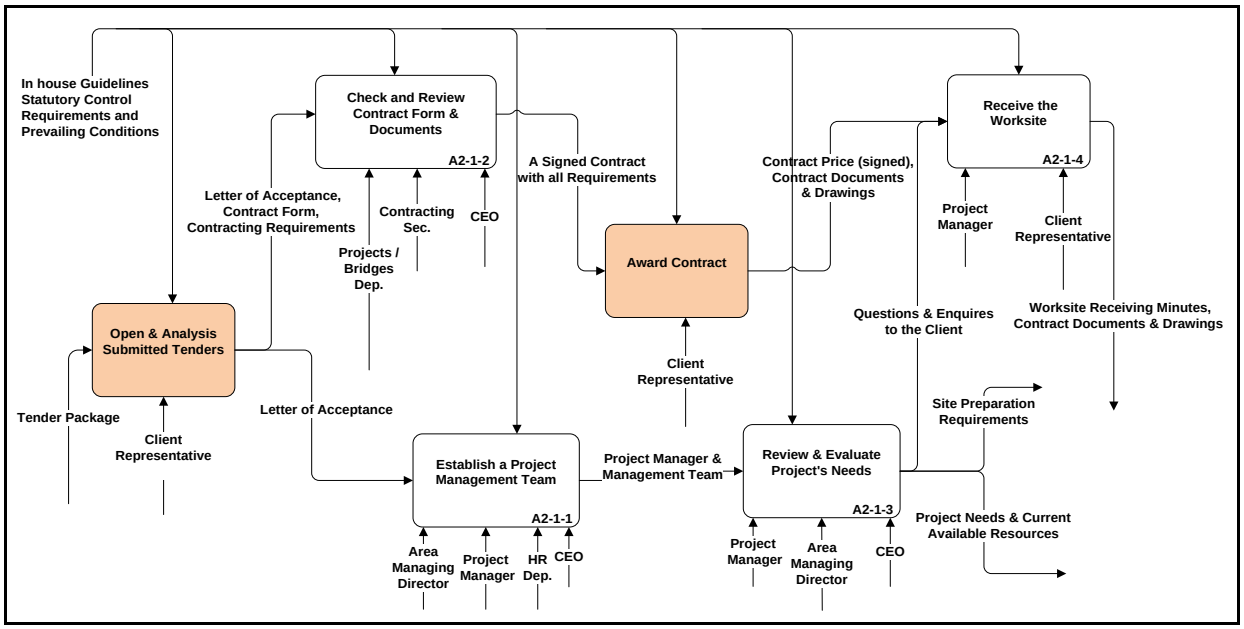


Figure 6-30: IDEFØ level three A2-1 Post award review – Company three

As illustrated in Figure 6-30, the first action undertaken by the company is the establishment of a project management team. According to the interviewees, this starts by appointing a Project Manager, which the responsibility of the Projects Department Director in consultation with the CEO. The Project Manager can be the Regional Manager for the area in which the project will be built, or an engineer selected from one of the company's departments or regional offices. In the second action, a temporary project management office would be established and linked directly to the projects department. While the authorities awarded to the Project Manager, in this case, would be fairly equal to those awarded to any Regional Manager. After appointing a Project Manager, it then becomes their responsibility to coordinate with the Projects Director to select the project management team members. Yet, in terms of the procedures adopted in executing other sub-processes (A2-1-2, A2-1-3, A2-1-4) they are generally analogous to those described in the case studies one and two.

6.5.2.2.2 Mobilisation A2-2 Process – Company Three

The A2-2 process commences after possessing the project site and finishes when the CEO's approves of the project pre-construction plan. Yet, some of its activities can start earlier and continue for maybe days or weeks during the construction processes. This process embraces three sub-processes. These sub-processes, along with their inputs, outputs, and the key stakeholders involved in performing them, are depicted in Figure 6-31.

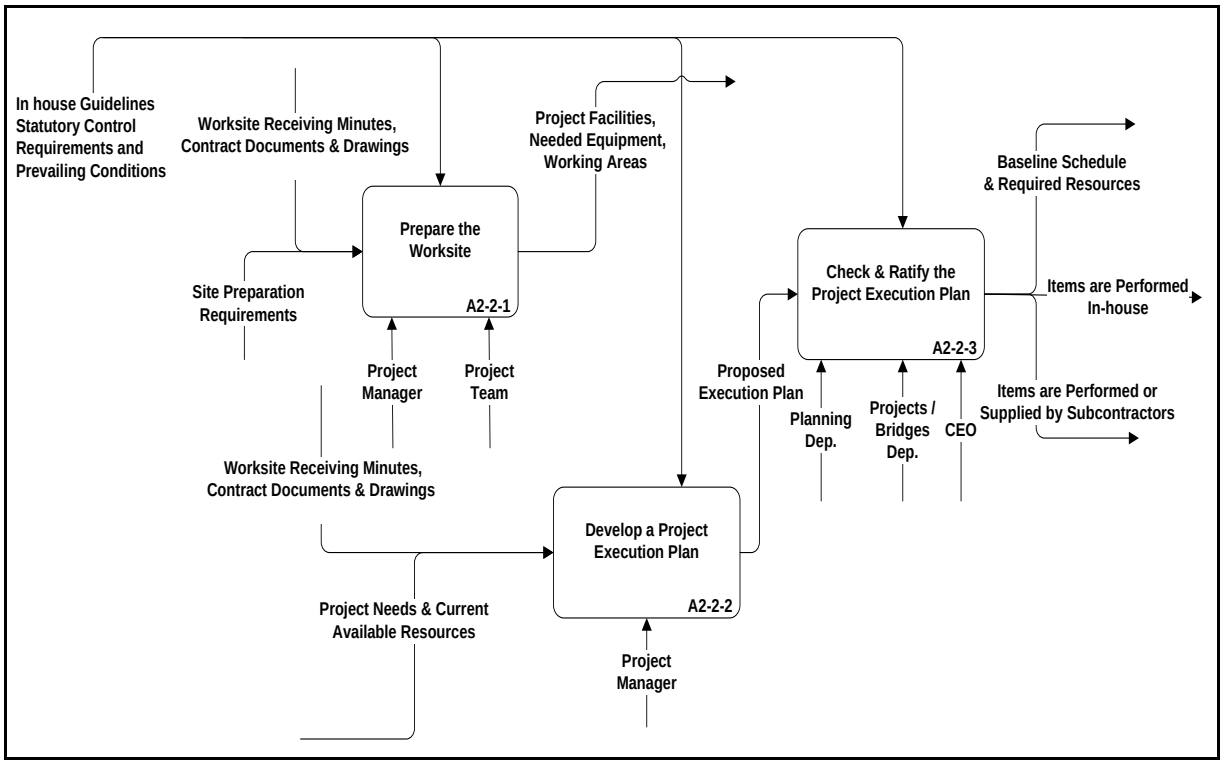


Figure 6-31: IDEFØ level three A2-2 Mobilisation – Company three

6.5.2.3 Construction: A3 Process –Company Three

The construction process, as reported by the company's interviewees, promptly commences after preparing the worksite and obtaining the necessary resources required to start the construction works. This, as the interviewees emphasise, can happen even before approval from the CEO or the client's representative for concerning the project pre-construction plan. Whereas, the process ends by the time the client's representative accepts all the deliverables stated.

Whilst managing the construction process and producing the designated deliverables, the company adopts four main interrelated and repeated sub-processes. These sub-processes, along with the procedures adopted in implementing them and the stakeholders involved in performing them, are similar to those adopted by companies one and two. Figure 6-11 shows the expansion of the construction process into its processes and sub-processes. A brief description of these sub-processes is provided in the upcoming sections.

A3-1-1 The **'Execute Construction Activities'** sub-process aims to produce the required deliverables. In order to create the project deliverables, both in-house execution and subcontracting are adopted by the company, as illustrated in Figure 6-12. Yet, as similarly identified in the second case study, this company also prefers to rely on in-house execution in the implementation of most of its projects.

A3-1-2 The **'Manage Procurement'** sub-process pertains to all activities undertaken with the aim of hiring, purchasing, and subcontracting the resources required to build the physical deliverables and/or to facilitate their creation. Its activities often start at the mobilisation stage and continue over the whole of the construction process. The procedures employed in managing the procurement process, in general, correspond with those adopted and described in the first and second case studies. This is because most of these procedures, as previously mentioned, are either stipulated by the Iraqi Regulations for Implementing Government Contracts and Iraqi Federal Budget Law, or determined through the instructions and directives issued by the Ministry.

A3-1-3 The **'Monitor and Control Performance'** sub-process is mainly the responsibility of the Project Manager. Other stakeholders can be associated in performing this process, including the engineering section at the regional level, planning department staff, and Projects Directors. As identified and depicted in Figure 6-31, the company's key focus during the mobilisation stage is to: decide on the project's work packages; provide the main resources that enable the

commencement of the construction works on site; and develop a project programme as required by the client. Accordingly, the project programme is deemed as the only development plan to monitor the project's performance.

Monitoring the project's progress is mainly the responsibility of the Project Manager in coordination with the engineering section at the regional office. Periodically, reports regarding the progress of the project's activities are prepared and sent by the project team to the planning department at the headquarters; this is usually conducted on a biweekly, and monthly basis. Moreover, all issues and problems affecting the progress that cannot be solved by the Project Manager are often reported with their proposed solutions to the Projects Directors and CEO with the aim of obtaining their approval on the proposed solutions. Moreover, the interviewees explained that the quality of the performed works and supplied materials are directly monitored and controlled by the project team and the client's representative. This is achieved through conducting the necessary checks and tests to ensure they comply with the required specifications. Furthermore, to monitor and control the project's execution costs, it was reported that, despite all the established committees, auditing bodies, and red tape procedures to control the project disbursements, such control cannot be achieved in reality. This is because the company does not accurately separate out the different budgets of the various projects they run.

A3-1-4 The **'Update Project Execution Plan'** sub-process is a part of the Project Manager's responsibilities to coordinate with the client's representative in order to review and update the project programme in light the new requirements and changes that occur in the project's scope.

6.5.2.4 Closeout and Termination: A4 Process – Company Three

As previously mentioned, the Iraqi General Conditions of Contract for Civil Engineering Works defines the mechanism that should be followed when closing out a construction project. Therefore, it is not surprising that the processes and activities employed by IQGCCs for closing out any project are similar. With the exception of slight differences in some stakeholders engaged in the implementation of some of these processes, this is what has been identified with all IQGCCs involved in this study. Figure 6-32 illustrates all the sub-processes adopted by the third company during the closeout and termination phase with their main inputs, outputs, and the people engaged in their execution.

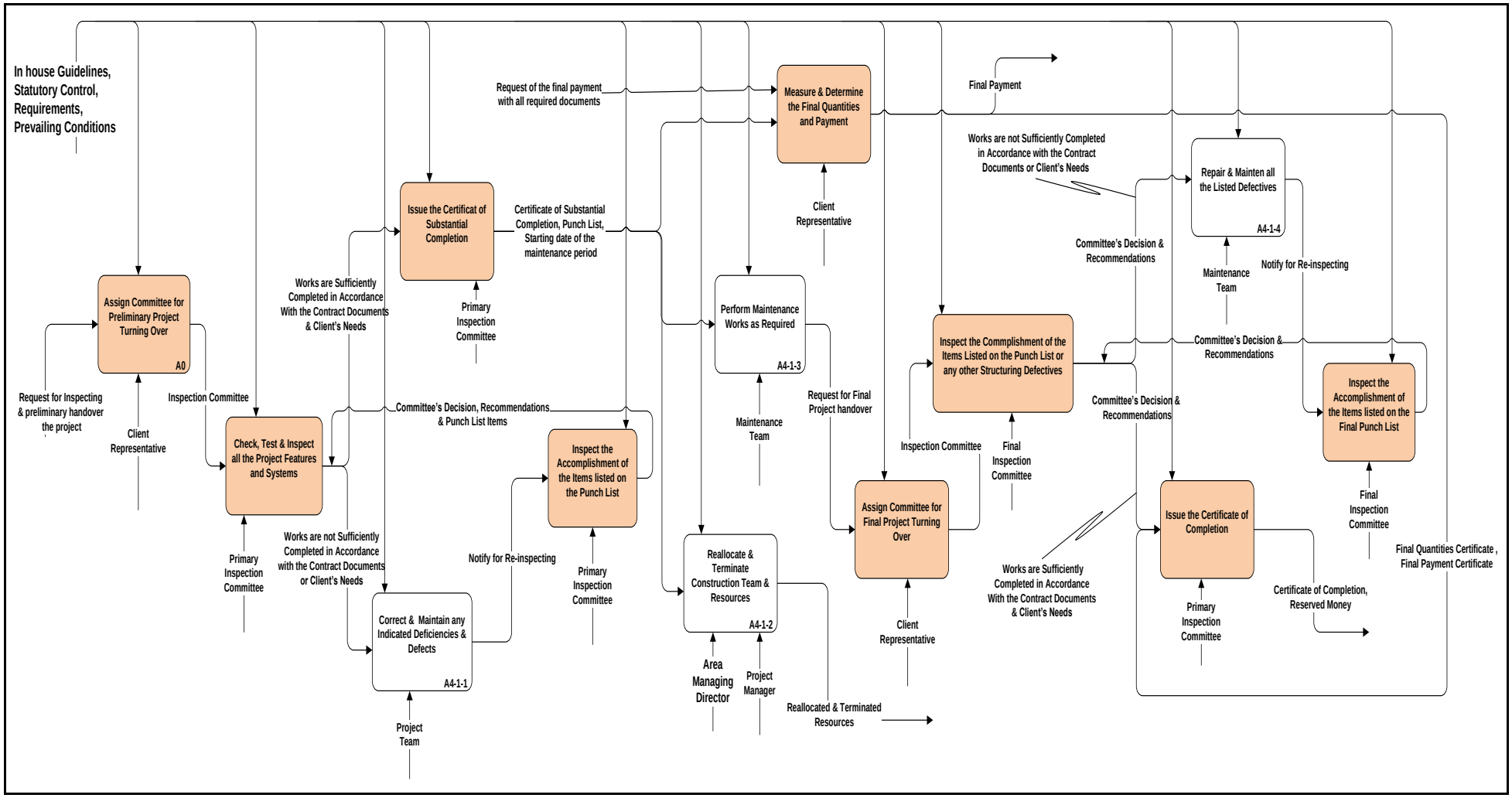


Figure 6-32: IDEFØ level three A4-1 Closeout and termination – Company three

6.6 Integrated Framework of IQGCCs Current Practices

Throughout the previous three sections, the current operational processes adopted by the three IQGCCs under a traditional contract have been mapped and described. Interestingly, the cross-case analysis of all the companies under study, tabulated in Table 6-7, showed that with a very slight difference in terms of the internal stakeholders engaged in performing some of these processes, all three companies employ similar practices in their approach to delivering construction projects. In fact, the analysis revealed that, in contrast to company two, company one does not have an independent estimating section per se whether at the regional or corporate level. However, the estimating role in this company is part of the responsibility of the engineering section and Regional Manager in regional office and projects/bridges department in the company headquarters. In contrast, although company three has an estimating section placed at the company headquarters, its regional offices do not have such section. Thus the responsibility of bidding process is assigned to the estimating section at the corporate level. While the Regional Manager plays an advisory role in this process. Moreover, company three differentiates than other two companies that it mainly depends on project organisational structure. Where the Project Manager is assigned by the Area Managing Director (Director of projects/bridges department) and be directly linked to projects/bridges department. It is important to mention here, that the Regional Manager can be the Project Manager at the same time. Other than the aforementioned differences, indeed, all the three companies showed quite similar practices. This can be justified in that all the companies under the study are a part of the governmental body and belong to the same Ministry; hence, they are subject to the same laws, regulations, instructions and management system.

Consequently, this allowed the researcher to depict the companies' core business processes on an integrated process generic framework, as reflected in Figure 6-33. This framework was developed through using similar modelling techniques as the Process Protocol (GDCPP) discussed in Chapter Three. Thus, the framework reveals the excessive dimension of centralisation and bureaucracy in managing these companies. Top management holds all the powers and almost all decisions must be reviewed and ratified by the CEO before an action can be taken. As a result, several points have emerged in the operational process where the flow of information is severely restricted. The decision-making bottlenecks are intensively prevalent across the whole spectrum of the business process; this results in considerable increases to the process in terms of their time and cost cycles.

Indeed, adopting the functional hierarchical system in managing the companies has forced the operational process to frequently go up and down the organisation hierarchy, which is taken in a zigzag path rather than straight horizontal. Figure 6-33 clearly illustrates how the decisions made have to go upwards through a number of management layers to the highest management layer in the hierarchy. Whereas, responses to these decisions are passed down the hierarchy to the level where actions are taken. Such exercises have significantly slowed down the process and increased costs due to the duplication of work in the various management layers. This functional system has also led to enhanced barriers and boundaries between the various departments, which in turn negatively affected their efficiency of communication, coordination, and handovers.

In comparison to the GDCPP, which is designed to cover and improve the entire project lifecycle in the UK, there are ten phases separated by nine soft and hard gates. With the aim of streamlining the operational process, reducing changes, and improving the coordination and efficiency, the processes within each phase are designed to be conducted by multi-functional teams, known as activity zones. An activity zone may consist of a single person in small projects or a complex network of personnel from different functional areas and/or organisations in large projects (Cooper *et al*., 2005). By the end of each phase, there is a stage gate. These gates are commonly referred to as decision gates or phase review meetings (Kagiolou *et al*., 1998). The project team representatives and a multi-functional senior management group usually attend the meetings. The key aim of these meetings is to ensure that the multi-functional teams execute a high quality of work in phase and that approval is established before proceeding to the next phase. In other words, these gates are exclusively employed as 'mistake avoidance mechanisms' rather than being 'brick walls', as in the case of IQGCCs, where mistakes are seen as inevitable and compulsory.

Evident from what has been presented in Figure 6-33 and briefly discussed here, there are several challenges and problematic points inherent in IQGCCs' current practices. Accordingly, it is imperative to identify these challenges and explore viable solutions to overcome them and enhance the overall performance of IQGCCs. The following section is devoted to identifying and discussing the most important challenges associated with IQGCCs' current practices, as reported by the interviewees from these companies and/or as a result of comparing IQGCCs' current practices to the current industry good practice.

Table 6-7: Cross-case analysis of the current operational processes employed by the companies under study

Phase		**Phase 1: Bidding process**										**Phase 2: Pre-construction planning process**						
Stage		**One: Get opportunity**				**Two: Work up bid**			**Three: Tender review and submission**			**Four: Post awarding review**				**Five: Mobilisation**		
Process		Initial project evaluation	Site visit	Obtain the CEO approval of the project	Buy & collect the tender documents	Check and review tender documents	Attend tender clarification meeting	Initial pricing	Check and approval of tender prices	Prepare the bid documents	Submit priced tender with all required documents	Establish project management team	Check & review contract form and documents	Review & evaluate project's needs	Receive the project worksite	Prepare the worksite	Develop a project execution plan	Check & ratify the project execution plan
Key Internal stakeholders engaged in process	Company 1	• Regional Manager • Area Managing Director	• Regional Manager • Engineer	• Regional Manager • Area Managing Director • CEO	• Authorised Employee	• Regional Manager • Head of the engineering section & his/her staff	• Head of the engineering section	• Head of the engineering section • Regional Manager	• Area Managing Director & his/her staff • CEO	• Employee from the projects / bridges dep.	• Authorised Employee	• Regional Manager • Project Manager • Area Managing director • H.R dep. • CEO	• Projects / bridges dep. • Legal / Contracting dep. • CEO	• Project Manager • Regional Manager • Area Managing Director • CEO	• Project Manager	• Project Manager • Project team	• Engineering section • Regional Manager	• Planning dep. • Projects / bridges dep. • CEO
	Company 2	• Regional Manager • Projects Director	• Regional Manager • Engineer	• Regional Manager • Projects Director • CEO	• Authorised Employee	• Regional Manager • Regional Estimator and his/her staff	• Regional Estimator	• Regional Estimator • Regional Manager	• Chief Estimator & estimating staff • CEO	• Employee from the estimating section	• Authorised Employee	• Regional Manager • Project Manager • Projects Director • H.R dep. • CEO	• Estimating section • Contracting section • CEO	• Project Manager • Regional Manager • Projects Director • CEO	• Project Manager	• Project Manager • Project team	• Project Manager • Regional planning sec. • Regional Manager	• Planning dep. • Estimating sec. • CEO
	Company 3	• Regional Manager • Projects Director	• Regional Manager • Engineer	• Regional Manager • Area managing Director • CEO	• Authorised Employee	• Chief Estimator & estimating staff	• Authorised Employee	• Chief Estimator & estimating staff • Regional Manager	• Area Managing Director • CEO	• Employee from the estimating section	• Authorised Employee	• Area Managing Director • Project Manager • H.R dep. • CEO	• Projects / bridges dep. • Contracting Sec. • CEO	• Project Manager • Projects Director • CEO	• Project Manager	• Project Manager • Project team	Project Manager	• Planning dep. • Estimating sec. • CEO

Phase		**Phase 3: Construction process**				**Phase 4: Closeout and termination process**	
Stage		**Six: Commence work on site**				**Seven: Closeout and termination**	
Process		Execute construction activities	Manage procurement	Monitor & control performance	Update project execution plan	Correct and maintain & indicated deficiency and defects	Reallocate & terminate construction team & resources
Key Internal stakeholders engaged in process	Company 1	• Project Manager and project task teams	• Project Manager • Regional Manager • Area Managing Directors, purchasing committees, contracting section • CEO	• Project Manager • Regional Manager and regional planning section • Planning dep. • CEO	• Project Manager • Regional Manager and regional planning section • Planning dep. • CEO	• Project teams / Maintenance teams	• Project Manager • Regional Manager
	Company 2	• Project Manager and project task teams	• Project Manager • Regional Manager • Projects Directors, purchasing committees, contracting section • CEO	• Project Manager • Regional Manager and regional planning section • Planning dep. and estimating sec. • CEO	• Project Manager • Regional Manager and regional planning section • Planning dep. and estimating sec. • CEO	• Project teams / Maintenance teams	• Project Manager • Regional Manager
	Company 3	• Project Manager and project task teams	• Project Manager • Area Managing Directors, purchasing committees, contracting section • CEO	• Project Manager • Planning dep. • CEO	• Project Manager and his team • Planning dep. • CEO	• Project teams / Maintenance teams	• Project Manager • Area Managing Director

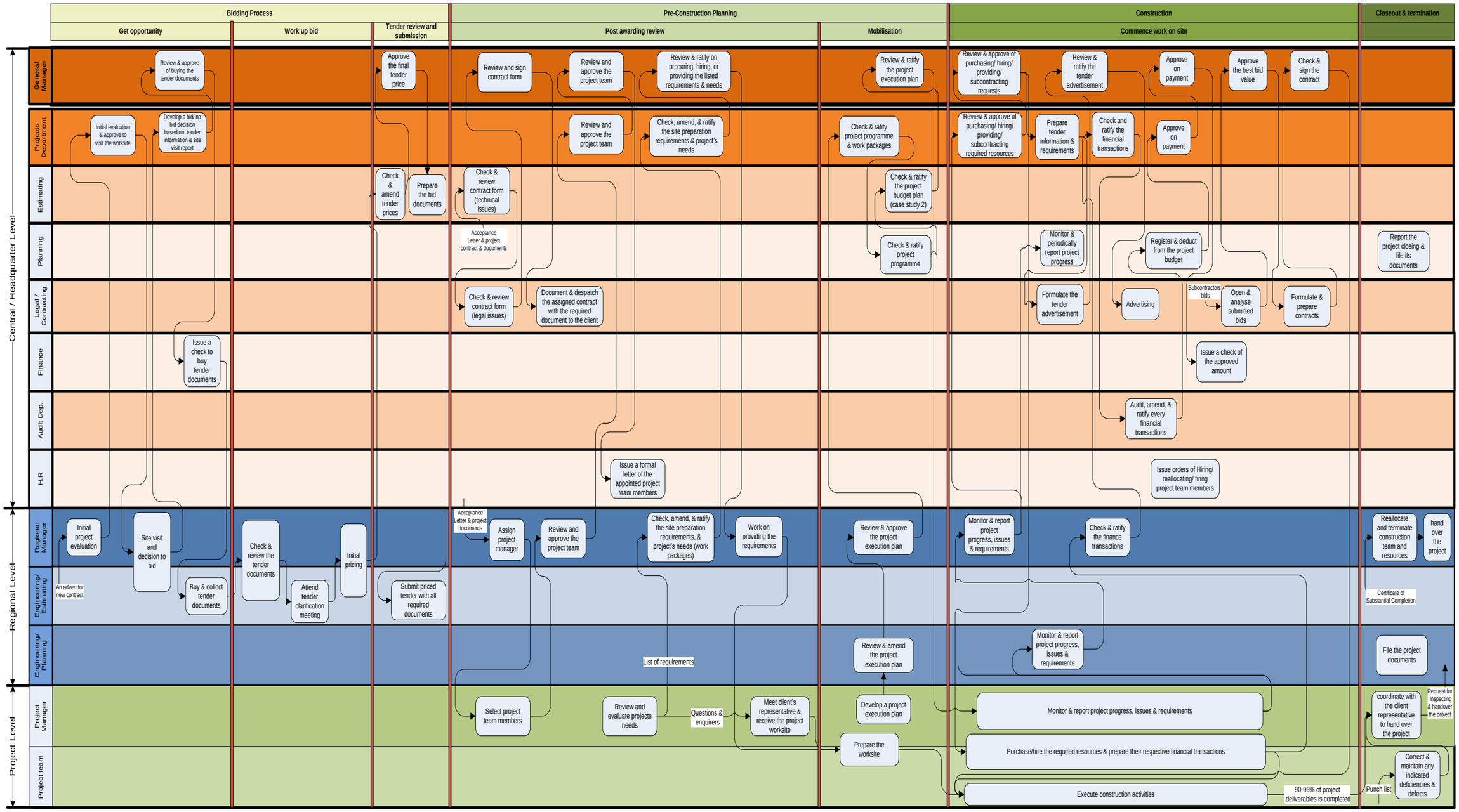


Figure 6-33: Integrated framework of IQGCCs' current practice

6.7 Challenges and Problematic Points in the Current Practices

Section 6.6 highlighted two main issues: 1) the similarity of the current practices adopted by IQGCCs; and 2) the existence of several challenges that need to be overcome within these practices. However, in order to streamline the whole core business process and bring it in line with the current industry good practice benchmark, the key challenges along with the major factors causing them need to be identified and overcome from a process point of view. Moreover, as discussed in Chapter Two, being faster, better, and cheaper is the aim of any construction company in order to ensure success and remain ahead of the competition. This, as Dumas *et al.* (2013) profess, makes the eternal triangle of cost-time-quality the main dimensions to measure process performance. Thus, these dimensions were used as a basis for measuring the problematic points and barriers in IQGCCs' processes. This was important to allow for a repeatable and consistent representation of these barriers. Accordingly, the challenges and problematic points identified within the IQGCCs operational process, as recognised from all the case studies, are discussed and detailed under each phase of the core business process, as follows:

6.7.1 Challenges and Problematic Points in the Current Bidding Process

As mentioned in Chapter Four, the bidding process in the construction industry is usually costly, and always time and effort consuming (Brook, 2008). It is, therefore, important that all construction companies develop their own selective tendering strategy at an early stage, to avoid wasting time and money bidding for unattractive contracts. However, this does not seem the case with IQGCCs according to the interviewees. According to the participant C312 there are no outlines or specified criteria for the projects that the company bids on, but rather it widely depends upon the willingness and attitude of the CEO. This is depicted in the statement that is indicated as follows:

> *"Honestly, we do not have a clear strategy for selecting our projects. Under the same conditions, rejected projects today can be accepted tomorrow. It mainly depends on the personal Chief Executive Officer's convictions and visions."* C312

Thus, the lack of a clear strategy for the selection of projects with a need to obtain new projects have sometimes pushed the company to bid for any available opportunity without carefully considering whether it would enhance the company's overall interest; this was reported by interviewees C213, C112 and C3H2:

"Despite this, we always try to focus on building projects, but generally the company does not have a problem in bidding for any project, regardless its type, size, or location as long as it would ensure us the continuation of work." C213

"No matter the scope of projects, our company's key focus is to keep staff and equipment fully engaged in works all the time." C112

"Just to satisfy the government officials and show that the company is engaged in works so often [the company] bids for projects that are known that they would not generate profits." C3H2

This is further confirmed by reviewing the companies' documents. For instance, the documents of company two revealed that, during the last five years, they have implemented projects in sewerage, electric, roads, oil, building, and so forth, with sizes ranging from very small, with cost of $30,000, to large, with costs reaching $40,000,000. This in itself can reflect the amount of variation in the type and size of projects that are bidden upon by the company.

Moreover, examining the bid process revealed that there is an inefficient mechanism in developing bid/no bid decisions. During the A1-1-3 process, as illustrated in Figures 6-5, 6-17, and 6-25, a decision is made by the CEO whether to bid for the project, and therefore to purchase the contract documents. This decision is similar to the bid/no bid decision in the good practice guidance. Nevertheless, it is generally based on information derived from the advertisement for a tender and a subsequent site visit, and such limited information is seldom enough to make an accurate decision. The companies really need to evaluate the risks and opportunities embedded in the tender documents, such as: the terms and conditions of the contract; the details and complexity of the work; and the tender documentation quality. The Code of Estimating Practice (CIOB, 2009) emphasises that the decision to bid or not should be made based on an appropriate risk analysis report, and the standpoints of other senior management members; this approach is currently not implemented by IQGCCs. Accordingly, it could be argued that the absence of an appropriate risk analysis report is negatively affecting decision making, which would allow more room for the CEO to fully evaluate the risk and opportunity profile of the new projects.

At the root of this problem are two fundamental issues with the operation of the IQGCCs. The first issue concerns the lack of authority given to the Regional Managers, which does not allow

them to buy tender documents without obtaining the CEO's approval, despite the minimal outlay compared to the costs of developing the bid. As respondent C211 stated:

> *"We are not authorised to pay the tender fees and charges without getting the general manager's acceptance of payment."* C211

In the same context, a similar statement was made by a Deputy Regional Manager, in case study one:

> *"Buying the tender documents is out of our manager's authorities; therefore, in order to proceed with the bidding process, we need to obtain an acceptance to buy the tender documents from the company in advance."* C112

Restricting the permission to buy the tender documents to the CEO, is clearly not adding value to the process; instead, it can be time and cost consuming. Given that written approval is usually needed, this is then issued to the organisation's accountant who subsequently issues a cheque for the purchase of the tender document. Obtaining this approval generally takes between three to five working days and needs an authorised employee to both deliver the formal written request and bring the acceptance back, as reported by respondent C112:

> *"With an authorised employee appointed just to follow up our formal written requests and permissions at the headquarters, a permit such as buying tender documents may take two days to a week."* C112

The second fundamental issue with the operation of the IQGCCs, is the excessive auditing and inspection actions, imposed by different internal and external governmental bodies, such as: Internal Auditing, the Inspector General Office, and the Commission of Integrity. This usually prevents the Estimator from stopping the bidding operation after paying for the tender documents, no matter how bad the risk profile for the project. Therefore, this seems to be a hard gate in this stage. This problem is reported by an Estimator, who stated:

> *"After buying the contract documents, we have to proceed with the tender process and submit our bid package, otherwise, we might be questioned by the company's Internal Auditing and/or the Inspector General Office in the Ministry."* C222.

Indeed, the excessive auditing and inspection actions have become a major obstacle, not only in the bidding process but also to the whole value chain efficiency. In the presence of a large number of inspection bodies, managers have become more afraid of bearing responsibility and

making decisions, even for those within their power. This is to avoid the accountability of various inspection bodies, as reported by a Senior Manager in case study three:

> *"Many Project Managers, in order to protect themselves from the accountability of various government inspection bodies, prefer to obtain the approval of the CEO in advance about any action they want to do it, rather than using their authorities."* C3H2

The exaggerated administrative procedures and red tape exercised by all the companies' departments, including the finance department, is another problem that hinders the company's bid business operations. This led one engineer to argue:

> *"Although, we obtained approval to buy a tender over a week ago, we are still waiting for the finance department to send us the tender fees ... a fatal routine in addition to the lack of awareness amongst some of the finance department staff about the importance of such issues are always the main reasons for this delay."* C223

This viewpoint identifies another important problem, namely the lack of understanding amongst some staff. From the interviews, it appears those employed by the company do not understand the core business process and its importance to the organisation. This is due to the company structure, which is based on hierarchy and traditional functions, which ultimately prevents employees seeing and understanding how the organisation operates beyond the boundaries of their departments.

Bottlenecks and poor work quality can also be seen as a key feature, not only in the bidding process, but throughout the IQGCCs' operational processes. As depicted in Figures 6-7 and 6-17, before the submission all tenders must pass through process A1-3-1 in order to check the accuracy of pricing and its computation. This process is executed by the projects department in case study one and by the estimating section in case study two. Reviewing the organisation records of one of these companies revealed that the company submitted around 1,140 tenders between January 2008 and December 2013, suggesting the company, on average, submitted 1 tender every 1.2 working days. Considering the high number of tenders that need to be checked and amended by one section, whose personnel also undertake other duties, such as checking and reviewing the execution plans for awarded projects, opening and analysing bids submitted by subcontractors, and auditing the in-house purchase transactions, avoiding mistakes and

delays would undoubtedly be very difficult, especially as all work is undertaken manually. Thus, inaccurate or incorrect tenders were likely submitted to clients. This issue was raised during several interviews, yet the following quotes provide a useful summary of the main argument:

> *"Sometimes certain mistakes could occur in pricing, but as you may know, due to the excessive workload and time constraints on the estimating section, some of them might not be caught. I do remember this happened with two of our projects."* C212

> *"Under the massive weight of paperwork that we deal with daily, add to this, the importunity of the various stakeholders to finish their respective works as fast as possible, mistakes could happen whether in pricing or other areas."* C1H2

In the same context, an important issue was also mentioned by a Regional Manager in case study one, which leads a reduction in the quality and efficiency of work. According to this manager, having a sense that the work will be checked and amended later before being ratified, can create a kind of careless, irresponsible, and less meticulous approach in performing that work:

> *"Sometimes, I say to Mr. X, please just finish this report slapdash and send it, it will be reviewed and checked further by the corporate staff, and if they have any problems, they will contact us."* C121

As a result, the A1-3-1 process duplicates earlier work and creates a bottleneck in the bidding process that leads to reduced quality and efficiency.

Moreover, it was noted that there is no a clear mechanism in place to decide on the desired mark-up and to settle the final bid price. Most of the interviewees explained that the mark-up is semi-fixed for all projects and is equivalent to 20% of the forecast project cost. For example, a Chief Estimator professed:

> *"We usually add 20% of the project cost as a mark-up. This ratio is recommended by our Ministry."* C2H1

Whilst, the CEO's final approval of the tender price is just a routine procedure to satisfy the CEO himself and to formalise the tender, as stated by respondent C113:

> *"The final tender price is usually determined by the projects department, whereas the CEO's role is just to ratify that price."* C113

Accordingly, it would be more time and cost efficient if the regional offices were encouraged to perform their work correctly the first time. Achieving this would mean streamlining the bidding process by giving the regional offices the required authority and responsibility to perform the entire process whilst keeping responsibility for the critical decisions amongst the top management. The ability of regional offices to carry out the bidding process successfully was confirmed by a number of interviewees:

> *"The chance of winning a project, in our geographical area, is always bigger when its cost is estimated by us rather than the corporate estimating section. This is due to two reasons: firstly, we know the prices and costs of work in our local area better than them; and secondly, when we estimate a project for our office, we put into our consideration that we will be responsible for its implementation in the future, which is not the case for the estimating section staff where their responsibility ends by submitting the priced tender."* C221

> *"Excepting the mistakes in the calculations, we generally rely on prices and costs estimated by our regional offices. However, if there is a need to make amendments, we would deliberate with their representatives to reach a consensus on a certain price."* C1H1

A similar statement was also made by a Deputy Regional Manager in case study one:

> *"The company rarely changes prices estimated by us, and if that happens, it is usually very slight, and on one or two items of the bill of quantity."* C112

It is clear, based on what has been discussed in the preceding section, that the challenges and problematic points facing the bidding process adopted by the companies under study are based or related to three major interrelated factors, namely: authority, management, and communication. Yet the government restriction represented by the exaggerated interference of various inspection bodies in the IQGCCs' operational processes can be considered a fourth source of inefficiency for these companies.

6.7.2 Challenges and Problematic Points in the Current Pre-Construction Planning Process

The pre-construction planning process, as explained, usually starts by allocating the project management team through the Project Manager in consultation with the Regional Manager and/or the Director of projects department. Yet, the authority given to each of them is limited to only managing and controlling the resources within their regional office or department. Accordingly, the main challenge in the A2-1-1 process emerges when all or most of the regional staff are engaged in other projects. In such cases, approval has to be obtained from the CEO to allocate the required staff from other regional offices, projects or departments. Taking into consideration the involvement of several separate internal stakeholders in this process, namely the CEO, the Director of projects department, the Regional Managers, the Project Managers, and the administrative department, along with using formal letters as the only accepted way of communicating, all have contributed to major delays in the process and have increased costs as a result of task duplication. This situation was stated by a Regional Manager:

> *"As a Regional Manager, my power is restricted to managing the resources within the boundaries of my regional office; allocating any other additional resources can only be through the CEO. This often consumes a huge amount of time and effort, due to the deadly routine followed in the communication."* C221

Nevertheless, worse can happen when the additional staff need to be appointed from outside the company, whether from other QGCCs or the market. In such cases, approval has to be obtained from the highest level of authority in the Ministry '*the Minister*', to which the company belongs. Obtaining such approval can take between two and four months, if it is allowed, since, for several reasons, the recruitment of new employees can be prevented by the government or the Ministry itself. Moreover, the employment of new staff, particularly the engineers and surveyors required to manage works on site, is always blocked by government regulations. Since 2006, the government has prevented any permanent recruitment to the SOEs. Meanwhile, it has confined the exclusive power to award approval for short-term appointments is held by the Minister and at quite a low monthly salary compared to that which can be offered in the private sector. This situation has emerged in case study one, as reported by a Regional Manager:

> *"Government policy and measures taken since 2006 against state-owned companies in general, have led to generate a repulsive environment for engineers and skilled workers to work for these organisations. This has made us suffer from*

a scarcity of such members, who are particularly required for executing and managing the construction works on sites." C121

Thus, the scarceness of engineering and skilled staff, in addition to the complexity and inflexibility of the staffing process have forced the managements of many IQGCCs to assign work and tasks to non-specialists, and/or allocate them more than they are able to manage. This has had a negative effect on the quality of work performed and has led to an increase in the costs as a result of an increase in errors at works. This was argued by a Deputy Regional Manager in case study three:

"Due to the lack of adequate engineering staff, and in order to fulfil the administrative requirements, very frequent, tasks are allocated to non-specialist employees. For instance, I'm an electrical engineer; however, many civil engineering tasks and duties have been assigned to me. Right now I'm the Deputy Regional Manager, and also responsible for managing a concrete plant. As a result, several failures have occurred whilst undertaking these tasks; an example of these failures is in the casting pillars and pre-tensioned girders." C312

In terms of the adequacy and competence of the pre-construction (execution) plan developed by IQGCCs, both the interviews and the examination a number of project files uncovered a clear deficiency and lack of concern in pre-construction planning issues in comparison with the current industry good practice.

The pre-construction plan for case studies one and three are only confined to producing the project schedule and evaluating the resources required to build the deliverables in order to decide which packages or work items will be performed in-house or subcontracted. Whereas, case study two showed a more competent execution plan; thus, in addition to what has been previously mentioned, the company develops a method statement and a budget plan, as illustrated in Figure 6-22. However, none of the companies showed any evidence from the interviews of developing and adopting a Risk Management Plan, Procurement Plan, Site Layout Plan, Staffing Plan, Health and Safety Plan, or even a cash flow diagram to manage the financial aspects of projects. Instead, the companies mainly depend on reactive actions to deal with any issues or problems that emerge during the implementation. In relation to this, some of the statements that were captured throughout the interviews are provided as follows:

"Honestly, not just our company, but in general, Iraqi construction companies and their staff do not have enough culture and knowledge regarding the health and safety measures and their importance. Therefore, such measures are often neglected, unless enforced by the client." C212

"Despite that, our company is a government company and classified as a first class company in Iraq; yet, it has no awareness or concern regarding health and safety measures." C312

"Since it is not a complex task, at the beginning of the construction phase, we determine where the management offices should be established, the material storage place, site entrances and exits, etc.; but all this remains in our minds without being documenting or presented as maps." C213

"One of the biggest problems that we face here in headquarters is that most of the subcontracting and materials purchasing requests are received from the regional offices or projects just before, or even after, the current construction materials are finished. You may know that the subcontracting procedures are very strict and take plenty of time, which leads to project delays.... All of this occurs because of the weaknesses of the project management in general and the absence of purchasing plans in particular." C1H1

"Risk management!!!, What is it? Never heard about such terminology before." C1H2

Moreover, in terms of case study two, as illustrated in Figure 6-22, the construction work cannot be commenced on the site, before the project execution plan is check and ratified through the A2-2-3 sub-process. Such a process, as explained earlier in section 6.7.1, can create a bottleneck in the mobilisation process and cause delays without really adding value to client. According to respondent C223, obtaining such approval might take 10 to 14 working days and require an authorised employee to follow it up:

"The project execution plan, after being approved by our Regional Manager, is sent off through a formal letter to the company headquarters with the purpose of checking and ratifying by the Chief Executive Officer ... Checking is fist done by the projects department and then by the planning department and estimating section.

This process usually takes 10 days to 2 weeks, and of course an employee has to follow it up." C223

It is clear from what has been stated by the interviewees and discussed above that the key challenges and problematic points result from four main factors: the management system, the authority distribution, communication, and the government restrictions represented here by the current government regulations imposed on IQGCCs.

6.7.3 Challenges and Problematic Points in the Current Construction Process

As mentioned earlier, the main objective of the construction process is to perform the project activities in accordance with the execution plan. However, this requires the effective management and coordination of people and resources in order to successfully achieve the project objectives and meet the client's requirements. In the previous section, a number of challenges have been identified in the pre-construction planning process. The inadequacy and incompetence of the pre-construction plan can be considered the main aspect that needs to be addressed by IQGCCs in order to further enhance the construction process and their overall performance. In addition, the problematic points associated with acquiring the project team were also discussed. Accordingly, this section will focus on highlighting the challenges inherent in the current procurement and resource acquisition processes in addition to the monitoring and controlling of the construction process.

As illustrated in Figure 6-12, the procurement process can either be achieved through direct purchasing from the market or through subcontracting. Table 6-8 shows the methods and powers of purchasing granted to Iraqi Ministers and Governors to be used in procuring the resources required for delivering projects, as stipulated in the Federal Budget Law 2016. The law also allows the Ministers and Governors to transfer and delegate such powers, or part thereof, to their deputies and CEOs.

Table 6-8: Purchasing powers and manners granted to Iraqi Ministers and Governors

Purchasing Powers (Iraqi Dinar) *	Purchase Manner
≤ 2000,000	Without purchasing committee
2000,001 – 10,000,000	Through a purchasing committee (without price quotations)
10,000,001 – 100,000,000	Through a purchasing committee (with 3 price quotations)
≥ 100,000,001	Through subcontracting

* Note: 1 Iraqi Dinar = 0.00085 US Dollar

Interviewees from all three case studies confirmed that CEOs are generally authorised to work within these permissions; however, such powers are kept at the CEO level only and do not transfer into the lower levels, such as through the Directors of different departments, Regional Managers and Project Managers. In this context, an insightful comment was offered by a Regional Manager:

> *"As a Regional Manager, I, or not just me but all other Regional Managers and Project Managers, generally have very limited authority in terms of purchasing, hiring, or staff acquisition. Such things can only be done through obtaining the Chief Executive Officer's permission in advance."* C211

This was further confirmed by reviewing some formal letters that organise and determine the powers authorised to the Directors of departments, Regional Managers, and Project Managers. These include:

1) **Purchasing Permissions**
   - ≤ 50,000 ID without a purchasing committee;
   - 50,001 – 100,000 ID through a purchasing committee (with one offer);
   - 100,001– 250,000 ID through a purchasing committee (with three offers);
   - ≥ 250,001 ID through a purchasing committee (with three offers and CEO permission).
2) **Hiring Permissions**
   - All hiring permissions have to be through the CEO.
3) **Repair of Mechanisms**
   - Up to 500,000 ID for each heavy and productive equipment / month;
   - Up to 150,000 ID for small and unproductive vehicles.

In addition to the challenge of the lack of authority, the departmentalisation, red tape and very bureaucratic procedures adopted in managing the procurement process can also be seen as a significant problem affecting the efficiency of IQGCCs. As described in the A3-1-2 'Manage Procurement sub-process' and illustrated in Figure 6-33, the process of purchasing an item normally consists of two loops, where its value does not lie within the authority granted to the Project Manager or Regional Manager. Within each loop, the process starts from the lowest level in the hierarchy and goes up across the various management layers to the highest level in the organisation, as represented by the CEO, to pass down the hierarchy towards the starting

point. The first process loop aims to obtain approval to purchase the required item, whereas the second seeks to secure an approval for payment of the value of the purchased item. Relevant stakeholders and committees at each management layer review, audit, and ratify every purchase request and transaction; as such, these requests pass through a series of handovers between the various stakeholders and committees. Each entity, after performing its assigned tasks, passes the requests to the next. Taking into account the involvement of almost twelve different internal stakeholders in the process, as well as the strict procedures used in implementation, substantial amounts of time, effort, and cost are consumed. This issue prompted a number of respondents to argue:

> *"Because of the chain of command and red tape, getting an approval, for instance, to buy a backup material needed to repair a machine usually takes two weeks. It is really a waste of time, since, during all this, the machine will simply be out of order and cannot be used."* C111

Respondent C312 also expressed his displeasure regarding the complexity of the procurement procedures and reported some associated problems:

> *"Obtaining three offers from three different vendors for every purchased item which cost over 100,000 Dinar, is really a difficult, exhausting, and time-consuming task, since most vendors are unwilling to provide such offers to avoid taxes."* C312

> *"Although the procurement process and procedures are designed in this way to reduce corruption, in fact, it increases it, through increasing the auditing entities in which most members are corrupt."* C312

> *"Corrupt members are always trying to hinder and delay the purchase transactions in order to force the Project Managers to pay bribes for them, which in the end further increases the process's time and cost."* C312

Yet, forcing a substantial amount of purchasing packages to be reviewed and audited by certain committees and stakeholders, would itself lead to a bottleneck in the process at every review and audit point, resulting in more delays. This is significant as most employees involved in the audit are from different departments and engaged with other responsibilities. Therefore, getting their approval in a reasonable period is indeed a difficult task and requires an employee to follow up on these packages and collect the required signatures from the relevant members.

According to respondent C221, to work under such strict routines is semi-impossible; therefore, in order to make the work more efficient, some IQGCCs managers breach this red tape:

> *"Often, we find ourselves forced to break the red tape, simply because we cannot wait a month every time just to obtain approval to buy something for the project."* C221.

> *"Although it is contrary to the terms and instructions, for the benefit of the work, we are occasionally compelled to break these terms and purchase the needed material and then work on obtaining the required approvals."* C121

Moreover, companies usually resort to subcontracts with subcontractors and suppliers in order to perform part of construction work or supply certain materials. The processes employed in subcontracting work items or materials are almost the same, since their conditions and main activities are also determined by the Iraqi Regulations for Implementing Government Contracts and Federal Budget Law, as explained earlier. Indeed, the subcontracting process inherits several challengers, most of which have been highlighted through the review of relevant documents and by interviewees in case study one, as this company heavily depends on subcontractors in supplying the construction materials and performing the work.

The first challenge encountered in this process pertains to the delays in obtaining the permission of top management to advertise. Reviewing the documents revealed that obtaining such permission usually takes seven to ten days. This is attributed to the involvement of four different departments/sections in the process, namely: the regional office, the income/outcome section, the projects department, and the CEO. It is similarly impacted by the use of formal letters as the main means for performing the process. This problem was also reported by respondent C122:

> *"With the exception of the Chief Executive Officer, no one within the company has the authority to give a permission to start advertising any tender ... getting such permission might take seven to ten working days." C122*

The second problem relates to the preparation of the tender advertisement. This activity, as respondent C1H1 professed, should be performed by the legal department in coordination with the projects department; however, in reality, it is mainly executed by the projects department staff. This leads to bottlenecks in the process due to the limited number of engineering staff in this department compared to the substantial amount of duties that they have. Furthermore, as

discussed earlier, the absence of an adequate procurement plan sometimes puts the projects department staff under time pressure to finish the advertisements as fast as possible. Consequently, mistakes and delays in the tender advertisements can arise. This argument was extracted from a Projects Director's response:

> *"Preparing the tender advertisement, in fact, is part of the legal department's responsibilities through coordinating with us; however, we do the whole work, from determining the type and amount of materials, the required specification, contract conditions to the printing of the advertisement."* C1H1

> *"Sometimes, we really are under large pressure, whether from the CEO or Regional Managers to prepare certain tender advertisements at the same time. In the end, there are only four engineers in the department and everyone has the responsibility for following up issues related to 4-5 projects. Therefore, in such an environment, there is no way to overcome all errors or delays."* C1H1

Having completed the preparation of the tender advertisement, it has to be ratified by the CEO. Obtaining the CEO's signature itself generates a bottleneck in the process and causes delays.

> *"Because of the vast responsibilities of the CEO and his daily engagement in dealing with the various issues related to the company's projects, a delay in his response to the daily excessive amount of formal letters cannot be avoided."* C1H2

The placing of advertisements in three well-known government newspapers as a condition stipulated by the Iraqi Regulations for Implementing Government Contracts is another challenge in the subcontracting process. Due to the fact that such newspapers are usually full of advertisements, significant delays to the advertising of tenders occur through waiting their turn. This problematic point was mentioned by a Senior Manager in case study three:

> *"Under the Regulations for Implementing Government Contracts, we are forced to advertise in three well-known government newspapers. Yet, the problem is, we don't usually find an available area for advertising, the thing that makes us wait five to ten days until we get our turn."* C3H2

Moreover, in order to involve the largest possible number of contractors in the competition, the Iraqi Regulations for Implementing Government Contracts stipulates that the period of tender advertisement must not be less than 14 days, causing more delays. However, the major delays

can really happen when the acceptable submitted tenders number less than three, or when the offered prices are very high. In such cases, the companies are obliged to re-advertise the tender up to two more times, as stipulated by the Iraqi Regulations for Implementing Government Contracts and reported by respondents C1H1 and C113.

After opening and analysing the submitted bids, an acceptance letter is issued to the winning bidder. This letter needs to be ratified by the CEO and, thus, more delays often occur in this stage for the same reason as those discussed above. The acceptance letter, as respondent C111 declares, usually states that the work should commence within 10 days after the issue date of that letter. Whereas, respondent C113 argued that the subcontracting process at best takes two months:

> *"Because of the strict procedures adopted, in the best case scenario, we might need at least two months to complete the process of subcontracting."* C113

In terms of the quality, several interviewees argued that the current process adopted in selecting subcontractors and suppliers is inefficient, since it: 1) is time and effort consuming; 2) gives both the qualified and unqualified contractors the same opportunity to win; and 3) prevents companies from developing and entering into long-term relationships with certain qualified subcontractors. As a result, it is common, under the current process, for contracts to be awarded to incompetent contractors or specialists, thus causing delays, cost increases, and poorer work quality:

> *"The problem is that a large number of competitors, who are usually involved in the competition for a contract, are, in reality, not qualified or have the ability to fulfil their obligations. However, we cannot prevent them from being involved or even awarding them the contracts, since they provide what is required for the tender submission … obtaining what is required for tender submission, such as experience certificates or similar works certificates, is not a big deal for any competitor in Iraq."* C211

> *"Because of the current strict government regulations, the top management finds itself forced to award contracts to the owners of the lowest submitted bids, regardless of their competence. As such, it would be much better if the companies have more flexibility on their side, by giving them the right to invite only the well-known and qualified subcontractors."* C212

Accordingly, most of the challenges and problematic points associated with the procurement process are related to four key elements, namely: government regulations, authority, management, and communications.

In addition to the challenges inherent in the procurement process, there are a number of problematic points in the monitoring and control process that need to be highlighted. As discussed in sections 6.3.2.3, 6.4.2.3, and 6.5.2.3, Quality, Time and Cost are the main performance metrics used by companies in order to monitor and control their project's performance.

Monitoring and controlling the quality of the supplied materials and executed works can be seen as an important reason for project delays, as suggested by a number of interviewees. However, the reasons mentioned were generally out of their control. These might include, but are not limited to; insisting the client use certain sources of materials, despite the availability of other sources that could provide the same materials with a better quality and at cheaper prices; insisting the client use a certain laboratory for testing; delays in obtaining the test results from the laboratory; and the corruption of laboratory staff. Nonetheless, covering such issues is beyond the scope of this research.

In regards to monitoring the progress of project activities, all the companies showed significant concern for measuring and reporting the progress of their project on monthly and biweekly bases. Yet, the taken corrective actions, seemingly, are inadequate in most cases to bring the project back on track, as reported by many interviewees:

> *"Bringing back a project onto its planned programme needs an increase in the efforts and resources which are really difficult to achieve, without negatively affecting other projects, in light of the limited abilities of our company."* C111

> *"Authorities at the project level are very limited; therefore, most of the corrective actions need to pass through a long series of approvals, and at the end of the day we don't get what we really need to get."* C212

Based on the above statements, it can be concluded that the poor control of project activities mainly pertains to the lack of three key elements, namely: authority, management and communications. However, in this context another opinion was proposed by respondent C1H1, who argued that most of the project progress reports do not really reflect the actual situations of the projects, and they are generally prepared just to satisfy the need amongst the top

management and the Ministry for such reports. As such, they cannot be adopted as a base to take real corrective actions. Thus, interviewee C1H1's statement is as follows:

> *"To be honest, three-quarters of the sent project reports are not correct. In other words, they do not really reflect the current progress of the projects and they are generally prepared just because they are required by the ministry."* C1H1

Although all companies showed very strict procedures in procurement, hiring, or recruitment with the aim of controlling the spending on projects, the interviewees from case studies one and three claimed that their companies do not have an accurate way to monitor and control the cost of individual projects. In other words, a periodical comparison of what is actually spent on every work item against the planned budget within each project, is not possible for two reasons: 1) The company does not develop a budget plan; 2) The company does not have a separate and specific budget for every individual project. With regard to the second reason, interviewees argued that their companies are not able, even after closing out a project, to determine whether it has generated profits or lost money, nor determine an accurate amount of this profit or loss. Some of the comments from interviewees include:

> *"Projects, especially those that are expected to a make profit, usually bear extra costs. Such costs can include bonuses and incentives to the personnel at the headquarters, the fuel and repair cost of equipment and cars at the headquarters, or assigning unnecessary staff to the projects. As a result, neither the top management nor project team would know the real cost of the project nor the actual percentage of profit or loss generated from the project, even after closure."* C312

> *"I challenge anyone to prove to me after closing out our project, whether it has generated a profit or lost money."* C121

> *"It would be much better if every project has its own budget, so every project team is responsible for the outcomes of its work, rather than funding a project from the budget of other projects."* C3H2

However, in spite of this, interviewees from case study two confirmed that such situations have been overcome in their company. Nevertheless, they suggested that they could be more efficient if every Regional Manager or Project Manager had the authority to directly monitor and control the projects under their responsibility:

"The performance of work would be much better if every regional office, or large project, has its own bank account, so we can issue the cheques required to manage our business, and easily monitor and control the budgets of our projects." C211

Based on the preceding findings, there is enough factual evidence to conclude that most of the challenges and problematic points associated with the construction phase are attributed to issues within the four key elements: government regulations, authority, management, and communication.

6.7.4 Challenges and Problematic Points in the Closeout and Termination Process

Mapping the current closeout and termination process reveals that its activities are similar across all companies within this study. Indeed, from the IQGCCs' perspective, the process adopted includes focusing on two major activities, namely: 1) correcting and maintaining any indicated deficiencies and defects in the performed works with the aim of aligning them with the project requirements to achieve client satisfaction; and 2) reallocating and terminating the construction team and resources to move on to other projects. However, it was also noted that there is a clear neglect of the importance of conducting a formal review and analysis of the project's performance to determine: firstly, whether the performed project has actually met its objectives and business benefits, and secondly, to extract the positive and negative lessons learnt which can be applied to or avoided in the future projects. This issue was reported by a number of interviewees as follows:

"There is supposed to be a comprehensive performance review after completing every project in order to know the success and failure points in that project so such points can be applied to, or eliminated from, future projects. Indeed, we do not conduct such practice, because most of the company's projects are disappointing; therefore, the only concern of our top management is how to close out the project and turn its pages totally." C313

"The negligence in terms of undertaking a project performance review, whether on the different project stages or even after completion, severely restricts the company's ability to extract lessons learnt and transfer such lessons and knowledge amongst its projects." C112

Moreover, comparing current to current good practice has shown that there is a lack of as-built plans. This point will be covered further in the second round of interviews. Nevertheless, the

omission of a comprehensive review of the project performance or the development of as-built plans generally pertains to poor management.

6.8 Bases of the Challenges and Problematic Points

It is clear, based on what has been discussed in section 6.7, that the challenges and problematic points facing the current practice adopted by IQGCCs relate to the aforementioned four factors: government restrictions forced on IQGCCs, authority distribution, management system adopted, and communication system. These factors are generally interrelated and collectively influence the efficiency and quality of the process. Details and analysis of these areas will be discussed in this section, and a summary of the results is shown in Table 6-9.

6.8.1 Government Restrictions

The government restrictions include two key elements, namely the government regulations and inspection bodies. Government regulations have effectively contributed to the promotion of the profligate nature of the current practices. The Iraqi Federal Budget Law stipulates that the ultimate authority and vetting powers go to the highest management layer, as represented by the Ministers and those who occupy positions equivalent to the Minister's position. Yet, under these regulations, a Minister has the right to give all or part of his/her authority to his/her Deputies and Chief Executive Officers. However, the regulations simultaneously do not give CEOs the right to award such power to a third body, such as Directors, Regional Managers and Project Managers. These regulations are valid for all the government bodies, including the IQGCCs.

As has been identified and explained, most of the processes and procedures undertaken by Iraqi QGCCs are restricted by government regulations and conditions stipulated in three main legislative sources along with the ministerial instructions. These three sources are: the Iraqi Federal Budget Law, the Regulations for Implementing Government Contracts, and the Iraqi General Conditions of Contract for Civil Engineering Works. These regulations and instructions have tied most the decisions by CEOs, in that they have determined how the procurement processes (hiring, purchasing and subcontracting) must be executed and imposed strict conditions on the acquisition of required staff. Moreover, they have also enforced the use of official hard copy papers (formal letters) as the sole acceptable means of communication. Relying mainly on formal letters has led to slow down in adopting information technology as an efficient way to enhance the overall performance of these organisations. Nevertheless, one of the key findings throughout this exploratory study is that the currently stipulated regulations

are inflexible, out-of-date and rigid. Furthermore, they can be seen as the key cause of bureaucracy and red tape in IQGCCs' current practices and one of the main drivers of the increased delays, costs, and errors in the companies' operational processes.

The over-interference of various government inspection bodies in the work of IQGCCs has also been recognised as an additional restriction to the flexibility of work within these companies. Interviews revealed that increased inspection actions have created a situation where personnel are unwilling to assume responsibility. Thus, to avoid questions from different inspection bodies and before taking any measure, managers have preferred to obtain CEO's approval on almost all decisions, even those related to the managing day-to-day of work; this has further complicated the operational processes.

6.8.2 Authority

As stipulated by the Iraqi government regulations, the CEO is the supreme president of the company as well as the Chairman of its board. Under this power, they have the authority to manage the company, according to the instructions and directives issued by the Ministry, and the governmental regulations stipulated by the Iraqi Regulations for Implementing Government Contracts, the Federal Budget Law, and the Iraqi General Conditions of Contract for Civil Engineering Works. Analysis of the current practice revealed that the CEO has the ultimate sanctioning and veto powers on almost all decisions. Furthermore, most actions within the business process, especially those with financial implications, have to be ratified and approved by the CEO before allowing them to proceed further. This is usually done through signing the relevant formal letters.

An example, extracted from the case studies, revealed that the permission to buy tender documents is held at the highest management level in the company, as represented by the CEO. Therefore, any permission request to buy tender documents often needs to be reviewed and verified at each management level, until it reaches to the highest point. All the companies under this study have three management levels. However, none of the first or second layer have the authority to approve such request because only the CEO has the power to do so, and this is the case for most tasks related to planning, procurement, recruitment, allocation resources, and so forth.

The analysis showed that adopting a hierarchical approach and restricting most of the powers and authorities to the CEO has led to workflow bottlenecks and delays. It was also noted that the amount of authority provided for each organisational management level proportionally

decreases as it vertically moves top down throughout the organisational hierarchy. The distribution of authority in this way has led to a situation of bureaucracy across the whole business process.

6.8.3 Management

All the companies are operated through a traditional hierarchal structure, where organisations are divided vertically into several management layers and laterally into functional departments. Adopting such an approach has helped to develop a fertile environment for notable delays, increases in the business costs, and a reduction of quality. This is because the management approach has divided the various business process activities horizontally into several functional departments and committees, and vertically into different management layers. Each department or committee executes its respective tasks and sends it to the next. Every department is only responsible for its own task, whereas in this picture the responsibility for the entire process is absent. Accordingly, the cohesion, coordination and integration of work, whether between the regional offices and the corporate departments/sections, or among the different departments/sections themselves have been inferior, and always governed by formal and statutory procedures. These, together with the intensive inspection measures imposed by various government bodies, have helped to create a working environment dominated by bureaucracy, administrative routine, red tape and inflexibility.

Furthermore, the hierarchical approach that entails verifying, amending, commenting and/or approving at each management level, has negatively affected the time and quality of work, as well as increased the cost due to a significant duplication of tasks. Undeniably, it is good practice to have gate review points to control processes; however, these control points should be designed and performed by multi-functional management teams with the aim of adding value to the whole business process through ensuring that all the stage outcomes are achieved, potential risks are manageable, and thus the project is worthy to proceed. Unfortunately, the operational processes adopted by IQGCCs lack such gate review points; whereas, the current procedures implemented in developing the critical decisions, such as bid/no bid, or mark-up value decisions, are inefficient and might not add value to the business process, since they are not supported by accurate and sufficient information. In fact, such decision points tend to be administrative requirements to give legitimacy to the businesses rather than to improve them. Additionally, the vast engagement of the top management in directing the day-to-day business activities has also led to the neglect of their primary roles and responsibilities in setting clear

goals, vision and developing a strategy for their companies; this was reported by interviewees from all case studies.

The exploratory study also uncovered a clear inadequacy and incompetence of both the project pre-construction prepared plans and the measures taken in monitoring and controlling projects during the construction phase. This mainly pertains to the lack of awareness amongst top management and the project team as to the importance of project pre-construction plans in managing projects during construction. Furthermore, the adopted management system prevents the project team from flexibly taking the required corrective action whenever the need arises. Likewise, the study revealed a clear neglect and insufficiency in terms of a comprehensive review and analysis of the project's performance after closing it out. Such action is important, whether in evaluating the outcomes or drawing lessons for future projects.

6.8.4 Communication

As previously mentioned, government regulations are considered one of the main contributors to the inefficiencies and the lengthening of communication means and routes. This is mainly attributed to the use of a dual mechanism, namely the adoption of formal letters in conjunction with the two-way communication cycle in performing all communication among all internal stakeholders involved in the business process. Although, all these stakeholders employ electronic communication systems, such as telephone and email, they are bound to communicate key tasks in writing. Thus, relying mainly on a hard copy-based format has generally led to the creation of a vast amount of hard copy, which has complicated decision-making and the accessibility and follow up of required information.

6.8.5 Summary of the Challenges in the IQGCCs Operational Processes the Need for Rectification

Based on what has been identified from the case studies and discussed above, Table 6-9 provides a summary of the main challenges inherent in IQGCCs' operational process, along with the key causal factors.

However, to handle the challenges that have beset the IQGCCs' operational processes, it is imperative to first address the key factors that give rise to these challenges. The analysis of current practice in the selected IQGCCs has revealed that these companies are managed through a traditional management system dominated by a hierarchical structure, centralised control, and very bureaucratic procedures. As outlined in Chapter Three, organisations worldwide have reached the conclusion that focusing on improving the business process is the most effective

way to ensure their success and enhance the overall performance in the present highly competitive and turbulent business environment. Accordingly, in order to survive, gain a better competitive advantage, and improve their productivity and performance, IQGCCs need to move away from the traditional, functionally orientated structures towards a business process view.

Table 6-9: Summary of challenges in IQGCCs' current processes with their key sources

Key sources of challenges	Challenges
Government restrictions	• Restricting the ultimate authorities and veto powers at the highest management level represented by the Minister and Chief Executive Officer. • Stipulating the use of the formal letter (hard copy papers) as the only acceptable means of official communications. • Subjecting IQGCCs to substantial amounts of government legislations and regulatory procedures that prevent them from exercising their business as independent entities seeking to generate profit. • Complicating the process through involving several auditing and inspecting entities. • Increasing the inflexibility, rigidity and red-tape.
Authority	• The ultimate authority is placed in the top management. Almost all the decisions have to be ratified by the CEO. • The powers granted to the regional offices' management and project management are almost non-existent.
Management	• Companies are still managed through a traditional system, which is based on centralised control, hierarchical structures and functional silos. • There is a lack of understanding the real roles and responsibilities of the various internal stakeholders at the different management levels. • The distribution of process activities to several isolated functional departments has led to the enhancement of functional sub-optimisation and prevented employees from viewing and understanding the business processes beyond the boundaries of their departments. • The duplication of tasks exists on the various management layers. • The mechanisms and processes of decision-making are inefficient. • There is a lack of coherence and integration amongst the various functional departments due to the absence of a process owner who takes the overall responsibility for the process. • There is incompetence within the pre-construction plans and measures taken in monitoring and controlling the construction works. • No clear review stages are available to evaluate the outcomes and obtain feedback at certain points of the operational process. • The process is complicated through the involvement of several auditing and inspecting entities. • Bureaucracy, inflexibility, and routines are boosted.
Communication	• Mainly based on a manual driven process through utilising formal letters as the only accepted manner in communication. • Lateral communication between departments seem to be non-existent. • Inevitable human errors at various levels.

Chapter Four included the development of a theoretical framework that proposed a systematic way to improve the performance of IQGCCs based on business process concepts. It is, indeed, the culmination of this step that can rectify and streamline the IQGCCs' operational business processes. However, the government restrictions and in particular the government regulations can still be seen as one of the most crucial factors and the main source of several challenges associated with the IQGCCs' current practice; indeed, these have negatively affected the overall performance of these companies. Such factors cannot be directly resolved by adopting the business process view, as the government regulations would still present a key barrier for any reform effort. Based on the information gathered from the interviews and document review, the Government Regulations in Iraq are generally formulated, changed and/or adjusted at a very high ministerial echelon and national level, namely within the Council of Ministers and Parliament. Accordingly, the government regulations problem can only be solved through recommendations and orders from the government itself. As a result, they are beyond the scope and jurisdiction of this study. Yet, as Chapter One outlines, for the purpose of this research, Iraqi QGCCs are seen as primarily profit-seeking entities that are managed independently and are not subject to the current governmental regulations or political interference in their commercial operation and strategic planning.

In addition, the proposed theoretical framework was developed in accordance with the current good practice in the construction industry, and as such, it is necessary to test the applicability and validity of this proposed framework in the context of IQGCCs and make the required amendments to ensure it fits with the local environment of these companies. This will be covered in detail within Chapter Seven.

6.9 Summary

This chapter provided an empirical exploratory study of the current practices adopted by IQGCCs. It started by describing the procedure employed to collect the necessary field data required to map and examine the operational processes of three IQGCCs selected as case studies. Using an intra-case study analysis, the operational process of each company was described and graphically presented through utilising IDEFØ and ADM process modelling techniques. The comparison between the generated process maps revealed that all the companies within the study employed quite similar operational processes. This allowed the production of a holistic map using a similar template to that employed in developing the theoretical framework outlined in Chapter Four. The process mapping exercise clearly showed

that Iraqi QGCCs are managed through a traditional functional system dominated by a hierarchical structure, bureaucratic procedures, and centralised control.

Subsequently, the end-to-end operational process was carefully examined with the aim of highlighting its main challenges and their underpinning factors. The study identified four key interrelated factors behind the greatest challenges in the current process, namely: government restrictions, authority, management systems, and communication. These factors, and their impact on the process, were thereafter individually discussed. Finally, a summary of the main challenges that hinder the efficiency of IQGCCs' processes was presented and grouped under their relevant causal factors. The next chapter will test the applicability of the theoretical framework proposed in order to rectify and streamline the current practices of IQGCCs.

Chapter Seven - The Proposed Theoretical Framework Applicability Test

7.1 Introduction

As illustrated in Chapter Three, organisations worldwide have reached a conclusion that focusing on managing and improving their business process is the core for success in today's turbulent business environment. However, studying the current practices of three IQGCCs, as presented in Chapter Six, revealed a number of challenges in the practices of these companies that prevent them from working efficiently. Most of these challenges are due to the adoption of a highly centralised control, and a bureaucratic, traditional management system. It is, therefore suggested that, in order to address their current challenges and conduct a step change improvement in their performance, IQGCCs should move away from the traditional management system to focus on improving their core business process. This could be achieved through adopting the theoretical generic process framework, developed in Chapter Four, as a roadmap for managing and streamlining the operational processes of large construction companies under a traditional procurement contract. However, the proposed theoretical framework, with its embedded solutions, is mainly based on the literature and thus the experiences and current practices of world-class construction companies. According to Lillrank (1995), the transfer and direct application of innovation across countries and industries cannot occur in its original packaging unless it is redesigned in a shape that suits its local context. Thus, the core aim of this chapter is to test the applicability of the proposed framework within the context of IQGCCs. This will help to: firstly, determine any changes and recommendations that can boost the framework; secondly, discuss how the current practice challenges can be remedied by employing process thinking, and finally, validate the proposed organisational structure.

7.2 Developing Interviews Questions for the Second Stage of Data Collection

As justified in Chapter Five, the semi-structured interview can be seen as the most appropriate research tool at this stage to obtain rich, valuable and consistent data through the application of a set of predetermined open-ended questions (Shneiderman & Plaisant, 2005; DiCicco-Bloom & Benjamin, 2006; Zhang & Wildemuth, 2009). Accordingly, the interviews for the study were conducted with a set of pro-forma questions to guide the interviewer during the conversation and ensure that the key components of the developed framework and its proposed solutions were covered. The questions were mainly based on information from the literature review and the results of the exploratory study. Appendix D includes a copy of pro-forma interview

questions that was used at this stage of data collection. Moreover, to allow a better understanding of the key elements of the framework and their underlying assumptions, the proposed theoretical framework, as shown in Figure 4-21, was presented and explained to the interviewees. The interviewees were thereby encouraged to express their views, which they could do with greater confidence and accuracy having viewed the framework and heard the explanation. During the interviews, the participants were asked about the applicability and validity of the key elements of the proposed framework. These included, but were not limited to: testing the validity of the framework's stages, processes, process owners, people involved in performing the processes and control gates, and the mechanisms proposed in decision-making, communicating, and sharing information across the organisation. The interviewees were also asked to suggest changes to the process map and/or to add further processes and elements to the framework to make it more suitable for their respective companies' needs. However, since different people have different perspectives, follow-up questions were also posed with the aim of gaining clarification and justification for any proposed amendments. This allowed the researcher to ensure that the rationale and meaning behind each suggested change was fully captured, and thus ensured the data collection met the objectives of this phase of the study.

7.3 Conducting the Interviews

All the interviews included in the second stage of the field data collection were conducted between December 2016 and January 2017. As justified in section 5.2.5.4, the interviewees were selected on the basis of their experience and roles in their companies. In total, this stage of data collection comprised ten participants. Participants were chosen from different management levels across three of the IQGCCs and from four different provinces in Iraq, namely: Baghdad, Babil, Karbala, and Al-Qadisiyah. A list of the selected participants with their related information is presented in Table 7-1. Telephone calls and e-mails were the main tools used to contact the participants and to invite them individually to be part of the study.

The interviews were held face-to-face at a time and place designated by the respondents, namely, in Iraq. Although general information related to the research aim, objectives and participant roles in the research was provided during the initial contact, each participant was given a guidance sheet a minimum of 24 hours before the interview. This guidance outlined the purpose of the research, the main interview questions, participant's rights and how the

participant's identity and responses would be managed, secured and protected along with details of their right to withdraw at any time from the study.

The interviews lasted between 80 minutes and 2 hours and were generally started by presenting IQGCCs current practice map and the problems associated with it, as identified within the exploratory phase of the study. On the one hand, this exercise allowed the participants to visually recognise their companies' core business processes, acknowledge the inherent challenges, and take the opportunity to think about how these challenges could be solved. On the other hand, it also allowed the researcher to validate the results obtained from the exploratory study along with presenting and testing the applicability of the proposed solutions and the various elements of the proposed framework. During these interviews, the respondents were given the freedom to express their ideas, opinions, and feelings on the proposed solutions. Moreover, to gain more clarification and justification about the issues that arose, the interviewer also posed follow-up questions.

Table 7-1: Details of participants – stage two of the data collection

Participant Name	Position / Role	Experience (years)	Nature of Company
R1	Site Engineer	17	Roads & Bridges Company
R2	Project Manager	15	Roads & Bridges Company
R3	Regional Manager	22	Multidisciplinary Engineering Company
R4	Regional Manager	28	Roads & Bridges Company
R5	Director of Bridges Department/Chief Estimator	38	Roads & Bridges Company
R6	CEO Deputy	35	Roads & Bridges Company
R7	Project Manager	14	Building Company
R8	Director of Planning Department	26	Multidisciplinary Engineering Company
R9	CEO	41	Multidisciplinary Engineering Company
R10	Regional Manager	34	Building Company

All ten interviews were conducted in Arabic and recorded with an electronic device, after securing the required permissions from the respondents. These recordings were important to ensure the accuracy of the transcription and to give the researcher an opportunity to go back over the data during the analysis phase. The responses of each participant were usually transcribed within two to three days of the interview, and the transcription was directly entered

into the computer via Microsoft Word. Transcription took between 6 and 10 hours for each of the ten interviews conducted.

7.4 Data analysis

Having completed the transcription, all data was uploaded to the Nvivo 11 software package that was used as a tool to facilitate the data analysis and management. The interviews identified the most applicable and suitable solutions for Iraqi QGCCs' performance problems based on the understanding and views of these experts who were picked from different management layers of these companies. The responses of the participants during this stage were grouped under the four key factors, as follows:

- Government restrictions;
- Authority distribution;
- Management system;
- Communication means.

It is important to mention that these factors originally arose from the exploratory study phase as the key reasons for the challenges and inefficiencies in IQGCCs' current practices. The next section of the data analysis will present the interview outcomes with respect to testing the applicability and validity of the proposed theoretical framework in improving the performance of IQGCCs. Figure 7-1 illustrates the cognitive mapping of the key factors impacting the IQGCCs' performances from the business process perspective, together with the main elements of the proposed conceptual framework. A cognitive map is defined by Germanakos and Belk (2016, p.30) as a, "*mental representation which serves an individual to acquire, code, store, recall, and decode information about the relative locations and attributes of phenomena in their everyday or metaphorical spatial environment*". It is a widely used tool in various disciplines to facilitate the understanding of the complexities of human-environment interactions through simplifying and ordering these complexities in a visual manner (Golledge & Stimson, 1997).

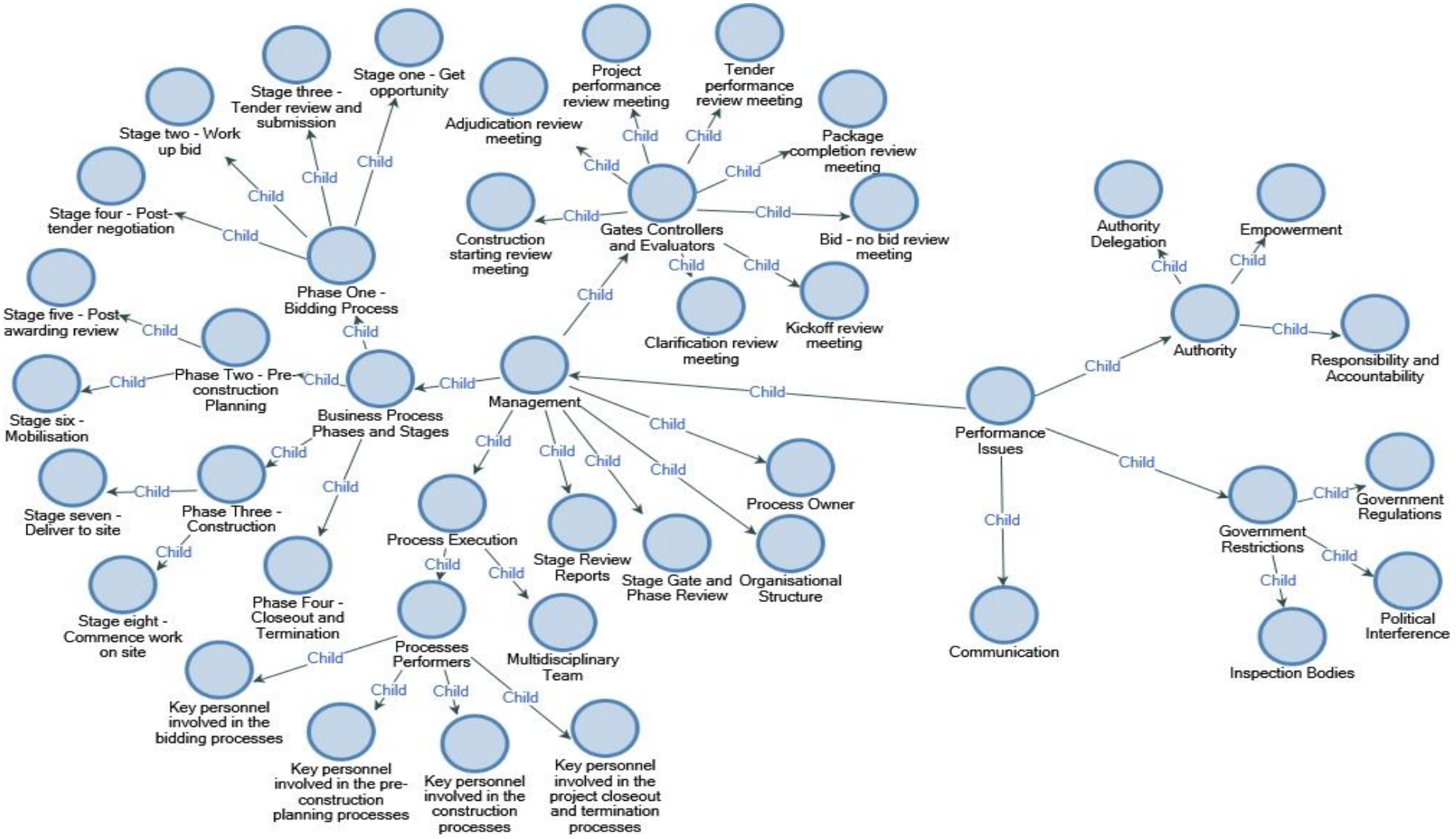
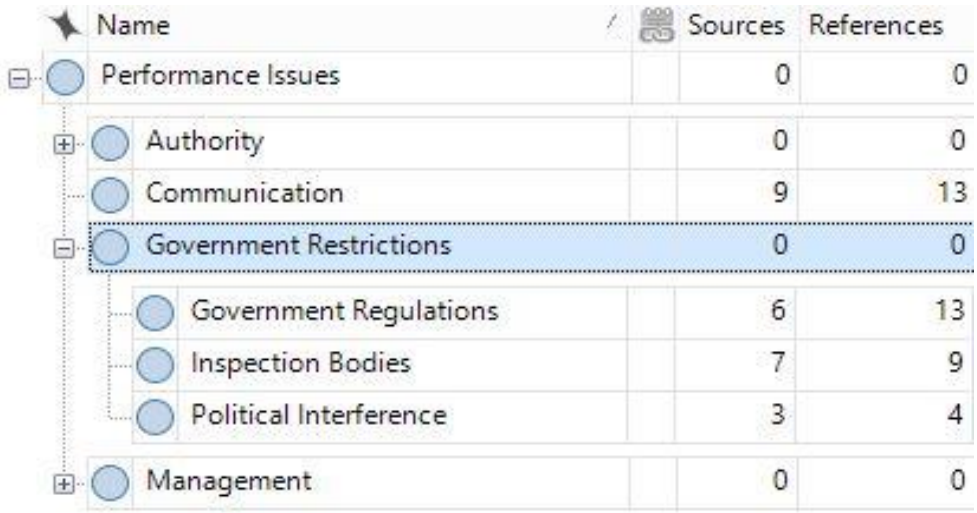


Figure 7-1: Cognitive mapping for the IQGCCs' key performance impacting factors

7.4.1 Element One: Government Restrictions

The current government restrictions were identified as one of the most crucial factors negatively impacting the efficiency of IQGCCs. However, this factor can only be resolved through the recommendations and orders from the government itself. Yet, as a starting point to pave the way to overcome the existing challenges, it has been assumed that Iraqi QGCCs are profit-seeking entities, who are managed independently and not subject to the current governmental regulations and/or political interference in their commercial operations or strategic planning. Therefore, it was important to verify the validity and appropriateness of such an assumption.

Indeed, the analysis of participants' comments about the government restrictions revealed that most of the comments focused on three key sub-factors, namely: government regulations, inspection bodies, and political interference. Figure 7.2 depicts the participants' responses to the government restrictions, which is covered in more detail within the next subsections.



Name	Sources	References
Performance Issues	0	0
Authority	0	0
Communication	9	13
Government Restrictions	0	0
Government Regulations	6	13
Inspection Bodies	7	9
Political Interference	3	4
Management	0	0

Figure 7-2: Government restrictions sub-factors

7.4.1.1 Government Regulations

The data collected in regards to this issue confirmed the findings from the exploratory study. Most of the interviewees considered that the current regulations imposed on IQGCCs prevent these companies from flexibly exercising their commercial operations. Interestingly, interviewee R2 commented that many of the current government regulations are out of date and unable to meet the developments that have occurred in Iraq's business environment.

> *"Currently, there are too many outdated laws restricting state-owned companies from working freely; such laws need to be changed in line with the development that has occurred in the country."* (R2)

Interviewees R4, R5 and R10 argued that, although the IQGCCs are self-financing companies, they are obliged to follow the laws, instructions, and regulations issued by the government. These laws and regulations often limit the freedom of work and undermine the competitive advantages of these companies. According to the interviewees, the current regulations greatly increase the complexity, cost and time of business processes through firstly, limiting the powers awarded to the companies represented by the Boards of Directors and CEO, and secondly, by increasing routine procedures:

> *"Because of red tape procedures imposed by the regulations, the process of subcontracting any work package to a subcontractor takes at least two months. Meanwhile, an imported item would take a year. All this costs us time, effort, and money. In contrast, a private company can award the same work package to a better subcontractor in a few hours with less effort and cost."* (R5)

> *"Generally, the technical, administrative, and financial powers granted to the CEO by the law are very limited and not sufficient to manage the company's business efficiently."* (R10)

> *"Subjecting IQGCCs to the Federal Budget Law and Regulations for Implementing Government Contracts makes it very difficult or impossible for these companies to compete with the private sector and succeed."* (R4)

Interviewee R5 added that the government has to remove all the constraints enforced by the laws and Ministry on IQGCCs and consider them as private companies, if there is any real orientation to improve their performance. Similarly, Interviewee R9 professed that:

> *"Legislating a law in which IQGCCs are exempt from the obligation of following the conditions stipulated in the Regulations for Implementing Government Contracts, is desperately needed to improve IQGCCs' performances."* (Respondent R9)

R1 also linked the chance of IQGCCs' success to the change of laws and regulations imposed on them, whilst R10 deemed that awarding IQGCCs more powers through changing the current regulations that restrict the flexibility in their business operation, is the most valuable support that could be given by the government for these companies. The government, as stated by R5:

"…should either privatise our company or give us the same privileges provided to the private sector; but to leave us in such situation is hard, and very hard for us to succeed." (R5)

7.4.1.2 Inspection Bodies Role

There was a consensus amongst the various participants on the negative role played by the governmental inspection bodies. Both R7 and R8 argued that, although companies under the Regulations for Implementing Government Contracts are not bound to accept the lowest bids for works projects, in reality, companies are forced to do so just to avoid questions from the personnel of Inspection General Office and Integrity Court. Unfortunately, 90% of the lowest bidders, according to R7 and R10, are unqualified subcontractors and do not have either the financial or technical capacity to carry out the works awarded as per the contract. Consequently, this has negatively reflected the overall performance of IQGCCs. Echoing this argument, R1 remarked:

"Of course inspections bodies, like the Office of Inspections General and Commission Integrity, have destroyed not just the government companies but the whole country. They are considered a redundant (extra) loop and devastating. In fact, they have not provided anything beneficial or an achievement worth mentioning, yet most of their works are based on suspicions and vexatious claims." (R1)

R1 professed that, because of the negative role played by inspection bodies, IQGCCs' employees have become unwilling and afraid to take responsibility. To protect themselves from charges, employees prefer to obtain formal approval from the CEO on most actions or decisions they need to perform. This opinion is also shared by R6, who cited an inspector:

"Believe me, Mr xxx, if you really know about what we audit and inspect, you would never sign or give approval for anything." (An inspector cited by R6)

Thus, these views reveal how such excessive inspection measures have resulted in reducing the empowerment of personnel and complicated the decision-making process, increasing its time and cost. Furthermore, they confirm the view of interviewee R4 who claims that the major concern of the auditing and inspections of employees is to ensure the conformity of procedures with instructions and regulations, regardless of whether such procedures would technically

service or harm the companies concerned. A typical example that summarises this issue was given by R2 who suggested:

> *"If I'm authorised to buy a generator, no matter how bad its quality, yet its transaction papers are correct and show that it has been bought from a government entity, I would not legally be accountable. Thus, to be on the safe side, I prefer to purchase this generator, although you could find much better quality items at lower prices on the local market, but without the proper required papers. Personally, I know this generator would not service us such as the others, but the proper and accurate papers are all the inspectors want to see, otherwise I would be in trouble. Really, the government regulation and inspection entities have become a burden on us."* (R2)

The deep involvement of auditing and inspection employees in all aspects and detail of the work has substantially increased costs and slowed down the performance of IQGCCs, which has provided an advantage to private sector companies and their ability to compete. According to R5, to improve their performance, IQGCCs have to become more flexible in conducting their business away from the bureaucratic procedures imposed on them by the regulations and inspection bodies' requirements.

> *"I am a contracting company and must be given the same freedom given to the private sector contractors in performing their businesses without interference from auditors and general inspectors in all the work's details."* (R5)

7.4.1.3 Political Interferences

The third sub-factor that could be grouped under the government restrictions theme is political interference. A number of participants mentioned the interference of many influential government political parties in the IQGCCs' businesses operations. These interventions have taken several forms, including, but not limited to:

1) The imposition of unrequired and redundant staff; R5 deprecatingly argued:

> *"Although the company is already overstaffed, from time to time the Ministry sends us a group of new employees who are actually redundant and not required. Honestly, where can a person with an arts or a sports bachelor degree work in our company? Whether they work or not, by the end of each month all those people need to get their salaries, and thus increase our overheads".* (R5)

2) The appointment of incompetent and inexperienced people in leadership positions within companies. An interesting event, described by participant R10 concerning the current working conditions in IQGCCs, summarises this:

> *"Unbelievable! A person who was fired because he is incompetent and redundant, returned within a few months as a CEO. Why!!! Simply because he is a member of the xxx party."* (R10)

3) The use of the companies' resources and equipment without financial compensation. This point was highlighted by interviewee R6 who espoused:

> *"Many cars, heavy equipment, and even caravans have been taken and consumed by political bodies without any financial compensation."* (R6)

7.4.1.4 Discussion of Element One: Government Restrictions

The outcomes of the data analysis from the second round of interviews regarding government restrictions, align with the findings from the exploratory study stage. Government regulations, inspection bodies, and political interference were highlighted as the main sources of government restrictions that prevent IQGCCs from operating flexibly and efficiently.

In terms of government regulations, it was recognised that, despite its stated intention to make IQGCCs economically efficient entities, the Iraqi government still restricts the freedom of the economic activities of these companies. This occurs through the application of laws and legislations that do not provide any advantage over other non-profit public organisations. Yet, most of these regulations are out-dated and not in line with the new business environment of IQGCCs, since, as reported by interviewees, they prioritise bureaucracy and thus increase the complexity, cost and time of the operational business processes. Pratuckchai and Patanapongse (2012) argue that state-owned enterprises should be seen as systematic models, consisting of externality and internality. Therefore, as Kloviene and Gimzauskiene (2014) profess, laws, regulations, rules and standards related to the state-owned enterprises should be regularly revised and amended to ensure their applicability and suitability to the external and internal environments of these organisations. This, indeed, aligns with the view of most interviewees who stressed the importance of changing the current regulations imposed on Iraqi QGCCs to make them more appropriate to the new business environment in Iraq and the government's ambition to move towards an open market economy.

Exaggerated inspection and auditing measures imposed by the government on IQGCCs through various internal and external government bodies were noted as another restriction factor that has negatively influenced the efficiency of these companies. Raudla *et al.* (2016) identify two main functions of government inspection bodies: 1) ensuring accountability, and 2) improving performance through learning and change. However, they argue that the reconciliation between these two functions is very difficult or even incompatible. Lonsdale and Bechberger (2011) claim that, when the focus of auditors or inspectors is on the compliance of organisations with rules, regulations, and set targets with the aim of increasing accountability, it would be difficult to employ the inspection process as a tool to enhance learning.

As suggested by most of the participants, the major concern of auditors and inspectors in Iraq is to ensure that all actions undertaken by public organisations comply with government laws and regulations. Such a role has complicated the IQGCCs' operational processes and increased their costs and time. This finding empirically confirms the arguments offered by Pigorini *et al*. (2006) who advocated that companies with corporate staff have a tendency to audit more than support the business units, which can end with unnecessary bureaucracy, the barring of decision making and an increase in costs. Moreover, Leeuw (2009) and Kells (2011) both assert that concentration of auditors on compliance, formal procedures and control would hinder innovation and experimentation in the organisations that are subjected to such kinds of inspections. Indeed, subjecting IQGCCs to substantial passive inspection measures have contributed to the creation of a tense work environment within these companies, in which employees avoid taking responsibility for fear of interrogation by inspection bodies. Undoubtedly, in such a work environment the ability of employees to innovate and create would be highly constrained. Additionally, the interviewees' comments reflect the existence of a weak relationship between the auditors and their audited employees, which is characterised by aggression, a lack of trust, suspicion and fear. Emphasising control and blame attribution in auditors' roles would create defensiveness amongst audited employees and thus limit the opportunities for learning and change for the better (Lonsdale & Bechberger, 2011). Accordingly, most interviewees stressed the necessity of reducing the inspections and auditing actions and changing the ways in which these actions are conducted in order to improve the efficiency and performance of IQGCCs.

The third element identified as a constraint to the efficiency of IQGCCs was political interference, which can occur in a variety of ways. These include: imposing unrequired staff, appointing/dismissing people at top management positions based on their political loyalty, and

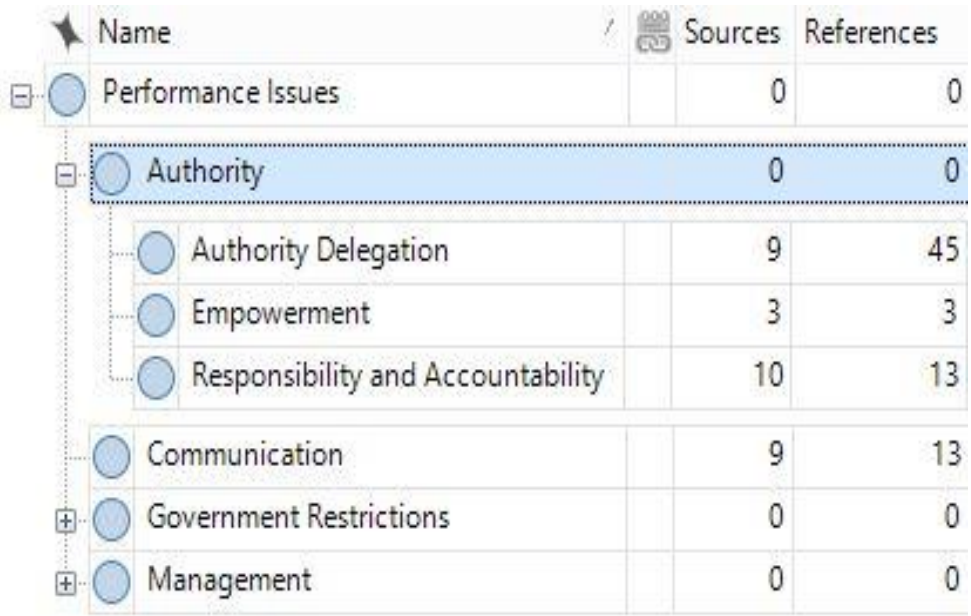
using the companies' resources to serve individual party or personal benefits. This finding corresponds with those identified within the study by Gunter (2013) regarding the challenges facing the reconstruction of Iraq's infrastructure. Gunter (2013) reported that one of the key problems facing Iraqi SOEs is that the political layer controlling the Iraq government uses these organisations as a means to reward supporters and punish those who are less than enthusiastic and lack high-level government protectors. He added that managers of Iraqi SOEs are more likely to be rewarded and promoted based on their political loyalty than their ability to achieve market efficiencies. This issue is not only specific to Iraqi SOEs, but can face any SOE around the world. According to Arocena and Oliveros (2012), politicians and government officials are more concerned with enhancing their own objectives, such as votes, power and prestige, than seeking to achieve general benefits. This may lead, for instance, to protect the benefit of some stakeholders (e.g. trade unions) at the expense of SOEs' efficiency.

To overcome the issues categorised under the government restrictions factor and further enhance the IQGCCs' efficiencies, most of the interviewees advocated that, in order to be responsible for their gains and losses in the market, IQGCCs should be autonomous profit-seeking organisations, managed independently away from political interference and the current government-imposed regulations. In fact, implementing such an approach to SOEs reform has already successfully contributed to the enhancement of productivity and performance amongst SOEs in different countries, such as China, Israel, Estonia, New Zealand, and South Korea (Aivazian *et al*., 2005; Chen *et al*., 2006; International Bank for Reconstruction and Development, 2014; Zhang & Rasiah, 2014; Min & Bowman, 2015). However, introducing this approach to reform IQGCCs requires governmental decision and changes to the current SOEs laws and general regulations regarding the organisation of these companies' work practices, which is beyond the scope of this research.

7.4.2 Element Two: Authority

Although the powers awarded to the IQGCCs' Chief Executive Officers (CEOs) under the government regulations are limited and do not allow them to undertake their business flexibly, the investigation into their current practices revealed that such authority is exclusively kept at the highest management layer, by the CEOs themselves. Figure 6-33 clearly illustrates how the CEOs have the ultimate sanctioning and veto powers on most decisions within the IQGCCs. Using a high degree of centralisation and a hierarchical structure has forced the majority of decisions to go up through several management layers in order to be reviewed and verified at

each layer until reaching the highest level (CEO). Meanwhile, responses to decisions are passed down the hierarchy until they reach the lowest layer. Consequently, this has led to a very bureaucratic system, which experiences delays, errors and cost increases in their operational processes. This is due to the significant duplication of tasks and the spreading of the workflow bottleneck points throughout the value chain. With the aim of enhancing the efficiency of IQGCCs' core business processes, the interviewees were asked how to streamline the business processes and accelerate the decision-making processes. Their comments mainly concentrated on three sub-elements, as illustrated in Figure 7-3.



Name	Sources	References
Performance Issues	0	0
Authority	0	0
Authority Delegation	9	45
Empowerment	3	3
Responsibility and Accountability	10	13
Communication	9	13
Government Restrictions	0	0
Management	0	0

Figure 7-3: Authority sub-factors

7.4.2.1 Authority Delegation

Most of the interviewees confirmed the findings from the exploratory study and agreed that the lack of authority amongst the lower management layers caused the aforementioned consequences. Some interviewees' statements on this point were as follows:

> *"…This is due to the authorities; Regional Managers are not authorised, for instance, to buy tender documents, recruit people, procure construction materials, or subcontract a work package without obtaining formal approval from the CEO."* (R4)

> *"Do you know that one of the most important reasons for delays in our projects, is related to the red tape procedures and delay in obtaining the CEO's approval for purchasing materials or hiring the required equipment."* (R1)

"That is absolutely right; because of the lack of powers awarded, whether to regional offices or projects, most of the activities are duplicated at the corporate centre in order to be checked and approved by the authorised people." (R8)

Respondents insisted that the elimination of task duplication, non-value added activities, and unnecessary bureaucratic procedures inherent in current practices could be achieved through delegating more authority to the appropriate regional and project management. In this context, interviewees R8 and R10 observed:

"In order to reduce the red tape, we really need to delegate to the regional offices more authority and encourage the decentralisation of management. Now all the official correspondence, purchasing approvals, subcontractor payments, etc., are carried out at the company's headquarters. In my opinion, it is much better that such things are directly conducted by our regional office management so as to facilitate and accelerate the proceedings." (R8)

"Most of the activities currently taking place at the headquarters are duplicated activities of those carried out by the projects or regional offices. Providing authority to the project and regional office managements to manage their resources would help to remove these activities and thus simplify processes." (R10)

A similar view was given by interviewee R7 who believes that granting wider powers to regional and project management so they can work more independently is an important exercise in overcoming the problem of administrative red tape and the need to obtain the CEOs' approval for every action undertaken. R3 also claimed that, in general, streamlining the business process and constraining all its activities end to end as much as possible within the scope of one management layer, would accelerate the processes and thereby enhance the company's efficiency. In terms of the IQGCCs, R3 noted that the geographical proximity of regional offices to the work sites enable them to identify more precisely their work conditions and needs. Meanwhile, they also have the advantage of good knowledge of the market prices, more qualified sub-contractors and suppliers, and a greater understanding of the general business environments within their regional geographical areas. Such knowledge would allow them to make more accurate and rapid decisions in relation to their work than those made by staff at the headquarters. Interviewee R5 also argued that:

"The company's centre should be responsible for setting the company vision and general strategy, key decisions, and resources coordination between the regional offices; but as for regional offices and projects, they should manage their businesses without interventions from headquarters. Does this what happen now? No, now everything is centralised. All approvals are issued from the headquarters, and all requests and transactions papers are reviewed and audited at the headquarters. It would be more appropriate to provide them with the required authority, while we at the headquarters really need to focus more on the results." (R5)

The above comment stresses the importance of awarding more powers and independence to regional and project management, and highlights a critical point related to the real roles that should be played by senior management. It clearly points to the importance of shifting senior management roles from managing day-to-day business operations to focus more on strategic issues. This view was shared by other interviewees who argued:

"It is supposed to be the CEO role who sets specific goals for the company and draws an overall strategy to achieve these goals. This indeed is needed so as to give the powers required to both the project management and regional offices in order to facilitate the achievement of those goals. It makes no sense, as a CEO, to interfere in work details, such as the approval to renew a labourer's contract, or the purchase of stationery or safety shoes. Such interventions badly affect the work performance." (R2)

"Headquarters should function as a consultative body helping to resolve problems facing regional and project management during construction, as well as monitoring and evaluating business performance and results, but without interfering in the detail." (R4)

"*Corporate senior management should be with regional offices at all stages of the business as an observer of performance and a supporter of it, whether in providing consultation and information or through solving problems and overcoming obstacles. It also plays a coordinator role between the different regional offices of the company to coordinate resources between them as needed."* (R6)

Examination of the IQGCCs current practice revealed that the hierarchy structure of these companies generally involves three management layers, as illustrated in Figure 7-4. Meanwhile, the comments above provide a clear picture of the key roles that should be undertaken by senior management and confirmed the need to delegate more authority to the lower management levels in order to improve the efficiency and performance of IQGCCs. However, there is still an urgent necessity to understand how such authority should be distributed, particularly between the first and second management layers. Answering this question would really be useful in shaping the roles and responsibilities within those layers. Yet, successfully achieving such an exercise first requires the identification of the key core business processes for execution at each layer including who should be involved in performing them. The discussion of this issue will be covered later under the management factor.

A summary of the key roles that should be played by the IQGCCs' top senior management, as reported by the interviewees, is depicted in Figure 7-4.

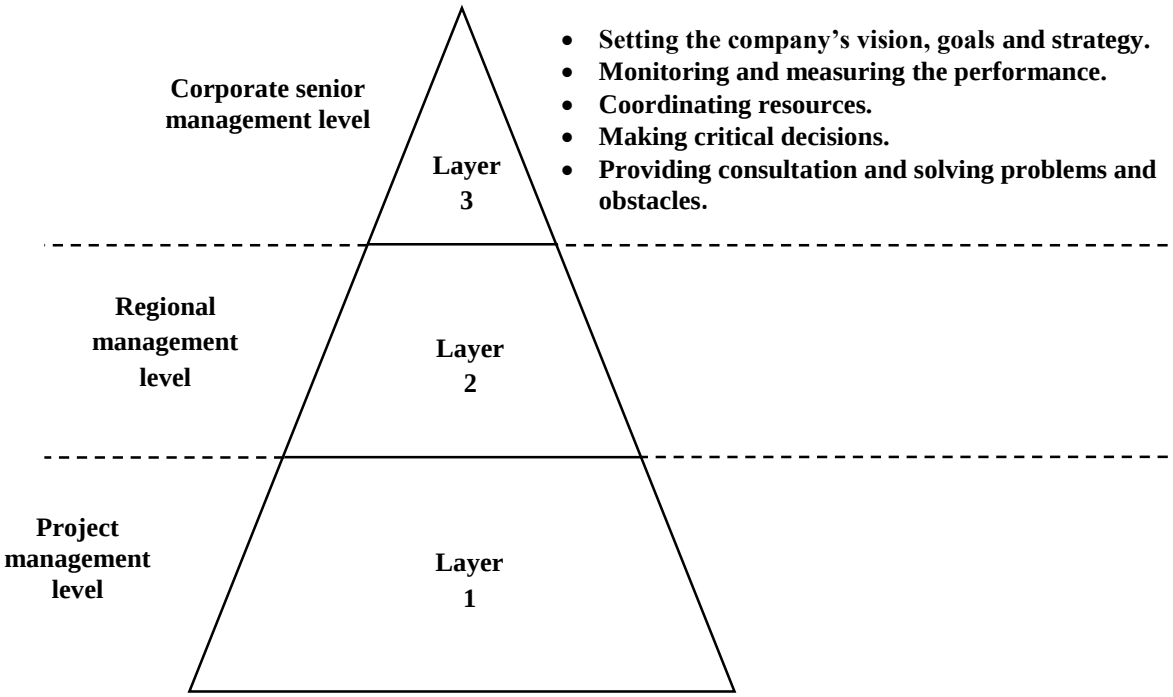


Figure 7-4: IQGCCs management layers

7.4.2.2 Responsibility and Accountability

Most of the interviewees, and particularly the senior managers, stressed the necessity of linking authority delegation with the accountability for results. Both R5 and R4 insisted that the delegation of authority to the regional and project managers should be accompanied by holding

them accountable for their performance. This view is also advocated by interviewee R8 who said that the:

> *"Fear of corruption is the main reason for the authority restriction. Awarding more authority to the regional offices despite this would enhance the company's efficiency, yet it may open doors for corruption. It is, therefore, very important that the regional offices are constantly monitored and held accountable for the outcomes of their business."* (R8)

Moreover, R2 argued that the regional or project managers would be more eager in their work, if they felt that they were accountable for the disbursements and project earnings. One of the reasons for IQGCCs' poor performances, as R3 reported, is the lack of accountability, whether from the Ministry to those in charge of managing these companies, or from the senior managements of the companies to their regional and projects managers. Although this is considered a weak point in the current management system, with a clear reference to the lack of powers and other imposed constraints, interviewee R7 justified that:

> *"You must first give people the ingredients for success, so you can hold them accountable for their performance."* (R7)

Nevertheless, some interviewees, such as R1 and R10, explained that the regional and project managers should develop their decisions based on the business process outputs and needs, yet collectively in consultation with relevant personnel. Accordingly, it is not fair to hold them fully responsible for any failure, but every individual involved in the process should be accountable according to their role. However, R1 added:

> *"If a particular regional office has failed to make a profit because of neglect and mismanagement, it is better to close this branch and demobilise its staff. This is because a governmental employee must learn the culture of loyalty and diligence to work as well as the feeling that his success and continuation in the job is directly linked to the success and continuation of his organisation."* (R1)

Interviewee R3 supported this opinion, suggesting:

> *"All the regional offices that generate profit should be supported and allowed to continue and expand, but those that are not able to do so, must be liquidated. There*

is no sense in keeping a branch that burdens the company's budget without benefit." (R3)

Interviewee R9 called this exercise the "*reward and punishment principle*", and considers it important for the IQGCCs to apply this in order to encourage personnel to work better. Nevertheless, they claimed that there is an imbalance in applying such principles now:

"At this time we are witnessing the reward of many people, yet we rarely see a person or a team that have been punished for their poor performance." (R9)

R9 justified that to the current situation in Iraq, however, he believes that activating accountability for performance is crucial for the success of IQGCCs.

7.4.2.3 Empowerment

A number of the participants mentioned employee empowerment as a significant element that can result from delegating authority and can significantly improve the performance of an organisation. In this context, R1 said:

"From my experience, I have reached a conviction, that awarding authorities would not only increase the work flexibility, but would also create a kind of personal empowerment which is, I believe, a very important element in performance improvement." (R1)

This view was shared by R7 who argued that giving employees the opportunity to express their opinions and share in the decision-making would help them to develop their personal values and make them more motivated to complete their work to the best of their abilities. Thus such practice would encourage employees to feel and believe that their success, on a personal level, would mainly depend on the success of their work.

7.4.2.4 Discussion of Element Two: Authority

The above analysis revealed a consensus amongst participants concerning insufficient authority within regional offices and project managements and that this is a key factor for the inefficiency in IQGCCs' performances. This finding further confirmed the results from the exploratory study phase, which identified that the centralised control adopted by IQGCCs has been a key source of bottlenecks, delays, and increased costs within the operational processes of these companies. Moreover, the analysis uncovered three key themes that are directly linked to the

distribution of authority and that influence the organisations' performances. These included: authority delegation, responsibility and accountability activation, and employee empowerment.

Interviewees highlighted that delegating a domain-wide authority to both regional offices and project managements can streamline and accelerate the operational process by eliminating the duplication of tasks, non-value added activities and unnecessary bureaucratic procedures. Similarly, participants criticised the current deep engagement of senior management in the day-to-day business operations as it complicates the flow of processes. Instead, they emphasised that the role of top management should be focused on developing the company's vision and objectives, setting strategies, monitoring performance, and coordinating between the various regional offices.

The interviewees' views generally align with the proposals in the theoretical framework, based on business process principles (see section 4.3). An important principle of the business process orientation is to streamline the business process and accelerate the decision-making process. However, this requires the organisation to break down the hierarchical and centralised control system and to redesign employees' jobs around the organisation's core business processes that produce the final products or services. Therefore, a process job, which refers to the extent to which employees' works are structured around the operational processes, is deemed an essential element in conceptualising the business process orientation (McCormack, 2007; Skrinjar *et al.*, 2010; Tang *et al.*, 2013). Johnson and McCormack (2011) argue that, with process jobs, horizontal or process oriented authority is also enabled. They state that this level of authority is important when looking to improve organisational performance, since this approach extends across existing functional boundaries to guide and encourage personnel to work together towards common goals and objectives. This concept, as Holt *et al.* (2000) express, leads to the autonomous mechanism of empowerment that gives employees greater freedom to manage their business processes in a way that creates self-responsibility and promotes self-efficacy.

Studies show that delegating and pushing authority for decision-making down to middle and lower management levels can provide several benefits for organisations. According to Olson *et al.* (2005), it allows the emergence of different ideas and views from different groups of work and empowers managers to respond rapidly to issues that are close to them, as they potentially possess more information regarding their work issues than others (Acemoglu *et al.* 2007). Both Ryan and Deci (2006) and Yang and Choi (2009) empirically found that the delegation of authority positively contributed to increasing the motivation, satisfaction and performance of

employees. Moreover, Pink (2011) cites a study conducted by Cornell University, which covered 320 small businesses of which half awarded their workers autonomy, whereas the other half depended on a top-down hierarchal approach. The study found that the businesses that employed autonomy grew at four times the rate of the centralised and control-oriented companies. Holt *et al*. (2000) also suggest that construction companies which choose to ignore the strategy of employees' empowerment may lose their market position, and ultimately, their competitive advantages.

Although advantages can be obtained by delegating authority to the lower management levels, it may also bring issues to companies in terms of coordination and control (Alonso *et al*., 2008). Indeed, concern about losing coordination and control is one of the major reasons that saw most IQGCCs interviewees disagree with giving full authority, particularly to project management, to manage projects independently. This will be explained further in the next section. This finding echoes those reported by Wang (2011) who suggested that construction companies will only achieve maximum operational performance and productivity when they achieve an appropriate balance in distributing authority between the various management layers.

Moreover, interviewees from the IQGCCs emphasised that the delegation of authority to regional office management and project management should be accompanied with an activation of responsibility and accountability. They indicated that such an exercise is important in increasing employees' eagerness, loyalty and diligence to work. This view accords with the business process concepts. McCormack (2007) explains that, in high-level business process maturity organisations, personnel usually work as process owners or in process teams. They have full responsibility and accountability for performing and improving the business processes related to products creation or service delivery that add value for the customer (Tang *et al.*, 2013). Cunningham *et al.* (1996) profess that the assignment of responsibilities to a lower organisational level is a vital factor in establishing a successful, motivated and empowered team. Yang and Choi's (2009) survey of 176 US municipal government employees, revealed that there is a strong positive relationship between a team's performance and its responsibilities and accountability.

Additionally, the interviews also revealed that granting wider authority to the lower management layers would play a significant role in empowering managers and employees at these layers, which would positively reflect on their organisation's performance. Heathfield (2016, para.1) defines empowerment as, "*the process of enabling or authorising an individual*

to think, behave, take action, and control work and decision making about her/his job in autonomous, independent, self-directed ways. It is the state of feeling self-empowered to take control of your own destiny". Empowerment, as interviewee R7 declared, would motivate employees to work better since it helps to build a sense that their success depends on the success of their work. Similarly, researchers from different sectors, including the construction industry, emphasise the importance of empowerment in providing sustainable competitive advantage and improving the overall organisational performance (Jogulu & Wood, 2007; Kahreh *et al.*, 2011; Meyerson, 2012; Kariuki & Murimi, 2015), reducing conflict and ambiguity in employees' roles, and improving their performance and job satisfaction (Yang & Choi, 2009; Meyerson, 2012; Nzuve & Bakari, 2012; Rajalingam *et al.*, 2015). Employee empowerment, according to Holt *et al.* (2000), Yang and Choi (2009), Meyerson (2012) and Kariuki and Murimi (2015), can also play a major role in reducing costs, and enhancing the organisation's productivity, flexibility and efficiency. Therefore, such strategy has been explicitly and strongly supported to be adopted in the Construction Industry in several well-known reports, such as Latham (1994), Eagn (1998), Sidwell *et al*. (2004) and Farmer (2016).

Nevertheless, some participants, including R1, R2, R4, R5, R7, and R10, argued that within the current lower management level there may be insufficient knowledge, experience, competence, and self-trust to undertake the responsibilities indicated in the proposed framework. Therefore, in order to facilitate the framework's success, they suggested that training and knowledge transfer to the people at the lower management levels is a critical step before embarking on a practical implementation of the proposed framework. However, identifying the factors required to ensure the successful implementation of the proposed framework is beyond the scope of this research.

7.4.3 Element Three: Management

Investigating the current practices of IQGCCs revealed that these companies are still managed through a traditional management system dominated by a hierarchical structure, centralised control and highly bureaucratic procedures. Several management challenges were also pinpointed and summarised in Table 6-9. Most of these challenges arise from the adoption of a traditional management approach, which has helped create a fertile environment for significant delays, an increase in works costs, and a decline in quality. Nevertheless, through employing business process principles and current industry good practice, a general theoretical process framework was developed (see Chapter Four). It was proposed that this framework, through its

various elements, can provide vital solutions to most management deficiencies identified in the IQGCCs' current practice. To facilitate the analysis of the collected data, the framework elements were grouped under the management theme, as shown in Figure 5-7. Using the proposed framework itself, as illustrated in Figure 4-21, along with a list of predetermined questions to guide the interviewer, the participants were asked about the applicability and validity of every element or proposed solution. The interviewees' comments resulting from this exercise are presented in the next sections of this chapter.

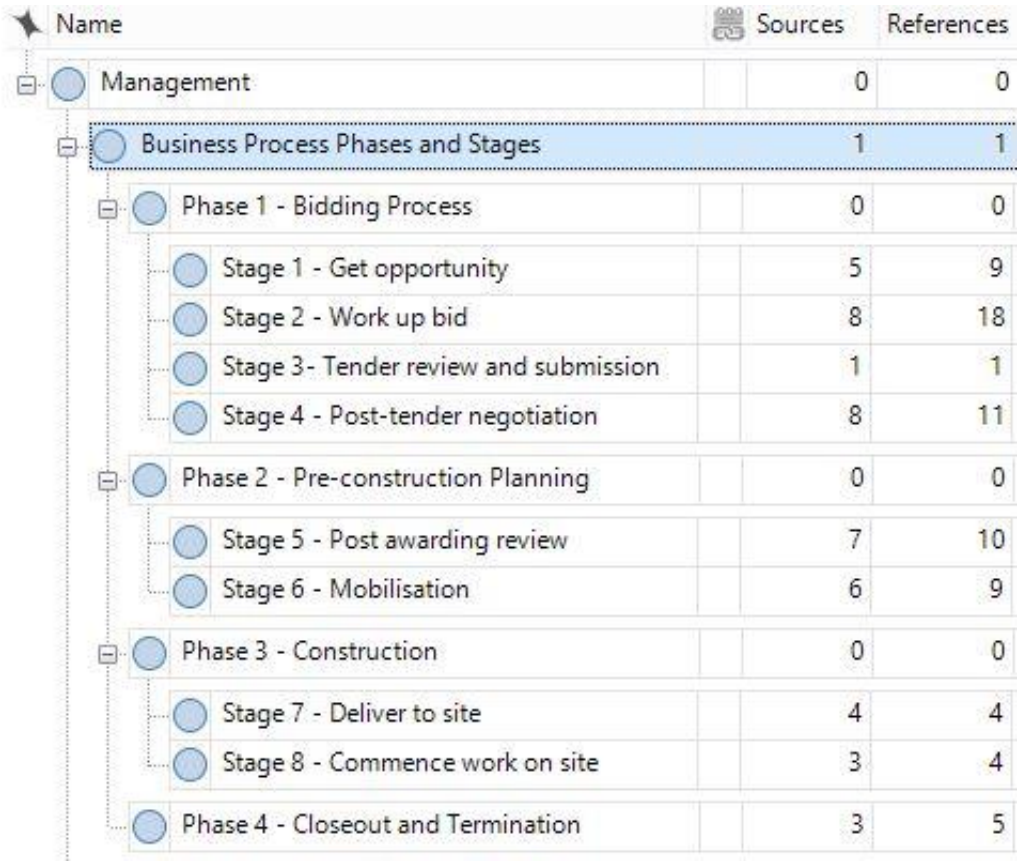
Name	Sources	References
Performance Issues	0	0
Authority	0	0
Communication	9	13
Government Restrictions	0	0
Management	0	0
Business Process Phases and Stages	1	1
Gates Controllers and Evaluators	0	0
Organisational Structure	8	28
Process Execution	0	0
Process Owner	4	6
Stage Gate and Phase Review	8	21
Stage Review Reports	8	12

Figure 7-5: Management/the proposed framework key elements

7.4.3.1 Business Process Phases and Stages

In order to provide better management and control of the business processes, the framework has been divided horizontally into four main phases, and nine stages, as shown in Figure 4-21. Each stage comprises a number of processes executed by internal stakeholders through multidisciplinary teams. In an effort to determine a realistic framework, which suits the needs of IQGCCs, the participants were invited to examine the proposed framework, and make suggestions regarding changes, whether on the processes or the people involved in conducting them. This included changing the time and the sequence of the processes, eliminating unnecessary processes, and adding new essential ones. Through these actions, more attention was paid to the processes that were identified as neglected or not applied during the current

practice. This exercise was important in testing whether such processes would add value overall. Accordingly, a number of changes were suggested; these proposed amendments to the framework's business processes have been captured and analysed using a coding framework, based on their respective phases and stages (sub-themes). Figure 7-6 illustrates this coding framework and each node and sub-node are also explained.



Name	Sources	References
Management	0	0
Business Process Phases and Stages	1	1
Phase 1 - Bidding Process	0	0
Stage 1 - Get opportunity	5	9
Stage 2 - Work up bid	8	18
Stage 3- Tender review and submission	1	1
Stage 4 - Post-tender negotiation	8	11
Phase 2 - Pre-construction Planning	0	0
Stage 5 - Post awarding review	7	10
Stage 6 - Mobilisation	6	9
Phase 3 - Construction	0	0
Stage 7 - Deliver to site	4	4
Stage 8 - Commence work on site	3	4
Phase 4 - Closeout and Termination	3	5

Figure 7-6: Business process phases and stage

7.4.3.1.1 Phase One: Bidding Process

As a prerequisite for any bidding process, interviewees confirmed the importance of having a clear strategy set by the corporation regarding the type and size of projects that they should bid for. A useful comment in this area was made by R1, who suggested:

> *"Having a clear selection strategy would help determine the boundaries of our research scope for new opportunities rather than wasting time and effort in bidding for unattractive and worthless projects."* (R1)

Interviewee R4 also stressed that every regional office has to conduct a periodical evaluation of its workloads, and available and required resources for both the current and future works.

Evaluation reports should be regularly sent to the projects department at the company headquarters in order to identify the needs of every regional office, whether for resources or new projects. Thus, at a time when any regional office has the intention to bid for a new contract, the senior managers would have a clear picture concerning the entire regional offices' needs. Hence, the decision on whether to bid would be more accurate and mature.

Both interviewees R5 and R9 referred to the importance of building a positive and long-term relationship with potential clients. Moreover, R5 claimed that the employees responsible for looking for new tenders generally lack knowledge of computers and internet use. As a result, many attractive tenders that are announced on client websites, could be missed or known about too late. Therefore, R5 considered that training for staff in this area is important.

As shown in Figure 7-6, the bidding phase comprises four stages. Interviewees' comments in relation to the applicability and validity of the processes within each stage were presented as follows.

Stage one: Get opportunity

The only change suggested by the respondents at this stage was in regard to the timing of the 'site visit' process. According to R1 and R8, the nature and condition of worksites have a significant impact on the bid/no bid decision; therefore, a visit to the site is always preferred immediately after identifying a new opportunity for work. For instance, R8 explained that:

> "*I prefer that a visit to the worksite is done before making a decision whether to bid or not; yet it would be even better for it to be conducted before buying the tender documents, if there is time to do so."* (R8)

Indeed, this is in line with what was identified in mapping the current practice of IQGCCs. However, R5 claimed that the 'site visit' process should not be restricted to a certain stage, but is better conducted when there is an essential need:

> *"For certain projects, we sometimes need to visit the worksite on more than one occasion. It is important to ensure that everything has been considered in the estimating and nothing has been missed."* (R5)

Stage two: Work up bid

Considering the R5's justification above, the 'site visit' process would be considered an optional process at this stage as long as it is conducted at the previous stage and there is no need

for more information about, or investigation into, the worksite conditions. This view was also supported by R7 who argued:

> *"After reviewing and studying the project drawings, designs, and bills of quantities several ambiguous issues that need more clarification usually emerge. So, as an estimator, you might need to visit the client's representative and/or the worksite at this stage with the aim of finding answers to your enquiries".* (R7)

Moreover, all the interviewees stressed the importance of contact with a number of suppliers and subcontractors to enquire about the prices of some of the construction materials and work packages. Yet, most disagreed on the processes proposed to obtain the quotations, justifying this with several reasons. Firstly, time constraints within the bidding process are one key reason that prevents the application of process in the context of IQGCCs. In this context interviewee R3 commented that:

> *"Communicating with suppliers or subcontractors to get their quotations through adopting the process you propose, would really take a long time and, from my view, would not add value, especially, for companies that have wide experiences in their business areas, such as our governmental companies."* (R3)

Secondly, it was suggested that every company has to have updated price lists of most construction materials, labour, and transportation, so these can be used promptly in estimating without needing to contact subcontractors. However, R4 justified his disagreement in involving subcontractors in the pricing of work packages, by saying:

> "*I do not agree with that for the following reasons; firstly, often the available time to prepare and submit a tender is very limited, so preparing and sending quotation requests to subcontractors and then waiting until the receipt of their quotations to analyse them all require time. Taking into consideration that most qualified subcontractors are from the capital, which is geographically far away from the provinces, the contact with them is really difficult and time-consuming in light of the current lack of effective means of communication in Iraq. Secondly, what is the guarantee that can be taken from subcontractors not to undo their quotations, when we win the contract? But simply, nothing as long as there is no a formal contract. Thirdly, a specialised company is supposed to have expert estimators with a good knowledge of the material prices and work costs. Nevertheless, there is nothing*

wrong with informally consulting some contractors or suppliers about the prices for the purposes of comparison and validation of our prices." (R4)

Similarly, R10 rejected the involvement of subcontractors in pricing certain items within the tender, justifying this with the lack of assurances that would oblige contractors to undertake the works according to their submitted prices.

The third issue raised at this stage concerned the 'propose alternative design' process; R7 argued that, under a traditional contract, clients produce all designs at the project design stage. Therefore, at the bidding stage, all the designs and drawings should be completed and attached with the tender documents. As contracting companies, they must estimate and calculate the project costs based on the attached designs, drawings, and bill of quantities. Therefore, R7 believes that proposing changes to project designs is not possible, particularly at this stage of a project lifecycle. This perspective was also advocated by R10 who professed:

"You suggest here to propose alternative designs, which is not possible at this stage, since any change to the original designs needs to be approved by the client and the consultant, which can take three months at least." (R10)

Stage three: Tender review and submission

In fact, all the processes within stage three can be seen as complementary and required to finalise the bid proposal. Moreover, these processes are similar to those currently adopted by IQGCCs, as identified by mapping the IQGCCs' current practices. Accordingly, interviewees agreed with them without suggesting any amendments.

Stage four: Post-tender negotiation

Most interviewees confirmed that the processes at this stage are not applicable and do not effectively impact on the performance of IQGCCs, given that they are mainly linked to the client's value chain rather than the contractor. According to the interviewees, these processes are deactivated under the current Iraqi regulations:

"If there are errors in the submitted tenders, the company would bear the consequences of those errors. It is not allowed for employers to contact contractors with the aim of correcting uncorrected tenders. Once you submit your tender package, it is over, you cannot make any amendments to it ... Currently, there is no negotiating, and it is not possible to write any precautions when submitting any tender." (R6)

"No, this stage does not exist and is not applied by clients. After submitting the tender, the client builds on the final written price. If the final submitted price is wrong and less than the correct one, the contractor bears the loss. Yet, if the submitted price is higher than the correct price, the client would correct the price and adopt it without asking or informing the contractor… In 2003, a new law was issued by the government and under it, negotiations are cancelled and contracts are awarded to the owner of the best-submitted tender." (R5)

Interviewee R9 also declared that IQGCCs, according to the Iraqi Regulations for Implementing Government Contracts, are generally exempt from the submission of insurance and securities. Whereas, the process of checking and signing the contract documents usually starts after awarding the project and issuing the letter of acceptance by the client. Indeed, the comments from R9 are consistent with that which has been identified and mapped during the exploratory study phase. All the companies studied showed that the 'check and submit the contract documents' process occurs in conjunction with the starting preparations of the project management team and the pre-construction plan. As a result, this process was moved to the next stage, and the stage of 'post-tender negotiation' was cancelled completely.

7.4.3.1.2 Phase Two: Pre-construction Planning Process

The receipt of a letter of acceptance for a submitted tender triggers the pre-construction planning processes. This phase is separated into two stages, namely, post awarding review and mobilisation. The interviewees' perspectives regarding each of these two stages are as follows.

Stage five: Post awarding review

Generally, all the interviewees agreed on the key processes grouped under this stage. For example, R6 suggested:

"As you explained, after obtaining a project, a project management team is established and a detailed review and examination of the project documents are conducted by the project management team to identify its needs. This usually goes along with the process of checking and signing the contract documents." (R6)

R2 emphasised the importance of including the process of 'checking and submitting the contract documents' at this stage. Whereas, R3 confirmed the importance of 'meet the client and site possession' process and the validity of its sequence:

"Once the contract is signed by the employer, the appointed Project Manager will coordinate with the employer's representative in order to take all the necessary measures for the purpose of possessing the work site." (R3)

Thus, by possessing the work site, a new stage of the project lifecycle would be started. The new stage includes all the processes required to produce the execution plans.

Stage six: Mobilisation

As discussed in Chapter Six, in comparison with the current industry good practice benchmark there is a clear deficiency and a lack of concern amongst IQGCCs regarding the pre-construction planning processes. With the exception of producing a project programme and an evaluation of the required and available resources, IQGCCs, in general, do not demonstrably develop a robust execution plan comprising, for example, a Risk Management Plan, Procurement Plan, Health and Safety Plan, and so forth. Accordingly, the researcher during the development of the framework, needs to identify the main processes to be included within this stage, or to test the applicability and validate these processes during the data collection.

Most of the comments from the interviewees confirmed the importance of the proposed processes under the mobilisation stage:

"In fact, one of the negatives marked on all our projects is the lack of solid execution plans. Companies often rely only on preparing simple programmes to manage their projects. So, I think the proposed processes within this framework are very necessary to develop effective execution plans that enable the proper management of projects." (R2)

"Of course, of course, all the mentioned processes I consider to be the work basics. Preparing a risk plan to manage potential risks, a site layout to locate the most suitable places for establishing the offices, cranes, material storage, etc. or a budget plan are all important to manage a project effectively... Producing a health and safety plan is also a very important issue that needs to be given more attention by IQGCCs to its direct impact on the costs and company reputation." (R3)

"Preparing a staffing plan is a very important and nice plan. Such a plan would give a future vision for the numbers and disciplines of the staff required throughout the execution phase. Thus, you can take proactive steps to bring in the required

staff just before starting their activities and to reallocate them to other projects directly after completing their tasks." (R2)

When asked if this stage of the process should be re-designed, interviewee R4 said:

"No no, all the explained processes are good, but I have a comment regarding the Health and Safety Manager. I think there is no necessity [for him] to be a part of the project team, yet he has to be involved in preparing all the health and safety plans and be responsible for monitoring the health and safety measures and providing their requirements in various projects." (R4)

Meanwhile, interviewee R10 argued that, although all the proposed processes are useful, some would be difficult to implement in practice especially in the Iraqi context. R10 attributed this to the influence of other organisations that do not conduct advance planning or employ systematic ways of working. In this context, R10 provided the following example in support of their argument:

"On a project worksite, and despite approval for the project offices' location obtained from both the client and the local council's representatives before starting the construction work, we were forced to change the location three times over the first six months of the project span. That was because developments occurred on the local council plans. You do not work individually; there are other organisations that work randomly and impact on your works and plans. Therefore, under such conditions, it is difficult to make a site layout plan, since the outside work conditions cannot be controlled, or you may need to change your site plan weekly, which I think is not reasonable." (R10)

Despite the pessimism in the above comment regarding the site layout, such a plan provides an incentive for the enhancement of other plans, such as risk management. For instance, acknowledging the risk of influence by other organisations and how such risk could impact on the project and how it should be managed would indeed enhance the company's performance. This can be generalised to other pre-construction plans since, without planning, it is hard to monitor and control construction work and organisations would be managed on reactive actions rather than proactive.

7.4.3.1.3 Phase Three: Construction Process

The construction phase, under the proposed framework, is decomposed into two stages, as illustrated in Figure 7-6. The first aims to prepare the essential requirements needed to enable the works to effectively commence on site; whilst, the second aims to execute the required deliverables as planned. The interviewees, in general, did not show any disagreement, but rather, a number of them strongly advocated this classification. For instance, interviewee R4 suggested:

> *"The success of any work mainly depends on the preparation of its essential requirements. I think, making the preparations of work requirements as a stage per se, is a good idea since this would help to ensure the availability of all the requirements to succeed in the execution of the construction works."* (R4)

Interviewees' perspectives regarding the key processes under each of these stages are presented as follows.

Stage seven: Deliver to site

All respondents agreed on the key processes involved in this stage and no amendments were suggested. In this context, interviewee R1 said that:

> *"Exactly, these are the most important processes that should be undertaken before commencing execution work on any of the worksites."* (R1)

R1 added that the preparation of work requirements should not just occur at the beginning of a construction phase, but should be continued across the whole phase and before commencing work on every new work package. Interviewee R6 also confirmed the validity of all processes at this stage. In comparison, R4 emphasised the importance of determining a timeframe for this stage and being this represented in the project programme.

Stage eight: Commence work on site

As identified in Chapter Six, the core business processes adopted by IQGCCs at this stage are, in general, similar to those recognised as good practice. Accordingly, the second round of interviews has not led to significant specific outcomes regarding the processes grouped under this stage. Most of the interviewees advocated that the 'commence work on site' processes depicted in the framework are typically similar to their companies' practices. For example, R4 observed that:

"Having a comprehensive execution plan and fundamental work requirements, the construction works would commence on site and should be monitored to ensure that they are performed as planned. Any deviation, whether in time, cost, or quality should also be corrected to keep the project on its planned track as far as possible." (R4)

Based on what has been discovered through the exploratory study phase, the major problematic points at this stage are not related to the processes themselves, but rather to the lack of authority awarded to the regional office management and project management, in addition to the inadequacy and incompetence of the pre-construction plans in enabling the efficient and effective management of these key processes. Meanwhile, the validation of the processes proposed to overcome the inadequacy of the current execution planning was covered above; whilst, the validity of the power distribution, as suggested by the framework, will be tested later under the process performers sub-elements.

7.4.3.1.4 Phase Four: Closeout and Termination Process

Closeout and termination is the last and last stage (stage nine) of the proposed framework. The stage involves four high-level business processes; two of these were already identified as adopted in the current practices, whilst the other two, namely 'finalised as-built plan' and 'undertake post project review and analysis', were added to overcome the deficiency in the current practice in closing out projects. Accordingly, the respondents were questioned about the general processes that should be included or omitted at this stage with a particular focus on those added.

Analysing the interviewees' responses confirmed that no changes were required to the processes within this stage. However, most of the interviewees strongly supported the need to produce as-built drawings and an assessment of the project results for every project nearing completion. Some of the interviewees' comments in this regard are cited below.

"No, no, I don't have any note, and the proposed processes are very sufficient." (R1)

"If it is not impossible, then it is very rare that the execution would be 100% identical to the designs. So in my opinion, it is very important to document any changes occurring during the execution, whether on the designs and drawings or specifications, and bind them together as a reference, firstly to measure and

determine the contractor's final quantities and payment, and secondly to help in solving problems that can happen in the future … For example, this building that we are in now, was carried out but without documenting any of the changes that occurred on the designs so that currently we do not know the actual maps for the electrical wires and air-conditioning ducts." (R2)

"I suppose, at the end of any project, the project manager, in coordination with other regional office departments, conducts a comprehensive assessment of the project's performance. It is very important to determine the work items that generated profits and those that did not, to compare the total project profits with what was planned, and to identify the weaknesses and unsuccessful practices in order for them to be avoided in the future." (R4)

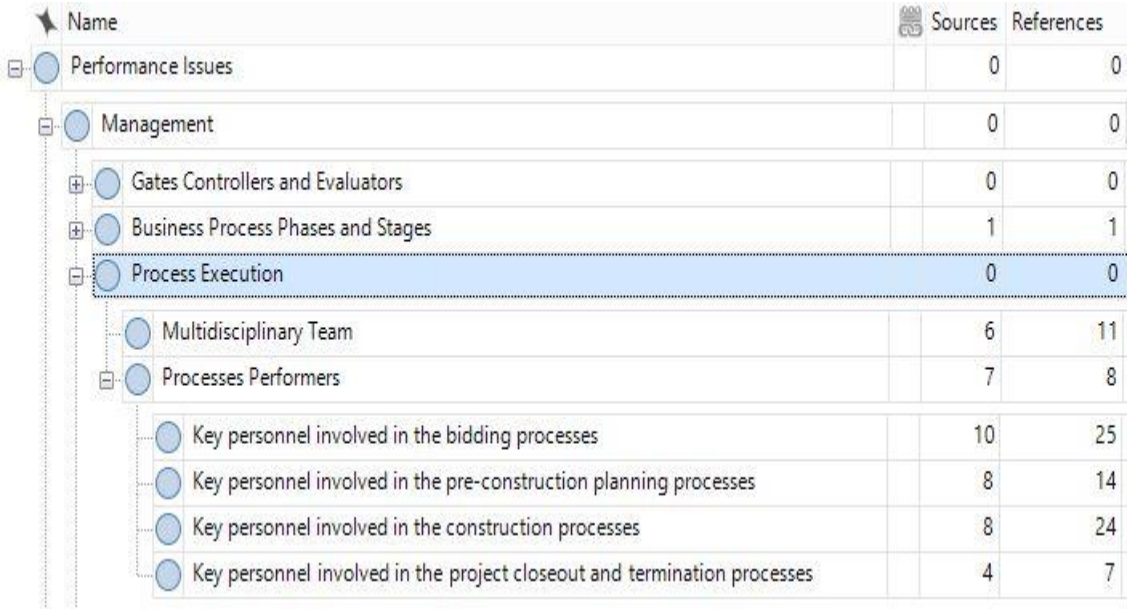
Table 7-2 illustrated the IQGCCs' key core business processes grouped under their relevant stages and phases after making the required amendments, as suggested by the participants during this round of interviews.

Table 7-2: The adjusted version of the key core business processes of IQGCCs

Phase	**Phase 1 Bidding**			**Phase 2 Pre-construction planning**		**Phase 3 Construction**		**Phase 4**
Stage	**1 Get opportunity**	**2 Work up bid**	**3 Tender review and submission**	**4 Post awarding review**	**5 Mobilisation**	**6 Deliver to site**	**7 Commence work on site**	**8 Closeout and termination**
Process	• Initial project evaluation. • Site visit. • Buy and collect tender documents. • Review and examine tender documents. • Carry out risk analysis.	• Prepare tender programme. • Establish a bid team. • Check and review tender documents. • Site visit if it is required. • Attend client tender clarification meeting. • Prepare method statement and pre-tender programme. • Estimate the construction cost. • Produce the estimating reports.	• Settle contract final bid price. • Prepare bid documents. • Document and submit contract priced tender package.	• Establish project management team. • Check and submit the required contract documents and securities. • Hold handover meeting • Review the contract document. • Meet the client and effect site possession.	• Revise and update risk management plan. • Produce method statement and master programme • Review and update procurement plan. • Produce health and safety plan. • Confirm the project budget and cost system. • Plan the project's site layout. • Develop staffing plan.	• Acquire construction team. • Organise project worksite. • Place purchasing orders and deliver to the worksite.	• Execute construction activities. • Monitor and control performance. • Update project execution plan. • Manage procurement and staffing processes. • Manage health and safety.	• Conduct operational test and maintenance. • Finalise as-built plan. • Reallocate and terminate. construction teams and resources. • Undertake post project review and analysis.

7.4.3.2 Process Execution

Throughout the previous subsections, the applicability of the key operational processes was tested. This section is devoted to testing two important issues: firstly, the applicability of IQGCCs adopting the concept of a multidisciplinary team in executing their operational processes; and secondly, the validity of the key internal stakeholders, otherwise called process performers, involved in executing these processes. Figure 7-7 demonstrates the analysis of the interviewees' responses in relation to this part of the study.



Name	Sources	References
Performance Issues	0	0
Management	0	0
Gates Controllers and Evaluators	0	0
Business Process Phases and Stages	1	1
Process Execution	0	0
Multidisciplinary Team	6	11
Processes Performers	7	8
Key personnel involved in the bidding processes	10	25
Key personnel involved in the pre-construction planning processes	8	14
Key personnel involved in the construction processes	8	24
Key personnel involved in the project closeout and termination processes	4	7

Figure 7-7: Process execution

7.4.3.2.1 Multidisciplinary Team

With the aim of reducing the functional sub-optimisation and increasing the coherence and integration across the various departments, it was suggested that multidisciplinary teams were used to undertake the core business processes. Accordingly, the interviewees were questioned about the applicability of such a suggestion. Most of the participants strongly supported the idea of forming task teams comprising members of various departments to perform major business processes, such as the bidding process and pre-construction planning process. Interviewee R7, for instance, observed that:

> *"Being a director does not mean you are an expert in everything and in all issues, whether legal, administrative, or technical. The involvement of people from different disciplines in undertaking processes would certainly help to generate a more comprehensive view of the tasks that we deal with, and thus the solutions*

proposed, actions taken, or decisions made would be more accurate and mature." (R7)

Interviewees R4, R3 and R8 also shared this view and stressed that multidisciplinary teams can foster a fertile environment to share and consider the different views that help to determine the most appropriate solutions. Such meaning was evident in R8's statement:

> *"In order to prepare a good bid proposal, a bid team should include, in addition to the Estimator, an expert from the worksite who has experience in the execution to give his opinions on the most appropriate ways of implementation and their costs, a Designer to check the project designs, a Planner to prepare a primary programme, and a Legal Adviser to study the tender conditions with the aim of identifying any potential legal risks."* (R8)

Additionally, R1 believes that the formation of multidisciplinary teams would break the walls between the different management sections and therefore reduce red tape and bureaucratic procedures. Interviewee R3 also advocated this view, arguing that:

> *"Dependence on multi-disciplinary teams in performing tasks, I think, is a very good thing. Because one of the reasons for delay, is the routine caused by the formal communication style adopted between the separated departments of the company. So forming such a team that combines members of these departments together would definitely reduce the administrative routine and accelerate the execution of the process with more flexibility and better quality."* (R3)

Interviewee R3 also insisted on the necessity of clear and well-distributed roles amongst the team members and a specific schedule for each team to accomplish its tasks as planned. Meanwhile, R1 argued that team members should have the experience, competence and knowledge that would enable them to execute their tasks as effectively as possible.

However, R6 showed concern about the time available, particularly in preparing a bid proposal. R6 believes that, despite the fact that forming a bid team is a good practice it may take time that is not available in reality. Moreover, R6 claimed that bid team members together might not have as much experience as an expert in estimating. Therefore, as a company, it usually depends on individual experts to estimate contracts costs. Interviewee R5 added that, because of the current situation and widespread corruption in Iraq, estimated prices could be leaked and

revealed to competitors. Accordingly, R5 emphasised that the final estimated prices of projects should be kept amongst the lowest possible number of personnel.

Thus, the concern of the respondents is reasonable, yet, as explained earlier, multidisciplinary team members should have sufficient experience in their field of work, and clear roles and schedules which should help to mitigate some of the aforementioned issues. In terms of the bidding process, the estimator, who should be an expert, has the responsibility for coordinating team members to accomplish their relevant tasks as planned, estimating and calculating a project cost, and ensuring the final tender price is safe until the final priced tender is submitted. Thus, good planning and management is key to success.

7.4.3.2.2 Process Performers

Following a similar approach used in validating the business processes within the proposed framework, the participants were also asked to examine the people involved in the multidisciplinary teams and performing the various business processes and make the required changes to them. As a result, interviewees proposed a number of adjustments regarding the key internal stakeholders; these suggestions were compared and summarised under each phase as follows.

Key personnel involved in the bidding processes

The first amendment suggested at this stage related to the involvement of the Regional Manager in conducting the 'initial project evaluation process'. Both R1 and R7 recommended engaging the Regional Manager and Regional Estimator in evaluating any opportunity for a new contract, and in making the decision to buy the contract documents. The second amendment involved the key people engaged in reviewing and examining tender documents ('review and examine tender documents'). Most interviewees, including R1, R3, R4, R5, R7, and R8, insisted on the importance of involving a Legal Adviser in reviewing tender documents with the aim of identifying any potential risks embedded in the tender's clauses and conditions:

> *"Involving a Legal Advisor in reviewing tender conditions is considered a very important thing, since there are so many vague terms within the tender conditions that need to be studied by a Legal Advisor in order to identify and assess the risks associated with them."* (R3)

> *"In order to be sure that everything is considered, a Legal Advisor should be involved in reviewing the tender's documents to identify potential risks in the terms*

and conditions of contracts, or any opaque clauses that need to be clarified from a legal perspective." (R1)

The third amendment was suggested regarding the involvement of a Buyer in the bidding process. Interviewee R4 disagreed with the engagement of the Buyer, whether in reviewing the tender documents or as a member of the bid team, and claimed that a Bid Manager has to be an expert with substantial experience and knowledge on prices and estimating. R6 also shared this view and professed that:

"No, from my point of view the involvement of a Buyer in the bidding process is a redundant ring, because it is supposed that the Estimator that is experienced, competent and has a good knowledge of materials' prices, and work costs." (R6)

However, both interviewees argued that Estimators could contact qualified contractors and suppliers with the aim of inquiring about certain material prices or work item costs. Nevertheless, R3 insisted that the engagement of Buyers in the bidding process is not needed since every company is supposed to have an updated price book.

The interviewees also showed a lack of consensus in the necessity of involving a Designer in the bidding process. Although R3, R6 and R8 supported the participation of the Designer in the check and review of tender documents (justified by the need to check the designs), R7 and R10 claimed that their involvement at the bidding phase is not, in fact, necessary. Meanwhile, R7 clarified the reason, by saying:

"Usually, in Iraq, everything related to project designs is part of the client's responsibilities; therefore, most of our companies do not have design departments or specialist people in design. The Designer's role in the bidding process is to check the contract designs, and in my view, such a task can very easily be conducted by an experienced construction engineer." (R7)

A similar reason was also provided by R10, who added:

"There is no need to assign a Designer in the regional offices or projects since the engineering staff should have the experience to read the designs. However, if there is any problem in the project designs, it is the consultant's responsibility to resolve it. Therefore, I believe the Designer is superfluous because construction engineers would be quite enough." (R10)

Correspondingly, R2 suggested merging the Designer's role with another function and allocating them to a qualified internal stakeholder. He attributed such a measure to the inability of the regional offices to assign a specialist or run a section for each functional area in light of the limited size of the businesses available within their geographical area.

Nevertheless, the interviewees' responses revealed a general consensus on the key people that should be involved in a bid team, which should include a: Bid Manager, Planner, experienced Project Manager, and Legal Advisor:

> *"An Estimator, Planner, nominated Project Manager, Designer, and Legal Advisor are the most important people who should be involved in a bid team."* (R3)

> *"Individuals within the bid team are almost constant. Each bid team needs a Bid Manager who takes the most responsibility for the bidding activities, such as studying and analysing the tender drawings and bill of quantities, estimating the execution cost and indirect costs, and preparing a risk plan and the documents required to be submitted with the priced tender. You also need a person from the worksite to help in preparing the method of construction and evaluating the work needs on site, a Planner to assist in preparing the tender programme and project pre-tender schedule, and a Legal Advisor to study the tender terms legally and identify the risks therein."* (R4)

The comment of R4, cited above, provides a clear picture as to the roles of the various bid team members. While the Bid Manager would be the main individual responsible for the entire bidding process, others members would act as consultants and supporters. The Planner, in working with the Bid Manager, would be responsible for preparing a basic programme for the key activities of the bidding process and for producing a pre-tender programme for the project after consulting with the proposed Project Manager on the method statement.

It is also important to mention that a number of the interviewees strongly advocated the involvement of a Project Manager, who is nominated to manage the project after winning the contract through the bidding processes, and particularly involved in preparing the method statement. This idea was expressed by R8, who stated:

> *"I prefer to assign the responsibility of preparing the methods of construction to the same experienced engineer who is supposed to manage the project after obtaining it, since he would know more about the project than his peers."* (R8)

Similarly, R3 argued that such an exercise would help Project Managers to generate a good understanding of the assumptions used in estimating the project costs, which would also increase their ownership of the projects because they would be engaged from the beginning.

Key personnel involved in the pre-construction planning processes

As reported above, participants encouraged the involvement of the nominated Project Manager in managing the project from an early stage of that project. Consequently, a Project Manager should be selected from the beginning when establishing a bid team. Selecting a Project Manager, according to interviewees R1, R4, R7 and R8, is the responsibility of the Regional Manager in coordination with the Bid Manager. However, having obtained a project, it would then be the responsibility of the Project Manager, as R1 and R8 declared, to coordinate with the Regional Manager and other section and Project Managers to establish the team required to manage the project.

Interviewees, in general, confirmed that the key internal stakeholders, as identified in the proposed framework, are the most important people who are usually needed in a project management team. Interviewee R1, for instance, suggested that:

> *"All the main persons required to manage large and medium projects are included in your proposed framework."* (R1)

Similarly, R3 professed that the management of medium and large scope projects require 'project pillars' who include: a Project Manager, Planner, Project Accountant, Project Engineer, HR Officer, Storekeeper, and representatives from the engineering and technical cadres who are particularly needed during the implementation phase. However, the number and disciplines of required people for any project mainly depends on the type and size of that project. Interviewee R10 claimed that, for a building project that cost 100 billion ID ($80 million), there would be a need for an experienced Project Manager, Planning Unit, Administrative Unit, Financial Unit, Warehouse Unit, and task teams. According to R10, the Project Manager is responsible for managing the whole project. The Planning Unit is responsible for preparing the project programme, payment requests, and quantities. The task teams, which include engineers, technicians, and craftsmen of various disciplines, are responsible for implementing the construction works. Meanwhile amongst the other units, each one works according to its competence.

Nevertheless, when it comes to the pre-construction planning process, the participants who are strongly recommended to be involved at the regional level through a planning team involved the same people engaged in developing the project bid, in addition to other experts from the regional office sections, such as finance, purchasing and health and safety. Interviewee R4 argued:

> *"I prefer the team members who would be responsible for preparing the project pre-construction plans to be involved in the bid team. So the expert person from the worksite would be the Project Manager, the Planner who prepared the pre-tender programme would be the same one in this phase, and so on for the Legal Advisor ... The Project Manager can easily coordinate with experts from other disciplines, such as health and safety, financial, and purchasing at the regional level in order to be involved in the planning."* (R4)

R4 justified his opinion with a number of reasons, including: 1) the key responsible members for the execution planning (Project Manager and Planner) would have a good understanding of the project and the assumptions made during the estimating since they were involved in the bidding process; 2) the most experienced and competent people are usually positioned at the regional level, thus involving such people in planning would enhance the project's quality; 3) there is a need to avoid over-staffing, which can result from unnecessary duplication in some functional areas at the project and at the regional office levels. R5 also supported this view, arguing that the time available for pre-construction planning is usually limited, since clients always want to see the commencement of work on site as soon as contracts are awarded. By the time a new project is obtained, many of the people who are required to be part of the new project management team may be involved in other projects; thus, the process of collecting and allocating all the project team members can take time. As R5 asserted, it would therefore be more suitable for the pre-construction processes to be conducted through the Project Manager in coordination with experts from the key functional areas at the regional office. In the same context, interviewee R10, in his response to the question, "*What do think about giving Project Managers a wide authority enabling them of planning, implementing and managing their projects independently?*" declared:

> *"We can, as a regional office, be seen as a small company. In this company, Project Managers are mainly responsible for the execution process, whereas other processes, such as bidding and planning, are better kept at the regional level, while*

the Project Managers would be involved in these processes and consulted about all matters related to their projects." (R10)

The above comment reveals that R10 insists on the value of carrying out the pre-construction planning process in the regional office. Such opinion, as clearly reflected by the interviewee's response, was mainly generated from their disagreement on awarding the ultimate authority to Project Managers in planning and managing their project. Indeed, most of the interviewees disagreed on providing all the powers to the project management team but rather preferred to keep certain things, such as the authority of procurement, recruitment and auditing, within the scope of the regional level. In terms of procurement, for instance, the majority of the interviewees, including R1, R2, R4, R5, R7, R8, and R10, recommended that all subcontracting and purchasing of bulk materials be carried out through a specialised central procurement committee or buyer at the regional level. As a result, in the preparation of the procurement plan the involvement of the Regional Procurement Manager (Regional Buyer), rather than the Project Buyer, has become necessary. As such, according to the interviewees, the Project Buyer would be responsible for facilitating urgent and simple needs on site. This issue, in addition to other matters related to the distribution of authority, will be covered more under the construction phase.

In light of what has been discussed, suggested, and justified by the interviewees, the key stakeholders involved in performing the pre-construction planning processes were adjusted to include the key stakeholders involved in bidding process in addition to the Regional Buyer, Health and Safety Manager, and Finance Manager.

Key personnel involved in the construction processes

It is supposed that, by the commencement of the construction phase, all the key people required to run the execution works on site are allocated to the project management team. Under the proposed framework the project management team would have the ultimate power to manage the construction phase independently. In other words, the Project Manager would have the entire authority to procure materials, subcontract work packages, hire equipment, recruit staff, and so forth. However, they would also hold the accountability for the results. Nevertheless, as mentioned briefly above, most of the interviewees did not advocate awarding such widespread authority to the project management. R4, for instance, argued that:

> *"Giving the full reins to Project Managers is not the right thing. The Project Manager should be given executive powers, while the role of the regional sections is to monitor, control and assist them in the implementation."* (R4)

Interviewee R7 also explained that, although awarding widespread authority to the project management team can accelerate the work and enhance its flexibility, it would, from another perspective, reduce company control, increase costs and open the doors for corruption. According to R7, a Project Manager should have the freedom to select the management team as well as hold a good level of authority to manage the resources under their project. Accordingly, interviewees were asked, "*What are the most reasonable authorities that should be awarded to Project Managers in order to manage their projects efficiently?*" The aim of this question was to identify and understand how the powers should be distributed between the regional and project levels. The focus was on four key processes, namely procurement, recruitment, work execution and monitoring, and updating execution plans.

1) The responsibility for procurement

As mentioned above, most interviewees did not agree with awarding full procurement authority to the project management team. R1 declared that:

> *"It is very important to set up a clear strategy for procurement. Under this strategy, the upper limits of procurement authorisations are determined and awarded to the project management according to the project's nature and conditions."* (R1)

Meanwhile, interviewees R1, R4, R5, R7 and R8 preferred all the subcontracting, or multi-million dinars purchasing agreements with suppliers and sub-contractors, to be conducted through a central purchasing committee or Regional Buyer after obtaining Regional Manager approval. In comparison, the key responsibility of the Project Manager in this process is to coordinate with the Regional Buyer in order to ensure the provision of the required materials, equipment or subcontractors as planned. According to R1, the involvement of other people in the procurement process, such as the Regional Manager and Regional Buyer, would enhance the quality assurance and reliability of this process and reduce the project risks and accountability to the Project Manager. R7 also mentioned that the centrality of procurement would save substantial costs through purchasing materials in bulk rather than in limited quantities for every project. Moreover, R6 claimed that granting widespread purchasing authorisation to the Project Managers may lead to increased corruption.

However, unlike most of the interviewees, R2 preferred to give full procurement authority to the Project Manager and their team and hold them the accountable for the results. According to R2, such an exercise can reduce the bureaucracy, enhance the project team empowerment, increase the work efficiency, and thus improve the overall company performance. Although all the advantages mentioned by R2 could be achieved by awarding full procurement authority to the project management team, the disadvantages cannot be overlooked, nor the advantages of centralising the procurement, as mentioned by most interviewees. Accordingly, an amendment was made to the key personnel involved in performing the process of 'place orders and deliver to the work site' and 'manage procurement' to include the Project Manager and Regional Buyer. These changes, as reflected in Figure 7-8, will further be validated through the next round of interviews.

2) The responsibility for project staff recruitment

An important plan that should be developed during the pre-construction phase is the staffing plan in which the numbers and disciplines of the workforce are determined to carry out the various construction activities throughout the construction phase. In other words, it provides a calendar that describes who, how many, and when different people on a project should be acquired and released. A staffing plan should also be reviewed and approved by the Regional Manager during the kick off meeting review. With that in mind, interviewees were asked, "*Who should be responsible for managing the recruitment and releasing the project required workforce?*" In his response to the above question, R4 professed that:

> *"When there is a need by any Project Manager to recruit additional staff, it is best to discuss this matter with the Regional Manager to first obtain his approval for employment… It is the responsibility of the regional office management to coordinate the workforces among the different projects and provide them for each project as planned."* (R4).

R1 also shared this view and emphasised that all project staff should be acquired through the coordination of the Project Manager and the Regional Manager. According to R1, the Regional Manager should be the main individual responsible for providing the required project staff, either from other projects under their powers or from other regional offices or the market by coordinating with the Projects Department Director at the headquarters. Interviewee R7 stated that:

> *"It is more economically feasible to exploit the unworked staff within the regional office or others remaining in the regional offices that are geographically close to the worksite instead of appointing new staff from outside the company."* (R7)

According to R4, giving Project Managers the ultimate authority for recruitment would reduce the control on staffing and may lead to overstaffing; this is because Project Managers are generally not in a position to see a comprehensive intensity map of people's workloads within the organisation. As a result, they do not have the opportunity or even the power that Regional Managers have to allocate workforce from other projects rather than through recruitment from the market. However, most interviewees confirmed that, after assigning the project team, the Project Manager should have the entire authority to manage and allocate the roles and responsibilities for their project team members, and would be responsible for releasing them as scheduled to avoid affecting other projects.

Based on the above discussion, it can be concluded that the interviewees' views regarding the recruitment process are aligned with the current industry good practice depicted within the proposed framework. However, it seems that the roles performed by the Contracts Manager, as identified in the current industry good practice, are actually carried out by the Regional Manager in IQGCCs. Thus, as recommended by a number of interviewees, the Regional Manager's role was added to the framework, while the Contracts Manager was eliminated.

3) The responsibility for works execution, monitoring and controlling

The interviews revealed a consensus among the participants regarding the necessity of delegating to project management the full responsibility for executing, monitoring and controlling the construction works. R3 suggested:

> *"The Project Manager and his team should be the main individuals responsible for performing and controlling the construction works. The Project Manager is also responsible for providing his regional office with periodic reports on work progress, updates on programmes, productivity, potential risks, resources required, etc."* (R3)

R3 also added that the Chief Executive Officer, or Regional Manager, should not generally intervene in the roles and responsibilities of the project management team, but only intercede in necessary cases, such as the emergence of problems at work or when there is a need for

resources from other projects or regional offices. A similar view was also shared by R4 who argued that:

> *"Whilst the project management team have the main responsibility for executing, monitoring and controlling the construction activities and are accountable for their project's results, the Regional Manager and Regional Planner would be responsible for monitoring and assessing the performance of this management, in addition, to coordinating and distributing the regional resources amongst them."* (R4)

The interviewees' views concerning the responsibility for executing and controlling the construction works were consistent with what was suggested in the proposed framework. Accordingly, no change was made to the proposed framework in this aspect.

4) The responsibility for updating the execution plans.

Although it was recommended that the project pre-construction plans were conducted through a Regional Planner and other experts, most of the interviewees stressed the involvement of a Planner in the project team who should be responsible for preparing monthly and weekly detailed construction plans based on the master programme. R2 claimed that, although currently, Regional Planners prepare project programmes, monitor works progress, and indicate deviations, all of this remains ambiguous and meaningless for projects teams. This is because they conduct this function in a superficial way that is limited to simply comparing progress without any further detail, such as cost and productivity. Accordingly, R2 declared that:

> *"There is a very urgent necessity to engage an engineer within every project team to be responsible for preparing weekly detailed work programmes, progress reports, and updated plans. Since such things, I believe, are the micro details of work and should be performed by the project team because they know the details of their work and its needs better than others."* (R2)

Moreover, R1 commented that:

> *"An important thing that can really help keeping projects on schedule is to prepare a weekly detailed programme for the construction activities planned for the next week. Such a programme would only be for the project's internal use and developed by the Project Planner in consultation with the Project Manager and Project Engineer*." (R1)

This was further advocated by R3, who explained that the Project Planner's role might be involved, but is not limited to monitoring work progress, producing updated plans, and periodical progress reports, and documenting changes. Such perspectives, indeed, confirm the validity of the Project Planner's role during the construction phase, as suggested by the proposed framework.

Key personnel involved in the project closeout and termination processes

In line with the proposed framework suggestions, interviewee R4 professed that the Project Manager is the main individual responsible for managing the project closeout processes. This includes coordinating with the Regional Manager, from one side, to release the project team members, to coordinating with the sections managers in the regional office in order to carry out a comprehensive review and analysis of the project performance and outcomes on the other side. However, R5 stressed the involvement of both the company CEO and the Director of Projects Departments in the review and analysis of the project performance. R2 also emphasised the production of as-built plans and recommended that the Project Manager, Planner and Project Engineer, or the individual responsible for organising and documenting the technical and engineering issues of the project conduct these.

Thus, the analysis of the interview data related to the IQGCCs' operational process performers revealed that most participants preferred regional office management to be responsible for performing both the bidding process and the pre-construction planning process. In comparison, the project management is responsible for performing the construction process and the project close-out and termination process. However, the interviewees generally preferred most authorities, whether in terms of the project resources procurement or staff recruitment, to be held at the regional management level. Figure 7-8 provides an overview of the main roles and responsibilities that should be undertaken by the various management levels of IQGCCs, as identified from the interviews. Whereas, Figure 7-9 illustrates the IQGCCs' key internal stakeholders with their roles and responsibilities in performing the operational processes after conducting the required changes suggested by the interviewees.

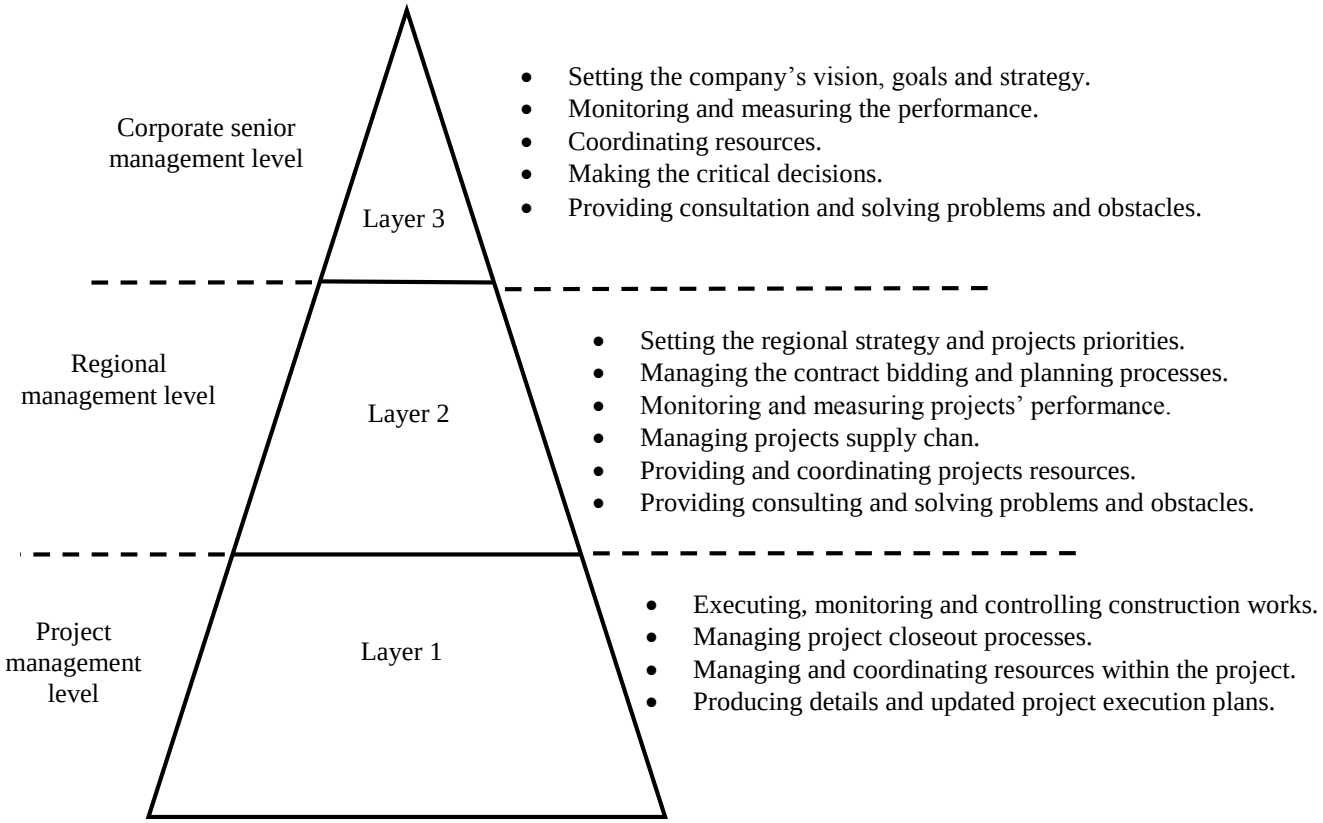


Figure 7-8: "As to be" key roles and responsibilities of the IQGCCs' management layers

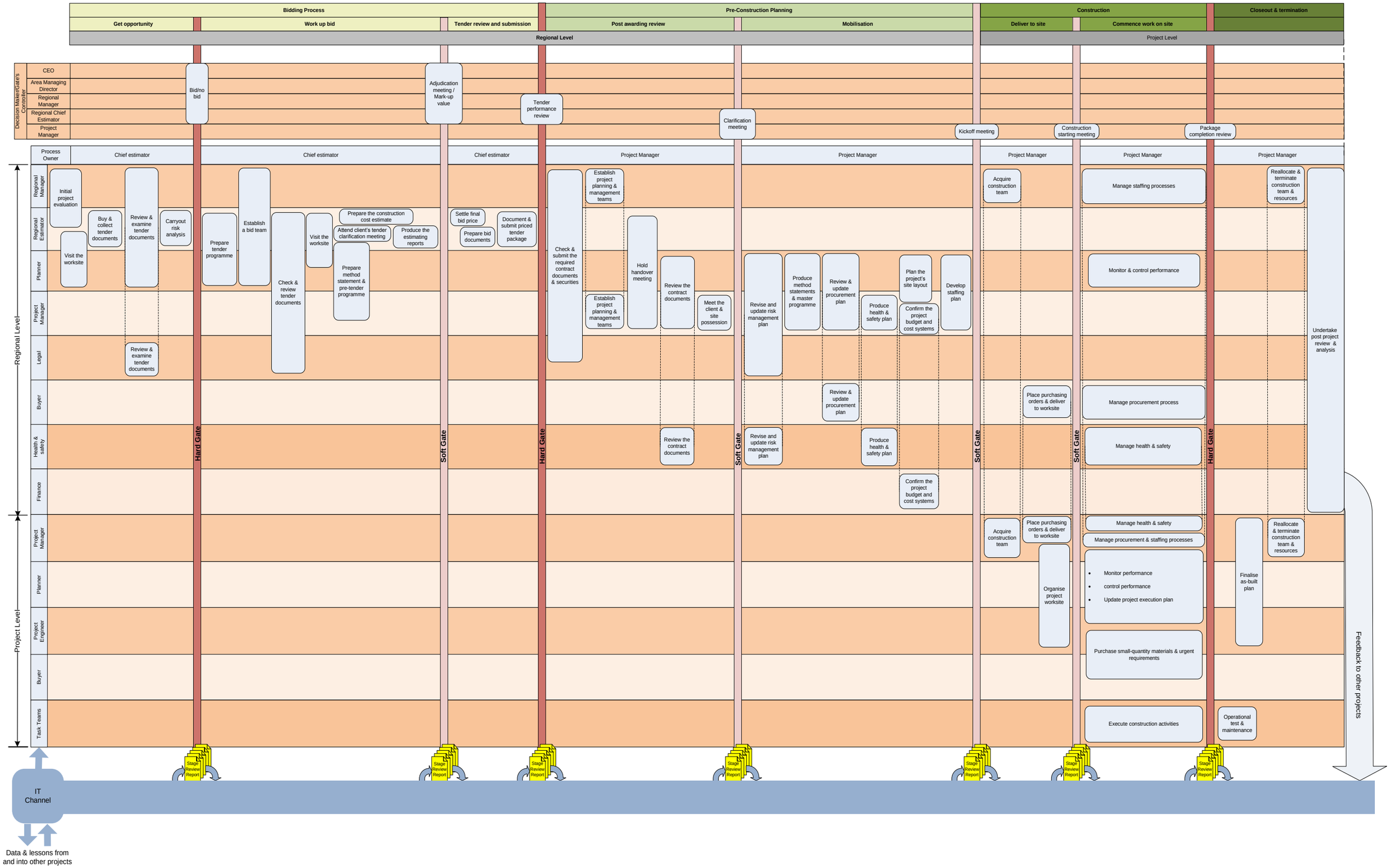


Figure 7-9: IQGCCs' transformational organisational framework after adjusting the key internal stakeholders and their roles

7.4.3.3 Stage Gate and Phase Review

With the aim of improving the quality control of the core business process and the quality assurance of the decisions made, the proposed framework includes a stage gate system, which acts as a checkpoint at the end of each stage to review preceding activities and expected deliverables before a decision is made to proceed with the succeeding stage. This was suggested through conducting a meeting involving senior managers and employees from different disciplines. Accordingly, interviewees were asked about the applicability of adopting such principles in IQGCCs, and the validity of the suggested stage gate types.

Analysing interviewees' responses showed that there was a general agreement amongst the interviewees on employing the concept of a stage gate to control the process quality. R1 and R2 strongly confirmed the importance of conducting a check and review of the process outputs at each stage to ensure that they have met their specific requirements before moving forward to the next stage of the process. Meanwhile, R3 and R4 also commented that reviewing and evaluating the activities' outputs at the end of each stage through a review meeting attended by multi-disciplinary personnel would be good practice. Similarly, R8 stated that:

> *"I see the most important feature of the proposed framework is the stage gates that allow, at the end of each stage, to conduct a review and evaluation of the outputs of that stage and thus get feedback. Such feedback would allow [the company] to take proactive actions to avoid the problems and risks expected to occur within the project, as well as to draw lessons for subsequent projects."* (R8)

Similarly, R6 professed:

> *"The establishment of a stage gate after each stage to check and assess the deliverables of that stage through a meeting is a really good exercise, especially, with regard to the soft gate pattern. Because it is necessary to allow certain activities in the subsequent stage to start before the completion of all current stage activities."* (R6)

Yet, in terms of the stage gate types (soft or hard), interviewees confirmed the validity of the suggested types within the proposed framework, with the exception of R5, who argued that the gate at the end of 'commence work on site' stage could be soft rather than hard. This was attributed to the fact that, at this stage, projects can be partially handed over to the employer:

> *"There are packages that can partially be handed over and operated before the entire project is finished. For example, project XXX involves constructing a motorway with a number of overpasses. We have handed over the motorway and it has officially been used, while we are still working on completing the overpasses. In other words, we have handed over a part of the project before the entire project has been completed. So, in my perception, the last gate can be soft."* (R5).

Furthermore, R5 also importantly argued that, after submitting a bid package, the decision to commence or not commence with the next stage mainly depends on the client and their decision whether to accept or not accept the submitted bid. As such, this is not usually the contractor's decision. Yet, from the contractor's perspective it is significant to evaluate the performance of its bidding process promptly after obtaining the results of every submitted bid. Accordingly, R5 suggested changing the hard gate at this stage to what he called the 'performance evaluation gate, which needs to be considered after completing an entire process. This stage gate would not include a 'go/no go' decision, but rather would be dedicated to conducting a comprehensive review of the processes' performance and their final outcomes and the impact on the organisation. R5 also suggested adding such a gate after the closing out and terminating phase with the aim of conducting a comprehensive review of the entire core business process performance. As a result, the proposed framework was amended, as suggested by R5, and depicted in Figure 7-10.

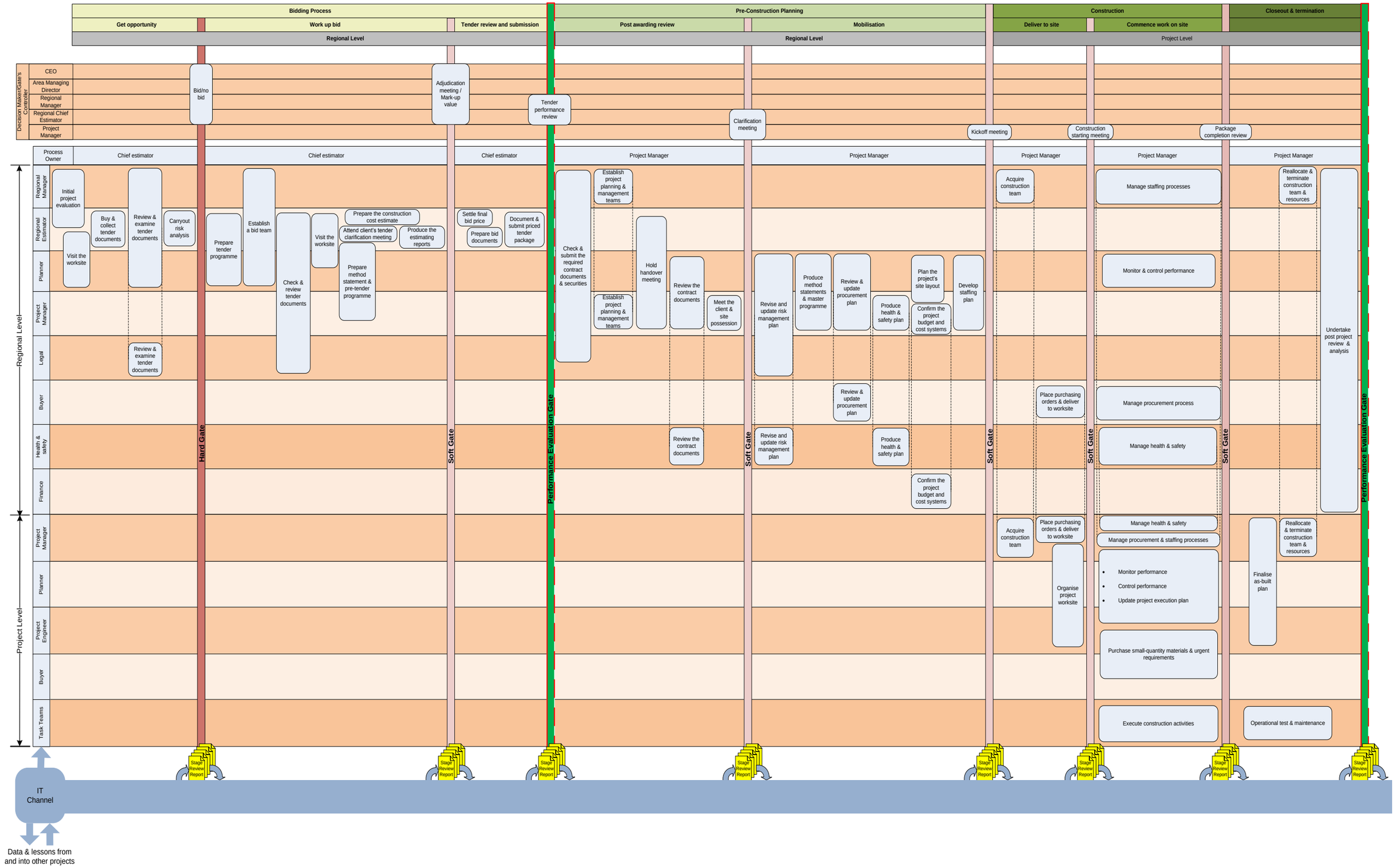
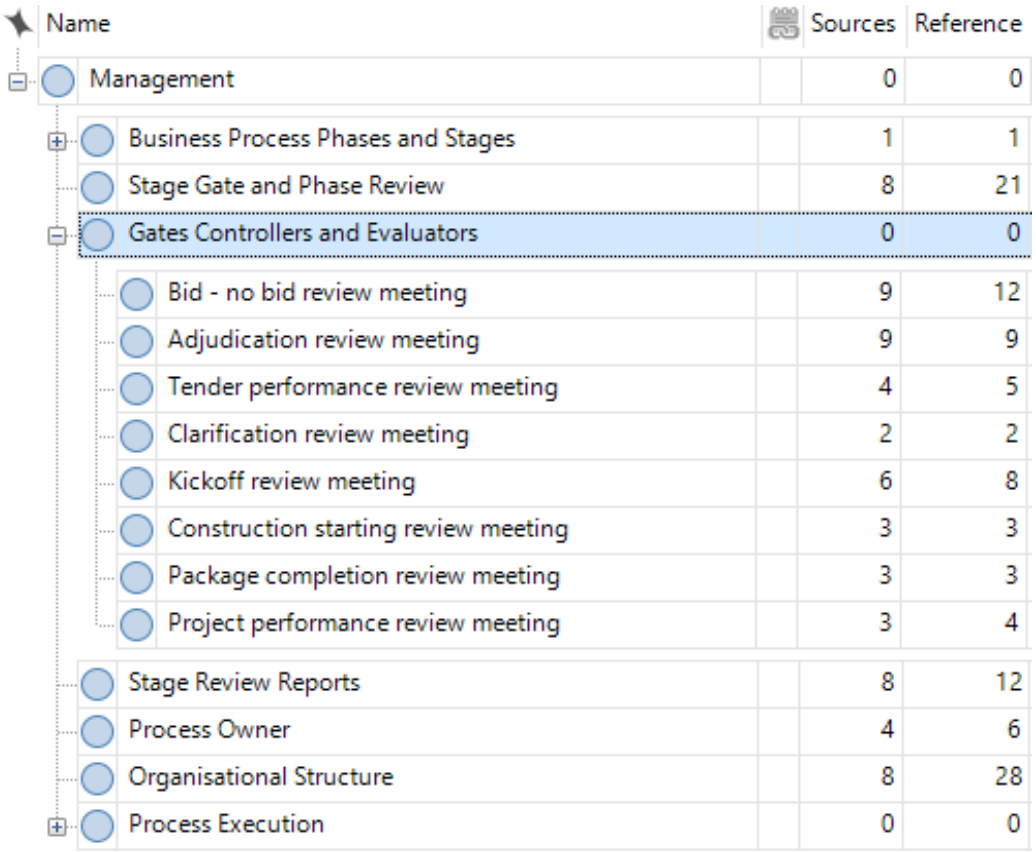


Figure 7-10: IQGCCs' transformational organisational framework after adjusting the stage gates types

7.4.3.4 Gates Controllers and Evaluators

Throughout the previous subsection, the applicability of a stage gate system in IQGCCs was tested and agreed. This subsection is dedicated to determining who should be involved in the different stage review meetings and controlling the stage gates, from the interviewees' perspectives. Their perspectives regarding this element were analysed under their relevant stage gates, as depicted in Figure 7-11.



Name	Sources	Reference
Management	0	0
Business Process Phases and Stages	1	1
Stage Gate and Phase Review	8	21
Gates Controllers and Evaluators	0	0
Bid - no bid review meeting	9	12
Adjudication review meeting	9	9
Tender performance review meeting	4	5
Clarification review meeting	2	2
Kickoff review meeting	6	8
Construction starting review meeting	3	3
Package completion review meeting	3	3
Project performance review meeting	3	4
Stage Review Reports	8	12
Process Owner	4	6
Organisational Structure	8	28
Process Execution	0	0

Figure 7-11: Gate controllers and evaluators

7.4.3.4.1 Bid/No Bid Review Meeting

Most of the respondents confirmed the importance of involving the top management layer, represented namely by the CEO and Projects Director, in the bid/no bid decision review meeting. R4 justified this by saying:

> *"[A] lack of headquarters involvement in such decisions means that each regional office becomes a fully independent company. But in fact, regional offices always need resources and support from each other. Only the headquarters would know the current and future expected workload and capabilities, whether of each regional office or the whole company. Therefore, obtaining top management*

approval to bid for a project is very important as they are responsible for the coordination of resources among the regional offices." (R4)

The same reason was also shared by R5, R6, R8, and R10, who argued that, as long as the regional offices are not completely separated from the mother company and always need its support, the decision to bid or not should be discussed with top senior managers. Most of the respondents also emphasised that the bid/no bid review meeting should involve the Manager and Estimator of the regional office that would be responsible for bidding and implementing the contract. In addition to the aforementioned members, R1 suggested the inclusion of the Corporate Finance Director, and Planning Director in such meeting. However, the involvement of the Corporate Finance Director at this meeting was rejected by both R5 and R8. In this respect, R8 declared that:

"This meeting is important to include the CEO, Projects Director, Regional Manager and the Estimator. Whereas the Finance Director is not required at this stage gate, because even if the company does not have enough financial liquidity, the employer would award an advance payment, which is 20% of the contract value, and the company can also depend on subcontractors to perform the construction work and pay their dues after obtaining payment for their executed work from the employer." (R8)

Indeed, the above justification by R8 can be considered as providing an important reason to include the Finance Director in the review meeting. Since without a clear picture of the company's capabilities and available resources, particularly their financial capacity, a bid team would not be able to decide correctly on the work packages and properly consider the potential risks. Consequently, the bid proposal may not be appropriate or serve the company's objectives. Moreover, company actions should be proactive rather than reactive. Depending on sub-contractors to perform work as a solution, when the company does not have enough financial liquidity, as mentioned by R8, can be seen as reactive action. Therefore, it would be better to consider the company's financial capacity at this stage gate so proactive actions can be taken.

R4 also insisted on involving the Planning Director at this meeting review, arguing that:

"[The] Planning Director is important in this decision because he is supposed to have all information regarding the company's projects and their progress, current

resources, and their future needs. Thus, his participation in this meeting would help to give a good idea of the company's current and future potential." (R4)

Meanwhile, R5 also recommended the involvement of the Corporation Machinery Director in this decision, claiming that:

"…. I cannot commence pricing a project without consulting with the Machinery Director regarding the capability of providing the required machinery and equipment for that project. If he says, we do not have the ability, so I would not bid." (R5)

Although the above argument is reasonable, it is clearly based on the respondent's experience, and such experience has been generated from working within an organisation dominated by a traditional functional and paper-based system, both of which have contributed to the isolation of organisational departments and the prevention of information sharing. However, under the proposed framework, an electronic central database linked directly with the regional offices and their projects has been suggested. Thus, information about every project in terms of its costs, duration, construction plans, progress, resources (materials, equipment, and human) available or needed with their programmes, should periodically be updated and uploaded to this database. As declared by R1, R4, R5, R7, and R10, the planning unit, whether in the project, regional, or head office, should be the main entity responsible for monitoring, reporting, updating, and maintaining project information. Accordingly, any information regarding equipment availability, distribution or the work programmed would be obtained from the Planning Director rather than the Machinery Director.

Consequently, it can be concluded that the CEO, Projects Director, Company Planning Director, Finance Director, Regional Manager, and Estimator are the key people that need to be engaged in reviewing the outputs at stage one and deciding on whether to bid for a new project.

7.4.3.4.2 Adjudication Review Meeting

In addition to the regional office members, represented by the Regional Manager, Estimator, and Regional Planner, R5 strongly stress the involvement of the CEO and Projects Director in the adjudication meeting in order to review the proposed method statement and programme, consider the assumptions made during the estimation, assess the potential risks, and decide on the most appropriate mark-up value. R5 argued that a Regional Manager usually knows the

status of projects for which he is responsible, yet there are other regional offices about whose projects the Regional Manager does not know. Nevertheless, the status of all company projects are known by headquarters and more precisely understood by the Projects Director. Some projects may be losing money and need financial support; this support should come from other projects. Thus, the key role for senior managers is to ensure that the estimate is accurate, to assess any risks, and decide on an appropriate mark-up value to cover the project overheads itself and generate a reasonable margin for profit. Part of this profit is used to support money-losing projects.

Interviewee R8 also confirmed that the CEO, Projects Director, Regional Manager, and Estimator are the key people who should attend the adjudication meeting. Moreover, R8 insisted on involving the Financial Manager from the regional office in order to provide information on the indirect costs spent by the regional office over a certain period. This is important in determining the right mark-up value. A similar opinion was also presented by R3:

> *"It is assumed that a person with financial knowledge should participate in the adjudication meeting in order to provide information on the indirect costs required to manage the project."* (R3)

Such a meeting, according to R3 should also include the Project Manager nominated to manage the project after obtaining the contract, the Estimator who has developed the bid proposal, the Regional Manager as the main individual responsible for all projects within his regional office, the Projects Director as the person responsible for all projects within the company, and the CEO. Moreover, in addition to the aforementioned people, both R1 and R7 also recommended involving the Planner in this meeting, who developed the pre-tender programme. Thus, based on the participants' views above, it can be concluded that the CEO, Projects Director, Regional Finance Manager, Regional Manager, Estimator, Regional Planner and Project Manager are the key members that should be involved in the adjudication meeting.

7.4.3.4.3 Tender Performance Review Meeting

All the participants asserted the importance of evaluating the tender performance after each attempt to submit a bid. However, they explained that this assessment would be more useful if it is conducted after obtaining the results of the submitted tender. R1 declared that the Regional Manager and Estimator are the key responsible members for evaluating the tender performance and improving all processes within the bidding phase. Whereas, participant R7 recommended

that such a meeting should include all the bid team members and be chaired by the Regional Manager:

> *"I believe the evaluation of a tender performance meeting should be chaired by the Regional Manager and attended by all key people [who] participated in developing the bid proposal."* (R7)

This view was also shared by both R5 and R1. Moreover, most of the interviewees insisted on the necessity of reviewing the results of the tender performance evaluation report by the senior management and sharing them with other regional offices.

As a summary of the participants' views, it can be said that the Regional Manager and key bid team members (Estimator, Planner, and Project Manager) are the key people responsible for reviewing and evaluating the tender performance. Yet, as R5 commented, this review meeting should be considered a performance review point to assess the entire bidding process rather than as a decision-making point to decide whether to move forward to next stage. This is because such a decision, as reported earlier, mainly depends on the client in terms of whether they accept or decline the company's submitted tender.

7.4.3.4.4 Clarification Review Meeting

The clarification meeting stage gate aims to ensure that the most important arrangements required to commence the mobilisation stage are achieved. Interviewees confirmed that this review meeting should be held at the regional management level. In this context, R4 stated:

> *"As I said a little while ago, I prefer [that] the pre-construction planning process is conducted at the regional management level; therefore, I prefer all the sage gates within the pre-construction planning phase to be controlled by personnel from this management level."* (R4)

A more specific statement was also offered by R10:

> *"Here at this stage gate you need to involve the Regional Manager as the main [person] responsible for all projects within his regional office, the Project Manager, who would manage the construction works, the Regional Planner, who would develop the execution project plan, and the Buyer, who would be responsible for procurements. Yes those, I believe, are the key people required to be in this meeting."* (R10)

7.4.3.4.5 Kick-off Review Meeting

Although R2 recommended the involvement of both the CEO and the Projects Director in the kick-off review meeting (being the main coordinators for the whole company's resources) this view was rejected by most other participants. R5, for instance, claimed that reviewing and adjusting the project plans is deemed to be work detail, which is not a responsibility of the senior managers. Whereas, R3 justified his rejection by saying:

> *"The main project needs should be identified and discussed with the corporate senior managers at an early stage of the bidding process. So the main project requirements are known for them, and what we really need is just an update of their information through a report."* (R3)

Accordingly, R3 identified that the Regional Manager, Regional Planner, Regional Buyer, Project Manager, and Project Engineer are the key people needed at this meeting. Similarly, R4 declared that it is important to include the Regional Manager, Regional Planner, and Project Manager with the management team at this meeting. Meanwhile, in addition to the key people proposed by R3 and R4, both R1 and R6 recommended the involvement of the Regional Finance Manager. Therefore, this meeting would involve the key functional area managers in the regional office (Regional Manager, Regional Planner, Regional Buyer, Regional Finance Manager) in addition to the Project Manager and Project Engineer.

7.4.3.4.6 Construction Starting Review Meeting

This review meeting aims to check and ensure that all the essential requirements to commence the physical construction work on site are available. According to R1, the Regional Manager, Regional Buyer, Project Manager, Project Planner, and Project Engineer should be the key people involved in this meeting. Similarly, R7 said that such a meeting should include the Regional Manager, Regional Buyer, Project Manager, Project Engineer and Project Task Team Leaders. Whereas, R4 claimed that this meeting would be fruitful if it involved the client's representative and the potential sub-contractors and suppliers, in addition to the aforementioned key company personnel.

7.4.3.4.7 Package Completion Review Meeting

Before moving to the close out phase activities, it is important to ensure that all of the project deliverables have been executed as agreed and accepted by the client's representative. This function, as interviewees R3 and R4 asserted, is the core of the project management teams'

responsibilities. Thus, R3 and R4 strongly recommended that a package completion review meeting includes all the key people directly engaged in the execution works, such as the Project Manager, Task Team Leaders, Project Planner and Project Engineer. R4 also stated:

> *"In addition to checking the accomplishment of all project deliverables and work packages, this meeting should also be employed by the Project Manager as a tool to document all good and bad practices, experiences, and decisions adopted by project's team or any problems they faced throughout the execution phase."* (R4).

Similarly, interviewee R10 felt that:

> *"As long as the execution authority is delegated to the project management team, the Project Manager and his key team members would be the main [individuals] responsible for checking and ensuring that all the project items are completed and formally accepted by the client."* (R10)

Thus, the Project Manager, Project Engineer, Project Planner and Task Team Leaders can be seen as the main people who would be involved in the package completion review meeting.

7.4.3.4.8 Project Performance Review Meeting

The addition of this stage gate, as explained earlier, was proposed by R5. Its key purpose is to check the project outcomes, to review and evaluate the entire process performance, and to assess all practices and decisions made from the starting point of the operational process to its end. Interviewee R5 strongly emphasised that such a meeting has to include the CEO, Projects Director, Finance Director, the Regional Manager, Estimator and Project Manager.

Figure 7-12 illustrates the transformational organisational framework, proposed to improve the performance of IQGCCs, after conducting the required amendments to the main people involved in the stage review meetings, as suggested by the interviewees.

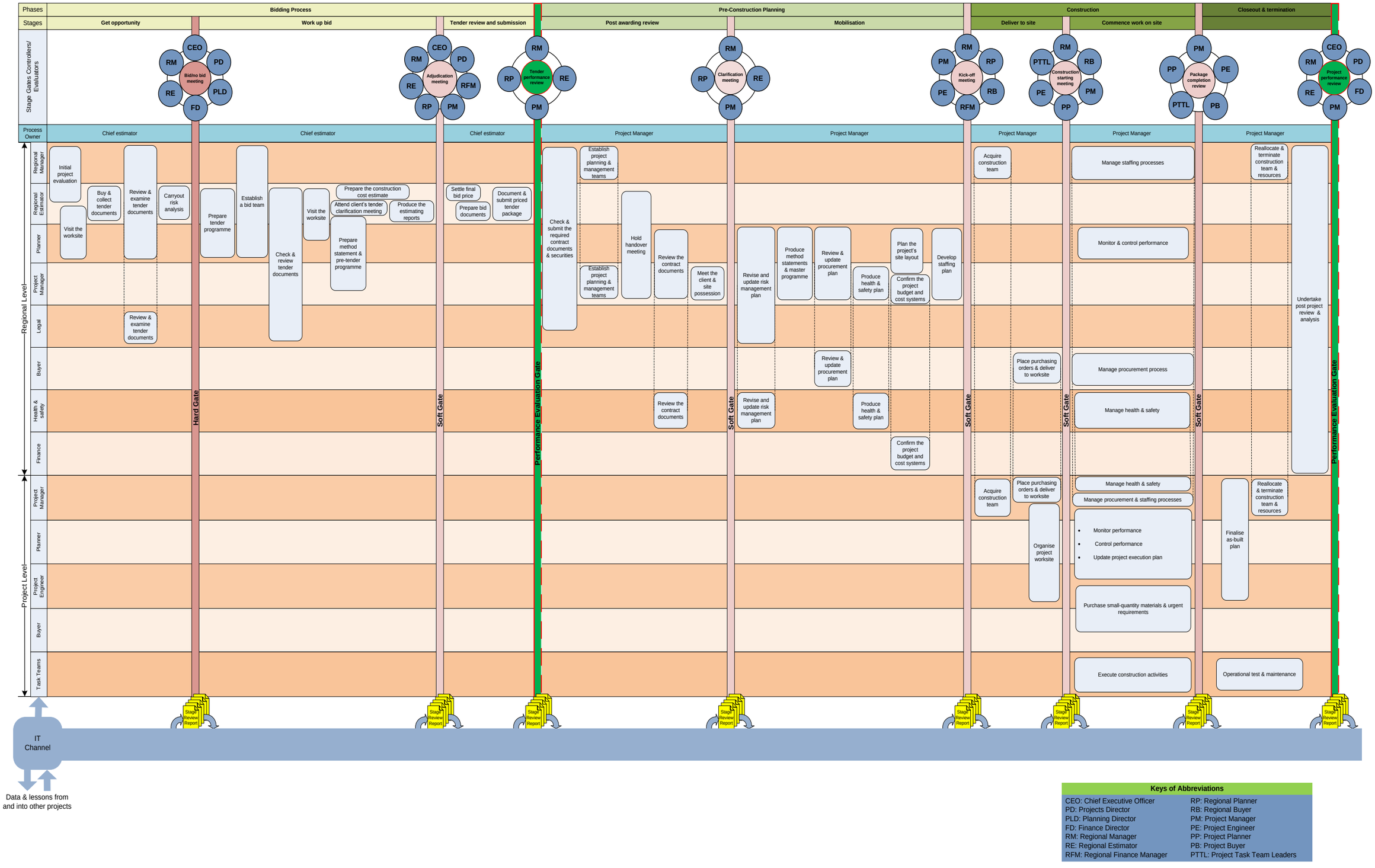


Figure 7-12: IQGCCs' transformational organisational framework after adjusting the gates controllers/evaluators

7.4.3.5 Process Owner

Although the participants, in general, stressed the importance of defining clear roles and responsibilities for personnel and holding them accountable for their work results, they did not give a clear and definite answer regarding the process owners or who should take full responsibility for the end to end processes, such as the bidding process, and hold accountability for its results. For instance, in their response to the question, "*Do you think that the Estimator should be the owner of the bidding process, who take full responsible for the bidding process and hold the accountability for its result?*" R4 said:

> *"No, it is not the Estimator; the Estimator gives you the prices. I think there is nothing wrong with assigning a new team leader for every new contract that the company wishes to bid for"* (R4)

Similarly, interviewee R3 commented:

> *"Look, if the responsibilities have not clearly been identified and the bid team remains without a responsible [individual] for managing and following up the team tasks, success would not be achieved."* (R3)

Analysing the collected data in relation to the roles and responsibilities of the various internal stakeholders, power distributions, and key people involved in the stage review meetings, reflected that the Regional Estimator is the main individual responsible and accountable for the bidding process, while the Project Manager seems to be the main individual responsible and accountable for the core business process from the time of awarding the contract to the end of the closeout phase. This, indeed, aligns with what has been identified within the literature review and depicted in the proposed theoretical framework. Accordingly, no amendment would be made to the framework in terms of the proposed process owners. However, this is just a conclusion obtained in light of the outcomes from the data analysis and may need further verification via the next stage of validation.

7.4.3.6 Stage Review Reports

Interestingly, although the respondents strongly advocated the production of a stage review report after checking and reviewing the processes outputs at the end of each stage, they disagreed on sharing information from these reports with the whole organisation unless the outcome of the entire process is obtained and an in-depth review of the process performance is conducted:

> *"Producing an evaluation report at each stage gate is absolutely a good thing. But my note is on the timing of sharing these reports and circulating them to the whole company. It is supposed that the report information should not be circulated until the completion of the whole process series and its final outcomes obtained."* (R3).

> *"It would be very useful to produce such stage review reports and share their information, yet the information in the reports should be shared only after obtaining the final outcomes of a process, such as the final result of the bidding process and submitted tender."* (R4)

This view was, indeed, supported by most of the participants, including R5, R7, R8, and R10. Moreover, they agreed on two certain points across the core business process series where the outcomes, performance review reports and summaries of stage review reports should be shared with the whole company and be accessible for the internal stakeholders. As R3, R4, R7, R8, and R10 professed, the first point for sharing the report's information should be after obtaining the results of the submitted tender and following an evaluation of the bidding process performance and practices. In comparison, the second point should be after closing the project. R10 justified this by saying:

> *"With the end of a particular process and the appearance of its results, it is assumed that all the issues related to that process have been understood. Therefore, all the problems, successful or unsuccessful adopted practices, in addition to the strengths and weaknesses of the process can be clearly defined and diagnosed. Thus, circulating such analysis and study would be more useful rather than sharing practices and information that have not been tested yet."* (R10)

R4 also claimed that the stage review reports can involve information on newly applied innovations where their impact on the final outcomes is not yet known. Therefore, sharing such information would not serve the company unless the impact of those innovations on the outcomes is evaluated and the good innovations are clearly identified and distinguished from the harmful ones. Similarly, R3 confirmed that the shared reports should be based on a comprehensive analysis and evaluation of all practices employed and the decisions made through carrying out the process, taking into consideration the general business conditions within which that process is performed. Thus, the views regarding the conduct of a comprehensive review and evaluation of the entire process performance after obtaining the results of submitted bid and following the close-out of a project, supports R5's suggestion to

establish outcome stage gates, as discussed under subsection 7.4.3.3. Accordingly, the proposed framework was amended to correspond with the interviewees' perspectives, as illustrated in Figure 7-13. Moreover, this amendment can also be considered the last adjustment to the proposed framework before being taken forward for further confirmation through the next stage of validation. Meanwhile, the next sub-section is dedicated to presenting the outcomes of testing the applicability of the proposed organisational structure in light of the changes to the operational processes of IQGCCs.

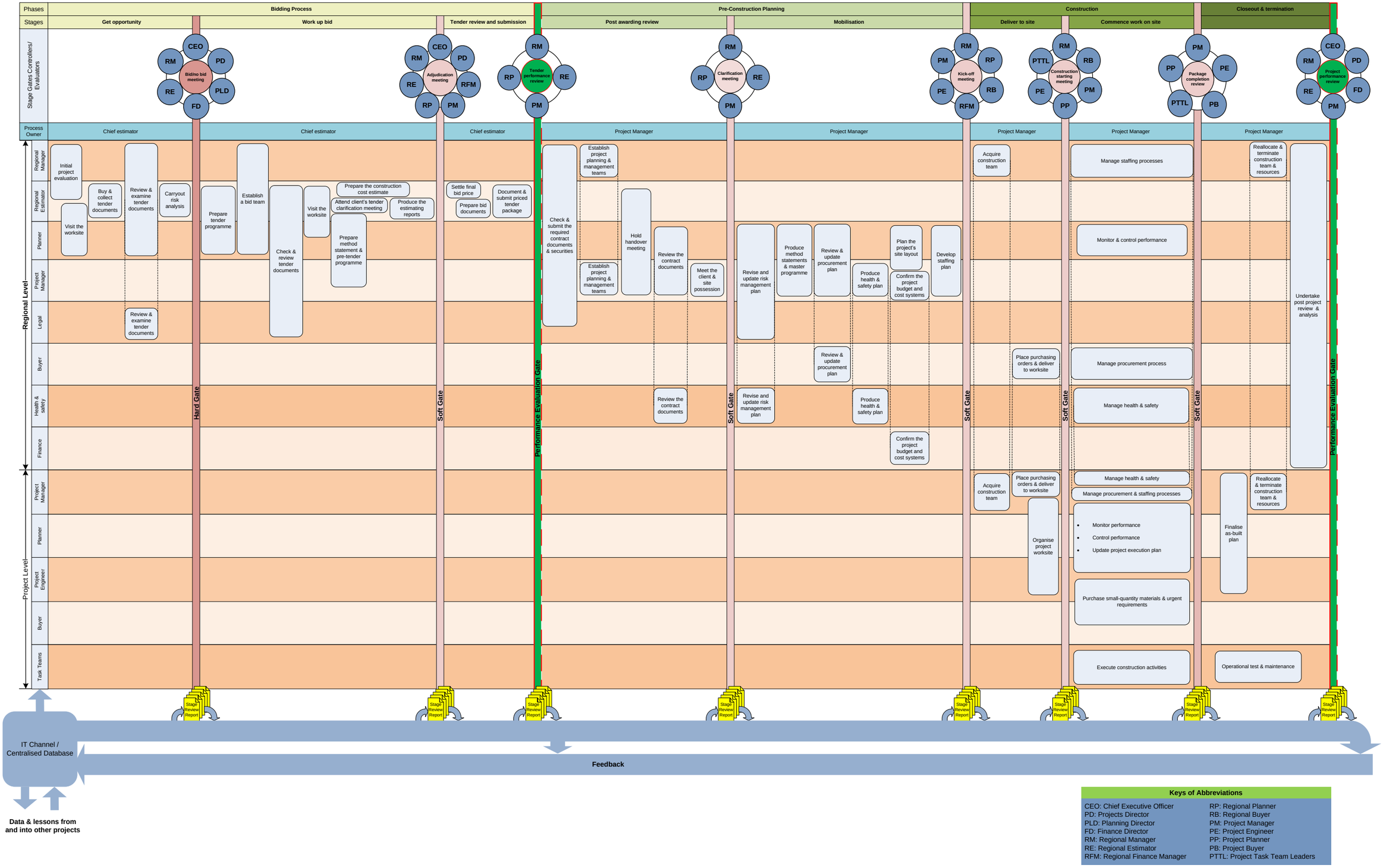


Figure 7-13: IQGCCs' transformational organisational framework after adjusting the times of sharing stage review reports

7.4.3.7 Organisational Structure

The transformational organisational framework clearly identified the key internal stakeholders and their roles and responsibilities in performing the core business process. However, it was important to understand how these stakeholders should be arranged and structured within these organisations, particularly if they run businesses in more than one field, which is the case with most IQGCCs. Moreover, the framework mainly focused on the operational process and thus sought to identify the key functional areas involved in executing this type of processes. However, there were other managing and supporting functional areas that needed to be determined or relocated within the organisational structure in order to facilitate the execution of the operational processes. Accordingly, with the aim of identifying the most realistic organisational structure to fit the newly designed operational processes of IQGCCs and their needs, the participants were invited to examine and make the required changes to the proposed organisational structure, illustrated in Figure 4-22. This included adding new essential functional areas, eliminating unnecessary ones, and restructuring their locations. As a result, interviewees suggested a number of changes to the proposed organisational structure in order to make it more appropriate to the IQGCCs' context.

A number of respondents, including R5, R8, and R10, insisted on the importance of the presence of a machinery department at the company headquarters to take responsibility for procuring the equipment and plant, following up their productivity, and coordinating their distribution among the regional offices. R5 and R8 also emphasised the addition of an auditing unit at each regional office to take full responsibility for auditing and checking the financial transactions and bargains; currently, this function is centralised. All the auditing units are linked to the auditing section at the headquarters, which would be responsible for following up the actions of the auditing units and relocated under the finance and commercial department. Such measures, as R8 claimed, are important in reducing the red tape and accelerating processes.

In supposing that a company runs its businesses in more than one field, for example roads and bridges, buildings, water and sewage, most of the interviewees confirmed the validity of appointing a Director for each business field. They would be responsible for following up all company projects within their field, as depicted in Figure 4-22. Nevertheless, respondents declined the suggestion to establish regional offices for each field of business. Instead, they preferred every regional office to include experts, experienced staff and specialised equipment

for each of the company's fields of operation. A useful comment in this context was provided by R2:

> *"I think it would be much better if a regional office is designed to run in more than one business field, rather than opening a regional office for every field. In this case, we will need an experienced Estimator in the field of roads and bridges and another specialised in the building field. We will also need a Planner specialised in road projects and another in buildings, and thus in relation to staff and equipment. As for the supporting functional areas, such as administration, accounting, legal, purchasing, etc., they can as units to service and support all the projects within the regional office regardless of their field."* (R2)

Similarly, R7 suggested establishing a technical section within each regional office involving expert Estimators and Planners from different business fields. This view was also supported by R3, R4, and R8.

Moreover, the data analysis relating to the key internal stakeholders involved in performing the core business processes also led to further amendments to the proposed organisational structure. These included: removing the Designer, Contracts Manager, and Commercial Manager, either because they were not needed, such as the Designer, or because interviewees preferred their roles to be achieved by other internal stakeholders, such as with the Contracts Manager and Commercial Manager at the regional level. R10 also confirmed the need for a warehouse unit in each regional office to take responsibility for managing the inventory. Meanwhile, R4 argued that the responsibility for managing and monitoring health and safety on site should be part of the Project Manager's responsibilities and the Health and Safety Manager. As a result, R4 claimed that there is no need to assign a health and safety employee on site.

All the aforementioned changes, as suggested by the interviewees, were reflected in Figure 7-15, which provides an amended organisational structure that will be taken forward for confirmation in the next round of interviews.

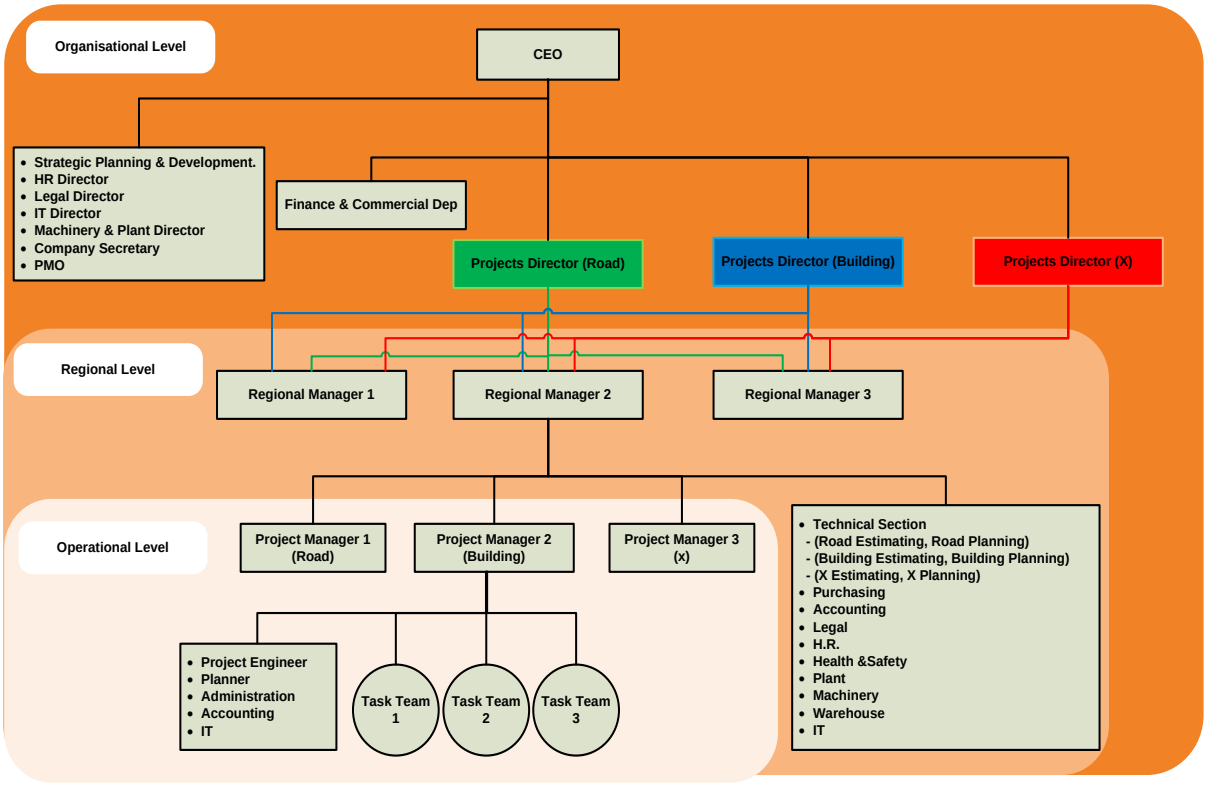


Figure 7-15: The adjusted organisational structure of IQGCCs

Indeed, one of the key features of employing BPM as a tool for organisational change, as explained in section 3.4.5, is the idea of building on and transferring for what already exists without the need to start all over from scratch. Thus, the comparison between the new proposed organisational structure and those that are currently used by IQGCCs such as in Figures (6-1, 6-2 and 6-15), shows that the new proposed organisational structure was almost built on the similar management layers, functional areas and units settled in the current ones. However, the big transform happened to the roles, responsibilities, reporting line and authority awarded to the internal stakeholders grouped under these management layers and functional areas. This was along with the manner in which those stakeholders are structured together around the operational process through multidisciplinary teams to increase the coordination and integration among the various functions areas and thus enhance the process efficiency. More discussions regarding the features of the new proposed organisational structure are presented in section 7.4.3.8.5. Whereas, further details about the new key roles and responsibilities of the various management layer and internal stakeholders involved in carrying out operational process are reflected in Figures 7-8 and 7-13 respectively.

7.4.3.8 Discussion of Element Three: Management

As exposed by the exploratory study phase, and summarised in Table 6-9, many of the challenges in IQGCCs' current practices are attributed to the management factor. However, most of these challenges can be solved through employing business process orientated elements that are captured and synthesised within the proposed framework. This section discusses the participants' perspectives regarding the adoption of these elements in order to overcome the management challenges in the IQGCCs' current practices.

7.4.3.8.1 Process View

A critical driver to improve an organisation's performance, as identified by Skrinjar *et al.* (2010), is that every individual in the organisation should have a clear view of the firm's common processes and a precise understanding of their roles in the processes and how that associates with building the bigger picture. This, unfortunately, does not seem to be the case in IQGCCs, as identified and explained in Chapter Six. Such issues can generally be solved through increasing the process view in these organisations. However, this necessitates the production of an effective and thorough organisational process map that clearly documents the organisation's business process. This is considered the first dimension in the business process orientation and a prerequisite for managing an organisation based on its processes (Kohlbacher, 2010). Such an approach allows, and even encourages, employees to look beyond their own tasks and the boundaries of their departments to consider any deficiencies and bottlenecks in the whole business process (McCormack, 2007). Willaert *et al.* (2007) further stress that good process documentation becomes the basis for process performance measurement, analysis and improvement. Moreover, Tang *et al.* (2013) argue that the process view offers internal stakeholders from different expertise, a common language and a solid platform to cooperate and interact with each other under the same goal and objectives. It visually shows them the role of each stakeholder in the business process and how they work together to produce a final product or service (Bernstein & Singh, 2006). This can facilitate an understanding of the interdependencies among the various organisational departments, which gives employees an incentive for solving differences and enhancing cooperation whilst also encouraging them to work together towards common goals and thereby improve cross-functional integration and overall performance (Kahn & Mentzer, 2008). Nilsson (2006) also asserts that process view is particularly important for multi-project organisations, such as construction companies, since it forms a cornerstone for managing these organisations in an effective manner through classifying, organising, and improving project processes. It enables construction companies to

focus more on value creation, waste elimination and thus improve efficiency (Lee *et al*., 2007). Additionally, as discussed in sections 3.7.4 and 4.3 without having a clear process view and a generic business process framework for delivering new built products, construction companies can lose their path towards their desired goals due to forgetting key steps. Where each individual project would be mainly managed based on the experience and competence of its assigned project manager.

Consequently, particular attention was paid, through the proposed framework, to documenting and visually representing the core business processes that should be adopted by IQGCCs in order to successfully deliver their projects. The in-depth interviews with experts from various IQGCCs' management layers led to the production of the most applicable version of core business processes for these companies. This process is designed to streamline the value chain of IQGCCs and add value to the customer. Therefore, most of the non-value added activities identified in the IQGCCs' current practices were eliminated. Meanwhile, a number of essential activities, as recognised in good practice, were added to IQGCCs' operational processes with the aim of increasing their quality, effectiveness and efficiency.

7.4.3.8.2 Process Job and Multidisciplinary Team

The interviewees showed a strong advocacy to employ multidisciplinary teams in executing the different processes. Yet this, as recommended by the participants, needs to be conducted within the traditional structure of their companies in order to achieve better control over their businesses. This is, indeed, aligned with the business process orientation's principles, which consider cross-functional teams as a basic unit for performing processes (Skrinjar *et al.*, 2010). Willaert *et al*. (2007) also argue that cross-functional integration endeavours are essential for official functional areas. Similarly, Johnson and McCormack (2011) argue that levels of success are dependent on the extent to which the organisation is horizontally and vertically integrated. Thus, rather than completely replacing their traditional hierarchy with process-based structures, companies may prefer to redesign their processes and organisational structures in a way that allows the combination of the specialisation of a functional structure with the responsiveness of a process-based one (Neubauer, 2009; Skrinjar & Trkman, 2013). This can usually be achieved through formulating multidisciplinary (task-focused) teams that work on synchrony and the integration of processes across traditional functional silo boundaries and end with the customer (Willaert *et al*., 2007; Shtub & Karni, 2010; Skrinjar & Trkman, 2013). This meaning was also expressed by a number of respondents from IQGCCs, who reported that employing multidisciplinary teams to perform processes can reduce bureaucratic procedures, enhance

problem-solving and foster coordination and knowledge share between employees from different functional areas. Similarly, Johnson and McCormack (2011) and Tang *et al*. (2013) empirically evidenced that assigning stakeholders from different departments in a team with common goals and objectives would lead to an increase in cross-functional integration to a high level. Moreover, it would eliminate the sequence of tasks with hand-offs between the various functions, reducing the conflict between stakeholders and enhancing the overall organisational performance. Thus to improve the performance of construction process, the multidisciplinary team technique was strongly recommended by both of Latham (1994) and Egan (1998). Furthermore, it has been one of the key elements for several process performance improvement methods and models, such as Concurrent Engineering (CE), Integration Product Development (IPD), The Generic Design and Construction Process Protocol (GDCPP).

Accordingly, one of the essential anticipated results of adopting a business process orientation is the reinforcement of cross-functional integration. Troy *et al*. (2008) described cross-functional integration as the degree of interaction, communication, information sharing, and coordination across departmental boundaries. Turkulainen and Ketokivi (2012) profess that cross-functional integration encourages employees to obtain a comprehensive overview of business processes and promotes the reduction of functional sub-optimisation within organisations that is inherent in the traditional system. Rather than being directed by narrow departmental objectives or cost minimisation, in organisations with a high level of cross-functional integration, employee activities are generally driven by the customers' needs and organisation-wide values (Johnson & McCormack, 2011; Tang *et al*., 2013).

7.4.3.8.3 Process Owner

One of most important advantages that can be gained from adopting the business process as an alternative to the hierarchy is the emphasis on appointing responsibility (Campos & de Almeida, 2015). Under the process view of management, every business process has to have a process owner who takes overall responsibility for the horizontal overview of the process from end to end. (Kohlbacher & Reijers, 2013; Rangiha *et al.,* 2015). This element is significant in solving the challenges of poor coherence and integration amongst the various functional departments of IQGCCs that stem from the absence of the process owner who takes the overall responsibility for a process. However, interviewees appeared to misunderstand the roles of a process owner; this may be attributed to the lack of adoption of process principles in general and the process owner specifically within IQGCCs.

The process owner, as professed by Hammer (2007a), is primarily accountable for the results of the process, which can have a direct effect on the customer. Their main role is to thereby ensure that all activities and tasks within the process are performed as planned. Furthermore, the process owner has additional responsibility for designing and continuously improving their assigned processes, measuring their performance and ensuring that all are running smoothly and effectively (Campos & de Almeida, 2015). Willaert *et al*. (2007) further suggests that the role of the process owner can be assigned to anyone within the organisational hierarchy, thus it does not necessarily lead to the emergence of new managerial functions. Willaert *et al*. (2007) espouse that, in some organisations, it is common practice for certain employees to occupy multiple managerial roles. In this context, a senior manager, for example, could be both the manager of a certain functional area and the manager of an end-to-end process. In comparison, the process owner, or equivalent, has to be given a certain level of autonomy in the decision-making and power required to take all measures necessary to coordinate and improve the business process (Hinterhuber, 1995; Hammer, 2007a; Willaert *et al*., 2007; Kohlbacher & Reijers, 2013; Rangiha *et al.,* 2015).

Analysing the data concerning the roles and responsibilities of people involved in performing the redesigned operational processes of IQGCCs and the decision-making revealed that the Regional Estimator should be the process owner for the bidding process. Meanwhile, the Project Manager is the process owner of the operational process from the time of awarding the contract to the end of the closeout phase. This corresponds with what has been recognised in mapping the good practice processes of large construction companies in Chapter Four.

7.4.3.8.4 Stage Gate and Review Report

Examining the IQGCCs' current practices also revealed that the procedures adopted in developing the most critical decisions are incompetent, and there is a clear neglect regarding the review and analysis of project deliverables and outcomes, whether throughout the process or after the project completion. In order to overcome these problems and further improve the decision-making process and the overall organisational performance, the proposed framework included using stage-gate processes proposed by Cooper (1994). Stage gates can be seen as decision points that involve a collection of predefined standards or deliverables that must or should be met by the process at certain points in time in order to proceed to the next stage of development (Cooper *et al.,* 2005). Interviews with experts from IQGCCs showed a strong acceptance of the concept of stage gates in improving the operational processes of IQGCCs (see section 7.4.3.3). However, interviewees proposed some changes to the type of stage gates, and

the people involved in controlling them as explained and justified in details under sections 7.4.3.3 and 7.4.3.4 respectively. Moreover, the interviewees, as presented in section 7.4.3.6, also confirmed the importance of producing a review report at every stage gate as it provides management with an effective means to record and update the project experiences throughout the process. Besides, such information can be used later as lessons learnt to improve both the subsequent phases and the future projects. However, participants recommended that the data from the review reports should only be shared with other regional offices and projects when the results of an end-to-end process are obtained and a performance evaluation of this process is done.

In fact, the philosophy of stage-gate processes, or phase reviews, was developed first in the manufacturing industry and has succeeded in improving the traditional chaotic, *ad hoc* approach of manufacturing (Cooper, 1994). Accordingly, and as an attempt to improve the construction industry this philosophy has been employed in developing a number of frameworks, such as the OGC Construction Procurement Framework, and The Generic Design and Construction Process Protocol (GDCPP), as explained in Chapter Three.

Moreover, it is important to mention that critical to the success in any business process orientation effort is the measurement and evaluation of the efficiency of the process itself rather than the departmental performance (Vuksic *et al.*, 2013). This is because, what is not measured cannot be controlled, managed, or improved (Davies & Davies, 2016). Furthermore, concentrating on measuring the performance of the processes rather than the functions would enhance the alignment and common focus across different organisational functions (Hammer, 2007b). It encourages personnel to focus on improving the overall performance of the business process instead of focusing on their departments' performance (Kohlbacher, 2010). Indeed, this requires organisations to identify a set of Key Performance Indicators (KPI) for every key business process and to develop a management system to track, communicate and improve their performances (von Rosing *et al.*, 2015a). Although the identification of such indicators for IQGCCs is beyond the scope of this research, however as discussed in section 6.7, the researcher suggested employing cost, time and quality as the main indicators to measure the performance of the designed processes depicted in the conceptual transformational organisational framework.

7.4.3.8.5 Organisational Structure

A critical dimension for successfully managing an organisation through the adoption of a process thinking approach is to redesign its organisational structure to fit the requirements of its redesigned operational processes (McCormack, 2007; Skrinjar *et al*., 2010). Willaert *et al*. (2007) claim that most companies adopting a process view are implementing some kind of matrix management structure that merges the horizontal and vertical methodologies through multidisciplinary teams. The multidisciplinary teams are responsible for performing activities within the value chains, or core business processes that directly add value to the customer. However, this calls for organisations to eliminate any unnecessary authorisation levels, which are often the main cause of the bottlenecks in the process (Trkman & McCormack, 2010).

Nevertheless, analysing the roles and responsibilities of the key internal stakeholders involved in the new operational process proposed for IQGCCs revealed that a hybrid organisational structure could be the most appropriate structure for these companies in order to manage their business processes in an effective and efficient way. Under this organisational form, IQGCCs would have three management layers, as shown in Figure 7-15. The top level includes a number of centralised functional areas, which are responsible for setting out the company's vision and goals along with drawing out the overall strategy for the company and monitoring the performance of regional offices. Regional offices, in contrast, would have a great level of authority and autonomy to manage their businesses independently in line with the company strategy. Each regional office has a number of functional operational units that are designed to execute special activities and become centres for training and a source of specialists. Yet, through adopting a matrix structure, they are also responsible for creating multidisciplinary teams, involving expert representatives, to undertake both the bidding and pre-construction planning process. Whereas, at the project level, IQGCCs would adopt a project-based management model where the project management team has a reasonable level of authority and independence in managing and controlling a project's resources. However, in order to increase control and reduce costs, it was recommended that the project's supply chains are managed through the regional units in coordination with the project management. Nevertheless, as explained in Chapter Three, the hybrid organisational structure seems to be the most appropriate organisational form for large construction companies, since it enables management to overcome several of the disadvantages inherent in other forms whilst simultaneously combining many of their advantages.

7.4.4 Element Four: Communication

In their responses to the question, "*What do you think of adopting an electronic system as an alternative to the existing paper system used by your company whether in communication or data store and maintain*?", most interviewees strongly advocated using an electronic system for the features that it can provide. Some comments in this regard are captured below:

> *"Absolutely: developing and adopting an electronic communication system would facilitate achieving works and saving time and cost."* (R4)

> *"Using the electronic system would reduce a lot of time, effort and cost."* (R3)

> *"Indeed, there is an urgent need to change our corporate governance system and adopt an electronic system in formal communication as an alternative to the currently manual paper-driven ones."* (R5)

Interviewee R8 also argued that, having an electronic database that included up to date information regarding best practices, constructions methods, material prices, qualified subcontractors and vendors, and key competitors in every regional area and field of work, would certainly facilitate and accelerate the work execution, improve its quality, and reduce costs. Meanwhile, R7 recommended establishing a database within a central electronic system linking the company's headquarters to the regional offices and projects within each regional office. Thus, the company's senior and regional managers could electronically review the periodical project reports and efficiently monitor their progress, plans, practices, needs and general performances. Storing such reports on an electronic database, as R7 confirmed, could facilitate information access and sharing across the companies' regional offices and projects.

Nevertheless, a number of participants argued that the adoption of the electronic system should not completely eliminate the paper system. According to the R3's point of view, the paper-based systems are needed to archive important documents for fear of damage to the electronic system. Whereas, R9 claimed that, although the electronic system can be utilised locally to facilitate and improve internal communication, the paper-based system remains effective for external communication as long as the electronic driven system is not employed by other organisations.

7.4.4.1 Discussion of Element Four: Communication

The analysis of the IQGCCs' current practices revealed that one of the key reasons for the delay and increasing cost of works is related to the means of communication adopted by these

companies, which is manually driven and paper based. Nevertheless, resolving this problem, as identified through the literature section 3.9 and confirmed by the IQGCCs' experts, can be achieved through using an information communication technology driven system (ICT) as a substitute for the existing one. In other words, a transition from the paper based formal letter to an electronic communication method was suggested by establishing, for instance, a central database, that links all the company's units and projects and is accessible to the stakeholders. It was felt that this could substantially accelerate operations, reduce costs, and improve the quality of communication through providing quick, reliable, and vigorous communication routes (Alshawi, 2007). The interviewees, as discussed above, further proved this view.

Moreover, interviewees suggested that Information Technology (IT) could not only facilitate and enable the implementation of the processes, but also offer effective tools for storing and maintaining project data in an organised and efficient way. Reports and other relevant documents developed throughout the execution of the business processes can be stored on IT systems to be examined and presented in different views (Al-Atawi, 2005). Such data and information would be crucial for drawing lessons and educating organisations on their experiences, whether they are successful or unsuccessful, and applying those lessons-learnt to future projects (Westland, 2006; Paranagamage *et al.*, 2012; Vignos, 2014; Khol, 2016). Thus, establishing an electronic database that is updated with information on an ongoing basis through reports produced at each stage gate review can offer an effective solution to the decision-making process, and in learning lessons from experiences to share them with the company's units and projects. According to a number of interviewees, an electronic database can significantly reduce the cost, time and effort required to store a large amount of paper-based documents and facilitate the accessibility and data exchange across all the organisation.

7.4.5 Summary of the Solutions to the Challenges Inherent in the IQGCCs' Operational Processes

The data analysis and subsequent discussions concerning the applicability of the proposals showed that this framework could provide vital solutions to most of the existing challenges within the IQGCCs' current practices. These solutions were summarised and presented in Table 7-3.

Table 7-3: Solutions to the challenges of the IQGCCs' current processes

Key sources of challenges	Challenges	Solutions
Government restrictions	• Restricting the ultimate authorities and veto powers at the highest management level represented by the Minister and CEOs. • Stipulating the use of formal letter (hard copy papers) as the only acceptable means of official communications. • Subjecting IQGCCs to a substantial amount of governmental legislations and regulatory procedures that prevent them from exercising their business as independent entities seeking to generate profit. • Increasing the inflexibility, rigidity, and red-tape.	• There is an urgent need to change a number of government regulations that hinder the efficacy of IQGCCs and prevent them from work flexibly. Yet changing of these regulations is outside the scope of this research. • Reducing inspection procedures. • It is important to consider Iraqi QGCCs as profit-seeking companies, managed independently and not subject to the current governmental regulations and/or political interference in the commercial operations or strategic planning.
Authority	• The ultimate authority is placed in the top management. Almost all the decisions have to be ratified by the CEO. • The powers granted to the regional offices managements and projects managements are almost non-existent.	Breaking down the functional hierarchy structure through: • Redesigning employees' jobs around the core business processes. • Enhancing horizontal authority and empowering employees to manage their business processes in a way that creates self-responsibility and promotes self-efficacy. • Identifying a process owner for each process who has the authority and responsibility to manage and improve processes and be accountable for results.
Management	• Companies are managed through a traditional system dominated by centralised control, hierarchical structure, bureaucratic procedures and red tape. • Lack of understanding amongst employees at different management levels as to their real roles and responsibilities. • Distributing the process activities to several isolated departments has led to the enhancement of functional sub-optimisation and prevented employees from viewing and understanding the business processes beyond the boundaries of their departments. • Duplication of tasks. • The mechanisms and processes of decision-making are inefficient. • Lack of coherence and integration amongst the various functional departments due to the absence of a process owner who takes overall responsibility for a process. • The incompetence of the pre-construction plans and measures taken in monitoring and controlling the construction works. • No clear review stages to evaluate the results and to obtain feedback across the operational process. • Complicating the process through involving several auditing entities.	• Focusing on improving the core business process as a key vehicle for organisational management. • Documenting and mapping the business processes to enable every employee in the company to have a clear view of the firm's common processes and a precise understanding of his/her roles in the processes and how that associates with the organisations operations. • Increasing cross-functional integration through establishing multidisciplinary teams, which combine expertise from different functional areas to manage and undertake processes. • Assigning a process owner for every process, who takes overall responsibility and accountability for the horizontal overview of the process, from end to end. • Streamlining processes by eliminating non-value added activities and maximising those that have value. • Establishing stage gates to control and evaluate the progress of the process and its outcomes at certain points, based on predefined criteria and/or measurements. • Redesigning companies' organisational structures to fit with their new operational processes.
Communication	• Mainly based on a manually driven process through utilising formal letters as the only accepted means of communication. • Lateral communication between departments seems to be non-existent. • Inevitable human errors arising at various levels.	• Adopting an information communication technology-driven system (ICT) as a substitute for the existing paper-based ones. • Establishing multidisciplinary teams supported by ICT would enhance the horizontal communications and coordination amongst the functional areas. • Establishing an electronic database to facilitate the maintenance of the data produced throughout execution the business processes, and sharing them with the company's projects and units.

7.5 Summary

Through step-by-step qualitative data analysis, this chapter developed a transformational organisational framework that is appropriate to the IQGCCs' context. The framework aims to provide a step change improvement in IQGCCs' performances through rectifying the challenges highlighted in their current practice. This chapter provided a brief description of the development of the interview questions, the characteristics of the participants, and the procedure employed in collecting the data required to test the applicability and validity of the proposed theoretical framework in the local IQGCC context.

The field-collected data was carefully examined using thematic analysis. Data were analysed and discussed under four key factors, namely: government restrictions, authority distribution, management, and communication system. The analysed data confirmed the validity of the results obtained from the exploratory study phase and most of the solutions proposed through the theoretical framework. Nevertheless, it also provided a number of changes and amendments to some elements of the proposed framework with the aim of making it more applicable to IQGCCs. All the suggested amendments were discussed, justified and then graphically adjusted on the framework. A discussion of the results and solutions to overcome the deficiencies within IQGCCs' current practice was undertaken after analysing the data related to the various themes embedded under each key factor. As a result, a framework was produced that acts as a roadmap to streamline and continuously improve Iraqi QGCCs' core business processes. Moreover, the results also produced a new organisational structure for IQGCCs to fit their new operational processes. Finally, the solutions offered through the framework to address the existing challenges in IQGCCs' operational processes were summarised, tabulated, and presented in Table 7-4. The next chapter will further confirm the validity of the last version of the transformational organisational framework developed in this phase, and thereby produce the final framework for IQGCCs.

Chapter Eight - Validation of the IQGCCs' Conceptual Transformational Organisational Framework

8.1 Introduction

Throughout Chapter Seven the applicability of the proposed framework in the Iraqi QGCCs' local environment was tested and the framework subsequently resynthesised to fit the requirements of these companies. However, in order to reduce any bias that may have arisen from relying on a single category of respondents when testing the applicability of the framework, and to acquire a broader confirmation regarding the conceptual framework's validity, credibility, and applicability in practice, a third round of semi-structured interviews was conducted with interviewees from different spectra. Accordingly, this chapter presents the procedure adopted in conducting this round of interview, the results obtained from this exercise, and lastly, the details of the final recommended transformational organisational framework for IQGCCs.

8.2 Validation Process

The conceptual framework produced in Chapter Seven can be seen as the main contribution of this study. This framework was initially based on the literature review and then resynthesised according to the perspectives and feedback of interviewees from IQGCCs. In order to obtain further confirmation and a broader view regarding: 1) the completeness and validity of this conceptual framework; 2) the usefulness and possibility of its utilisation in practice to enhance the performance of IQGCCs; and 3) its clarity, a validation exercise was undertaken with four leading and highly qualified experts in the field of construction management.

Participants involved in the validation process were selected based on their criteria. Two of the interviewees were from higher education institutions, holding PhD degrees in construction management, and already engaged in projects to reform and improve the efficiency of Iraqi public and state-owned organisations. The third participant was a senior manager and selected for their position as a consultant in the Iraqi Ministry of Construction and Housing, which is considered the official owner of most IQGCCs. Finally, the fourth interviewee was a CEO Deputy of one of the IQGCCs and selected for their experience in the practices employed by their company in delivering construction projects. Table 8-1 illustrates the key information of the interviewees who participated in the validation exercise.

Table 8-1: Information on the interviewees involved in the framework validation interviews

Participant Name	Position / Role	Experience (years)	Organisation
RV1	Senior Manager / Consultant	28	The Iraqi Ministry of Construction and Housing
RV2	Lecturer	10	An Iraqi Higher Education Institution
RV3	Associate Dean	25	A UK Higher Education Institution
RV4	CEO Deputy	22	An IQGCC

The interviews were held face-to-face, at different times and locations, as designated by the participants. Employing a similar process to that used in the second round of data collection, participants were initially provided with a brief explanation of the research aims, objectives, assumptions, findings of the exploratory study phase, and solutions accepted in the conceptual framework. Thereafter, interviewees were invited to examine the conceptual framework in detail, illustrated in Figure 7-13, and asked to add, adjust, or remove any element or feature of the framework as required. Furthermore, focus was also placed on the major changes proposed to the theoretical framework and on certain points where conclusive opinion was not reached during the second round of interviews. Moreover, by the end of each interview, the participants were asked a number of questions to validate the framework's strategy in enhancing the performance of IQGCCs and the acceptance of the framework.

All interview sessions were conducted in Arabic and lasted for about an hour and half. The conversations with most respondents were recorded using an electronic recording device; however, one interviewee did not wish the interview to be recorded. The recorded data were then transcribed and analysed manually by using thematic analysis approach.

8.3 Results from the Validation

The interviewees were asked to examine and validate the conceptual framework, which was produced by adjusting the theoretical framework, as explained in Chapter Seven and depicted in Figure 7-13. As a result of this exercise, all four interviewees strongly agreed with all the framework elements, whilst providing a few recommendations to enhance its accuracy and clarity. These recommendations included:

1) Processes Recommendations

Interviewee RV2, who recommended adding the "report construction performance" process into the 'commence work on site' stage, offered the only proposed adjustment to the framework processes. Adding this process, as justified by the participant, is important in

increasing the clarity of the processes involved in managing the construction project and in making them more comprehensible for readers and potential users. Both RV3 and RV4 agreed with, and appreciated, this amendment:

> *"Good note, I would recommend adding it too."* (RV4)

2) Stakeholder Recommendations

With the aim of eliminating any confusion regarding the key stakeholders listed in the framework, interviewees RV1, RV2, and RV3 recommended redefining the stakeholders in a clearer way, so that readers can easily distinguish between the roles of personnel within regional offices and those who work on the projects at sites. For instance, to differentiate between the planner at the regional level and at the project level, it was suggested that they were redefined as the Regional Planner and Project Planner respectively.

Interviewee RV1 also suggested reflecting the role of the Regional Finance Manager in monitoring the project budget. This view was further supported by RV4:

> *"You have clearly shown the role of Project Manager and Planner in monitoring and controlling the project progress, but what about the project budget ... I would recommend involving the Finance Manager in the monitoring and controlling process as a reflection of his role in monitoring the budget of projects."* (RV1)

> *"It is the responsibility of the Financial Manager to monitor project expenditure and report them periodically to the project during the execution."* (RV4)

Meanwhile, RV2 declared that the Project Manager, Project Engineer and Project Planner are the key people involved in the process of 'report construction performance'. The final recommendation about the internal stakeholders was made by RV3, who recommended involving all key internal stakeholders, who have participated in developing the project, in undertaking the project post review and analysis.

> *"Since the main aim of undertaking a post project review is to draw and collect lessons-learned, the more people you involve, the more benefit you will get. Thus, I suggest including all the stakeholders in this process."* (RV3)

Offering a similar reason to that above, RV2 also encouraged the inclusion of the internal stakeholders, who are engaged in the operational process, in the post project review exercise so their experiences can be documented

1) **Stage gate Recommendations**

As part of the validation process, all respondents were asked to express their views regarding the type of stage gate with some focus on those amended by interviewee R5 in the second round of interviews (see subsection 7.4.3.3). Most interviewees, excepting RV2, agreed with the suggestions made by R5 with regard to changing the third stage gate (Tender performance review), from a hard to a performance evaluation gate, and adding a similar one at the end of the whole process. However, RV2 expressed a preference to keep the hard gate and to add a dotted line at the right end of the framework citing that this is used in the Generic Design and Construction Process Protocol (GDCPP). However, employing the GDCPP as a key initial notion to develop a framework for IQGCCs does not mean adhering strictly to the GDCPP methodology, but rather that the framework should be reshaped to fit the local context of IQGCCs. Accordingly, the suggestions proposed by R5 can be considered valid, particularly, after having been advocated by three of validation stage respondents.

However, all the interviewees confirmed that the gate at the end of the 'construction phase' should be hard rather than soft. Some of their statements on this point are as follows:

> *"It is a hard gate, because you cannot get into the closeout phase before ensuring that all the construction tasks have been done and accepted by the client. Yet, in terms of the partial handover for some project items, I believe that each item can be seen as a project that cannot be handed over unless it has been completed as agreed."* (RV1)

> *"I prefer a hard gate, since, after commencing the closeout process, going back again on the construction phase to complete some missed or unaccepted works items would be difficult and costly."* (RV2)

2) **Process owner Recommendations**

Both RV2 and RV3 strongly recommended considering both the Estimator and Project Manager as the key owners responsible and accountable for the core business process. Accordingly, the Estimator would be the main individual responsible and accountable for

the bidding process; whereas, the Project Manager would be responsible for managing all of the pre-construction, construction and closeout processes and would be accountable for their results. This view aligns with the findings from the literature review and the data analysis from the second round of interviews related to key people involved in performing processes.

Considering the recommendations mentioned above, the conceptual framework was adjusted to be more appropriate for Iraqi QGCCs. The final revised version of the framework is illustrated in Figure 8-1.

Moreover, the validation interviews also asked participants to express their perspectives regarding the framework's usefulness and capacity in improving the performance of IQGCCs, including its main advantages and disadvantages, and the ease in understanding and using the framework. Meanwhile, the final question related to the completeness of the framework, and interviewee feedback is illustrated in Table 8-2.

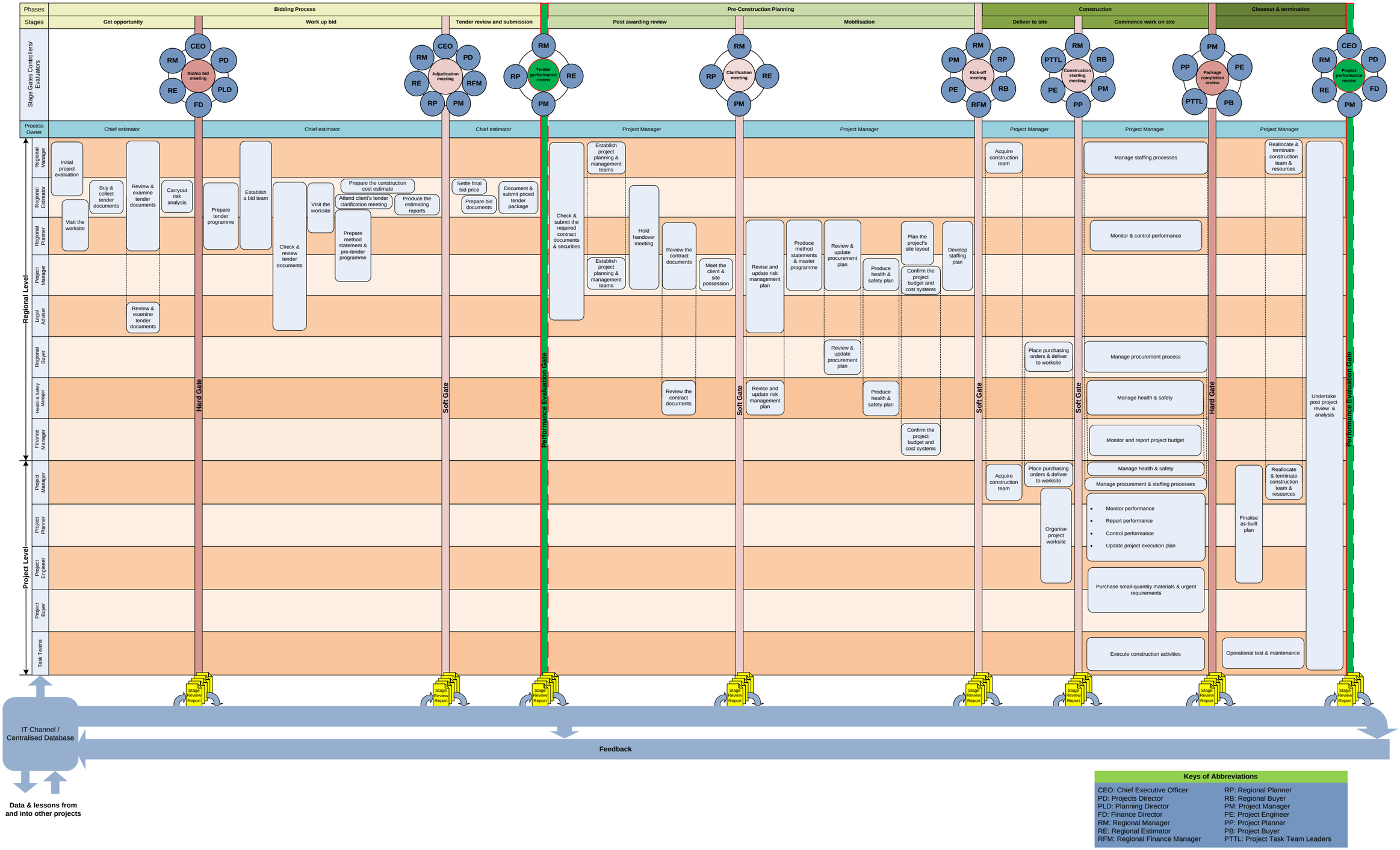


Figure 8-1: The final recommended version of IQGCCs' transformational organisational framework

Table 8-2: Participants' responses to the conceptual framework

Question	RV1	RV2	RV2	RV4
Do you find the framework useful and could it enhance the performance of IQGCCs?	Yes, it helps in easily understanding the practices and spotting the weaknesses. It also assists in relocating the roles and responsibilities, which emphasises the processes' efficiency and thus the company's performance.	Absolutely, I believe it is very useful and would improve our companies' performance, if it is properly implemented.	Yes	Yes, since it simplifies and accelerates the carrying out of works.
What are the advantages and disadvantage of the framework?	I can see many advantages in the framework, yet the streamlining of workflow, gate control, and the mechanism of the decision making, and obtaining feedback on practices are the most important features of the framework. In terms of disadvantages, I cannot see any weakness in the framework itself; it is all ok.	Providing clear roles and responsibilities for the key stakeholders in IQGCCs, ensuring a systematic way in executing and controlling projects, and playing an educative role to the decision makers in Iraq. However, a number of CSFs regarding the implementation should be considered. These include, for instance, ensuring top management awareness of the need for the framework, highlighting contradictions within Iraqi regulations and proposing a reconciliation plan.	The framework has the potential to introduce a step change to improve the performance of IQGCCs. However, due to the current local culture, it is expected that there will be many challenges in its implementation.	It can be seen as a standard road map guiding companies as to how they should manage their business process in order to perform their projects successfully. It provides efficient tools for controlling the processes' quality, measuring their performance, and drawing lessons that, altogether, can ensure continuous improvement. But in terms of disadvantage I can't note any.

Do you find the framework is easy to understand?	Yes, it is easy to understand. However, an Arabic version of it will be helpful for Arabic speaking people.	Yes	Yes	Yes, it is very clear
Do you find the framework is easy to use?	Yes, from my view, I would recommend to work on applying it immediately.	Yes, if it is ensured that the decision makers have undertaken an awareness programme regarding the need for such framework.	As mentioned in point two above, the implementation of the framework will require further studies.	Applying this framework would mean needing to change the organisational culture, implementing an electronic system, and ensuring competent and well-trained employees, etc. Therefore, I recommended implementing it first on one company, or even a regional office to test its applicability in practice.
How do you assess the completeness of the framework?	It is complete, from my point of view. However, this framework can be improved, or even amended, after implementation starts when all the framework assumptions will be tested.	It is clear that the framework covers all the key aspects required to optimise the practices of IQGCCs.	It is a holistic approach to organisational process; from this point of view, it can be considered complete.	Yes, it is quite a comprehensive framework, and I'm very impressed by its detail and elements. I really hope that such a framework will be applied in our companies**.**

Generally, the feedback obtained from the interviewees was positive; all participants found the conceptual framework is useful and believed that it would enhance the efficiency and overall performance of IQGCCs. They also mentioned several advantages that could be gained from implementing the framework, without stating any disadvantages within the framework itself. From their perspective, it is clear and easy to understand. However, RV1 recommended the production of an Arabic version of the framework to make it more understandable for Arabic speakers, such as IQGCCs' employees.

Moreover, most interviewees were optimistic about employing the framework within IQGCCs. However, they did not hide their apprehension about the challenges that could be faced in the implementation process. Whereas RV1 recommended implementing the framework immediately, RV3 expected that there would be many challenges for its implementation due to the need to change the organisational culture. Nevertheless, RV2 emphasised that there are a number of critical success factors that should be carefully considered before embarking on any implementation in practice. Meanwhile, RV4 recommended that, in order to reduce the implementation challenges, it would be better to implement the framework first on a limited scope, such as a single regional office. This would firstly facilitate the identification and management of problematic points and difficulties, and secondly, give a good opportunity to realise the advantages and disadvantages of the framework in practice. Indeed, all these views are valuable; however, the implementation of the framework is out the scope of this study.

Nonetheless, the participants agreed on the completeness of the framework, and RV2 professed that the framework covers all the aspects required to improve the efficiency of the IQGCCs' current business processes and their overall performances. Similarly, both RV3 and RV4 considered it a holistic process improvement framework designed to optimise the practices of IQGCCs. Whereas, RV1 commented that the framework may be improved during the implementation; indeed, an important feature of the framework is that it is designed to be flexible rather than compulsory so it can be continually improved based on the feedback obtained through the stage review reports. Consequently, it can be concluded that the participants agreed overall that the framework is useful and can enhance the performance of IQGCCs. However, further studies are required to cover all aspects of its implementation.

8.4 Final Recommended Transformational Organisational Framework for IQGCCs

As a result of the second round of interviews presented in Chapter Seven, and the recommendations suggested through the validation exercise, as documented above, the final

recommended transformational organisational framework to improve the performance of IQGCCs has been produced. This framework is depicted in Figure 8-1, while its details are presented as follows:

1) Stage one: Get Opportunity

The bidding process is often costly and always time and effort consuming. Therefore, an important early stage before deeply engaging in the bidding process is to conduct an initial evaluation and risk assessment for every opportunity for a new tender. This is to ensure that each opportunity is aligned with the company's strategy, goals and objectives and all the potential associated risks can be managed.

Before the stage

- Through its top management, the company has to set a clear vision and mission and develop long and short-term strategic plans that are consistent with these overarching foci. This should include developing a selective tendering strategy that guides the regional offices to the general characteristics and criteria of contracts that the company wishes to win.
- Conduct an assessment of the need for additional work. This includes evaluating the current and potential future workloads and resource availability.
- Build a good relationship and develop strong contacts with potential clients with the aim of securing and identifying new opportunities for work.

During the stage

- Undertake an initial evaluation for the new contract based on the tender invitation information with the aim of developing a decision as to whether to accept the invitation in case the contract complies with the company's strategy and abilities or is declined, if it does not.
- Visit the worksite with the aim of examining the site conditions and assessing the associated potential risks.
- Buy and collect tender documents and drawings.
- Examine and review the tender documents in order to ensure they are consistent with the tender information given in the invitation letter, and to identify and evaluate the potential risks inherent in the contracts.

Deliverables

- Summary of the new contract information, conditions and requirements.
- Summary of the current and estimated future workloads. This should also include an analysis of the availability of resources that are expected to be used in the construction of the new project.
- Report on the worksite conditions.
- Risk assessment report.

Gate pattern

- 'Hard' gate.

2) Stage two: Work-up Bid

This stage aims to establish a solid basis and strategy for bidding, along with the management and production of a bid proposal.

Before the stage

- Obtain authorisation to accept the invitation and proceed with the tender process.
- All the tender documents and drawings have been collected.
- The risk assessment report has been produced and agreed.

During the stage

- Carefully programme and schedule the dates of the key bidding process activities through preparing the tender programme.
- Establish a bid team. This includes assigning a Project Manager to be involved in preparing the contract pre-tender statement and programme, and to manage the project in the future if the contract is obtained.
- Check and review the tender documents in order to ensure that all documents and drawings have been received and to identify any anomalies, and missing or mismatching information in the tender documents. However, the main purpose of this examination is to agree on the outline of the construction methods, and decide on which work packages will be performed in-house or subcontracted. Additionally, this means extracting and quantifying the construction materials required for work and preparing the take-off sheet.
- Visit and investigate the work site for more detail if needed.

- Attend the client's clarification meeting with the aim of inquiring and obtaining answers on any unclear and ambiguous issues regarding the contract.
- Prepare a pre-tender method statement and programme.
- Prepare and produce a construction cost estimate.
- Produce the estimating reports.

Deliverables

- Tender programme
- Estimating reports, which generally include:
    - A summary of the project characteristics.
    - A brief description of the project site work conditions.
    - A description of the proposed method statement that would be adopted for the construction.
    - An initial work programme that briefly explains the sequence of activities, their estimated duration, and their expected interface dates for starting and finishing.
    - A summary of all potential and unusual risks associated with the new contract that have not yet been effectively covered.
    - A summary of the key assumptions used in estimating.
    - An assessment of the profit expected from the project.
    - A summary of the contract expected cash flow, which is calculated on a range of supposed mark-ups.
    - Brief information regarding the market's nature and the industrial conditions.
- Cost of work report, which briefly explains:
    - The main labour, materials, and plants required to conduct the work and their costs.
    - The distribution of the work packages.
    - The key nominated subcontractors and suppliers.
    - A summary of the indirect and the contract preliminaries costs.

Gate pattern

- 'Soft' gate

3) Stage three: Tender Review and Submission

This can be seen as complementary to the previous stages. It aims to settle and produce the final bid price based on the mark-up value determined during the adjudication meeting and any other proposed adjustments. The stage also aims to ensure that all the documents and forms that need to be submitted with the priced tender are adequately prepared and will be submitted on time.

Before the stage

- The estimating reports have been produced and reviewed.
- The cost of work report has been prepared and reviewed.
- A decision regarding the right value of the mark-up has been made and an approval for the submission the final bid price has been obtained.

During the stage

- Adjust and produce the final bid price.
- Prepare the required bid documents.
- Submit the tender package.

Deliverables

- A priced tender with all the required documents.
- A tender performance evaluation report.

Gate pattern

- The 'Performance Evaluation' gate

4) Stage four: Post Awarding Review

After obtaining the contract, a set of preparatory activities should be undertaken by the contractor during this stage, with the aim of establishing a solid base for planning the project in hand.

Before the stage

- The tender package has successfully been submitted.
- An acceptance letter to the submitted tender has been received from the client.
- The new project, in principle, has been accepted by the contractor.
- The documents and drawings of the project have been all received.

During the stage

- Check and review all the documents enclosed with the acceptance letter and contract form to ensure that they reflect the exact content of those used during the preparation of the tender. The process also includes signing the contract form by the Regional Manager and submitting all the required documents, bonds or securities.

- Establish the project planning and management teams. The project planning team would be responsible for setting up the project's pre-construction plans; whereas, the project team would be responsible for managing the work during the construction phase. It is preferable that the project planning team includes the employees engaged in developing the tender proposal. Moreover, establishing a project management team can continue throughout the entire the pre-construction phase.

- Hold a handover meeting, which aims to transfer knowledge, data, and all other documents used in developing the bid proposal, from the bid team to the project planning team.

- Review and examine the contract documents to develop a full understanding of the project requirements and establish familiarity with its details. This can involve the systems that will be set up, and all resources required to successfully fulfil the construction works. Accordingly, a construction take-off sheet should be prepared and compared to those presented on the bid take-off sheet. Any major discrepancies have to be reviewed by the Project Manager and Estimator, whilst the verified items will be handed to the Buyer in order to procure them. The review also enables the Project Manager and their team to identify any uncertainties or risks embedded in the project.

- Visit the work site and meet the client’s representative in order to open the contact with the client's representative, enquire about any ambiguous issues, and arrange to possess the worksite.

Deliverables

- The contractor’s letter of acceptance and a signed contract with all the required documents and securities
- The project planning team.
- A construction take-off sheet.

- A list of general client and project needs.
- A list of uncertainties or risks embedded in the project.
- The site visit updated report.
- The possession of the worksite
- A list of clarifying questions and issues that need to be explained or solved with their related explanations or solutions, as reported by the client's representative or the Estimator.

Gate pattern

- 'Soft' gate.

5) Stage five: Mobilisation

The mobilisation stage pertains to the development of a set of pre-construction plans, which together form a baseline to monitor and control the execution of works on site.

Before the stage

- A project planning team has been established.
- All the project documents and drawings have been reviewed and answers to any critical issues and qualifying questions have also been obtained.
- The project specifications and client needs have been well identified
- The project work site conditions have been well determined.

During the stage

- Revise and update the risk management plan.
- Develop a method statement and master programme.
- Revise and update the procurement plan.
- Produce a health and safety plan.
- Establish the project budget and cost systems.
- Produce the project site layout.
- Develop a staffing plan.

Deliverables

- A set of baseline plans, which includes:
    - A risk management plan;

- The method of construction with all the resources required throughout the construction work;
- The master and target project programmes;
- A procurement plan;
- A health and safety plan.
- The project budget and expected cash flow;
- The project site layout;
- A staffing plan.
- The project management team.

Gate Pattern

- 'Soft' gate.

6) Stage six: Deliver to Site

This stage aims to prepare and deliver all the resources and facilities required to commence the construction works physically on the site.

Before the stage

- All the pre-construction plans have been produced and approved by the Regional Manager.
- The project contract agreement has been signed by both the client and contractor.
- The worksite has officially been received by the contractor.
- The project management team has been established.

During the stage

- Acquire task team members and assign the roles, responsibilities, authorities, and reporting lines to the different members within the teams, as detailed in the staffing plan.
- Organise the project worksite and provide the required facilities.
- Purchase and deliver the required resources based on the procurement plan and purchasing programme.

Deliverables

- The project task teams.
- An organised worksite.

- The materials, equipment and other resources required to commence work on site.

Gate pattern

- 'Soft' gate.

7) Stage seven: Commence Work on Site

The main aim of this stage is to construct and create the physical project deliverables according to the approved pre-construction plans, required specifications and agreed client acceptance criteria.

Before the stage

- Project task teams have been established.
- The work site and required facilities have been well prepared and established.
- The required project resources (construction materials, equipment, plants) have been prepared.

During the stage

- Execute construction activities
- Monitor, report and control performance on an ongoing basis.
- Update the project execution plan. This may include updating all the plans developed during the mobilisation stage.
- Manage the procurement process.
- Manage the staffing process.
- Manage the health and safety issues.

Deliverables

- The project's physical deliverables.
- Periodic progress, productivity and performance reports, including a performance evaluation of the subcontractors and suppliers.
- A list of issues and problems emerging during execution, with their impacts on the project and their best-identified solutions.
- Lessons learnt from the successful and unsuccessful experiences.

Gate Pattern

- 'Hard' gate

8) Stage eight: Project Closeout and Termination

This stage comprises all the processes required to close out the project and hand over the created deliverables to the client.

Before the stage

- Project required deliverables have been fully constructed as agreed and accepted by the client's representative.

During the stage

- Finalise the as-built plan.
- Conduct operational tests and maintenance.
- Reallocate and terminate the construction teams and resources.
- Undertake a post project review and analysis.

Deliverables

- An as-built plan, which includes a set of revised drawings and documents that show all the changes made in the specifications and working drawings during the construction process.
- A certificate of completion
- The reallocated and/or terminated resources.
- The terminated contracts with subcontractors and suppliers
- A project closeout report, which generally includes:
    - A summary of the project's deliverables and baseline activities over the course of the project.
    - Variances from the baseline plan and the predefined goals and objectives.
    - A list of outstanding business activities, risks and issues.
    - A list of the project's achievements and failures;
    - The lessons learned.
    - A comprehensive evaluation report regarding the subcontractors' and suppliers' performances.

Gate pattern

- 'Performance Evaluation' gate.

8.5 Summary

This chapter examined the validity, credibility, usefulness and possibility of utilising the conceptual transformational organisational framework to enhance the overall performance of IQGCCs. The examination showed that there is a strong consensus amongst the interviewees on the validity and completeness of the framework. However, a few amendments were made to the framework, as recommended by the interviewees, to increase its clarity and validity.

Moreover, the validation exercise also revealed that the framework is useful and can enhance the efficiency and performance of IQGCCs. According to the interviewees, it is very clear and easy to understand. Additionally, most of the interviewees were optimistic about the IQGCCs' ability to employ the framework. However, they also indicated that the process of implementing the framework could face a number of challenges. Therefore, further studies may be required to identify implementation success factors and thus facilitate the practical application of such an initiative in the IQGCCs' context. Finally, details of the final transformational organisational framework recommended to IQGCCs were presented. The next chapter offers a brief conclusion of this study and recommendations for further research.

Chapter Nine - Conclusion

9.1 Introduction

This chapter provides a summary and conclusion to this research project through revisiting the content of the previous chapters. It starts by revisiting the research objectives and their attainments. Thereafter, the study's main contribution to both academic and practice arenas will be highlighted, which will be followed by an outline of the key limitations. Finally, this chapter will conclude with a set of recommendations for facilitating the implementation of the final recommended framework along with suggestions concerning a number of future research concepts that have arisen from this study.

9.2 Achievement of Research Objectives

The main aim of this research was to develop and present a transformational organisational framework for Iraqi Quasi-Governmental Construction Companies (IQGCCs) that acts as a roadmap to enable the management of these companies in an effective and efficient way. To achieve this, the researcher identified five major research objectives, which were to:

1) Theoretically investigate the impacts of the changing Iraqi business environment on IQGCCs and how these organisations can survive and succeed;

2) Develop an in-depth understanding of business process concepts and principles alongside the main related process performance improvement approaches and models;

3) Synthesise a theoretical framework for streamlining and continually improving the operational processes of large construction companies under traditional procurement;

4) Investigate, map, and examine the Iraqi QGCCs' 'as is' operational processes to facilitate a better understanding of the key challenges and barriers to efficiency;

5) Test and validate the conceptual transformational organisational framework within IQGCCs to address the challenges in their operational processes and thereby enhance their performance.

With the aim of checking the successful accomplishment of each research objective and to draw conclusions, each of the aforementioned objectives is revisited, as presented below.

Research objective 1: **To theoretically investigate the impacts of the changing Iraqi business environment on IQGCCs and how these organisations can survive and succeed.**

Research objective 1 was mainly achieved through the literature review presented in Chapter Two. The chapter provided a historical, geographical, and economic overview of Iraq, as an explanatory introduction to how the changes in the Iraqi business environment have affected Iraqi state-owned enterprises in general and IQGCCs in particular. The investigation showed that, over the second half of the last century, Iraq established hundreds of SOEs as part of successive governments' policies to support a centrally planned economy. Many of these SOEs were specialists in construction works, which were termed in this research as Quasi-Governmental Construction Companies (QGCCs). Thus, the orientation toward the planned economy along with the deterioration of the country's economic situation resulting from wars and economic sanctions, led to the weakening of the private sector and the dominance of SOEs on most of the governments' investments.

Nevertheless, following the US led invasion in 2003, the Iraqi business environment has been subjected to profound change influenced by the radical transformations to Iraq's political, and economic systems. These changes have put IQGCCs into direct competition with the private sector. Thus, after decades of domination over most publicly funded construction contracts, these companies face fierce competition from, in excess of, 3,500 local and international private firms. Consequently, IQGCCs have struggled to both win contracts and generate profit in this competitive market. As a result, the majority have incurred substantial financial losses becoming unsustainable burdens on the national economy, through burdening the national budget and undermining the current government's efforts to move towards an open economy.

The research has also identified that, although the Iraqi government has attempted to reform these companies and improve their performance, most of these efforts have ended in recapitalising them rather than making them commercially viable or even addressing their problems. Therefore, with the aim of reforming IQGCCs and making a step change improvement in their performance, the second part of research objective 1 was to identify how some organisations have managed to survive, succeed, and expand in today's turbulent and highly competitive business environment. The findings from the literature review noted that the most successful organisations are those that have the ability to beat their competitors by being better, faster and cheaper. However, achieving this requires organisations to invest their effort, time and capital in improving their operational processes. Indeed, seminal researchers, such as

Porter (1985), Hammer and Champy (1993), Harmon (2003), McCormack (2007), and more recently Brocke and Rosemann (2015) and Trkman *et al*. (2015), espouse that, focusing on improving business processes remain the most appropriate means by which organisations can survive, succeed and ultimately enhance their performance and competitive advantage in today's business environment. Many theoretical and empirical studies reveal the strategic value that can be obtained by companies through a focus on optimising their business process. For example, it was found that organisations with strong emphases on business processes usually achieve higher levels of performance and provide an enhanced work environment with higher levels of cooperation and less conflict. Moreover, studies show that focusing on the business process can enhance customer satisfaction, product quality, delivery and time-to-market speed. Based on this finding, it can be concluded that, in order to improve their performance, IQGCCs need to concentrate on improving and managing their business processes. However, it was first important to understand the concept and dimensions of business process, process types and the most significant approaches, models, and techniques used in enhancing the process view in an organisation. Accordingly, the second research objective was as follows.

Research objective 2: To develop an in-depth understanding of business process concepts and principles alongside the main related process performance improvement approaches and models.

Research objective 2 was accomplished through conducting a comprehensive literature review, which was presented in Chapter Three. Focusing on business process simply means to view an organisation as a combination of highly integrated processes, not as collected functional areas. This means being oriented towards processes, customers and outcomes, rather than hierarchies. Such thinking, or view, of an organisation has been described as process thinking, process view, or business process orientation. Reviewing the literature also uncovered a consensus amongst researchers regarding the main dimensions of a business process oriented organisation. These dimensions include: process view; process jobs; process owner; process management and measurement; empowered task team; process organisation structure; customer focus, and continuous improvement of the process. These dimensions were employed later in synthesising the transformational organisational framework for IQGCCs.

The results obtained from successfully applying the process view in the manufacturing industry have encouraged the construction industry to adopt this view in improving the construction process. Accordingly, several process plans and models, such as the RIBA plan of work, OGC

gateway process, and the more academically robust Generic Design and Construction Process Protocol, have been proposed to streamline and improve the process of construction. However, most of these initiatives have been designed with a focus on enhancing the project processes, typically from the client's perspective or that of their professional team. Whereas, insufficient attention has been placed on studying and improving the business processes (BPs) employed by the main contractors to deliver their projects under traditional procurement. Moreover, the process frameworks identified above have been typically developed from the perspective of western developed nations; as such, developing, post-conflict nations, such as Iraq, have been disregarded. It was therefore resolved to develop a framework to streamline and improve the core business processes of Iraqi QGCCs.

Moreover, reviewing the related literature uncovered several approaches that could be used to implement the principles of business process within an organisation. These included: Total Quality Management (TQM), Business Process Reengineering (BPR), Lean, Benchmarking and Business Process Management (BPM). Each of these approaches have their advantages and disadvantages; however, a critical comparison showed that BPM was the most comprehensive, well-known, and widely accepted and employed nowadays as it incorporates many aspects of other approaches. Accordingly, BPM has been employed as a base to increase the business process orientation within IQGCCs with the aim of improving their overall performance and efficiency. Nevertheless, a prerequisite for effecting any dramatic performance improvement using BPM, is to develop a clear understanding of the organisation's core business processes. However, very little is known about how the IQGCCs operate; there are no existing process maps or indeed directives on how such processes should be undertaken. It was, therefore, critical to identify, map, and analyse the current processes of these companies to understand the inherent challenges (research objective 4). However, before embarking on this exercise, it was important to capture and map the current good practice operational process for large construction contracting companies engaged under a traditional procurement contract. Such a map would provide a benchmark to facilitate the analysis of the 'as is' operational processes of IQGCCs, as well as, to provide a base from which to develop and synthesis the theoretical transformational framework (research objective 3).

Indeed, several techniques have been suggested to map the processes and structure the information, such as the Activity Decomposition Models (ADM), Business Process Model and Notation (BPMN), Data Flow Diagram (DFD), and Integration DEFintion Modelling (IDEF). Selecting the most appropriate technique is mainly dependent on the purpose of the modelling,

the system being modelled, the modeller's experience, the availability of supporting software, and any time constraints. Having discussed each of these techniques, a decision was made to employ both of ADM and IDEFØ process modelling techniques to facilitate the achievement of objectives 3 and 4.

Finally, it was recognised that changing an organisation's business process would lead to a change in its structure. Therefore, a number of widely utilised organisational structures were critically discussed. The discussion showed that hybrid organisational structures can be seen as the most appropriate form for construction companies, as they give organisations the opportunity to combine two or more structures and thus enable them to reorganise employees' jobs in line with the requirements of their business processes.

Research objective 3: To synthesise a theoretical framework for streamlining and continually improving the operational processes of construction companies under traditional procurement.

Research objective 3 was addressed in Chapter Four. To address this research objective, a literature review was conducted to identify and generate a generic good practice operational processes map from the perspective of the main contractor under a traditional contract agreement (as this is the most used contracting form in Iraq). This was also combined with the identification of key decision points and the internal stakeholders involved in performing these processes and developing the decisions.

As a result of this investigation, it was found that a contractor's operational process comprises four distinguished phases, namely, bidding, pre-construction planning, construction, and close out. Each of these phases include one or more stages. In total, nine stages were identified across the operational process. Each stage embraces a number of processes that are performed through empowered multidisciplinary teams. The Chief Estimator, or Bid Manager, can be the process owner of the bidding process; whilst, the Project Manager would be the main individual responsible and accountable for executing the rest of the operational process. At the end of each stage, a review and check of the process outputs are conducted to ensure that they meet the predefined deliverables and requirements, and before a decision is made to embark on next stage. The importance of having an electronic database to facilitate the storage, maintenance, and sharing of documents, information and learnt-lessons across the organisation was also recognised.

However, in order to accomplish objective 3 successfully, it was important to synthesise the key data obtained from the aforementioned exercise and objective two under a single framework to be as a process roadmap for improving the performance of IQGCCs. To achieve this, the Generic Design and Construction Process Protocol (GDCPP) was employed as a template to synthesise the framework's components. According to Cooper (1994, p.3), a fundamental element to succeed every company is to have a "*formal blueprint, roadmap, template or thought process for driving a new product from the idea stage to market launch and beyond*". Thus, the developed framework would act as a roadmap for streamlining and continuously improving the operational process of construction companies. An explanation of the proposed framework elements was presented in section 4.3.3.

Research objective 4: **To investigate, map and examine the Iraqi QGCCs' 'as is' operational processes to facilitate a better understanding of the key challenges and barriers to efficiency in these processes.**

This objective was achieved through conducting an exploratory study that comprised three case studies of IQGCCs, as presented in Chapter Six. Semi-structured interviews, focus groups and a review of documents, were used as multi evidence sources for collecting the data required to map and examine the current operational process adopted by these companies. Analysis of the data collected showed that:

1) IQGCCs generally employ similar operational processes with a little difference in terms of the people engaged in performing some of these processes. This is owing to the fact that IQGCCs, as part of the government body, are subject to the same laws, regulations, and management systems.

2) Government restrictions imposed on IQGCCs, through both the current regulations and government inspections bodies, can be seen as a key factor in hindering the performance and efficiency of these companies.

3) IQGCCs are generally managed through a traditional management system, which is based on dividing an organisation into several isolated functional departments and a hierarchical structure with centralised control. This system has directly led to the creation of workflow bottlenecks throughout the core business process and the duplication of tasks at the various management layers resulting in extensive delays and the increased costs of processes.

4) Adopting a hierarchical structure and centralised control, where most power and authority are restricted to the CEO, have led to a very bureaucratic work environment, characterised by exaggerated administrative procedures, departmentalisation and red tape. These have all negatively affected the efficiency of the decision-making process and the overall performance of companies.

5) There is substantial engagement amongst the IQGCCs' top management in managing day-to-day operational activities and a clear disregard for strategic aspects. This evidently reflects an inadequate understanding of the role of top management in their primary and essential role in developing the company's goals, vision, and strategies. It also reveals a problem in distributing the roles and responsibilities throughout the various management layers.

6) Involving a large number of functional departments and/or committees in performing various activities of the operational processes. Each department is responsible for a certain part (activities) of the process, whereas there is no owner or responsible for the whole process. As a result, there is a clear lack of cohesion and integration across the entire process; this can be seen in the procurement and acquire processes.

7) Lateral communication amongst the various departments seems to be weak. The chain of communication, which is governed by the formal letters (FL), can only go through a vertical line and through securing the permission of one-line manager per management level.

8) The mechanism employed in developing the most critical decisions, such as bid/no bid and value of mark-up decisions, is inefficient.

9) There is clear neglect and incompetence in preparing project pre-construction plans. None of the three case studies reflected a concern for producing, for instance, a risk management plan, budget plan, procurement plan, staffing plan, site layout plan, and health and safety plan. Thus, IQGCCs have generally relied on reactive actions to deal with issues that emerge during the implementation.

10) There are weaknesses and inadequacy in the measures taken to monitor and control the progress and costs of projects. This is mainly due to the lack of pre-construction plans and the limited powers granted to Project Managers, which would enable them to take corrective actions to control their projects.

11) There is a clear deficiency in the employment of information technology (IT), whether in communications or for the purpose of data storage and exchange. It was identified that the manually-driven and paper-based system is the only accepted communication method in IQGCCs. This mainly pertains to the government restrictions and regulations that still consider the electronic communication system as unreliable. Thus, the current communication system was recognised as an additional reason for the inefficiency of the IQGCCs' core business processes.

12) There is a clear lack of measurement in the performance of processes, and drawing learnt lessons for the future.

As a conclusion, the case studies uncovered a number of challenges that exist in the operational processes of IQGCCs and prevent them from operating efficiently. Thus, in order to improve the performance of IQGCCs, it is important to handle the challenges that beset their operational processes. This can only be achieved through addressing the key causes of these challenges. The case studies revealed that most of the challenges facing the current operational processes of IQGCCs are mainly attributed to four fundamental interrelated factors: 1) government restrictions imposed on IQGCCs; 2) the management system adopted by these companies; 3) authority distribution; and finally 4) their communication system. Indeed, with the exception of government restrictions, all the other factors can be overcome by employing a process view approach supported by information technology. In other words, this means moving away from the traditional management system dominated by a hierarchical structure, centralised control, and bureaucracy to focus on business process orientation. Theoretically, this can be achieved through adopting the theoretical framework, developed in Chapter Four. However, the applicability of this framework in the context of IQGCCs should be tested before any effort to apply it in practice. Accordingly, the next research objective was:

Research objective 5: **To test and validate of the conceptual transformational organisational framework within IQGCCs to address the challenges existing in their operational processes and thereby enhance their performance.**

The accomplishment of research objective 5 was through conducting two rounds of semi-structured interviews as explained in Chapters Seven and Eight. The first round included ten participants selected based on their knowledge and experience from different management levels of three IQGCCs. The aim of this phase was to test the applicability of the proposed theoretical framework to address the challenges inherent in the IQGCCs' operational processes.

Using thematic data analysis, the interviewees' responses were analysed, and amendments to the theoretical framework were made step by step to suit the IQGCCs' local context. The importance of the conceptual transformational organisational framework manifested by providing IQGCCs with a roadmap for streamlining and continuously improving their operational process. It also offers effective tools that facilitate the shift in focus of these companies, from a functional and hierarchical orientation towards process thinking, which, indeed, can trigger a step-change improvement in their performance.

The finding of this stage of interviews confirmed that:

1) IQGCCs have to be seen as autonomous, profit-seeking organisations managed independently away from current government restrictions so they can flexibly operate their businesses and be responsible for their own gains and losses in the market. However, this requires a change in the law for IQGCCs and other government regulations that restricts the flexibility of the work of these companies. This is, indeed, an essential precondition to any further improvement step.

2) In order to eliminate the non-value added activities and workflow bottlenecks to accelerate the operational processes of IQGCCs, it is important that these companies break down their hierarchical structures and centralised control systems to concentrate on process jobs and the redesign of employees' roles around the core business processes that produce the final products or services for the customers. Nevertheless, this requires the push of authority from the top management layer to the middle and lower layers.

3) Rather than being entirely centralised or decentralised, IQGCCs can achieve their best performance when there is a good balance in the distribution of powers between the different management layers.

4) Interviews showed that, rather than being engaged in running day-to-day business activities, the IQGCCs' top senior managers should focus on setting the companies' visions, objectives, and strategies along with monitoring the performance of their regional offices and coordinating among them.

5) The awarding of powers to middle and lower management layers should be accompanied with the activation and increase in their accountability for results; such practice would boost employees' eagerness, loyalty, and diligence to work, along with a reduction in corruption.

6) Interviews led to determining, documenting, and visually presenting sets of high-level core business processes that IQGCCs need to perform in sequential stages in order to successfully deliver their construction projects. This is important, as identified through the literature and confirmed by the interviews, in allowing employees to look beyond the boundaries of their departments and understand the company's core business process and their roles within this process. It, indeed, provides a common language for employees from different disciplines to cooperate and work together to achieve the same goal and objectives.

7) Establishing multidisciplinary teams to undertake the core business processes is considered one of the most important exercises for IQGCCs to apply in order to increase the coordination, coherence, and integration between various functional areas whilst maintaining the driving principle of specialisation amongst these functions.

8) Redesigning the roles and responsibilities of the different internal stakeholders engaged in executing the operational processes of IQGCCs with the aim of streamlining and enhancing the quality of these processes. Moreover, the recommended framework clearly depicts who, where, and when stockholders should be involved in performing each process. This is essential in enabling employees to recognise their roles in the whole process, encouraging them to identify and overcome deficiencies and bottlenecks in the process, and how to work together in order to deliver projects successfully.

9) In order to improve coherence and integration amongst the various functional departments and further secure an improvement in business process, a process owner should be employed for each end-to-end process. The process owner would take up the responsibility for developing and implementing the process and be accountable for its results.

10) The quality of IQGCCs' operational processes, along with the decision making process, can be significantly improved through employing a stage gate review tool. This is where the process outputs are reviewed and checked at the end of each stage through a formal meeting involving senior managers, process owners and employees from various functional areas. During a stage review meeting, decisions are made collectively on critical issues in the operational process such as bid/no bid, mark-up values, and execution plans, whether approval or rejection should be issued in terms of proceeding with the process, and producing a stage review report.

11) The performance of an end-to-end process along with its outcomes should be measured and evaluated after completion. Two performance evaluation points were identified across IQGCCs operational processes. The first is to evaluate the bidding process after obtaining its results from the client, whilst, the second is to evaluate the performance of the whole operational process after closeout of the project. A performance evaluation report should also be reviewed by the top management and shared along with the stage review reports of the evaluated process on the company IT channels at these points to draw out the learnt lessons for the future by other regional offices and projects.

12) Using information technology as an alternative tool to the current manual paper-driven mechanise employed by IQGCCs, whether in communication or data store, and its maintenance can significantly reduce the process cycle time and cost in addition to improving its quality.

13) IQGCCs need to adopt a hybrid organisational structure in order to fit with the requirement of the new proposed operational process.

Based on the findings summarised above, it can be concluded that Iraqi construction professionals tend to adopt a hybrid strategy to control and manage IQGCCs. This kind of post-bureaucratic organisation combines the features of bureaucracy and autonomy. The IQGCC experts stressed, for instance, the importance of granting regional office management and project management a wide-ranging authority and autonomy to manage their businesses. However, they also emphasised increasing the accountability, control, formalisation of procedures, and documentation and reporting, which are deemed key practices of bureaucratic organisations.

The second round of interviews comprised four construction management experts selected from different organisations, as presented in Chapter Eight. The aim of this round was to secure further confirmation regarding the validity of the refined conceptual framework produced from the first round of validation interviews.

Feedback obtained from the second validation exercises was generally positive. All respondents confirmed the clarity and ease of understanding of the proposed framework. Moreover, they emphasised the usefulness of the framework and strongly agreed that it could make a considerable improvement in the performance of IQGCCs, if it is implemented successfully. Yet, a few adjustments were made to the framework, as recommended by participants, to

increase its accuracy and avoid any confusion. The final recommended IQGCCs transformational organisational framework was depicted in Figure 8.1, whilst its details were presented in section 8.4. Producing and presenting this framework for IQGCCs indicates the accomplishment of all the research objectives and that the main aim of this research has been met. The next section provides a number of recommendations or guidelines to facilitate the implementation of the framework by IQGCCs.

9.3 Recommendation for the Implementation of the Proposed Framework

As expressed by a number of respondents, the implementation of the transformational organisational framework could be a challenge due to the current local culture. Throughout this section, a list of recommendations is proposed by the researcher to facilitate the implementation process. These recommendations were based on the researcher's knowledge and suggested by some participants throughout the interviews. Consequently, further in-depth studies to identify the key implementation success factors of the framework are still required. These recommendations include:

1) Developing an awareness programme regarding the importance of the proposed framework in triggering a step-change improvement in IQGCCs' performances. Such a programme is critical to ensure the commitment and support of both the company's senior management and the decision makers at the highest ministerial level in the Iraqi government.

2) Work on changing the current government regulations imposed on IQGCCs in a way that allows these companies to run their business in a more flexible, independent, and efficient manner; without a strong commitment and support from the top decision-makers, changing the government regulations will be a challenge.

3) Facilitating the implementation of the framework and process view through effective project management. Accordingly, a steering committee, comprising the company's senior managers and chaired by the Chief Executive Officer, should be established by the top management during the early stages. This committee should be responsible for designing and managing the implementation process. Moreover, to facilitate and directly manage the implementation process within the company it is also recommended that a Project Manager be appointed with knowledge of process thinking approaches, the IQGCCs' context, and good project management skills.

4) Developing the educational and training programmes necessary to increase the awareness, understanding and knowledge amongst company employees of the principles of business process in general and the framework in particular. Training programmes to enhance the competence of middle managers, improving their abilities and confidence to make decisions independently will also be important in the successful implementation of the framework.

5) Piloting the framework on small-scale, such as one or two regional offices, or even implementing it in a new business unit formed particularly for a pilot-assessment of the results obtained from implementing the framework. This is important in reducing the resistance to change, avoiding the disruption that is expected to arise when introducing the proposed framework to the entire company, facilitating the monitor and control required with change, and finally, drawing out the lessons learnt that would facilitate the implementation process in the future.

6) Allocating the resources (time, money, people) required to secure the successful implementation of the framework.

7) Redesigning the organisation's supporting systems, such as the recognition and rewards system, recruitment system, accounting system, communication system, documenting system, and performance measurement system, to align with the core business process.

8) The proper implementation of the proposed framework is expected to produce a step change improvement in the IQGCCs' performance. However, as suggested by BPM, an evaluation of the process performance and results obtained from its implementation is critically important to ensure the continuous improvement of the process.

9.4 Research Contributions to Knowledge

This research has made valuable contributions to both the academic research community and practitioners in practice. These contributions are presented in the following sub-sections.

9.4.1 Contributions to Knowledge and Academic Community

In terms of the theoretical context, this research has contributed to the enrichment of knowledge through several dimensions, including;

1) Information on the Iraqi construction industry and IQGCCs, in particular, is scarce. Thus, this research adds valuable information to global knowledge on this scope, through:

   Firstly, highlighting the impacts of the changes in the Iraqi business environment on the Iraqi construction sector and IQGCCs;

   Secondly, providing a complete picture of the current status of IQGCCs. This was achieved through mapping and examining the current practices employed by these companies;

   Thirdly, identifying the main factors behind the challenges and deficiencies within IQGCCs' current operational processes;

2) At an early stage of this study, the researcher concluded that focusing on improving core business processes is the most appropriate approach for organisations to adopt in order to secure their survival and achieve success in today's dynamic environment. However, it was recognised that little attention has been paid to producing a process map or framework that improves the operational processes employed by contracting construction companies during the delivery of their projects under traditional procurement contracts. Accordingly, the theoretical transformational organisational framework has contributed to bridging this gap in knowledge;

3) The research methodology adopted in this study can also be employed by other researchers to examine and improve the operational processes of organisations from different sectors in different countries;

4) The research provided rich information about the form of post-bureaucratic quasi-governmental organisations from the perspective of Iraqi construction experts;

5) Fostering integration of the business process principles within the construction process in general and the practices of the main contractor in particular.

9.4.2 Contributions to Practice

In the practice context, the contribution of this research can be summarised as follows:

1) The research helps to raise awareness amongst practitioners about the importance and advantages of employing Business Process Management to manage and control changes in an organisation's business processes over other business process changing approaches;

2) The developed theoretical framework can be seen as a generic process map that can be used to streamline and enhance the operational process of any construction company under traditional procurement after adapting it to suit the context of the company;

3) The research could enhance the understanding of those interested in improving the performance of IQGCCs in particular by highlighting the problems faced by these companies. This was achieved through identifying the main challenges and barriers to efficiency inherent in IQGCCs' current practices along with their key causal factors;

4) The final recommended transformational organisational framework identifies and offers valuable solutions to address the challenges facing Iraqi construction companies in general and QGCCs in particular. It provides a complete roadmap that guides managers and employees of these companies to the core business processes, their roles in performing these processes, when key decisions are made, and who is engaged in making them. Moreover, through its stage gates, review reports, and IT channel the framework provides an efficient tool for continually evaluating and improving the process;

5) Increasing the awareness amongst industry practitioners of the significant role of information technology in enhancing the efficiency of the process and reducing its time cycle and cost;

6) The outputs of this research can be employed as a tool to encourage organisations in various industries, especially in Iraq, to adopt business process thinking as a fundamental way to improve their performance.

9.5 Research limitations

Although there are valuable outcomes from this research, this study has its own limitations. Most of these limitations are concerned with the generalisability, accessibility, and time constraints. A summary of the research limitations is presented as follows:

1) The proposed framework concentrated on depicting the high-level operational processes performed by internal stakeholders within contractor organisations under a traditional procurement scenario. Accordingly, an obstacle for the generalisability of the framework was identified. However, addressing other process types and levels or other scenarios could be achieved by employing a similar approach as that used in this research;

2) In conducting the exploratory study, the researcher sought to access a wide range of documents that could help in investigating and assessing the current status of IQGCCs. However, due to the very strict policy employed by the companies in the control of documents, the researcher's accessibility to internal materials and files was very limited. This was particularly relevant to those items related to the financial position of companies, and their internal procedures or project files as there was no chance to review such documents. As an alternative, the researcher mainly depended on official government published reports and participants' views to examine the current practice of IQGCCs and to draw conclusions on the status of these companies;

3) Only participants who work for the IQGCCs owned by the Iraqi Construction and Housing Ministry provided the core research data. This might have generated bias; however, the researcher attempted to reduce this risk through the validation exercise (see Chapter Eight). Nevertheless, it is still unknown how the research outcomes might have changed if the study had included experts from companies controlled by other Iraqi ministries. Therefore, a test on the framework applicability in such companies may be required before implementing it in practice.

9.6 Recommendations for Further Research

Despite the above limitations, this research has successfully achieved its aim and objectives to produce a transformational organisational framework to promote a step-change improvement in IQGCCs' performances. The framework acts as a roadmap to institute the concepts of business process in IQGCCs and thus facilitate a shift in their focus from a functional orientation to process thinking. Yet, as doctoral research, this study naturally has a specific scope; hence, there is still a need to investigate some further areas that are outside the scope of this study. Further research directions are highlighted below:

1) As a response to the positive and optimistic feedback regarding the expected benefits that could be obtained from implementing the transformational organisational framework in IQGCCs, further study is required to investigate the critical success factors impacting the implementation of the framework in these companies. As a result of such a study, an implementation framework or guidelines to facilitate the implementation process need to be produced and validated.

2) An important dimension to secure the continuous improvement of business process and performance is the measurement of process performance. Accordingly, further research could design a measurement system and establish Key Performance Indicators (KPIs) by drawing on the results of this research. These KPIs would help the companies to effectively monitor and control their processes.

3) The processes depicted throughout the framework stages are high-level. These processes need to be decomposed further in order to show the low-level detailed processes along with the detailed tasks and responsibilities assigned to each member of the various multidisciplinary teams engaged in performing these processes.

4) It was recognised that the optimum results in employing business process management can only be achieved through an appropriate alignment between information technology and business process. Therefore, an in-depth study into this context is recommended in order to facilitate the integration of information technology with the redesigned processes of IQGCCs.

References

Abdelrazig, A. A. (1995). *Computerized AHP model for solving Bid/no-Bid decision problem* (Unpublished MSc. thesis), King Fahd University of Petroleum and Minerals, Saudi Arabia.

Abdulrazzaq, H., & Mohammed, S. (2014). Development a proposed system of organisation structure to management multi construction projects. *Journal of Engineering*, 20(8), 1-19.

Abeysinghe, G., & Urand, D. (1999). Why use enactable models of construction processes? *Journal of construction engineering and management*, 125(6), 437-447.

ACCA (2015). *Project management – business case and gateways*. Retrieved 20 Sept. 2015 from http://www.accaglobal.com/us/en/student/exam-support-resources/professional-exams-study-resources/p3/technical-articles/project-management---business-cases-and-gateways.html.

Acemoglu, D., Aghion, P., Lelarge, C., Van Reenen, J. & Zilibotti, F. (2007). Technology, information, and the decentralization of the firm. *Quarterly Journal of Economics*, 122(4), 1759-1799.

Adusei, C., & Dunyah, J. (2016). Forest fringe communities' participation in forest reserve sustainability in Ghana. *Open Journal of Forestry*, 6(02), 94.

Aggarwal, S. C., & Khurana, S. K. (2009). *Research methodology and statistical analysis (for M. Com)*. FK Publications.

Aguilar-Saven, R. S. (2004). Business process modelling: Review and framework. *International Journal of production economics*, 90(2), 129-149.

Ahmad, I., & Minkarah, I. (1988). Questionnaire survey on bidding in construction. *Journal of Management in Engineering*, 4(3), 229-243.

AIA. (2007). Integrated project delivery (IPD): *A guide. The American Institute of Architects*. Retrieved from: http://www.aia.org/groups/aia/documents/pdf/aiab083423.pdf.

Aivazian, V., Ge, Y., & Qiu, J. (2005). Can corporatization improve the performance of state-owned enterprises even without privatization?. *Journal of Corporate Finance*, 11(2005), 791– 808.

Akintoye, A., Goulding, J., & Zawdie, G. (2012). *Construction innovation and process improvement*. Sussex: John Wiley & Sons.

Al-Ahbabi, M., (2014). *Process protocol for the implementation of integrated project delivery in the UAE a client perspective*. (Unpublished PhD thesis), University of Salford, Salford.

Al-Ajam, M. (2008). *Integrating collaborative extranets with project integrate databases to improve the construction tender stage*. (Unpublished PhD Thesis), University of Salford, Salford.

Al-Alwani, H. (2011, 4 July). Specialize: the country has not seen any strategic project during the past years. *Almada Newspaper*. Retrieved from http://www.almadasupplements.net/news.php?action=view&id=2518

Al-Atawi, S. (2005). *An ICT framework to improve the tendering process in the governmental construction sector in the Kingdom of Saudi Arabia*. (Unpublished PhD thesis). University of Salford, Salford.

Al-Haidari, N. (2011, 21 March). Corruption topples specifications of projects implemented despite the big money. *Radio of Iraq Hurr*. Retrieved from http://www.iraqhurr.org/content/article/2345395.html

Al-Obaidi, T., & Higham, A. (2017). *Examining and mapping the bidding process of Iraqi quasi-governmental construction companies*. Paper presented at the 13th International Postgraduate Research Conference, Salford, Uk.

Al-Shikhely, B. (2007). Control planning of time, cost and quality for fast track projects. *Iraqi Journal of Civil Engineering*, 7, 99-119.

Al-Tuwaijari, J. (2013). *Generic business process modelling framework for quantitative evaluation*. (Unpublished PhD thesis). Newcastle University, Newcastle.

Alberts, D., & Hayes, R. (2006). "*Understanding command and control*. Command and Control Research Center Publications: USA, Retrieved from http://www.dodccrp.org/files/Alberts_UC2.pdf

Alhadeff, L. (2016). *The geopolitics of the civil war of Shia Islam*. Retrieved on 24 th May 2017 from https://iakal.wordpress.com/2016/05/19/the-geopolitics-of-the-civil-war-of-shia-islam/

Alice, M., & Esther, M. (2011). An analysis of the effect of corporate governance on performance of commercial state corporations in Kenya. *International Journal of Business and Public Management*, 1(1), 36-41.

Alonso, R., Dessein, W. & Matouschek, N. (2008). When does coordination require centralisation?. *The American Economic Review* 98(1), 145-179.

Alsehaimi A., Tzortzopoulos P. & Koskela L. (2009). *Last planner system: Experiences from pilot implementation in the middle east*. Proceed in the 17th IGLC Conference (pp 53-66). Taipei, Taiwan.

AlSehaimi, A., Koskela, L., & Tzortzopoulos, P. (2012). Need for alternative research approaches in construction management: Case of delay studies. *Journal of Management in Engineering*, 29(4), 407-413.

Alshawi, M. (2007). *Rethinking IT in construction and engineering: Organisational readiness*. London: Taylor & Francis.

Amaratunga, D., Baldry, D., Sarshar, M., & Newton. R. (2002). Quantitative and qualitative research in the built environment: application of "mixed" research approach. *Work Study*, 51(1), 17–31. doi:10.1108/00438020210415488

Amaratunga, D., Haigh, R., & Baldry, D. (2005). *Structured process improvements in facilities management organisations: best practice case studies in the retail sector*. In 11th Joint CIB International Symposium - Combining Forces - Advancing Facilities Management and Construction through Innovation. Retrieved from http://usir.salford.ac.uk/9922/.

Amaratunga, D., Jeong, K., Sarshar, M., & Siriwardena, M. (2002). *Structured process improvement for construction enterprises (SPICE) Level 3: establishing a management infrastructure to facilitate process improvement at an organisational level*. Retrieved from http://usir.salford.ac.uk/9965/1/280_Jeong_KSStructured_Process_Improvement.pdf.

American Society of Civil Engineers. (2012). *Quality in the constructed project: a guide for owners, designers and constructors*. (3rd Ed.). ASCE Manuals and Reports on Engineering Practice No. 73.

Andayesh M., & Sadeghpour, F. (2013). Dynamic site layout planning through minimization of total potential energy. *Automation in Construction*, 31, 92–102.

Andrews, D. (2012). Is there an organizational structure for our reengineering business operation? *Enterprise Re-engineering*. Retrieved from http://www.efenselink.mil/c3ibpr/prcd 5280.html.

Ansah, R. H., & Sorooshian, S. (2017). Effect of lean tools to control external environment risks of construction projects. *Sustainable Cities and Society*, 32, 348-356.

Ansah, R. H., Sorooshian, S., & Mustafa, S. B. (2016). Lean construction: An effective approach for project management. *Journal of Engineering and Applied Sciences*, 11(3), 1607-1612.

Antunes, R., & Gonzalez, V. (2015). A production model for construction: A theoretical framework. *Buildings*, 5(1), 209-228.

Anumba, C., Baugh, C., & Khalfan, M. (2002). Organisational structures to support concurrent engineering in construction, *Industrial Management and Data Systems*, 102(5), 260-270.

Aoieong, R. T., Tang, S. L., & Ahmed, S. M. (2002). A process approach in measuring quality costs of construction projects: model development. *Construction Management & Economics*, *20*(2), 179-192.

Aouad, G., Hinks, J., Cooper, R., Sheat, D., Kagioglou, M., & Sexton, M. (1998). An IT map for a generic design and construction process protocol. *Journal of Construction Procurement*. Retrieved from http://eprints.lancs.ac.uk/id/eprint/39899.

Aouad, G., Wu, S., Lee, A., & Onyenobi, T. (2013). *Computer aided design guide for architecture, engineering and construction*. London: Spon Press.

Arain, F., & Low, S. (2005). The potential effects of variation orders on institutional building projects. *Facilities*, 23(11/12), 496-510.

Archibald, R. (2003). *Managing high-technology programs and projects*. (3rd Ed.). New Jersey: Wiley.

Ariff, A., Cabanda, E., & Sathye, M. (2009). Privatization and performance: evidence from telecommunications sector. *Journal of the Operational Research Society*, 60, 1315-1321.

Armistead, C., & Machin, S. (1997). Implications of business process management for operations management. *International Journal of Operations & Production Management*, 17(9), 886-898.

Arocena, P., & Oliveros, D. (2012). The efficiency of state-owned and privatized firms: Does ownership make a difference?. *Int. J. Production Economics*, 140(2012), 457–465.

Asquith, P. (2017). Better, faster and cheaper?. Retrieved 31 May 2017 from https://www.realysgroup.com/2017/04/10/better-faster-and-cheaper/

Association of Business Process Management Professionals (ABPMP). (2009). *Business Process Management BPM Common Body of Knowledge (BPM CBOK)*, Version 2.0. (2nd. Ed.). Retrieved from https://pdfs.semanticscholar.org/0fed/f6792d8c622a273e9f3323d97a7cef8059e0.pdf.

Attaran, M. (2004). Exploring the relationship between information technology and business process reengineering. *Information&Management*, 41(5), 585–596.

Attiany, M. S. (2014). Competitive Advantage Through Benchmarking: Field Study of Industrial Companies Listed in Amman Stock Exchange. *Journal of business studies quarterly*, 5(4), 41.

Austin, S., Baldwin, B., & Waskett (1999). Analytical design and planning technique: a model of the detailed building design process. *Design Studies*, 20, 279-292.

Avison, D., Golder, P. & Shah, H. (1992). Towards an SSM toolkit: rich picture diagramming. *European Journal of Information Systems*, 1(17), 397–408.

Aziz, R. F., & Hafez, S. M. (2013). Applying lean thinking in construction and performance improvement. *Alexandria Engineering Journal*, 52(4), 679-695.

Backlund, F., Chronéer, D., & Sundqvist, E. (2014). Project management maturity models–A critical review: A case study within Swedish engineering and construction organizations. *Procedia-Social and Behavioral Sciences*, 119, 837-846.

Bagies, A., & Fortune, C. (2006, September). Bid/no-bid decision modelling for construction projects. In *Procs 22nd Annual ARCOM Conference* (pp. 511-521). Birmingham

Bai & Sarkis (2013). A grey-based DEMATEL model for evaluating business process management critical success factors. *International Journal of Production Economics*, 146, 281-292.

Baines, T., Lightfoot, H., Williams, G. M., & Greenough, R. (2006). State-of-the-art in lean design engineering: a literature review on white collar lean. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, 220(9), 1539-1547.

Bajaj, A., & Wrycza, S. (2009). *Systems analysis and design for advanced modelling methods: best practice*. New York: Hershey.

Baldwin, A., McCaffer, R., & Oteifa, S. (1995). *International bid preparation*. UK: International Labour Organisation.

Baloh, P., Uthicke, K., & Moon, G. (2008). A business process-oriented method of KM solution design: A case study of Samsung Electronics. *International Journal of Information Management*, 28(5), 433–437.

Bangemann, T. (2005). *Shared services in finance and accounting*. England: Gower Publishing Limited.

Banner, D., & Gagné, T. (1995). *Designing effective organizations: Traditional and transformational views*. California: Sage.

Bartels, W., Bremmer, L., Buchholz, T., Cadbury, A., Choudhry, M., (...) Zollinger, p. (2012). *Qfinance: The ultimate resource.* (3rd Ed.). London: A&C Black.

Bennett, L. (2003). *The management of construction: a project life cycle approach*. Oxford: Butterworth-Heinemann.

Berg, T., & Pooley, R. (2013). Rich Pictures: a valuable means to explore complex IS issues. *Systemic Practice and Action Research*, 26(4), 361-376.

Bernard, H., R. (2011). *Research methods in anthropology: qualitative and quantitative approaches*. (5th Ed.). Plymouth: AltaMira Press.

Bernstein, B., & Singh, P. (2006). An integrated innovation process model based on practices of Australian biotechnology firms. *Technovation*, 26(5), 561-572.

Bhasin, S. (2012). Performance of Lean in large organisations. *Journal of Manufacturing Systems*, 31(3), 349-357.

Bhasin, S. (2015). *Lean management beyond manufacturing: a holistic approach*. London: Springer.

Bhasin, S., & Burcher, P. (2006). Lean viewed as a philosophy. *Journal of manufacturing technology management*, 17(1), 56-72.

Bicheno, J. (2009). *The Lean toolbox: The essential guide to Lean transformation*. (4th Ed.). Buckingham: Picsie.

Bititci, U., Ackermann, F., Ates, A., Davies, J. Garengo, P., Gibb, S … Firat, U. (2011). Managerial processes: business process that sustain performance. *International Journal of Operations & Production Management*, 31(8), 851 - 891

Blyth, A. (1998). A business process re-engineering success story. *ACM SIGGROUP Bulletin*, 19(1), 21.

Bobera, D. (2008). Project management organisation. *Management Information Systems*, 3(1), 3-9.

Bogdan, R. C., & Biklen, S. K. (2007). *Qualitative research for education: An introduction to theory and methods*. (5th Ed.). Boston, Mass: Pearson A & B.

Bortolotti, T., Boscari, S., & Danese, P. (2015). Successful lean implementation: Organizational culture and soft lean practices. *International Journal of Production Economics*, 160, 182-201.

Borysowich, C. (2007). *Determining activities for IDEF0 models*. Retrieved on 29th August 2015 from http://it.toolbox.com/blogs/enterprise-solutions/determining-activities-for-idef0-models-18662.

Bouri, Mazen, Francois Nankobogo, & Frederick, R. (2010). *Synthesis review of corporate governance of state-owned enterprises in Burkina Faso, Mali, and Mauritania*. Africa Region Working Paper 131, World Bank, Washington, DC.

Bourne, M., & Bourne, P. (2016). *Change management in a week: Managing change in seven simple steps*. (2nd Ed.). London: John Murray Learning.

Boyatzis, R. (1998). *Transforming qualitative information: thematic analysis and code development*. London: Sage Publications.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*. 3, 77–101.

Brenton, K. (2007). Using soft systems methodology to examine communication difficulties. *Mental health practice*, 10(5), 12-16.

Bresnen, M., Goussevskaia, A. & Swan, J. (2005). Implementing change in construction project organizations: Exploring the interplay between structure and agency. *Building Research and Information*, 33(6), 547-560.

Broadman, H. (1995). *Policy options for reform of Chinese state-owned enterprises.* The International Bank for Reconstruction and Development: Washington.

Brodeur, C,. Israel, G., & Craig, D. (2014). *Using secondary data to build strong extension programs, IFAS Extention, University of Florida*. Retrieved from http://edis.ifas.ufl.edu/pdffiles/PD/PD01000.pdf.

Bronzo, M., Resendeb, P., Oliveirac, M., McCormackd, K., Sousab, P. & Ferreirab, R. (2013). Improving performance aligning business analytics with process orientation. *International Journal of Information Management,* 33, 300– 307.

Brook, M. (2008). *Estimating and tendering for construction work*. (4th Ed.). UK: Elsevier Butterworth-Heinemann.

Brown, S. (2008). *Identifying business functions and business processes involved in mass layoffs in the United States*. Background paper for the 2008 World Congress on national accounts and economic performance measures for nations Washington, D.C. Retrieved from http://www.indexmeasures.com/dc2008/papers/BFWorldCongress_revised%20May%202008.pdf.

Bryman, A. (2012). *Social Research Methods*. (4th Ed.). New York: Oxford: Oxford University Press.

Bureau of Economic and Business Affairs (2013). 2013 *Investment climate statement.* Retrieved from https://www.state.gov/e/eb/rls/othr/ics/2013/204661.htm

Burke, W. (2011). *Organization change: Theory and practice*. (3rd Ed.). Thousand Oaks, CA: Sage Publications.

Burley, K. (2015). *What is a deliverable in project management?*. Retrieved 7 July, 2015 fromhttp://smallbusiness.chron.com/deliverable-project-management-31615.html.

Burlton, R.T. (2001). *Business process management: profiting from Process*. Indianapolis: Sams Publishing.

Burnes, B. (2009). *Managing change: A strategic approach to organisational dynamics*. (5th Ed.). Essex: Pearson Education.

Business Dictionary. (2015a). *Functional area*. Retrieved 10 August 2015 from http://www.businessdictionary.com/definition/functional-area.html

Business Dictionary. (2017). *Core process*. Retrieved 20 June 2017 from http://www.businessdictionary.com/definition/core-process.html

Business Monitor International (2017). *Industry Trend Analysis - Construction Market Poised For Gradual Recovery - MAY 2017: Middle East & Africa May 2017 / Iraq / Industry*. Retrieved 29 May 2017 from http://www.infrastructure-insight.com/industry-trend-analysis-construction-market-poised-gradual-recovery-may-2017.

Business Monitor International (BMI). (2015). *Iraq country risk report*. Retrieved from http://store.bmiresearch.com/iraq-country-risk-report.html.

Cabinet Office (2011). *Machinery of government changes following the general election 2010: an explanatory document.* Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/61286/machinery-government-explanatory-notes.pdf.

Caithness, A. (2014). *Top 10 tips to tendering*. Retrieved 14 Oct. 2015 form https://www.linkedin.com/pulse/20141029111321-11551916-top-10-tips-to-tendering.

Camagu, S. (2010). *Investigating factors that negatively influence lean implementation in the eastern cape automotive industry*. (Unpublished MSc. Thesis), Nelson Mandela Metropolitan University, South Africa.

Campos, A., & de Almeida, A. (2015). A multicriteria decision model for classifying management processes. In *Decision Models in Engineering and Management* (pp. 109-125). Springer International Publishing.

Cao, G., Clarke, S., & Lehaney, B. (2004). The need for a systemic approach to change management: A case study. *Systemic Practice and Action Research*, 17(2), 103-126.

Cartlidge, D. (2015). *Construction Project Manager's Pocket Book*. Oxon: Routledge.

Cerere, L., & Chase, C. (2013). *Bricks matter: the role of supply chains in building market-driven differentiation*. New Jersey: John Wiley & Sons.

Chaffey, D. (1998). *Group ware, workflow and intranets: reengineering the enterprise with collaborative softeare*. USA: Butterworth-Heinemann.

Chai, J., Chi, H. L., Wang, X., Wu, C., Jung, K. H., & Lee, J. M. (2016). Automatic as-built modeling for concurrent progress tracking of plant construction based on laser scanning. *Concurrent Engineering*, 24(4), 369-380.

Chand, S. (2015). *8 Types of organisational structures: their advantages and disadvantages*. retrieved 14 June 2016 from http://www.yourarticlelibrary.com/organization/8-types-of-organisational-structures-their-advantages-and-disadvantages/22143.

Chaudhry, K. A. (2002). Consuming interests: market failure and the social foundations of Iraqi etatisme. *Iraq's Economic Predicament, edited by Kamil A. Mahdi*, 233-265.

Checkland, P. (1999). *Systems thinking, systems practice: Includes a 30 year retrospective*. New York: John Wiley & Sons.

Chen, G., Firth, M., & Rui, O. (2006). Have China's enterprise reforms led to improved efficiency and profitability?. *Emerging Markets Review*, 7(1), 82-109.

Chen, J., Suen, M., Lin, M., & Shieh, F. (2016). Organizational Change and Development. *T & D*, 113(100), 1-13.

Chen, Y. L. (2009). Data flow diagram. In Li, Q., & Chen, Y. L. *Modeling and Analysis of Enterprise and Information Systems* (pp. 85-97). Retrieved from http://inls382.web.unc.edu/files/2016/01/DataFlowDiagram.pdf

Cherian, T. M., & Kumaran, L. A. (2016). E-Business in Construction Industry: Opportunities and Challenges. *Indian Journal of Science and Technology*, 9(32) 1-6.

Chetty, S. (1996). The case study method for research in small-and medium-sized firms. *International Small Business Journal*, 15(1), 73-85.

Cho, K., Hong, T., & Hyun, C. (2010). Scheduling model for repetitive construction processes for high-rise buildings. *Canadian Journal of Civil Engineering*, 38(1), 36-48.

Chua, J., Eze, U., & Goh, G. (2010). Knowledge sharing and total quality management: a conceptual framework. In *Industrial Engineering and Engineering Management (IEEM), 2010 IEEE International Conference on* (pp. 1107-1111). IEEE.

CIOB. (2010). *A report exploring procurement in the construction industry.* Retrieved from: http://www.ciob.org/sites/default/files/CIOB%20research%20-%20Procurement%20in%20the%20Construction%20Industry%202010_1.pdf.

CMMI Institute Partner (2015). *Institutionalisation: Embedding process in the organisation*. Retrieved from: http://www.trinity-cmmi.co.uk/PDF/Achieving_Institutionalisation_Factsheet.pdf.

Cockrell, C., McBurnett, D., & Ellinger, A. (2012). Transformational organizational change as projects: Exploring the actions taken by project managers when leading and implementing change. In *UFHRD 2012 13th International Conference on HRD Research and Practice Across Europe*.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education.* (6th Ed.). London: Routledge.

Collis, J. & Hussey, R. (2009). *Business Research: A practical guide for undergraduate and postgraduate students*. (3rd Ed.). New York: Palgrave Macmillan.

Colorado State University. (2017). *Content analysis. Colorado State University*. Retrieved 12 Augast, 2017, from http://writing.colostate.edu/guides/research/content/index.cfm

Committee for Oversight & Assessment of U.S. Department of Energy Project Management (2005). *The owner's role in project risk management*. Washington: The National Academies Press.

Conger, S. (2011). *Process mapping and management.* New York: Business Expert Press.

Connor, G., McFadden, M., & McLean, L. (2012). Organisation design. In J. Stewart and P. Rogers (Eds), *Developing people and organisations*. (pp. 1-35) Retrieved from http://www.cipd.co.uk/nr/rdonlyres/0f71ec66-bfee-437e-b8f0-d53e3588898a/0/intermediatespfinalnocrop.pdf.

Construction Industry Review Committee (CIRC). (2001). *Construct for excellence. Report of the Construction Industry Review Committee*. Retrieved from https://www.devb.gov.hk/filemanager/en/content_735/reporte.pdf.

Construction-IT (2001). *Introduction to SPICE. UK, Construction-IT For business*, The University of Salford, Salford.

Cooke, B., & Williams, P. (2009). *Construction planning, programming and control*. (3rd Ed.). UK: Wiley-Blackwell.

Cooper, R. G. (1994). Third-generation new product processes. *Journal of product innovation management*, 11(1), 3-14.

Cooper, R., Aouad, G., Lee, A., Wu, S., Fleming, A., & Kagioglou, A. (2005). *Process management in design and construction.* Oxford: Wiley-Blackwell.

Corbin, J., & Morse, J. (2003). The unstructured interactive interview: issues of reciprocity and risks when dealing with sensitive topics. *Qualitative Inquiry*, 9(3), 335-354.

Corzine, P. (2004). The Islamic empire. London: Lucent Books.

Creswell, J. W. (2014). *Research design: qualitative and mixed methods approaches*. (4th Ed.). London: Sage Publication.

Crotty, M. (1998). *The foundations of social research: meaning and perspective in the research process*. London: Sage Publication.

Cui, Q., Hastak, M., & Halpin, H. (2010). Systems analysis of project cash flow management strategies. *Construction Management and Economics*, 28, 361–376.

Cunningham, I., Hyman, J., & Baldry, C. (1996). Empowerment: the power to do what?. *Industrial Relations Journal*, 27(2), 143-154.

Curristine, T., Lonti, Z., & Jourmard, I. (2008). Improving public sector efficiency: Challenges and opportunities. *Presupuesto y gasto público, 51*, 161-198.

Daft, R. L. (2013). *Understanding the Theory and Design of Organizations*, (11th Ed.). Manson: Thomson South-Westeren.

Damelio, R. (2011). *The basics of process mapping.* (2nd Ed.). Florida: CRC Press.
Darnall, R., & Preston J. (2012). *Beginning project management*. Retrieved from http://2012books.lardbucket.org/pdfs/beginning-project-management-v1.1.pdf
Das, M., Deb, M., & Wilkins, M. (2012). *Oracle business process management suite 11g handbook.* USA. The McGraw.Hill.
Davenport, T. (1993): *Process innovation - reengineering work through information technology*. Boston: Harvard Business School Press.
Davies, J. (2015). *Disadvantages of Lean Manufacturing (and how to make Lean work in your firm).* Retrived 18 June 2017 from: http://www.winman.com/blog/disadvantages-of-lean-manufacturing-and-how-to-make-lean-work-in-your-firm
Davies, R., & Davies, A. (2016). *Value management: translating aspirations into performance*. (2nd Ed.). London: Routledge, Taylor and Francis Group.
Davies, R., & Davies, A. (2016). *Value management: translating aspirations into performance*. (2nd Ed.). London: Routledge, Taylor and Francis Group.
De Luna-Martinez, Jose, & Carlos Leonardo Vicente. (2012). *Global survey of development banks*. Policy Research Working Paper 5969, World Bank, Washington DC.
De Water, H., Schinkel, M., & Rozier, R. (2007). Fields of application of SSM: a categorization of publications. *Journal of the Operational Research Society*, 58(3), 271-287.
Deming, W. (1986). *Out of the crisis*. Cambridge, MA: MIT Center for Advanced Engineering Study.
Dennis, A. R., Carte, T. A., & Kelly, G. G. (2003). Breaking the rules: success and failure in groupware-supported business process reengineering. *Decision support systems*, 36(1), 31-47.
Dennis, A., Wixom, B. H., & Roth, R. M. (2014). *Systems analysis and design*. (6th Ed.). Hoboken: John wiley & sons.
Department of Defence of the United State. (2011). *Unified facilities criteria (ufc) handbook: construction cost estimating*. Retrieved from http://www.wbdg.org/FFC/DOD/UFC/ufc_3_740_05_2010_c1.pdf
DeToro, I., & McCabe, T. (1997). How to stay flexible and elude fads. *Quality Progress,* 30(3), 55–60.
Dhimmar, V., Sharma, N., & Rathod, H. (2016). Evaluation of factors influencing change management for construction project by SPSS tool. *International Journal of Scientific Development and Research (IJSDR)*, 1(5), 361-364.
DiCicco-Bloom, B. & Benjamin, C. (2006). The qualitative research interview. *Medical Education*, 40: 314–321.
Dieronitou, I. (2014). The ontological and epistemological foundations of qualitative and qualitative approaches to research with particular reference to content and discourse analysis of textbooks. *International Journal of Economics, Commerce and Management*, 11(10), 1-17.
Dixit, J. B. & Kumar, R. (2007). *Structured System Analysis and Design*. New Delhi: Laxmi Publications.
Domegan, C., & Fleming, D. (2007). Marketing research in Ireland: Theory and practice. (3rd Ed.). Dublin: Gill & MacMillan.

Donald, S., & Vie Jr, L. (2000, May). *Understanding data flow diagrams*. Paper presented in the 47th Annual Conference on Society for Technical Communication. Retrieved from http://ratandon.mysite.syr.edu/cis453/notes/DFD_over_Flowcharts.pdf.

Doroodchi, M., & Roudaki, A. (2009). Developing games in Alice using workflow. In *Proceedings of the 2009 Alice Symposium* (p.4). ACM.

Dorsey, R. (1997). *Project delivery systems for building construction.* Associated General Contractors of America.

Dulaimi, M. F., & Shan, H. G. (2002). The factors influencing bid mark-up decisions of large- and medium-size contractors in Singapore. *Construction Management & Economics*, 20(7), 601-610.

Dumas, M., La Rosa, M., Mendling, J., & Reijers, H. A. (2013). *Fundamentals of business process management*. New York: Springer Heidelberg.

Eadie, R., & Perera, S. (2017). 4 Drivers for electronic procurement and building information modelling in the construction industry. In S., Perera, B., Ingirige, K., Ruikar, & Obonyo, (Eds.), *Advances in Construction ICT and e-Business*, (pp. 65-86), New York, Routledge.

Easterby-Smith, M., Thorpe, R., & Jackson, P. (2012*). Management research.* (4th Ed.). New Delhi: Sage Publication.

Edraw. (2017). *Edraw Flowchart*. Retrieved 27 June 2017, from: https://www.edrawsoft.com/Data-Flow-Diagrams.php.

Edson, R. (2008). *Systems thinking. Applied. A primer*. The applied system thinking (ASysT). Retrieved from http://www.anser.org/docs/systems_thinking_applied.pdf

Egan, J. (1998) *Rethinking construction*. Department of the Environment, Transport and the Regions.

Egemen, M., & Mohamed, A. N. (2007). A framework for contractors to reach strategically correct bid/no bid and mark-up size decisions. *Building and Environment*, *42*(3), 1373-1385.

Ekung, S., Adeniran, L., & Adu, E. (2014). Appraisal of process mapping in heavy engineering projects: a case of Nigeria East-West Coastal Highway. *International Letters of Natural Sciences*, 20, 17-27.

El-Gohary, N., & El-Diraby, T. (2010). Domain ontology for processes in infrastructure and construction. *Journal of Construction Engineering and Management*, 136(7), 730-744.

Elmuti, D., & Kathawala, Y. (1997). An overview of benchmarking process: A tool for continuous improvement and competitive advantage. *Benchmarking for Quality Management & Technology*, 4(4), 229-243.

Elo, S. & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62, 107–115.

Enshassi, A., Mohamed, S., & El Karriri, A. A. (2010). Factors affecting the bid/no bid decision in the Palestinian construction industry. *Journal of Financial Management of Property and Construction*, 15(2), 118-142.

Erdogan, B., Anumba, C., Bouchlaghem, D., & Nielsen, Y. (2005). Change management in construction: the current context. In *21st Annual ARCOM Conference* (pp. 1085-1095).

Esain, A., Williams, S., & Massey, L. (2008). Combining planned and emergent change in a healthcare lean transformation. *Public Money and Management*, 28(1), 21-26.

Essa, R. (2008). *A framework for the pre-construction evaluation of sustainable housing projects in the UK*. (Unpublished PhD. Thesis), Heriot Watt University, Edinburgh.

Esu, B. B., & Inyang, B. J. (2009). A case for performance management in the public sector in Nigeria. *International Journal of business and management*, 4(4), 98.

Eugene, N., & Judipat, O. (2015). Cost-benefit analysis of business process reengineering. *International Journal of Innovative Research in Social Sciences and Strategic Management Techniques*, 1(1), 17-34.

F.I.D.I.C. (1994). *Tendering procedure.* (2nd Ed.). Lausanne: FIDIC.

Farmer, M. (2016). *The Farmer review of the UK construction labour model. Construction Leadership Council. Uk*. Retrieved from http://www.cast-consultancy.com/wp-content/uploads/2016/10/Farmer-Review-1.pdf.

Fatolahi, A., Jalalinia, S., Dabestani, Z., & Eskandari, M. (2007). Extracting business process decomposition: A practical approach using the ISIran V methodology. *Business Process Management Journal*, 13(2), 214-222.

Fayek, A., Ghoshal, I., & AbouRizk, S. (1999). A survey of the bidding practices of Canadian civil engineering construction contractors. *Canadian Journal of civil engineering*, 26(1), 13-25.

Fayek, A., Young, D. M., & Duffield, C. F. (1998). A survey of tendering practices in the Australian construction industry. *Engineering Management Journal*, 10(4), 29-34.

Fellows, R. F., & Liu, A. M. (2015). *Research methods for construction*. (4th Ed.). Oxford: John Wiley & Sons.

Filaih, A. (2013, 26 July). Why the efficiency of projects that are carried out in Iraq today is decreased? *Radio of Iraq Hurr*. Retrieved from http://www.iraqhurr.org/content/article/25060931.html.

Filicetti, J. (2008). *Project management process - phase 2 -planning - create risk management plan*. Retrieved on 15 Nov. 2015 from http://www.pmhut.com/project-management-process-phase-2-planning-create-risk-management-plan.

Finnemore, M., Sarshar, M., & Haigh, R. (2000). Case studies in construction process improvement. In *Proceedings of the ARCOM Construction Process Workshop* Loughborough University, Loughborough. February 16. Retrieved from http://www.arcom.ac.uk/-docs/workshops/2000-Loughborough.pdf.

Flick, U. (2011). *Introducing research methodology: A beginner's guide to doing a research project.* London: Sage Publication.

Fontana, A., & Frey, J. (2005). *The interview: from neutral stance to political involvement*. In: Denzin N, Lincoln Y, eds. The Sage Handbook of Qualitative Research. (3rd Ed.). Thousand Oaks, California: Sage 2005; 695–727.

Forster, G. (2013). *Building organisation and procedures*. (2nd Ed.). New York: Routledge.

Francis, A. T. (2008). *Re engineering and Re defining University Libraries in the context of modern Information and Communication Technologies a study with special reference to the University Libraries in Kerala*. (Unpublished PhD Thesis), Cochin University of Science and Technology, Kerala. Retrieved from file:///C:/Users/tal-o_000/Downloads/Dyuthi-T0885.pdf.

Freitas, H., Oliveira, M., Jenkins, M., & Popjoy, O. (1998). The focus group, a qualitative research method. *ISRC, Merrick School of Business, University of Baltimore (MD, EUA)*, 1, 1-22.

Frenken, K. (2009). *Irrigation in the Middle East region in figures AQUASTAT Survey-2008*. Water Reports, (34). Retrieved from http://www.fao.org/3/a-i0936e.pdf.

Frolov, V., Ma, L., Sun, Y., & Bandara, W. (2010). Identifying core functions of asset management. Retrieved from http://www.springer.com/978-1-84996-177-6.

Galbraith, J. R. (1995), *Designing Organizations, an executive briefing on strategy, structure, and process*, Jossey-Bass Publishers: San Francisco.

Gardener, N. (2008). Business continuity and the link to insurance: A pragramtic approach to miticate principal risks and uncertainties. *Hazards XX Symposium Serie, 154, Manchester, UK. 1-16.*

Gareis, R. (Ed.). (1990). *Handbook of management by projects*. Vienna: Manz.

Garrett, K. (2015). *Project management - business cases and gateways*. Retrieved 6 July 2017 from http://www.accaglobal.com/uk/en/student/exam-support-resources/professional-exams-study-resources/p3/technical-articles/project-management---business-cases-and-gateways.html.

Gartner. (2010). *Leading in Times of Transition*: The 2010 CIO Agenda.

Germanakos, P., & Belk, M. (2016). *Human-centred web adaptation and personalization: from theory to practice*. Switzerland: Springer.

Gerring, J. (2008). *Case study research: principles and practices*. Cambridge: Cambridge University Press.

Gibbs, G. (2007). *Analyzing qualitative data*. London: Sage Publications.

Gichuiri, J. (2001). *Process modelling: an evaluation approach in support of effective management of construction project information*. (Unpublished PhD. thesis), University of Salford, Salford.

Glavan, L. M., & Vuksic, V. B. (2017). Examining the impact of business process orientation on organizational performance: the case of Croatia. *Croatian Operational Research Review CRORR*, 8(1), 137-165.

Golledge, R. G., & Stimson, R. J. (1997). Spatial cognition, cognitive mapping, and cognitive maps. *Spatial behavior: A geographic perspective*, 224-266. Retrieved from http://www.diliaranasirova.com/assets/PSYC579/pdfs/10.1-Golledge&Stimson.pdf

Graetz, F. & Smith A. (2009). Duality theory and organizing forms in change management. *Journal of Change Management*, 9(1), 9–25.

Grant, K. P., & Pennypacker, J. S. (2006). Project management maturity: an assessment of project management capabilities among and between selected industries. *IEEE Transactions on engineering management*, 53(1), 59-68.

Gray, D. E. (2014). *Doing research in the real world*. (3rd Ed.). London: SAGE Publications Inc.

Griffith, A., & Howarth, T. (2014). *Construction health and safety management.* London: Routledge.

Grint, K., & Willcocks, L. (1995). Business process re-engineering in theory and practice: business paradise regained?. *New Technology, Work and Employment*, *10*(2), 99-109.

Grover, V., Kettinger, W. J., & Teng, J. T. (2000). Business process change in the 21st century. *Business and Economic Review*, 46(2), 14-18.

Gunter, F. (2013). *Challenges facing the reconstruction of Iraq's infrastructure.* Retrieved from http://www.lehigh.edu/~incbeug/Attachments/Iraq%20Infrastructure%2028Oct13.pdf.

Gupta, A. (2009). *Functional vs divisional structure*. Retrieved 24 Apral, 2015, from http://practical-management.com/Organization-Development/Functional-Vs-Divisional-Structure.html.

Hagen, C., Ratz, D., & Povalej, R. (2005). Towards self-organising knowledge intensive processes. *Journal of Universal Knowledge Management*, 2, 148–169.

Haigh, R. (2004). *Continuous process improvement and learning on construction projects – the role of process capability assessments*. (Unpublished PhD Thesis), University of Salford, Salford.

Halpin, D. W., & Riggs, L. S. (1992). *Planning and analysis of construction operations*. Canada: John Wiley & Sons.

Hammer, M. (1990). Re-engineering work: don't automate, obliterate. *Harvard Business Review*, 90(4), 104-112.

Hammer, M. (2007a). The process audit. *Harvard Business Review*, 85(4), 111-23.

Hammer, M. (2007b). The 7 deadly sins of performance measurement. *MIT Sloan Management Review*, 48(3), 19-28.

Hammer, M. & Champy, J. (1993). *Reengineering the corporation: A manifesto for business revolution*. New York, NY: HarperBusiness.

Hammer, M., & Stanton, S. (1999). How process enterprises really work. *Harvard business review*, *77*, 108-120.

Hansford, M. (2009). Construction returns to claims and conflict. *New Civil Engineer*. 15th. October 2009 (pp. 6-7).

Harmon, P. (2003). *Business process change: a manager's guide to improving, redesigning, and automating processes*. San Francisco: Morgan Kaufmann.

Harmon, P. (2010). *BPMN for business - The role of the customer*. Retrieved 1 July 2017 from http://www.bpminternational.eu/68-29480.php.

Haron, A. T. (2013). *Organisational readiness to implement building information modelling: A framework for design consultants in Malysia*. (Unpublished PhD. Thesis), University of Salford, Salford.

Harrington, H. (2006*). Process management excellence*. California: Paton Press.

Harris, F., McCaffer, R., & Edum-Fotwe, F. (2013). *Modern construction management*. (7th Ed.). UK: Wiley-Blakwell.

Harty, J., Kouider, T., & Paterson, G. (2016). *Getting to grips with BIM: A guide for small and medium-sized architecture, engineering and construction firms*. New York: Routledge.

Health and Safety Executive (HSE) (2001). A guide to measuring health and safety. Retrieved from http://www.hse.gov.uk/opsunit/perfmeas.pdf

Healy, M., & Perry, C. (2000). Comprehensive criteria to judge validity and reliability of qualitative research within the realism paradigm. *Qualitative Market Research: An International Journal*, 3(3), 118-26.

Heathfield, S. (2016). *Empowerment in Action: How to Empower Your Employees Definition and Examples of Empowered Behavior*. Retrieved from: https://www.thebalance.com/empowerment-in-action-how-to-empower-your-employees-1918102.

Hechanova, M., Regina, M., Alampay, R. B. A., & Franco, E. P. (2006). Psychological empowerment, job satisfaction and performance among Filipino service workers. *Asian Journal of Social Psychology*, 9(1), 72-78.

Hegde, D. (2015). *Essays on research methodology*. New Delhi: Springer. doi 10.1007/978-81-322-2214-9.

Hendriks, P. (1999). The organisational impact of knowledge-based systems: a knowledge perspective. *Knowledge-Based Systems*, (12) 4,159-69.

Herr, K., & Anderson, G. L. (2014). *The action research dissertation: A guide for students and faculty*. (2nd Ed.). USA: Sage Publications.

Hesson, M., Al-Ameed, H., & Samaka, M. (2007). Business process reengineering in UAE public sector: a town planning case study. *Business Process Management Journal*, 13(3), 348-378.

Hill, G. (2014). *The complete project management office handbook*. (3rd Ed.). London: CRC Press, Taylor & Francis Group.

Hinterhuber, H.H. (1995). Business process management: The European approach. *Business Change & Re-engineering*, 2(4), 63-73.

Holt, G., Love, P., & Jawahar Nesan, L. (2000). Employee empowerment in construction: an implementation model for process improvement. Team Performance Management: *An International Journal*, 6(3/4), 47-51.

Holtham, C. (1994). Business process re-engineering-contrast what it is with what it is not. *Business process re-engineering myth and reality*, Colin Conulson-Tomas Ed, 60-74.

Holweg, M. (2007). The genealogy of lean production. *Journal of operations management*, 25(2), 420-437.

Hooker, K. (2013). *A better jobsite: a well-organized jobsite boosts productivity and safety*. Retrieved 19 Nov. 2015 from http://www.concreteconstruction.net/management/organizing-the-jobsite_o.aspx

Horine, G. (2013). *Project management absolute beginner's guide*. (3rd Ed.). Indiana: Que Publishing.

Hua, G. (2013). *Implementing IT business strategy in the construction industry*. USA: Business Science Reference.

Hughes, P., & Ferret, E. (2011). *Introduction to Health and Safety in Construction*. (4th Ed.). New York: Routledge.

Hwang, B. G., & Low, L. K. (2012). Construction project change management in Singapore: Status, importance and impact. *International Journal of Project Management*, 30(7), 817-826.

Hwang, B. G., Thomas, S. R., Haas, C. T., & Caldas, C. H. (2009). Measuring the impact of rework on construction cost performance. *Journal of Construction Engineering and Management*, 135(3), 187-198.

Ibbs, C. W., Wong, C. K., & Kwak, Y. H. (2001). Project change management system. *Journal of Management in Engineering*, 17(3), 159-165.

IBM (2011). *Improving the efficiency, accuracy and cost effectiveness of core business activities enable better management of product, customer, employee, asset and supply chain information through enterprise content management*, Retrieved from https://www-07.ibm.com/sg/manufacturing/pdf/manufacturing/ECM.pdf

Ibrahim, R., & Yen, S. (2010). Formalization of the data flow diagram rules for consistency. *International Journal of Software Engineering & Applications (IJSEA)*, 1(4), 95-111.

Inmon, W. H., & Linstedt, D. (2015). *Data Architecture: A Primer for the Data Scientist: Big Data, Data Warehouse and Data Vault*. Waltham: Morgan Kaufmann.

International Association for Contract and Commercial Management (IACCM). (2011).*Contract and commercial management: the operational guide*. Zaltbommel, Netherlands: Van Haren Publishing.

International Bank for Reconstruction and Development (2014). Corporate governance of state-owned enterprises: A toolkit. Retrieved from http://documents.worldbank.org/curated/en/228331468169750340/pdf/913470PUB097810B00PUBLIC00100602014.pdf.

International Energy Agency (IEA). (2012). *Iraq Energy Outlook: World Energy Outlook Special Report*. Retrieved from http://www.worldenergyoutlook.org/media/weowebsite/2012/iraqenergyoutlook/Fullreport.pdf.

IPMO (2015). *Reconstruction of Iraqi state-owned enterprises: the reality... vision toward reforming*. Iraqi Prime Minister Office.

Iraqi Federal Board of Supreme Audit (IFBSA). (2011). *Annual report 2011: part 2*. Retrieved from http://www.d-raqaba-m.iq/pdf/annual2011part2.pdf.

Iraqi Federal Board of Supreme Audit (IFBSA). (2012). *Annual report 2012: part 3*. Retrieved from http://www.d-raqaba-m.iq/pdf/annual2012part3.pdf.

Iraqi Federal Board of Supreme Audit (IFBSA). (2013). *Annual report 2013.* Retrieved from http://www.d-raqaba-m.iq/pdf/annual_report2013.pdf.

Iraqi Federal Board of Supreme Audit (IFBSA). (2014). *Annual report 2014.* Retrieved from http://www.d-raqaba-m.iq/pdf/rep_4_quartrly_2014.pdf.

Iraqi Federal Board of Supreme Audit (IFBSA). (2015). *Annual report 2015: the second half of the year 2015.* Retrieved from http://www.d-raqaba-m.iq/pdf/rep_second_quartrly_2015.pdf.

Iraqi Ministry of Planning (2013). *Central Statistical Organization*. Retrieved 25 May 2017 from http://www.cosit.gov.iq/en/.

Isaksson, R. (2004). *Total quality management for sustainable development-focus on process.* (Unpublished PhD thesis), Lulea University of Technology, Lulea.

Issham, I., Ab dul Samad, M. F., Hwa, Y. S., Abdulbasah, A., Kamil, A., & Ayub, M. A. (2008). Economic value added (EVA) as a performance measurement for GLCs vs Non-GLCs: evidence from Bursa Malaysia. *Prague Economic Papers 3*. Retrieved from http://www.vse.cz/pep/abstrakt.php3?IDcl=328.

Ivanko, S. (2013). *Modern theory of organisation*. Retrieved from http://blog.ub.ac.id/cikida/files/2014/12/Book-of-ModernTheory-of-organization1.pdf

Jadhav, R., Mantha, S., & Rane, B. (2014). Exploring barriers in lean implementation. *International Journal of Lean Six Sigma*, 5(2), 122-148.

Jaksic, M., & Rakocevic, S. (2012). *Proceedings of the XIII international symposium SymOrg 2012: innovative management and business performance*. Newpress d.o.o: Serbia.

Jamali, D., Sidani, Y., & Zouein, C. (2009). The learning organization: tracking progress in a developing country: a comparative analysis using the DLOQ. *The learning organization*, 16(2), 103-121.

Jassim, N. (2013). Selection the optimum construction company from the quality of construction planning by using AHP technique. *Journal of Engineering and Development*, 1, 13-32.

JCT (2016). *Making good with rectification periods*. Retrieved from https://corporate.jctltd.co.uk/making-good-with-rectification-periods/

Jeong, K. S., Kagioglou, M., Haigh, R., Amaratunga, D., & Siriwardena, M. L. (2006). Embedding good practice sharing within process improvement. *Engineering, Construction and Architectural Management*, 13(1), 62-81.

Jeong, K. S., Siriwardena, M. L., Amaratunga, R. D. G., Haigh, R. P., & Kagioglou, M. (2004). Structured process improvement for construction enterprises (SPICE) level 3: establishing a management infrastructure to facilitate process improvement at an organisational level.

Jogulu, U., & Wood, G. (2007). Leadership empowerment-power struggle. *Engineering management journal*, 17(3), 36-37.

Johnson, B., & Christensen, L. (2017). *Educational research: Quantitative, qualitative, and mixed approaches*. (6th Ed.). California: Sage Publication.

Johnson, C., & Levien, S. (2010). Numbers You Need: Top Tech Priorities; IT departments are focused on cloud computing, business intelligence and business process management. *CIO*, 23(9).

Johnson, G., Whittington, R., & Scholes, K. (2014). *Exploring strategy*. (8th. Ed.). Essex: Pearson Education Limited

Johnson, G., Whittington, R., Scholes, K., Angwin, D., & Regner, P. (2015). *Fundamentals of strategy*. (3rd Ed). Harlow: Pearson Education Limited.

Johnson, P., & Clark, M. (2006). *Business and management research methodologies*. (Vols 1-6). London: Sage.

Johnson, W., & McCormack, K. (2011). Business process integration and supply chain networks. *International Business & Economics Research Journal* (IBER), 1(12), 79-88.

Jones, K., & Kaluarachchi, Y. (2008). Performance measurement and benchmarking of a major innovation programme. *Benchmarking: An International Journal*, 15(2), 124-136.

Joseph, P., & Mohapatra, S. (2014). *Management information systems in knowledge economy*. New Delhi: PHI learning Private Limited.

Kagioglou, M. Cooper, R. & Aouad, G. (1999). Re-engineering the UK construction industry: The process protocol. *Second International Conference on Construction Process Re-Engineering-CPR99*. Retrieved from http://www.processprotocol.com/pdf/cpr99.pdf.

Kagioglou, M., Cooper, R., Aouad, G., & Sexton, M. (2000). Rethinking construction: the generic design and construction process protocol. *Engineering construction and architectural management*, 7(2), 141-153.

Kagioglou, M., Cooper, R., Aouad, G., Hinks, J., Sexton, M., & Sheath, D. (1998). *A Generic Guide to the Design and Construction Process Protocol Final Report*: University of Salford, UK.

Kahn, K., & Mentzer, J. (2008). Marketing's integration with other departments. *Journal of Business Research*, 42(1), 53–62.

Kahreh, M., Ahmadi, H., & Hashemi, A. (2011). Achieving competitive advantage through empowering employees: An empirical study. *Far East Journal of Psychology and Business*, 3(2), 26-37.

Kariuki, A., & Murimi, C. (2015). Employee empowerment and organization performance of Tata Chemicals Magadi Ltd, Kenya. *European Journal of Business and Management*, 7(8), 190-200.

Kazi, A. (2005). *Knowledge management in the construction Industry: A socio-technical Perspective*. London: Idea Group Publishing

Kelessidis, V. (2000). *Benchmarking: Report produced for the EC funded project INNOREGIO: dissemination of innovation management and knowledge technique*. Retrieved from: http://www.adi.pt/docs/innoregio_benchmarking-en.pdf.

Kells, S. (2011). The Seven deadly sins of performance auditing: implications for monitoring public audit institutions. *Australian Accounting Review*, 21(59), 383–396.

Kerzner, H. (2006). *Project management: a systems approach to planning, scheduling and controlling*. (9th Ed.). New York: Wiley.

Khanam, S., Siddiqui, J., & Talib, F. (2013). Role of information technology in total quality management: a literature review. *International Journal of Advanced Research in Computer Engineering &Technology (IJARCET)*, 2(8), 2430-2445.

Khosravi, A. (2016). Business process rearrangement and renaming: a new approach to process orientation and improvement. *Business Process Management Journal*, 22(1), 116-139.

Kim, D. (2011*). Construction planning and execution strategies for enhancing project success on electrical construction subcontracts*. (Unpublished PhD. Thesis), The University of Texas at Austin, Austin.

Kirchmer, M. (2011). *Enabling innovation through business process management*. Philadelphia: Accenture.

Klotz, L., Horman, M., Bi, H. H., & Bechtel, J. (2008). The impact of process mapping on transparency. *International Journal of Productivity and Performance Management*, 57(8), 623-636.

Kloviene, R., & Gimzauskiene, E. (2014). Performance Measurement Model Formation in State-owned Enterprises. *Procedia-Social and Behavioral Sciences, 156*, 594-598.

Kohl, K. (2016). *Becoming a Sustainable Organization: A Project and Portfolio Management Approach*. Boca Raton: Taylor & Francis Group.

Kohlbacher M., & Reijers H., (2013). The effects of process-oriented organizational design on firm performance. *Business Process Management Journal*, 19(2), 245 – 262.

Kohlbacher, M. (2009). *The Effects of Process Orientation on Customer Satisfaction, Product Quality and Time-Based Performance*. Paper presented at the International Conference of the Strategic Management Society, Washington DC, October 11–14, Conference. Retrieved from http://dc.strategicmanagement.net.

Kohlbacher, M. (2010). The effects of process orientation: A literature review. *Business Process Management Journal*, 16(1), 135 - 152.

Kohlbacher, M., & Gruenwald, S. (2011). Process ownership, process performance measurement and firm performance. *International Journal of Productivity and Performance Management*, 60(7), 709-720.

Kokkaew, N., & Koompai, S. (2012). Current practices of human resource management (HRM) in Thai Construction Industry: A risk and opportunity perspective. *Review of Integrative Business and Economics Research*, 1(1), 1-14.

Konieczny, E. (2016). *Generating accurate as built drawing sets (Without the headache).* Retrieved from https://jobsite.procore.com/generating-accurate-as-built-drawing-sets-without-the-headache.

Koppell, J. (2007). Political control for China's state-owned enterprises: Lessons from America's experience with hybrid organizations. *International Journal of Policy, Administration, and Institution*s, 20(2), 255–278.

Koskela, L., Howell, G., Pikas, E. & Dave, B. (2014). If CPM is so bad, why have we been using it so long?. In, B., Kalsaas, L., Koskela, & T., Saurin, *22nd Annual Conference of the International Group for Lean Construction (pp 27-37).* Oslo, Norway.

Koskela, L. (1995). On foundations of construction process modelling. In *CIB Workshop on Computers and Information in Construction. Stanford, California*.

Koskela, L. (2000). *An exploration towards a production theory and its application to construction*. (Unpublished PhD. Thesis) VTT Technical Research Centre of Finland. Retrieved from https://www.researchgate.net/publication/35018344_An_Exploration_Towards_a_Production_Theory_and_its_Application_to_Construction

Koskela, L. (2011). On theory of production in economics and production management. In, G. de Valence (Ed.), *Modern Construction Economics: Theory and Application*, (pp. 80-100). London: Spon Press.

Koskela, L., & Ballard, G. (2006). Should project management be based on theories of economics or production?. *Building Research & Information*, 34(2), 154-163.

Kovacic, A., & Bosilj-Vuksic, V. (2005). *Management poslovnih procesov: Prenova in informatizacija poslovanja*. GV Založba d.o.o.: Ljubljana.

Krafzig, D., Banke, K., & Slama, D. (2005). *Enterprise SOA service- oriented architecture: best practices*. USA: Prentice Hall Professional.

Krueger, R. (1996). *Focus groups: the practical guide goes applied research*. (2nd Ed.). Thousand Oaks: SAGE Publications.

Kulatunga, Amaratunga, & Haigh. (2007). Structuring the unstructured data: The use of content analysis. In *7th International Postgraduate Conference in the Built and Human Environment* (pp. 498–509). Salford, Manchester. Retrieved from http://usir.salford.ac.uk/9857/ /158_Kulatunga_U_et_al_STRUCTURING_THE_UNSTRUCTURED_DATA_THE_USE_OF_CONTENT_AN LYSIS_IPRC_2007.pdf.

Kumar, R. (2014). *Research methodology - a step-by-step guide for beginners.* (4th. Ed.). London: Sage Publications Ltd.

Kumar, S., & Bansal, V. (2015). Framework for safe site layout planning in Hilly Regions. *European Journal of Advances in Engineering and Technology*, 2(4), 14-19.

Kumar, S., & Phrommathed, P. (2006). *New product development: an empirical approach to study of the effects of innovation strategy, organization learning and market conditions* (Vol. 191). Ney York: Springer Science & Business Media.

Kung, P., Hagen, C. (2007). The fruits of business process management: an experience report from a Swiss bank. *Business Process Management Journal*, 13(4), 477-487.

Kupersmith, K., Mulvey, P., & McGoey, K. (2017). *How to use process decomposition diagrams in your business analysis report*. Retrieved 25 June 2017 from http://www.dummies.com/business/business-strategy/how-to-use-process-decomposition-diagrams-in-your-business-analysis-report/.

Ladeira, M. B., Resende, P. T. V. D., Oliveira, M. P. V. D., McCormack, K., Sousa, P. R. D., & Ferreira, R. L. (2016). The effects of analytical and business process orientation approaches on the performance of small and medium industrial and service enterprises in Brazil. *Gestão & Produção*, 23(3), 486-502.

Laguna, M., & Marklund, J. (2013). *Business process modelling, simulation and design*. (2nd Ed.). Boca Raton: Taylor & Francis Group.

Lanning, H. (2001). *Planning and implementing change in organisations: A construct for managing chance projects*. (Unpublished PhD thesis), Helsinki University of Technology. Retrieved from http://lib.tkk.fi/Diss/2001/isbn9512257025/isbn9512257025.pdf.

Latham, M. (1994). *Constructing the team, Final report of the joint government/industry review of procurement and contractual arrangements in the United Kingdom construction industry*. London: HMSO.

Laureani, A., Antony, J., & Douglas, A. (2010). Lean six sigma in a call centre: a case study. *International journal of productivity and performance management*, *59*(8), 757-768.

Lavender, S. (2013). *Management for construction industry.* (2nd Ed.). London: Routledge

Lazra, C. (2012). *Relevant aspects of the organisational changes in the public system*. (Unpublished PhD thesis), National School of Political Studies and Public Administration. Bucharest.

Lee, A. (1998). *A Study of process management*. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.500.1105&rep=rep1&type=pdf.

Lee, D., Song, Y. & Choi, Y. (2007). Continuous improvement plan of business process in construction company. *Proc. Conf. of IGLC-15*, Michigan, USA. Retrieved from http://wenku.baidu.com/view/155bbc21bcd126fff7050bd2.html?from=related.

Leeuw, F. L. (2009). Evaluation: a booming business but is it adding value? *Evaluation Journal of Australasia*, 9(1), 3–9.

Lentz, S. (1996). Hybrid organization structures: A path to cost savings and customer responsiveness. *Human Resource Management*, 35(4), 453-469.

Lester, A. (2014*). Project management, planning, and control: managing engineering, construction, and manufacturing projects to PMI, APM, and BSI Standards*. (6th Ed.). Oxford: Elsevier Ltd.

Levi, M. H. (2002). The business process (quiet) revolution: Transformation to process organization, interfacing technologies corporation. *Enterprise inter-and intra-organizational integration*, 147-157.

Levy, A., & Merry, U. (1986). *Organizational transformation – approaches, strategies, and theories*. New York: Greenwood Publishing Group.

Lewis, J. (2011). *Project planning, scheduling, and control: a hands-on guide to bringing projects in on time and on budget.* (5th Ed.). New York: McGraw Hill Professional.

Lewis, W. (2016). *Software testing and continuous quality improvement*. (3rd Ed.). Boca Raton: CRC press.

Lillrank, P. (1995). The transfer of management innovations from Japan. *Organisation Studies.* 16(6), 971-989.

Lim, C. & Mohamed, M. (1999). Criteria of project success: an exploratory re-examination. *International Journal of Project Management*, 17(4), 243-248.

Lind, M. (2006). Determination of business process types founded in transformation and coordination. *Systems, Signs & Actions an International Journal on Communication, Information Technology and Work*, 2(1), 60–81.

Lindfors, C. (2003). Process orientation: An approach for organizations to function effectively. In *Proceedings of the Ninth International Group for Lean Construction Conference*, 6, (8).

Lindsay, A., Downs, D., & Lunn, K. (2003). Business processes–attempts to find a definition. *Information and Software Technology*, 45(15), 1015–1019.

Ling, F. (2002). Attributes that are need to undertake concurrent engineering. *In Proceedings of the third international conference on concurrent engineering in construction* (pp.1-12). University of California, Berkeley.

Lock, D. (2014). *The essentials of project management.* (4th Ed). Surry: Gower Publishing Limited.

Lockamy, A., & McCormack, K. (2004). The development of a supply chain management process maturity model using the concepts of business process orientation. *Supply Chain Management: An International Journal*, 9(4), 272–278.

Lonsdale, J., & Bechberger, E. (2011). Learning in an accountability setting. In J. Lonsdale, P. Wilkins, & T. Ling (Eds.), *Performance auditing: Contribution to accountability in democratic government*. Cheltenham: Edward Elgar.

Looy, A., De Backera, M., & Poelsb, X. (2011). Defining business process maturity. A journey towards excellence. *Total Quality Management*, 22(11), 1119–1137.

Losee, J. (2001). *A historical introduction to the philosophy of science*. (4th. Ed.). Oxford: Oxford University Press.

Loudon, D., & Carter, T. (2014). *Many thin companies: The change in customer dealings and managers since September 11, 2001*. London: Routledge.

Luecke, R. (2003). *Managing change and transition* (Vol. 3). Boston: Harvard Business Press.

Macheridis, N., & Nilsson, C. (2006). *Management of multi-projects in a process oriented organization.* Working Paper Series from Lund University, Institute of Economic Research. Retrieved from http://www.kunskapspartner.se/wp-content/uploads/2012/02/Mgmt-of-multi-projects_2006.pdf.

MacIntosh, R. (2003). BPR: Alive and well in the public sector. *International Journal of Operations & Production Management*, 23(3), 327-344.

Magloff, L. (2017). What is an operational framework in business? Retrieved 20 July 2017 from http://smallbusiness.chron.com/operational-framework-business-25852.html.

Malega, P., & Bialkova, D. (2012). Process management and process maps–trend in management of advanced businesses-review article. *International Journal of Advances in Management and Economics*, 1(5), 105- 109.

Maley, C. (2012). *Project management concepts, methods, and techniques*. U.S.: Taylor & Francis Group.

Malshe, V., & Sikchi, M. (2008). *Basics of Paint Technology Part II*. India: Antar Prakash Center for Yoga.

Maqsood, T., Finegan, A., & Walker, D. (2003). *A soft approach to solving hard problems in construction project management*. Paper presented in the Second International Conference on Construction in the 21st Century (CITC-II) "Sustainability and Innovation in Management and Technology". Hong Kong.

Marr, P., & Al-Marashi, I. (2017). *The modern history of Iraq*. (4th Ed.). London: Hachette.

Marrelli, A. (2005). The performance technologist's toolbox: process mapping. *Performance Improvement*, 44(5), 40-44.

Masaaki, I. (1986). *Kaizen: The Key to Japan's Competitive Success*. New York: McGraw-Hill Publishing Co.

Matasniemi, T. (2008). *Operational decision making in the process industry: multidisciplinary approach*. Finland: VTT.

Matsumoto, I. T., Stapleton, J., Glass, J., & Thorpe, T. (2005). Use of process maps to develop a management briefing sheet for a design consultancy. *Engineering, Construction and Architectural Management*, *12*(5), 458-469.

McAdam, R. (2003). Radical change: a conceptual model for research agendas. *Leadership & Organization Development Journal*, 24(4), 226-235

McAdam, R. (2000). The implementation of reengineering in SMEs: A grounded study. *International Small Business Journal*, *18*(4), 29-45.

McCormack, K. P., & Johnson, W. C. (2001). *Business process orientation: Gaining the e-business competitive advantage*. New York: CRC Press.

McCormack, K. (2007). *Introduction to the theory of business process orientation.* In K. McCormack (Ed.), Business process maturity. Theory and application (pp. 1–18). South Carolina: Booksurge Publishing.

McCormack, K. & Lockamy, A., (2004). The development of a supply chain management process maturity model using the concepts of business process orientation. *Supply Chain Management: An International Journal*, 9(4), 272-278.

McCormack, K., & Rauseo, N. (2005). Building an enterprise process view using cognitive mapping, *Business Process Management* Journal, 11(1), 63 – 74.

McCormack, K., Johnson, W. & Walker, T. (2003). *Supply Chain networks and business process orientation.* New York: CRC Press.

McCormack, K., Willems, J., Bergh, J., Deschoolmeester, D., Willaert, P., Štemberger, M., (…) Vlahovic, N. (2009). A global investigation of key turning points in business process maturity", *Business Process Management Journal*, 15(5), 792 – 815.

McCormick, M., & MPCS Consultant. (2010*). Enterprise project management office (EPMO) charter: National energy technology laboratory (NETL): information technology division, IT management plan.* Retrieved from http://www.mccormickpcs.com/images/NETL_PMO_Charter_11.18.2010.pdf.

Mehregana, M., Hosseinzadeha, M., & Kazemia, A. (2012). An application of soft system methodology. *Procedia - Social and Behavioral Sciences*, 41, 426 – 433.

Meidan, A., García-García, J. A., Escalona, M. J., & Ramos, I. (2017). A survey on business processes management suites. *Computer Standards & Interfaces*, 51, 71-86.

Melton, T. (2005). The benefits of lean manufacturing: What lean thinking has to offer the process industries. *Chemical engineering research and design*, 83(6), 662-673.

Meyerson, G., & Dewettinck, B. (2012). Effect of empowerment on employees' performance. *Advanced Research in Economic and Management Sciences*, 2, 40-46.

Min, B. S., & Bowman, R. G. (2015). Corporate governance, regulation and foreign equity ownership: Lessons from Korea. *Economic Modelling*, 47, 145-155.

Mingers, J., & White, L. (2010). A review of the recent contribution of systems thinking to operational research and management science. *European Journal of Operational Research*, 207(3), 1147–116.

Mohanty, R. P., Yadav, O. P., & Jain, R. (2007). Implementation of lean manufacturing principles in auto industry. *Vilakshan–XIMB Journal of Management*, 1(1), 1-32.

Monczka, R. M., Handfield, R. B., Giunipero, L. C., & Patterson, J. L. (2016). *Purchasing and supply chain management*. (6th Ed.). Boston: Cengage Learning.

Moon, S., Han, S., Zekavat, P. R., Bernold, L. E., & Wang, X. (2017). Process-waste reduction in the construction supply chain using proactive information network. *Concurrent Engineering*, 25(2), 123-135.

Moore, B.N., & Parker, R. (2007). Critical thinking. (8th Ed.). New York: McGraw Hill.

Moore, F. (2016). *Qualitative vs quantitative research*. Retrieved from https://www.researchgate.net/publication/310101530_Qualitative_vs_Quantitative_Research.

Morgan, D. (1996). *Focus groups as qualitative research*. (2nd Ed.). Thousand Oaks: Sage publications.

Morren, K. (2014). *Capturing the way in which risk appetite is integrated within the bid/ no bid heuristics of a contractor's business unit: Observing the decision making process about the acceptability of risks for bid/ no bid decisions related to construction projects.* (Unpublished MSc. Thesis), University of Twente. Enschede.

Morris, C., & Dyson, R. (2012). *A guide to process mapping and improving*. Retrieved from http://www.cps.gov.uk/publications/finance/abc_process_mapping_guide_v2.pdf.

Morris, T. (2007). Internal and external sources of organizational change: Corporate form and the banking industry. *The Sociological Quarterly*, 48(1), 119-140.

Mostafa, S., Mostafa, S., Chileshe, N., Chileshe, N., Abdelhamid, T., & Abdelhamid, T. (2016). Lean and agile integration within offsite construction using discrete event simulation: A systematic literature review. *Construction Innovation*, 16(4), 483-525.

Motawa, I. A., Anumba, C. J., Lee, S., & Peña-Mora, F. (2007). An integrated system for change management in construction. *Automation in construction*, 16(3), 368-377.

Mowen, M., Hansen, D., & Heitger, D. (2015). *Cornerstones of managerial accounting*. (6th Ed.). Canada: Nelson Education. Ltd.

Myers, M. D. (2013). *Qualitative research in business and management*. (2nd Ed.). London: Sage.

Nadarajah, D., & Kadir, S. L. (2016). Measuring Business Process Management using business process orientation and process improvement initiatives. *Business Process Management Journal*, 22(6), 1069-1078.

Nadunias, C., & Nachmias, D. (1996). *Research Methods in the social sciences*. (5th Ed.). New York: Martin's Press.

Naim, M., & Barlow, J. (2003). An innovative supply chain strategy for customized housing. *Construction Management and Economics*, 21(6), 593-602.

Naji, H., & Mijwel, H. (2008). Selection the optimum construction company from aspect information system for controlling and following up construction costs by using AHP technique. *Diyala Journal of Engineering Science*, 1(1), 1-27.

Naji, H., & Abass, A. (2013). Assessment the organisational structure of the construction companies using TOPSIS technique. *Diyala Journal Engineering Science*, 6(4), 24-44.

Naomi, R., H. (2009). Managing moderator stress: Take a deep breath. You can do this. *Marketing Research*, 21(1), 28-29.

Naoum, S. G. (2012). *Dissertation research and writing for construction students*. (3rd. Ed.). London: Routledge.

Nayab, N. (2010). *Pros and Cons of Benchmarking*. Retrieved 29 July 2017 from http://www.brighthub.com/office/entrepreneurs/articles/82292.aspx

Nelson, L. (2003). A case study in organisational change: implications for theory. *The Learning Organization*, 10(1), 18-30.

Nesensohn, C., Bryde, D., Ochieng, E., & Fearon, D. (2014). Maturity and maturity models in lean construction. *Australasian Journal of Construction Economics and Building*, 14(1), 45-59.

Neubauer, T. (2009). An empirical study about the status of business process management. *Business Process Management Journal*, 15(2), 166–183.

Newman, K. L. (2000). Organizational transformation during institutional upheaval. *Academy of Management Review*, 25(3), 602–19.

Newton, P. (2015). *Managing a project team: Project skills*. Retrieved from: http://www.free-management-ebooks.com/dldebk-pdf/fme-project-team.pdf.

Ning, X., & Lam. K. (2013). Cost–safety trade-off in unequal-area construction site layout planning. *Automation in Construction*, 32, 96–103.

Nzuve, S. N., & Bakari, T. H. (2012). The Relationship between Empowerment and Performance in the City Council of Nairobi. *Problems of Management in the 21st Century*, 5, 83-98.

Oakland, J. (2014). *Total quality management and operational excellence: text with cases*. (4th Ed.). New York: Routledge.

Object Management Group (OMG). (2011). *Business Process Model and Notation (BPMN) Version 2.0*. Retrieved from http://www.omg.org/spec/BPMN/2.0/.

OECD (2005). *Guidelines on Corporate Governance of State-owned Enterprises*. Retrieved from http://www.oecd.org/corporate/ca/corporategovernanceofstate-ownedenterprises/34803211.pdf.

OGC (2003). *Achieving excellence in construction: procurement guide 3: project procurement lifecycle: The integrated process*. Retrieved from http://www.ccinw.com/images/publications/OGC%20Procurement%20Guide%203%20Project%20Procurement.pdf.

OGC (2007). *OGC Gateway™ process review 2: Delivery strategy: OGC best practice – Gateway to success*. Retrieved from http://www.dfpni.gov.uk/cpd-coe-ogcgateway2-delivery-strategy.pdf.

Ojo, A. S. (2010). Defect liability period: Employer's right and contractor's liabilities examined. *Proceedings of COBRA 2010-W113 Papers on Law and Dispute Resolution*, 2-3.

Olson, E. M., Slater, S. F., & Hult, G. T. M. (2005). The performance implications of fit among business strategy, marketing organization structure, and strategic behavior. *Journal of marketing*, 69(3), 49-65.

Online Business Dictionary (2017). *As-built drawings.* Retrieved 1 May 2017 from http://www.businessdictionary.com/definition/as-built-drawings.html.

Palmberg, K. (2009). Exploring process management: Are there any widespread models and definitions? *The TQM Journal*, 21(2), 203–215.

Palmer, I., Dunford, R., & Akin, G. (2017). *Managing organizational change: A multiple perspectives approach*. (3rd Ed.). New York: McGraw-Hill Irwin.

Palmer,W., Coombs, W., & Smith. M. (1995). Construction accounting and financial management. (5th Ed.). McGraw-Hill.

Pandey, D. (2011). *Project management essentials: a quintessential guide to a successful project*. USA: Tate Publishing and Enterprises,LLC.

Panizzolo, R., Garengo, P., Sharma, M. K., & Gore, A. (2012). Lean manufacturing in developing countries: evidence from Indian SMEs. *Production Planning & Control*, 23(10-11), 769-788.

Paranagamage, P., Carrillo, P., Ruikar, K., & Fuller, P. (2012). Lessons learned practices in the UK construction sector: current practice and proposed improvements. *Engineering Project Organization Journal*, 2(4), 216-230.

Pasquale, L., & Sharpe, T. (2015). *Handover strategy: Riba Plan of Work 2013 guide*. Riba Publications.

Patton, M. (2002). *Qualitative research and evaluation methods*. (3rd Ed.). Thousand Oaks, CA: Sage Publications.

Pellicer, E., Yepes, V., Teixeira, j., Moura, H., & Catalá, J. (2014). *Construction management*. UK: Wiley-Blackwell.

Perera, S., Ingirige, B., & Ruikar, K. (Eds.). (2017). *Advances in construction ICT and E-Business*. New York: Routledge.

Peters, A. (2010). *Your journey to Lean: Continuous improvement supported by tools*. Retrieved from http://lattix.com/files/wp/journey_to_lean_continuous_improvement_supported_by.pdf

Petter, G. (2009). *E-Government interoperability and information resource integration: Frameworks for aligned development*. New York: Information Science Reference.

Phillips, J., & Simmonds, L. (2013). Change management tools 3: Use of process mapping in service improvement. *Nursing Times*, 109(17/18), 24-26.

Pidd M. (2009). *Tools for thinking: modelling in management science*. (3rd Ed.). Chichester: John Wiley & Sons.

Pigorini, P., Couto, V., Fleichman, A., & Gondim, E. (2009). *Reshaping your company business model: Building for the future during the downturn*. Retrieved from https://www.strategyand.pwc.com/media/file/Reshaping-your-company-business-model.pdf.

Pink, D. (2011). *Drive: The surprising truth about what motivates Us*. (3rd Ed.). London: Penguin Publishing Group.

Polk, W. (2006). *Understanding Iraq*: *The whole sweep of Iraqi history, from Genghis Khan's Mongols to the Ottoman Turks to the British mandate to the American Occupation*. London: I.B.Tauris & Co Ltd.

Poon, J., Potts, K. F., & Musgrove, P. (2003). CONBPS-An expert system to improve the efficiency of the construction process. *RICS Foundation*, 4(21), 1-47.

Porras, J., & Robertson, P. J. (1992). Organizational development: Theory, practice and research. In M. D. Dunnette & L.M. Hough (Eds.), *Research in organization change and development* (2nd Ed., Vol. 3, pp.719-822) Palo Alto, CA: Consulting Psychologists Press.

Porter, M. (1985). *Competitive advantage: Creating & sustaining superior performance*. New York: The Free Press.

Poskey, M. (2010). *Benchmarking Is the Process of Improving Performance*. Retrieved 29 July 2017 from https://www.captive.com/news/2017/06/21/benchmarking-is-the-process-of-improving-performance.

Post, N. M. (2007). *Sutter health unlocks the door to a new process.* Retrieved 5 July 2016 from http://enr.construction.com/features/bizLabor/archives/071121a-1.asp

Power, R., & Naysmith, J. (2005). *Action research: A guide for associate lecturers*. Retrieved from http://www.open.ac.uk/cobe/docs/AR-Guide-final.pdf.

Pratuckchai, W., & Patanapongse, W. (2012). The study of management control systems in state owned enterprises: A proposed conceptual framework. *International Journal of Organizational Innovation (Online)*, 5(2), 83.

Presley, A. (2006). ERP investment analysis using the strategic alignment model. *Management Research News*, (29)5, 273-84.

Pressreader (2013). *Senior trade commissioner of Matrade Dubai aimed to further forge more partnerships and joint ventures with project owners in Kurdistan*. Retrieved 29 May 2017 from http://www.pressreader.com/iraq/the-kurdish-globe/20131031/281556583578757.

Project Management Institute PMI (2008). *A Guide to the project management body of knowledge (PMBOK® Guide)* (4th Ed). Pennsylvania: Project Management Institute.

Project Management Institute PMI (2013). *A Guide to the project management body of knowledge (PMBOK® Guide)* (5th Ed). Pennsylvania: Project Management Institute.

Proverbs, D., Gameson, R. (2008). Case study research. *In Knight, A. and Ruddock, L. (Eds.) Advanced research methods in the built environment*. Chichester, Wiley-Blackwell.

Povey, B. (1998). The development of a best practice business process improvement methodology. *Benchmarking for Quality Management & Technology*, 5(1), 27-44.

Punch, K. (2009). *Introduction to social research methodology in education.* London: Sage Publication.

Putnik, G. D., & Putnik, Z. (2012). Lean vs agile in the context of complexity management in organizations. *The Learning Organization*, 19(3), 248-266.

PWC. (2014). *The new Iraq-2014 discovering business*. Retrieved from http://iraq-businessnews.com/media/The-New-Iraq-2014.pdf.

Radnor, Z. J. (2010). *Review of business process improvement methodologies in public services*. London: AIM Research.

Rajalingam, Y., & Jauhar, J. (2015). A Study on the impact of empowerment on employee performance: The mediating role of appraisal. *International Journal of Liberal Arts and Social Science*, 3(1), 92-104.

Rajasekar, S., Philominathan, P. & Chinnathambi, V. (2013). *Research methodology*. Retrieved from http://arxiv.org/pdf/physics/0601009.pdf.

Rangiha, M. E., Comuzzi, M., & Karakostas, B. (2015). Role and task recommendation and social tagging to enable social business process management. In *International Conference on Enterprise, Business-Process and Information Systems Modeling* (pp. 68-82). Springer International Publishing.

Rasheed, A. (2016). *Iraq agrees $328 million GE deal to boost electricity grid*. Retrieved 18 June 2017 from http://www.reuters.com/article/us-iraq-energy-idUSKCN0V31B5

Rashid, O. A., & Ahmad, M. N. (2013). Business Process Improvement Methodologies: An Overview. *Journal of Information System Research Innovation*, 5, 45-53.

Raudla, R., Taro, K., Agu, C., & Douglas, J. W. (2016). The impact of performance audit on public sector organizations: The case of Estonia. *Public Organization Review*, 16(2), 217-233.

Raydugin, Y. (2013). *Project risk management: essential methods for project teams and decision makers*. Oxford: John Wiley & Sons.

Reddy, C. (2017). Benchmarking: *Types, process, advantages & disadvantages*. Retrieved 29 July 2017, from https://content.wisestep.com/benchmarking-types-process-advantages-disadvantages/.

Reginato, J., & Alves, T. (2012). Management of preconstruction using Lean: An exploratory study of the bidding process. In *Proceedings for the 20th Annual Conference of the International Group for Lean Construction* (pp. 1-10).

Reijers, H. (2006). Implementing BPM systems: the role of process orientation. *Business Process Management Journal*, 12(4), 389-409.

Rentzhog, O. (1996). *Core process management*, Division of Quality and Technology, Department of Mechanical Engineering, Linko¨ping University, Linko¨ping.

Rezgui, Y., & Miles, J. (2010). Exploring the potential of SME alliances in the construction sector. *Journal of Construction Engineering & Management*, 136(5), 558-567.

RIBA (1973). *Architectural practice and management.* London, Royal Institute of British Architects.

RIBA (2013). *Plan of Work 2013 overview*. Retrieved on 9th December 2015 from https://www.architecture.com/Files/RIBAProfessionalServices/Practice/RIBAPlanofWork2013Overview.pdf.

Ribeiro, F., & Fernandes, M. (2010). Exploring agile methods in construction small and medium enterprises: A case study. *Journal of Enterprise Information Management*, 23(2), 161-180.

Ritchie, J., & Lewis, J. (2005). *Qualitative research practice: a guide for social science students and researchers*. (2nd Ed.). London: Sage.

Rizescu, A., & Tileag, C. (2016). Factor influencing continuous organisational change. *Journal of Defense Resources Management*, 7(2), 139-144.

Robbin, S., DeCenzo, D. & Coulter, M. (2010). *Fundamentals of management: essential concepts and applications* (7th ed). Pearson Education: Harlow

Robson, C. & McCartan, K. (2016). *Real world research: A resource for users of social research methods in applied settings*. (4th Ed.). West Sussex: John Wiley & Sons Ltd.

Rocha, R. (2011). *Financial access and stability for the MENA region: a roadmap*. World Bank: Washington, DC.

Rock, G., & Dwyer, T. (2016*). What is BPM anyway? Business process management explained*. Retrieved 23 June 2017 from http://www.bpminstitute.org/resources/articles/what-bpm-anyway-business-process-management-explained.

Rohloff, M. (2009). Case study and maturity model for business process management implementation. *In Business Process Management*. (pp. 128-142). Springer Berlin Heidelberg.

Rojas, E. (2009). *Construction project management: A practical guide for building and electrical contractors*. USA: J. Ross Publishing.

Rose, J. (2013). *Soft systems methodology*. Retrieved from http://doc.gold.ac.uk/~mas01jo/sandbox/sandbox12/worksheets/SSMHAND.pdf

Rose,V., & Cohrssen, B. (2011). *Patty's industrial hygiene.* (6th Ed.). Volume 1 Hazard Recognition. New Jersey: John Wiley & Sons.

Rospocher, M., Ghidini, C., & Serafini, L. (2014). An ontology for the Business Process Modelling Notation. In Garbacz, P., & Kutz, O. (Eds.), *Formal ontology in information systems*, (pp. 133-146). doi: 10.3233/978-1-61499-438-1-133.

Roux, G. (1991). *Ancient Iraq*. (3rd Ed.). London: Penguin Books.

Rubin, H. J., & Rubin, I. S. (2012). *Qualitative interviewing: The art of hearing data*. (3rd Ed.). California: Sage Publications Ltd.

Rummler, G., & Brache, A. (1995). *Improving performance: How to manage the white space in the organisation chart*. Lucie Press: San Franscisco.

Russell, S., & Taylor, W. (2003). *Operations management*. (4th Ed.). NJ: Upper Saddle River.

Ryan, R. M., & Deci, E. L. (2006). Self-regulation and the problem of human autonomy: does psychology need choice, self-determination, and will?. *Journal of personality*, 74(6), 1557-1586.

Sagoo, J., Tiwari, A., & Alcock, J. (2009). A Descriptive model of the current microelectromechanical systems (MEMS) development process. In *DS 58-1: Proceedings of ICED 09, the 17th International Conference on Engineering Design, Vol. 1, Design Processes, Palo Alto, CA, USA, 24.-27.08. 2009*.

Said, H., & Ei-Rayes, K. (2013). Performance of global optimization models for dynamic site layout planning of construction projects. *Automation in Construction,* 36, 71–78.

Salford Royal NHS Foundation Trust. (2007). Full business case for the redevelopment of Salford Royal Foundation Trust site. Retrieved from file:///Users/tahaal-obaidi/Downloads/SRFT%20FBC%20021107%20public.pdf.

Sandelowski, M. (2010). What's in a name? Qualitative description revisited. *Research in Nursing and Health,* 33, 77–84.

Sandelowski. (1995). Sample size in qualitative research. *Research in Nursing & Health, 18*(2), 179–183. doi:10.1002/nur.4770180211.

Sandmo, A. (2014). *Adam Smith and Modern Economics*. Retrieved from https://brage.bibsys.no/xmlui/bitstream/handle/11250/194583/1/SAM1314.pdf.

Sanford, J. E. (2003, June). *Iraq's Economy: Past, Present, Future. Library of congress Washington dc congressional research service*. Retrieved from http://www.dtic.mil/dtic/tr/fulltext/u2/a476247.pdf.

Sapuan, S. M., & Mansor, M. R. (2014). Concurrent engineering approach in the development of composite products: a review. *Materials & Design*, 58, 161-167.

Sarshar, M., Haigh, R., Finnemore, M., Aouad, G., Barrett, P., Baldry, D., & Sexton, M. (2000). SPICE: a business process diagnostics tool for construction projects. *Engineering, construction and Architectural management*, 7(3), 241-250.

Saunders, M. (2012). Chossing research participants, in G. Symons & C. Cassell (eds) *The practice of Qualitative Organizational Research: Core Methods and Current Challenges*. London: Sage Publications, Inc, pp. 37-55.

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research methods for business students.* (7th Ed.). Edinburgh: Pearson Education Limited.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students,* (5th Ed). Italy: Rotolito Lombarda.

Saunders, M., Lewis, P., & Thornhill, A. (2011). *Research methods for business students*, (6th Ed*).* India: Pearson Education.

Schilling, M. (2008). *Strategic management of technological innovation*. (2nd Ed.). New York: McGraw-Hill Education.

Schmidt, J., & Lyle, D. (2010). *Lean integration: An integration factory approach to business agility*. London: Pearson Education.

Schutt, R. K. (2012). *Investigating the social world: The process and practice of research*. (7th Ed.). California. Sage Publication.

Scotland, J. (2012). Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and Critical Research Paradigms, *English Language Teaching*. 5(9), 9-16.

Sedlak, P., Komárková, J., Jedlička, M., Hlásný, R., & Černovská, I. (2011). The use of modelling tools for modelling of spatial analysis to identify high-risk places in barrier-free environment. *International Journal of Systems Applications, Engineering & Development*, 1(5), 81-87.

Segatto, M., Inês Dallavalle de Pádua, S., & Pinheiro Martinelli, D. (2013). Business process management: a systemic approach?. *Business Process Management Journal*, 19(4), 698-714.

Serpell, A., & Díaz, J. I. (2016). Linking central business processes of construction companies with the performance of construction operations: A preliminary exploration. *Procedia Engineering*, 164, 376-382.

Sertyesilisik, B. (2014). Lean and agile construction project management: As a way of reducing environmental footprint of the construction industry. In H., Xu, & X., Wang, *Optimization and Control Methods in Industrial Engineering and Construction*, (pp. 179-196). Netherlands: Springer.

Sever, K. (2007). The power of process orientation. *Quality progress*, 40(1), 46-52.

Sexton, M. (2007). PhD research: Axiological purposes, ontological cages and epistemological keys. *Research Institute for the Built and Human Environment Research Methodology Workshop, University of Salford*.

Sgourou, E., Katsakiori, P., Papaioannou, L., Goutsos, S., & Adamides, E. (2012). Using soft systems methodology as a systemic approach to safety performance evaluation. *Procedia Engineering*, 45,185 – 193.

Shang, G., & Sui Pheng, L. (2014). Barriers to lean implementation in the construction industry in China. *Journal of Technology Management in China*, 9(2), 155-173.

Shash, A. (1993). Factors considered in tendering decisions by top UK contractors. *Construction Management and Economics*, 11(2), 111-118.

Shaw, E. (2011). *Three types of project management organizations*. Retrieved 26 April, 2015, from http://www.projectsmart.co.uk/forums/viewtopic.php?t=730.

Shields, P. M., & Rangarajan, N. (2013). *A playbook for research methods: Integrating conceptual frameworks and project management*. USA: New Forums Press.

Shneiderman, B., & Plaisant, C. (2005). *Designing the user interface: Strategies for effective human-computer interaction.* (4th Ed). New York: Addison-Wesley.

Shtub, A., & Karni, R. (2010). *ERP: the dynamics of supply chain and process*. (2nd Ed.). New York: Springer Science & Business Media.

Siddiqui, J., & Rahman, Z. (2007). TQM principles' application on information systems for empirical goals: A study of Indian organizations. *the TQM Magazine*, 19(1), 76-87.

Sidwell, A., Kennedy, R., & Chan, A. (2004). *Reengineering construction delivery process*. Report, January, Construction Industry Institute, Queensland University of Technology, Brisbane.

Siegel, J. (2008). *In OMG's OCEB certification program, what is the definition of business process?* An OCEB Certification Program White Paper. Retrieved from http://www.omg.org/oceb/OCEB_Definition_Of_Business_Process.pdf.

Sinclair, D. (2013). *Assembling a collaborative project team: Practical tools including multi-disciplinary schedules of services*. RIBA Publishing.

Singh, B., Garg, S. K., & Sharma, S. K. (2010). Scope for lean implementation: a survey of 127 Indian industries. *International Journal of Rapid Manufacturing*, 1(3), 323-333.

Singh, H. (2015). *Mastering project human resource management: effectively organise and communicate with all project stakeholders*. USA: FT Press.

Singh, P. J., & Smith, A. J. (2004). Relationship between TQM and innovation: an empirical study. *Journal of Manufacturing Technology Management*, 15(5), 394-401.

Siriwardena, M.L., Kagioglou, M., Jeong, K.S., Haigh, R. & Amaratunga, D. (2005). *SPICE 3: Facilitating organisational process improvement through good practice sharing*. In Salford Centre for Research and Innovation (SCRI) 2nd International Symposium, University of Salford, Greater Manchester, 434-448. Retrieved from http://eprints.hud.ac.uk/id/eprint/22707/.

Sirotkina, N. V., Golikova, G. V., & Romashchenko, T. D. (2018). Policy, Technologies, and Approaches to Management of Organizational Changes. In *Management of Changes in Socio-Economic Systems* (pp. 31-38). Springer, Cham.

Sivusuo, J., & Takala, J. (2016). Management changes in MRO business through product lifecycle. *Management and Production Engineering Review*, 7(3), 87-93.

Skrinjar, R., & Trkman, P. (2013). Increasing process orientation with business process management: Critical practices. *International Journal of Information Management*, 33(1), 48-60.

Skrinjar, R., Bosilj Vuksic, V., & Indihar-Stemberger, M. (2010). Adoption of business process orientation practices: Slovenian and Croatian survey. *Business System Research*, 1(1-2), 5-19.

Skrinjar, R., Bosilj-Vuksi, V. & Indihar-Stemberger, M. (2008). The impact of business process orientation on financial and non-financial performance. *Business Process Management Journal*, 14(5), 738 – 754.

Smith, H., & Fingar, P. (2003). *Business process management: the third wave* (Vol. 1). Tampa: Meghan-Kiffer Press.

Snieder, R., & Larner, K. (2009). *The art of being a scientist: a guide for graduate students and their mentors.* Cambridge: Cambridge University Press.

Song, Y. W., & Choi, Y. K. (2011). Sustainable business process management model for construction companies. *Proceedings of the 28th International Symposium on Automation and Robotics in Construction, ISARC 2011*. Retrieved from http://www.iaarc.org/publications/fulltext/S12-6.pdf.

Springer, M. (2013). *Project and program management: a competency-based approach.* (2nd Ed.). USA: Purdue University.

Stapenhurst, T. (2009). *The benchmarking book*. Oxford: Routledge.

Stare, A. (2011). The impact of the organizational structure and project organizational culture on project performance in Slovenian enterprises. *Management: Journal of Contemporary Management Issues*, 16(2), 1-22.

Stokes, A. (2005). *A study in the relationships between organizational structures and public relations practitioner roles*. (Unpublished MSc. thesis), University of South Florida, Florida. Retrieved from http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1876&context=etd.

Stolzer, A., Halford, C., & Goglia, J. (2011). *Implement safety management systems in aviation*. England: Ashgate Publishing Limited.

Sungau, J., Ndunguru, P., & Kimeme,J. (2013). Business process re-engineering: the technique to improve delivering speed of service industry in Tanzania. *Independent Journal of Management & production (IJM&P)*, 4(1), 208-227.

Suter. (2011). *Qualitative data, analysis, and design. In Introduction to educational research - a crtitical thinking approach* (2nd Ed.). California: SAGE Publications Inc.

Suttapong, K., & Tian, Z. (2012). Performance benchmarking for building best practice in small and medium enterprises (SMEs). *International Journal of Business and Commerce*, 1(10), 46-60.

Sweet, J., & Schneier, M. M. (2013). *Legal aspects of architecture, engineering and the construction process*. (9th Ed.). Stamford: Cengage Learning.

Swetaanand (2011). *Business process management vs business process reengineering.* Retrieved 5 Sep. 2015 from http://bpmgeek.com/blog/business-process-management-vs-business-process-reengineering.

Tajino, A., James, R. & Kijima, K. (2005). Beyond needs analysis: soft systems methodology for meaningful collaboration in EAP course design. *Journal of English for Academic Purposes*, 4, 27–42.

Tang, J., Pee, L. G., & Iijima, J. (2012). *The Effects of business process orientation on innovation*. Paper presented at the Pacific Asia Conference on Information Systems (PACIS), Langkawi, Malaysia. Retrieved from http://aisel.aisnet.org/pacis2012/68.

Tang, J., Pee, L., & Iijima, J., (2013). Investigating the effects of business process orientation on organizational innovation performance. *Information & Management* 50 (2013) 650–660.

Tangkawarow, I. R. H. T., & Waworuntu, J. (2016). *A Comparative of business process modelling techniques*. Paper presented at the International Conference on Innovation in Engineering and Vocational Education: Materials Science and Engineering. Retrieved from http://iopscience.iop.org/article/10.1088/1757-899X/128/1/012010/pdf.

Taylor, A., & Randall, C. (2007). Process mapping: enhancing the implementation of the Liverpool Care Pathway. *International Journal of Palliative Nursing*, 13(4), 163-167.

Taylor, J., & Van Every, E. (2000). *The emergent organization: communication at its site and surface*. London: Lawrence Erlbaum.

Teece, D. (2010). Business models, business strategy and innovation. *Long Range Planning*, 43,172-194.

The Bridgespan Group, (2009). *Design an effective organisational structure*. Retrieved 24 Apral, 2015 from http://www.bridgespan.org/getmedia/b1139597-adfe-4dd7-bbb2-ac8c67883020/effective-organizations_-structural-design.pdf.aspx.

The Center for International Private Enterprise (CIPE). (2014). *Public procurement toolkit*: *how to produce an eligible bid when applying for public contracts in Kosovo* Prishtina: Riinvest Institute.

The Chartered Institute of Building (CIOB). (2009). *Code of Estimating Practice*. (7th Ed.). Oxford: Wily-Blackwell.

The English Oxford Living Dictionary. (2017). *Definition of change in English.* Retrieved 3 June 2017 from https://en.oxforddictionaries.com/definition/change.

The National Institute of Standards and Technology (NIST). (1993). *Announcing the Standard for integration definition for function modeling (IDEF0).* Processing Standards Publication 183.

The Swedish International Development Cooperation Agency (Sida). (2014). *Supporting Iraq's move to market economy*. Retrieved from http://www.sida.se/English/where-we-work/Asia/Iraq/examples-of-results/Supporting-Iraqs-Move-to-Market-Economy/

The World Bank. (2004). *State owned enterprises reform in Iraq.* Retrieved from http://siteresources.worldbank.org/IRFFI/64168382-1092419012421/20266668/SOE%20Reform.pdf.

Thirkell, E., & Ashman, I. (2014). Lean towards learning: Connecting lean thinking and human resource management in UK higher education. *The International Journal of Human Resource Management*, 25(21), 2957-2977.

Timetric (2016). *Construction in Iraq – Key Trends and Opportunities to 2020*. Retrieved 29 May 2017 from https://www.timetricreports.com/report/cn0331mr--construction-in-iraq-key-trends-and-opportunities-to-2020/

Todnem By, R. (2005). Organisational change management: A critical review. *Journal of change management*, 5(4), 369-380.

Toomanian, A., & Mansourian, A. (2009). An Integrated Framework for the implementation and continuous improvement of Spatial Data Infrastructures. In B. Van Loenen, J. Besemer & J. Zevenbergen (Eds), *SDI convergence: Research, emerging trends and critical assessment* (pp. 161-173). Retrieved from file:///C:/Users/tal-o_000/Downloads/The_potential_of_a_national_atlas_as_int.pdf.

Trading Economics. (2017). *Iraq GDP annual growth rate 1991-2017.* Retrieved 28 May 2017, from https://tradingeconomics.com/iraq/gdp-growth-annual.

Trading Economy. (2015). *Iraq GDP annual growth rate.* Retrieved 2 March 2015 from http://www.tradingeconomics.com/iraq/gdp-growth-annual

Tran. Q., & Tian, Y. (2013). Organizational structure: Influencing factors and impact on a firm. *American Journal of Industrial and Business Management*, 3, 229-236.

Trkman, P., & McCormack, K. (2010). Estimating the benefits and risks of implementing e-procurement. *IEEE Transactions on Engineering Management*, 57(2), 338–349.

Trkman, P., Mertens, W., Viaene, S., & Gemmel, P. (2015). From business process management to customer process management. *Business process management journal*, 21(2), 250-266.

Troy, L., Hirunyawipada, T., & Paswan, A. (2008). Cross functional integration and new product success: an empirical investigation of the findings. *Journal of Marketing*, 72(6), 132–146.

Turkulainen, V., & Ketokivi, M. (2012). Cross-functional integration and performance: What are the real benefits. *International Journal of Operations & Production Management*, 32(4), 447–467.

U.S. Department of State. (2015). *Iraq investment climate statement 2015*. Retrieved from https://www.state.gov/documents/organization/241832.pdf

Ucak, A. (2015). Adam Smith: The Inspirer of Modern Growth Theories. *Procedia-Social and Behavioral Sciences*, 195, 663-672.

United Nations Educational, Scientific and Cultural Organisation (UNESCO). (2014). *UNESCO country programming document for the republic of Iraq*. Retrieved from http://unesdoc.unesco.org/images/0021/002136/213680E.pdf.

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing and Health Sciences*, 15, 398–405.

Valenca, G., Alves, C., Alves, V., & Niu, N. (2013). A systematic mapping study on business process variability. *International Journal of Computer Science & Information Technology*, 5(1), 1.

Vergidis, K., Saxena, D., & Tiwari, A. (2012). An evolutionary multi-objective framework for business process optimisation. *Applied Soft Computing*, 12(8), 2638-2653.

Vignos, T. (2014). *Implementing lessons learned best practices in project management*. (Unpublished MSc. Thesis), University of Oregon. Retrieved from https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/19641/Vignos2014.pdf

Virginia Information Technologies Agency (VITA). (2011). *Information technology resource management (ITRM): Project management guideline*. Retrieved from https://www.vita2.virginia.gov/uploadedFiles/Library/PSGs/COV_ITRM_Project_Management_Guideline_CPM110_03_20110314.pd.

Volkner, P., & Werners, B. (2000). A decision support system for business process planning. *European Journal of Operational Research*, 25, 633-647.

Vom Brocke, J., & Rosemann, M. (2015). *Handbook on business process management 1: Introduction, Methods, and Information Systems.* (2nd Ed.). London: Springer

von Rosing, M., Kemp, N., & Arzumanyan, M. (2015a). Understanding business process management roles. In Von Rosing, M., Von Scheel, H., & Scheer, A. W. (2014). *The Complete Business Process Handbook: Body of Knowledge from Process Modeling to BPM (Vol. 1)*. (pp. 241–263) http://dx.doi.org/10.1016/B978-0-12-799959-3.00013-6.

von Rosing, M., White, S., Cummins, F., & de Man, H. (2015b). Business Process Model and Notation-BPMN. In Von Rosing, M., Von Scheel, H., & Scheer, A. W. (Eds.), *The Complete Business Process Handbook: Body of Knowledge from Process Modeling to BPM* (Vol. 1), (pp. 429-453). doi.org/10.1016/B978-0-12-799959-3.00021-5

Vuksic, V. B., Bach, M. P., & Popovic, A. (2013). Supporting performance management with business process management and business intelligence: A case analysis of integration and orchestration. *International journal of information management*, 33(4), 613-619.

Walliman, N. (2005). *Your research project: a step-by-step guide for the first-time researcher*. (2nd Ed.). London. SAGE Publications Inc.

Wang, Q., & Du, J. (2011). A scenario simulation study of decentralization on architecture, engineering and construction companies. In *Proceedings of the Engineering Project Organizations Conference. Estes Park, Colorado*. Retrieved from http://www.academiceventplanner.com/EPOC2011/papers/wang.pdf.

Wanous, M., Boussabaine, A., & Lewis, J. (1998). *Tendering factors considered by Syrian contractors*. In: Hughes, W (Ed.), 14th Annual ARCOM Conference, 9-11 September 1998, University of Reading. Association of Researchers in Construction Management, 2, 535-43.

Ward, J., & Uhl, A. (2012). *Success and Failure in Transformation Lessons from 13 Case Studies*. Retrieved from https://www.researchgate.net/publication/272484960_Success_and_Failure_in_Transformation_Lessons_from_13_Case_Studies.

Warwick, J. (2008). A case study using soft systems methodology in the evolution of a mathematics module. *The Montana Mathematics Enthusiast*, 5(2&3), 269-290.

Watt, A. (2014*). Project Management.* Retrieved from https://open.bccampus.ca/

Weerakkody, V., Janssen, M., & Dwivedi, Y. K. (2011). Transformational change and business process reengineering (BPR): Lessons from the British and Dutch public sector. *Government Information Quarterly*, 28(3), 320-328.

Weske, M. (2012). *Business process management: Concepts, languages, architectures*. (2nd Ed.). New York: Springer.

Westland, J. (2006). *The project management life cycle: A complete step-by-step methodology for initiating, planning, executing & closing a project successfully*. London: Kogan Page Limited.

Whatley, P. (2014). *Project planning handbook.* Leicester: Troubador Publishing ltd.

White, P. (2010). Making use of secondary data. In *N. Clifford, S. French and G. Valentine (Eds.), Key Methods in Geography (pp. 61-76)*. Thousands Oaks, CA: Sage Publication.

White, T. (2010). *The doctor's handbook, part 1: Managing your role beyond clinical medicine*. (4th Ed.). Oxford: Radcliffe Publishing.

Willaert, P., Bergh, J., Willems, J., & Deschoolmeester, D. (2007). The process-oriented organisation: a holistic view developing a framework for business process orientation maturity. *Business process management*, 47(14), 1-15.

Williams, B. (2005). *Soft systems methodology*. Retrieved 9 Sept. 2015 from http://www.bobwilliams.co.nz/Systems_Resources_files/ssm.pdf.

Wing, J. (2009). *Mission on Iraq: Life in Iraq before and after the invasion*. Retrieved 6 May 2016 from http://musingsoniraq.blogspot.co.uk/2009/08/life-in-iraq-before-and-after-invasion.html.

Wing, J. (2013). *Musings on Iraq: Problems reforming Iraq's state owned enterprises*. Retrieved 7 May 2016 from http://musingsoniraq.blogspot.co.uk/2013/03/problems-reforming-iraqs-state-owned.html.

Wolstenholme, A., Austin, S., Bairstow, M., Blumenthal, A., Lorimer, J., McGuckin, S., (...) & Davies, R. (2009). *Never waste a good crisis: A review of progress since Rethinking Construction and thoughts for our future*. Constructing Excellence, London, UK. Retrieved from https://dspace.lboro.ac.uk/dspace-jspui/bitstream/2134/6040/1/Wolstenholme%20Report%20Oct%202010.pdf

Womack, J. P. & Jones, D. T. (1996). *Lean Thinking*: New York, Simon & Schuster.

Womack, J. P., Jones, D. T. & Roos, D. (1990). *The Machine that Changed the World*: New York, Macmillan.

Woods, M. (2011). *Risk management in organizations: an integrated case study approach*. Oxon: Routledge.

World Bank and Development Research Center of the State Council. (2013). *China 2030: building a modern, harmonious, and creative society*. World Bank and Development Research Center: Washington, DC.

World Bank Group, (2014). *Corporate governance of state-owned enterprises a toolkit*. Retrieved from https://openknowledge.worldbank.org/bitstream/handle/10986/20390/9781464802225.pdf?sequence=1.

World Population Review. (2017). *Iraq Population 2017*. Retrieved 28 May 2017 from http://worldpopulationreview.com/countries/iraq-population/.

Wright, D. & Yu, B. (1998). Strategic approach to engineering design process modelling. *Business Process Management Journal*, 4(1), 56 – 71.

Wu, B. (2012). *Manufacturing systems design and analysis*. London: Springer Science & Business Media.

Wu, H., & Ying, J. (2004). How can process help CSCW?. In *Computer Supported Cooperative Work in Design, 2004. Proceedings. The 8th International Conference on* (Vol. 2, pp. 302-306). IEEE.

Wu, S., Fleming, A., Aouad, G., & Cooper, R. (2001). The development of the process protocol mapping methodology and tool. *International Postgraduate Research in the Built and Human Environment.*

Xu, W. & Uddin, S. (2008). Changing regimes of control, public sector reforms and privatization: a case study from China, *Accounting Forum*, 32(2), 162-177.

Yang, C. C. (2012). The integration of TQM and Six-Sigma. *AIZED, Tauseef–Total Quality Management and Six Sigma.* Rijeka / Croatia*:* InTech, 219-246.

Yang, S. B., & Ok Choi, S. (2009). Employee empowerment and team performance: Autonomy, responsibility, information, and creativity. *Team Performance Management: An International Journal*, 15(5/6), 289-301.

Yin, R. (2014). *Case study research: Design and methods*. (5th Ed.). London: Sage Publication.

Yong-qiang, C., Jia, H., & Peng, M. (2008). *The development of the lifecycle function model by IDEF0 for Construction Projects*. Paper presented at WiCOM 4th International Conference on Wireless Communications, Networking and Mobile Computing, IEEE, 1-4.

Yu, A. (2011). *Facilitating organisational change and innovation: Activating intellectual capital within a learning paradigm* (Unpublished PhD thesis), The London School of Economics and Political Science (LSE). Retrieved from http://etheses.lse.ac.uk/147/1/Yu_Facilitating_organisational_change_and_innovation.pdf.

Yu, A., Flett, P., & Bowers, J. (2005). Developing a value-centred proposal for assessing project success. *International Journal of Project Management*, 23, 428–436.

Yu, W., Jutla, D. N., & Sivakumar, S. C. (2005). A churn-strategy alignment model for managers in mobile telecom. In *Communication Networks and Services Research Conference, 2005. Proceedings of the 3rd Annual* (pp. 48-53). IEEE.

Zaheer, A., Rehman, K. U., & Khan, M. S. (2010). Development and testing of a business process orientation model to improve employee and organizational performance. *African Journal of Business Management*, 4(2), 149-161.

Zainal, Z. (2007). Case study as a research method. *Jurnal Kemanusiaan*, *9*, 1-6.

Zairi, M. (1997). Business process management: A boundaryless approach to modern competitiveness. *Business Process Management Journal*, 3(1), 64-80.

Zawawi, M. (2016). *Improving competition within public private partnership (ppp) procurement processes in Malaysia*. (Unpublished PhD Thesis), University of Salford. Salford.

Zhang, M., & Rasiah, R. (2014). Institutional change and state-owned enterprises in China's urban housing market. *Habitat International*, 41, 58-68.

Zhang, Q., & Cao, M. (2002). Business process reengineering for flexibility and innovation in manufacturing. *Industrial Management & Data Systems*, 102(3), 146-152.

Zhang, Y., & Wildemuth, B. (2009). Qualitative analysis of content. in: B. Wildemuth (Ed.) *Applications of social research methods to questions in information and library*. Portland: Book News.

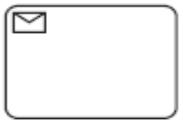
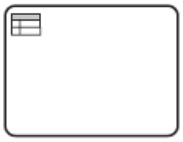
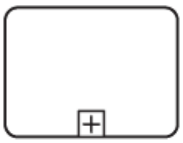
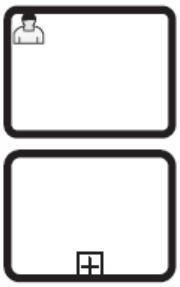
Zhu, Y., & Augenbroe, G. (2006). A conceptual model for supporting the integration of inter-organizational information processes of AEC projects. *Automation in construction*, 15(2), 200-211.

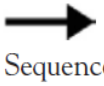
Zulal, S. (2012). *Why the messy banking sector endangers Iraqi development.* Retrieved 18 June 2017 from http://www.niqash.org/en/articles/economy/3002/

Zwikael, O. (2009). Critical planning processes in construction projects. *Construction Innovation*, 9(4), 372-387.

Zwikael, O., & Globerson, S. (2006). From critical success factors to critical success processes. *International Journal of Production Research*, 44(17), 3433-49.

Appendix A - Extended BPMN Modelling Elements

BPMN Task Description	
BPMN 2.0.2 Notation	**Task Description**
 None	No special task type is indicated.
 User Task	A User Task is a typical "workflow" task in which a human performer performs the task with the assistance of a software application and could be scheduled through a task list manager of some sort.
 Manual Task	A Manual Task is a task that is expected to be performed without the aid of any business process execution engine or application.
 Service Task	A Service Task is a task that uses some sort of service, which could be a web service or an automated application.
 Receive Task	A Receive Task is a simple task that is designed to wait for a message to arrive from an external participant (relative to the process).
 Send	A Send Task is a simple task that is designed to send a message to an external participant (relative to the process).
 Script	A Script Task is executed by a business process engine. The modeller or implementer defines a script in a language that the engine can interpret. When the task is ready to start, the engine will execute the script. When the script is completed, the task will also be completed.
 Business Rule	A Business Rule Task provides a mechanism for the process to provide input to a Business Rules Engine and to get the output of calculations that the business rules engine might provide. The input/output specification of the task will allow the process to send data to and receive data from the Business Rules Engine.
 Sub-Process	A Sub-Process is a type of activity within a process, but it also can be "opened up" to show a lower-level process. This is useful for process decomposition or general process organisation.
 Call Activity	A Call Activity is a type of activity within a process. It provides a link to reusable activities: for example, it will call a task into the Process (see upper figure on the left) or another Process (see lower figure on the left).

BPMN Flow Description	
BPMN 2.0.2 Notation	**Task Description**
 Sequence Flow  Message Flow Association  Data Association	A Sequence Flow is represented by a solid line with a solid arrowhead and is used to show the order (the sequence) in which activities will be performed in a process or choreography diagram. A Message Flow is represented by a dashed line with an open arrowhead and is used to show the flow of messages between two separate process participants (business entities or business roles) that send and receive them. An Association is represented by a dotted line, which may have a line arrowhead on one or both ends, and is used to associate text and other artefacts with flow objects. A Data Association is represented by a dotted line with a line arrowhead and is used to associate data (electronic or non-electronic) with flow objects. Data Associations are used to show the inputs and outputs of activities.

BPMN Marker Description	
BPMN 2.0.2 Notation	**Task Description**
 Loop Marker  Parallel Multiple Instance Marker  Sequential Multiple Instance Marker Adhoc Marker  Annotation Marker	A Loop Marker is used to represent an activity that will be executed multiple times until the condition is satisfied. The condition can be validated either at the start or end of the activity. A Parallel Multi-Instance Marker is used to represent an activity that can be executed as multiple instances performed in parallel. The number of instances will be determined through a condition expression that is evaluated at the start of the activity. All instances will start in parallel and each instance can have different input parameters. The activity, as a whole, is completed after all the instances are completed. However, another expression, if it becomes true, will stop all instances and complete the activity. A Sequential Multi-Instance Marker represents an activity that is similar to a Parallel Multi-Instance activity, but its instances will be executed in sequence. The second instance will wait until the first instance is completed and so on. The Adhoc Marker is a tilde symbol and used to mark a Sub-Process for which the normal sequence patterns are relaxed and its activities can be performed in any order at the discretion of the users. Tasks can start any time without any direct dependency on other tasks. An Annotation Marker is a mechanism for a modeller to provide additional text information (i.e. notes) for the reader of a BPMN diagram. Annotations can be connected to other objects through an Association (see above).

BPMN Data Object Description	
BPMN 2.0.2 Notation	**Task Description**
 Data Object  Data Input  Data Output  Data Store  Collection of Data Objects	A Data Object represents the data that are used as inputs and outputs to the activities of a process. Data Objects can represent singular objects or collections of objects. A Data Input is an external data input for the entire process. It is a kind of input parameter. A Data Output is the data result of the entire process. It is a kind of output parameter. A Data Store is a place where the process can read or write data (e.g., a database or a filing cabinet). It persists beyond the lifetime of the process instance. A Collection of Data Objects represents a collection of data elements related to the same data entity (e.g., a list of order items).

BPMN Data Gateway Description	
BPMN 2.0.2 Notation	**Task Description**
 Gateway   Exclusive Gateway  Inclusive Gateway  Parallel Gateway   Event-based Gateway  Parallel Event-based Gateway  Complex Gateway	Gateways are used to control how process paths converge and diverge within a process. The Event Gateway, when splitting, routes sequence flow to only one of the outgoing branches, based on conditions. When merging, it awaits one incoming branch to complete before continuing the flow. The Gateway can be displayed with or without the “X” marker, but the behaviour is the same. The Inclusive Gateway, when splitting, allows one or more branches to be activated, based on conditions. All active incoming branches must complete before merging. The Parallel Gateway, when splitting, will direct the flow down all the outgoing branches. When merging, it waits for all the in branches to complete before continuing the flow. The Event Gateway is always followed by catching events or receiving tasks. The flow of the Process is routed to the subsequent event/task that happens first. When merging, it behaves like an Event Gateway. This Gateway can be configured such that it can be used to start a Process, based on the first event that follows it (see the lower figure on the left). The Parallel Event Gateway is only used for starting a Process. It is configured like a regular Event Gateway, but *all* of the subsequent events must be triggered before a new process instance is created. The Complex Gateway defines behaviour that is not captured by other gateways. Expressions are used to determine the merging and splitting behaviour.

BPMN Data Gateway Description	
BPMN 2.0.2 Notation	**Task Description**
 Event: Start	Start Events indicate the instance or initiation of a process or an Event Sub-Process and have no incoming sequence flow. A Process can have more than one Start Event, but an Event Sub-Process only has one Start Event.
 Event: Event Sub-Process non-interrupting	Non-interrupting Start Events can be used to initiate an Event Sub-Process without interfering with the main process flow.
 Event: Intermediate and Boundary	Intermediate Events indicate something that occurs or may occur during the course of the process, between the Start and End. Intermediate Catching Events can be used to catch the event trigger and can be in the flow or attached to the boundary of an activity. Intermediate Throwing Events can be used to throw the event trigger.
 Event: Boundary non-interrupting	Non-interrupting Boundary Events can be attached to the boundary of an activity. When they are triggered, flow will be generated from them, but the source activity will continue to be performed.
 Event: End	The End Event indicates where a path in the Process will end. A Process can have more than one end. The Process ends when all active paths have ended. End Events have no outgoing sequence flows.
  Message (receive)	Receive messages to start a Process or in the middle of a Process, either in the flow or attached to the boundary of an activity.
  Message (send)	Send messages in the middle or at the end of a Process path.
  Timer (catch)	A Timer Event is always of catch type and used to signify waiting for a specific time condition to evaluate to true, which will start a Process, start an Event Sub-Process, wait in the middle of a flow, or wait as a Boundary Event.
  Escalation (catch)	An Escalation Event handles escalation conditions, triggering the start of an Event Sub-Process or a Boundary Event.
  Escalation (throw)	A throw Escalation Event will cause the escalation conditions that will trigger the catch Events.
  Link (throw and catch)	A Link Event is not significantly related to how the Process is performed, but facilitates the diagram-creation process. For example, you can use two associated links as an alternative to a long sequence flow. There is a throwing Link Event as the “exit point,” and a catching Link Event as the “entrance point,” and the two events are marked as a pair.
  Error (catch)	A catch Error Event is used to capture errors and to handle them. This event can only be used at the start of an Event Sub-Process or as a Boundary Event. These events can catch errors thrown by the throw Error Events or errors thrown by a BPM system or services used by the Process.

BPMN Data Gateway Description	
BPMN 2.0.2 Notation	**Task Description**
 Error (throw)	A throw Error Event is used as an error to be handled. This event can only be used as an End Event (i.e. never as an Intermediate Event).
 Cancel (catch)	Cancel Events can only be used in the context of the transactions. The catch Cancel Events are used as Boundary Events for the transaction Sub-Process, and will trigger the roll back of the transaction (i.e., the Activities of the Sub-Process).
 Cancel (throw)	Cancel Events can only be used in the context of the transactions. The throw Cancel Events are only used within a transaction Sub-Process.
 Conditional (catch)	Conditional Events are used to determine whether to start (or continue) only if a certain condition is true. Like the Timer Event, the Conditional Event can only exist as a catching event. They can be used at the start of a Process or an Event Sub-Process, in the middle of the flow, or as a Boundary Event.
 Compensation (catch)	A Compensation Event is used to handle compensation in the process. The catching Compensation Event can be triggered as an Event Sub-Process Start Event, or as a Boundary Event.
 Compensation (throw)	A Compensation Event is used to handle compensation in the process. The throwing Compensation Event can be used in the middle or end of a Process path.
 Signal (start)	Catching Signal Events are used for receiving signals. They are a generic, simple form of communication and exist within pools (same participant), across pools (different participants), and across diagrams. They can be used at the start of a Process or an Event Sub-Process, in the middle of the flow, or as a Boundary Event.
 Signal (end)	Throwing Signal Events are used for sending signals. They are a generic, simple form of communication and exist within pools (same participant), across pools (different participants), and across diagrams. They can be used in the middle or end of a Process path.
 Multiple (catch)	The Multiple Event is used to summarise several event types with a single symbol. The event is triggered if any one of those types is satisfied. They can be used at the start of a Process or an Event Sub-Process, in the middle of the flow, or as a Boundary Event.
 Multiple (throw)	The Multiple Event is used to summarise several event types with a single symbol. When this event is reached, then all the event types are thrown. They can be used in the middle or at the end of a Process path.
 Parallel Multiple (catch)	The Parallel Multiple Event is used to summarise several event types with a single symbol. The difference between this event and the Multiple Event is that the Parallel Multiple is only triggered if ***all*** of those types are satisfied. They can be used at the start of a Process or an Event Sub-Process, in the middle of the flow, or as a Boundary Event.
 Terminate (throw)	The Terminate End Event is the “stop everything” event. When a Terminate End Event is reached, the entire process is stopped, including all parallel activities.

Appendix B - Factors Affect Bid/No Bid Decision

Factors related to the contractor:

1) Financial capabilities of the contractor;
2) Number of previously executed projects by the contractor;
3) Experience in similar projects;
4) Contractor's category in PCU;
5) Previous relationship and communication level with the clients;
6) Experiences and competencies of the contractor's staff;
7) Availability of equipment owned by contractors;
8) Administrative skills, technical skills and experiences of the contractor's project manager;
9) Specific features that provide competitive advantages to the contractor, such as the ability to incorporate vertical integration;
10) Contractor's ability to develop sustainable or temporary joint ventures;
11) Bids in hand;
12) Risks taken and expected;
13) Contractor's competitive strategy;
14) Expected and planned profits for the project;
15) Importance of the project to the contractor;
16) Relationship between the contractor and the subcontractors;
17) Contractor's culture concerning how, when and why to deal with the clients;
18) Relationship between the contractor and the banks (expected bank facilities).

Factors related to the client

1) Financial capabilities of the client;
2) Number of previously advertised projects by the client;
3) Reputation of the client;
4) Previous relationship and communication level with the contractor;
5) Experiences and competencies of the client's staff;
6) The client's requirement of the contractors (financial, technical and administrative);
7) The client's level of supervision, restriction, monitoring and control over the contractors;
8) The quality level that the clients asks for;

9) The address of the client offices "where tenderers submit bids if it is not electronically tendered";
10) Client's evaluation and awarding policy;
11) Criteria for contractor selection;
12) Payment policy;
13) Currency paid by client (dollars, Shequle, Euro, or other);
14) Number of annual advertised projects by the clients;
15) Types of annual advertised projects by the clients;
16) Type of tendering system (open, restricted, pre-qualification or other systems);
17) Targeted categories by the client;
18) Advertisement duration for the tender;
19) Means of advertisement (newspaper, post board, PCU web site, etc.);
20) Adoption of the e-tendering policy by the client;
21) Client's safety requirements;
22) Type of system adopted in the contractual agreement;
23) Client's policy for compensation, and mainly under force majeure conditions;
24) Project source of funding;
25) Client's policy in resolving the disputes and litigations;
26) Client's policy to adopt advanced payments for contractors.

Factors related to contract and project characteristics:

1) Financial value of the project;
2) Duration of the project;
3) Location of the project;
4) Complexity of the project;
5) Language of the contract;
6) Values of the insurances;
7) Bid bonds (tender security deposit);
8) Fixed bid bond motivating participation rather than being a percentage bid bond;
9) Liquidated damages;
10) Tender period (for a contract value £500 000, a period of 4-6 weeks should be allowed for tendering);
11) Clarity of the contract clauses;
12) Presence of the VAT;

13) Type of contract cost (lump sum, unit price);
14) Type of project (construction building works, maintenance, repair works);
15) Size of the tender documents (number of pages, drawings);
16) Lotting system in the tender;
17) Terms and conditions of the contract;
18) Clarity of the drawings, especially, the detailed drawing;
19) Due date of the payments after one month, two months or others.

Factors related to the external environment:

1) Number of competitors in the market;
2) Competencies and capabilities of the competitors;
3) Weak barriers to penetrate the market by a new competitor, increased bidders' probability to bid;
4) Awareness of the number of competitors in the tenders;
5) Awareness of the competitors' identities: who will participate in the tender will increase the probability to bid and compete strongly;
6) The stability of the economic climate;
7) The stability of the political situation strengthens the probability to bid;
8) The availability of the required raw material strengthens the probability to bid;
9) The stability of the construction industry;
10) Local climate (probability to participate in the tenders in the spring and summer seasons is higher than winter and autumn);
11) Stability of the currency exchange rate;
12) Governmental regulations and statutes that are integrated in the construction industry;
13) The taxes and other financial requirements on each tender;
14) Availability (ampleness) of projects amongst the clients, at the same time reducing the volume of participation in the tenders and increase the cost;
15) Classification criteria for the contractors by the PCU.

Source: Enshass *et al.* (2010, p.139-142)

Appendix C - The Pro-Forma Interview Questions for the First Stage of Data Collection

Research Themes	Interview Questions	Role in Study
Introduction	• What is your current position in your company? • How many years of experience do you have in the construction sector?	Background of the respondent
	• Would you please provide me an overview of your company? • Could you please describe the organisational structure of your company? What are the departments/sections in your company/regional office? How are the authorities distributed throughout the company? • Is there a process-centred (cross-function) focus or a classical functional orientation? If yes, do you have any maps of your company operational processes?	Background of the company Understanding the company organisational structure
Understanding the current operational process	• Would you please state the main events or inputs that trigger the operational process? • Does your company have a selective tendering strategy? If yes, can you explain this strategy and who is responsible for developing it? If no, how do you select the most appropriate contracts? • Who is responsible for identifying and bringing a new contact for your company? What are the main measures that are usually taken to do so?	Identifying and evaluating the current preparations measures undertaken by the company before commencing on an operational process
	• Could you please describe in detail the steps (process) that are commonly carried out when identifying an opportunity for a new project? Who are involved in performing these steps and what are their main roles? • How is the bid/no bid decision made? Who are involved in making this decision? What is the information usually required to reach the final decision? • From the time of deciding to bid for a new project to the time of receiving the client notification regarding the submitted bid, could you please describe me: 1) The main activities of the bidding process and their sequence, along with their key inputs and outputs? 2) The key people involved in performing these activities and their roles? 3) Information required to perform them? 4) Where and how are the decisions made throughout the bidding process? 5) Who is responsible for making the decisions or providing approval of commencing works on the next stage of the process?	Identifying and mapping the current bidding process

	• After winning a new contract, could you please explain to me: 1) The main pre-construction process' activities that are usually undertaken by your company and their sequence, along with their key inputs and outputs? 2) The key people who are involved in performing these activities and their roles? 3) Information required to perform them? 4) Where and how are the decisions made throughout the bidding process? 5) Who is responsible for making these decisions or providing approval of commencing works on the next stage of the process?	Identifying and mapping the current practice employed in the pre-construction phase.
	• Would you please explain to me the key mechanisms that are usually employed by your company in executing its projects? • Would you please describe to me the process adopted in subcontracting a work package, who are engaged in this process, and what are its main challenges? • Would you please describe to me the process adopted in purchasing an item, how are engaged in this process, and what are its main challenges? • Would you please describe to me the process adopted in acquiring project teams, who are involved in this process, and what are its main challenges? • Would you please describe the main measures employed in monitoring and contorting projects after commencing the construction works on sites?	Identifying, mapping and examining the current practices employed in construction a construction project
	• Would you please describe me the main activities adopted by your company in closeout its construction projects? Who are involved in performing these activities and their roles?	Identifying, mapping and examining the current closeout process.
Opinions/View	• From your perspective, what are the main challenges or barriers that negatively impact on the efficiency of your company operational processes? • What is the impact of the current management system on the success of the company's business in terms of time, cost and quality? • Does your company have an electronic centralised database and communication system that links all departments and projects together to facilitate and accelerate accessing the required information and decision-making process? If not, what are the formal ways used in communication and data store and exchange? • Does your company have a performance management system and specific key performance indicators (KPIs) to assess and evaluate its performance? If no, what the impact of this on the company's performance? • Do you have any suggestions to improve the efficiency of your company's operational process?	Identifying the challenges inherent in the current practice and any suggestions for improvement

Appendix D - The Pro-Forma Interview Questions for the Second Stage of Data Collection

Research Themes	Interview Questions	Role in Study
Introduction	• What is your current position in your company? • How many years of experience do you have in the construction sector?	Background of the respondent
Research assumption and the key findings of expletory study	• How far do you agree with this statement "in order to improve the performance of Iraqi QGCCs, it is important to consider these companies as profit-seeking entities and managed independently away from the current governmental regulations and/or political interferences in the commercial operations and strategic planning"? • Having visually reviewed the current practice employed by IQGCCs, how far do you think that the current management system adopted by IQGCCs, which is based on the bureaucratic and functional structure, can affect the work efficiency and overall organisational performance of these companies? • Do you think there is an essential need to change the current management system if it is required to produce a step change improvement in IQGCCs' performance? • Do you think that streamlining the current operational process by removing non-value added activities can accelerate decision-making process and improve the performance of IQGCCs? • Do you agree that reducing the centralisation by awarding wider authority to the regional offices and project management teams in planning and managing their projects can streamline the operational process of IQGCCs and thus enhancing the efficiency of the operational process? If you agree, what are the main challenges that can face applying such approach and what is needed to overcome these challenges?	Testing the applicability and validity of the research assumption and the key findings of the expletory study.
Process view and documentation	• Would you please check the applicability and validity of the processes illustrated in the proposed framework, their sequence, and the key decisions required to be made throughout the operational process? • What are the activities that do not add value to the process and those that need to be added in order to improve the process? • Who should be engaged in performing each process of these processes? • Do you think it would be better if the bidding process is conducted by the regional offices staff? • Do you think it would be better to assign a project management team with a wide authority to take the whole responsibility and accountability for planning and executing a new project?	Testing the applicability and validity of the proposed redesign core business processes and the key people involved in performing them.
Cross functional integration	• What do you think of setting up multidisciplinary teams, each team combines expertise from different functional who work together under the same objectives to undertake a certain process? • What is your opinion of working in a collaborative environment? • What do you think the effectiveness of such team in developing? 1) Bid proposal 2) Project pre-construction planning	Testing the applicability and validity of employing multidisciplinary teams to perform the different

	3) Construction works 4) Closeout • Based on the business processes who should be engaged in the 1) Bid team 2) Pre-construction planning team 3) Construction team 4) Closeout team • Do you find any challenges or difficulties to work within a team? How these challenges can be overcome?	operational processes.
Process owner	• What do you think of assigning a qualified and competent individual for every business process to take the overall responsibility from end-to-end and be accountable for results? • Who should be responsible for or the process owner of the 1) Bid process 2) Pre-construction planning process 3) Construction process 4) Closeout process • Based on the business processes, what is the kind and level of authority that a process owner has to have in order to manage his/her process effectively and efficiently? • Do you think that holding the accountability to only a single person (process owner) is a right thing?	Testing the applicability and validity of employing a process owner for each end-to-end process.
Stage gates	• Do you think that designing stage gates to check the quality of operational process at certain points would enhance the performance? • From your perspective, do you think the types and distribution of stage gates as illustrated in the proposed framework is right? • Do you think that a feedback report should be produced at every stage of the business process before any decision could be made? • Who should be engaged in reviewing the report and making the decisions at every stage gate? • Do you think all data should be recorded at every stage for future use? • What type of data should be recorded? • From your perspective, what is the best applicable and effective way to store and share data and information throughout the company units and projects? • Who do you think should do this task? • Do you think that at the end of the project, project's feedback should be produced to improve the process and stages?	Testing the applicability and validity of the proposed stage gates and the key people involved in controlling them.
Information communication technology	• What do think of using an electronic driven system in communication as an alternative to the current paper-based ones? • How far do you think that developing a central database, which links all the company's units and projects together, can affect improving the work efficiency and overall performance? • Who do you think should do this task? • What are the main challenges that prevent of adopting and developing such system?	Testing the applicability and validity of using an electronic driven system in communication as an alternative to the current paper-based ones.

Appendix E - List of Publications and Award

Al-Obaidi, T., & Higham, A. (2015). *A Transformational Organisational Framework to Improve Iraqi Quasi-Governmental Construction Companies' Performance*. Poster presentation at 12th International Post-Graduate Research Conference 2015, Salford, UK.

Al-Obaidi, T., & Higham, A. (2017). *Examining and mapping the bidding process of Iraqi quasi-governmental construction companies*. Paper presented at the 13th International Postgraduate Research Conference, Salford, UK.

Al-Obaidi, T., & Higham, A. (2017). *A theoretical transformational organisational framework to improve Iraqi quasi-governmental construction companies' performance*. Paper presented at the 13th International Postgraduate Research Conference, Salford, UK.

International Council
for Research and Innovation
in Building and Construction

University of Salford
School of the Built Environment
13th International Postgraduate Research Conference (IPGRC)

This is to certify that

Taha Al-Obaidi and Anthony Higham

have been presented with the

CIB Award

For best paper on property and project management research,

Examining And Mapping The Bidding Process Of Iraqi Quasi-Governmental Construction Companies

Dr Wim Bakens
CIB Senior Programme Advisor
15 September 2017