Information Technology Project Success in Saudi Arabian Public Organisations: Chief Information Officers' Perceptions

Abdulaziz I. Almajed

Supervisor

Dr Pam J. Mayhew

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Abstract

Projects are highly critical to the survival and business continuity of any organisation. These include many IT projects that are highly important for effectively and efficiently managing business processes, data, information, and knowledge to achieve organisational goals. Success of any project is dependent on many factors, ranging from technical, organisational, and behavioural factors.

The main objective of this research is to investigate and develop the success model of IT projects in Saudi Arabian public organisations from the CIO perspectives. Accordingly, this research seeks to develop the research conceptual framework of IT project success, by identifying the relevant critical success factors (CSF) of IT projects, identifying the criteria for project success (PSC), examining the measurement model through relationship between CSF and PSC, and subsequently examining the possible relationships between the focus variables (CSF and PSC) and CIO demographics, organisational, and IT characteristics. To achieve these objectives, the research employs deductive approach using questionnaire surveys method, and utilization of both descriptive and inferential analyses.

The literature review and exploratory analysis phase, assisted the researcher to develop the research conceptual framework by identifying the shortlisted CSF constructs. These CSFs are: top management support and commitment, strategic planning, project management, project team competency, communication management, stakeholders' management, partners and suppliers management, and training and education. The PSC constructs are identified with six items comprising of criteria from conventional project management (triple constraint) and IS success model. The factor analysis led the criteria to be categorized into project short term success called project management success (PMS) and long-term success called project success (PS).

In the next analysis phase, descriptive analysis was performed to identify the characteristics of organisations (type, size), IT (governance, budget), the CIOs such age, gender, CIO type, etc. Subsequently, the reliability test was performed to ensure the reliability and validity of the constructs measured in the study using structural modelling (PLS). Accordingly, the effect of CIO characteristics on the CSF and PSC was checked using ANOVA, and the results indicate that most of the characteristics have weak or no significant influence with either CSF or PSC. Therefore, these demographic characteristics are not moderating the effect of CSF and PSC in the analysis that follows.

Further analysis using the PLS bootstrap procedure was conducted to test the project success model by verifying the measurement model as well as the impact of CSF (independent variables) on PSC (dependent variables). The results show that top management support, project management availability and stakeholder management had significant effect on the project success (PS). Whereas, project management availability also led to project success through the short-term project management success (PMS). Both PS and PMS are considered important and significant criteria for project success.

The results also indicate that there is a strong reliability of the measurement model, as well as a strong contribution of the composite of all the eight factors in project success. Such A significant result is also attributed to a few critical success factor constructs, which are predominantly by top management support, project management availability and stakeholder management availability.

Findings from this research are considered highly important as few researchers have investigated project success from the CIOs point of view. Their collective perceptions can be used more objectively and accurately by organisations to ensure the success of IT projects and to ensure the success of their IT strategic goals.

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Dedication

To the memory of my father (Monday, 16th of October 1995)

To my dearest mother, beloved wife, children, sisters, and brothers

Abbreviations

ANOVA	Analysis Of Variance
ANSI	American National Standard Institute
APM	Association for Project Management
AVE	Average Variance Extracted
BPR	Business Process Re-engineering
CEO	Chief Executive Officer
CFO	Chief Finance Officer
CHM	Change Management
CIO	Chief Information Officer
CM	Communication Management
CR	Composite Reliability
CSF	Critical Success Factor
EFQM	European Foundation Quality management
ENAA	Engineering Advancement Association
ERP	Enterprise Planning System
FA	Factor Analysis
GM	General Manager
HIS	Health Information System
ICT	Information and Communication Technology
IEEE	Institute of Electrical and Electronics Engineers
IPMA	International Project Management Association
IS	Information System
ISO	International Standards Organization
IT	Information Technology
ITIR	It Infrastructure Readiness
NCITP	National Communications and IT Plan
P2M	Project and Program Management
PLS-SEM	Partial Least Squares-Structural Equation Modelling
PM	Project Management
PMI	Project Management Institute
PMM	Project Management Maturity
PMO	Project Management Office
PMS	Project Management Success
PRINCE2	Projects IN Controlled Environments
PS	Project Success
PSC	Project Success Criteria
PSM	Partners and Suppliers Management
PTC	Project Team Competency
RM	Risk Management
RQ	Research Question
SHM	Stakeholders Management
SP	Strategic Planning
TE	Training and Education
TMS	Top Management Support and Commitment
WTO	World Trade Organisation

Chapter 1 : Introduction

1.1. Background

Information technology (IT) has become a crucial to organisations in order to become efficient and effective. In fact, IT is the backbone of many businesses where it would be almost impossible to function without its presence. Therefore, organisations have invested a huge amount of money in IT projects as a result of its increasingly important role. In some cases, however they believe that a powerful Enterprise System (ES) could solve what are, in effect, organisational problems (Abdullah, 2013, Davis, 2016). It has been noted that the organisational role of IT projects has changed greatly over the years, and IT projects turn out to be more strategic, widely spread, and extremely interconnected. The culture and structure of any organisation have been impacted by the implementation of IT projects (Doherty, 2003).

In particular, in developed countries, IT has been thought to be the fastest growing industry (Hartman and Ashrafi, 2002). The need for successful project managers is important with the growth in the number of IT projects (Brewer, 2005). In order to enable organisations to stay competitive, academics and practitioners have paid attention to the issues related to successful projects. There are numerous studies showing the fact that organisations are spending huge amounts of money investing in IT, with the desire to make a noteworthy achievement to the organisation's efficiency, effectiveness, and competitive positioning (Altuwaijri and Khorsheed, 2012). Furthermore, it has been evaluated that a vast number of organisations are spending up to 50% of their aggregate capital consumption on IT (Almajed and Mayhew, 2013). High-income developing countries around the world are devoting a large portion of their resources to building up their IT infrastructure, with the aim of gaining position in the global economy. However, there is a need to evaluate the progress of these countries in their quest direction for better utilisation of resources and maximising gained benefits (Al-Turki, 2011).

On the other hand, the financial effect of IT project failures is also tremendous. Around 150 billion US dollars are misused every year on IT projects, which fail in the US, and a comparable amount is reported to be spent in the European Union (Gauld, 2007). The London

Ambulance System, London Stock Exchange's Transfer and Automated Registration of Uncertified Stock (TAURUS) system, American Airlines Corporation, Mandata Human Resource System and the Californian State Automated Child System (SACSS), AMR Information Services (AMRIS), the Wessex Health Service RISP (Regional Information Systems Plan), FoxMeyer Drug Co., NHS IT programme, are all illustrations of prominent IT project disasters reported in the literature (Pelizza and Hoppe, 2015, Remenyi, 2012, Syal, 2013).

The fact that IT project failures are common has been observed by several scholars, and the rates stay high in spite of the vast investments in IT (Altuwaijri and Khorsheed, 2011). Hochstrasser and Griffiths (1991) found that up to 70% of IT projects fail, and Clegg et al. (1997) suggested that up to 90% of all IT projects fail to achieve their objectives. Furthermore, 87.5% of IT projects can be considered unsuccessful (McManus and Wood-Harper, 2007). The Standish Chaos Summary Reports provide a view of project statistics mainly in developed countries (the US and Europe). Project resolution results from the 2012 Chaos Research Report found that 39% of IT projects were considered successful (completed on time, on budget, with necessary features and functions) and 18% were considered total failures and abandoned (Figure 1.1). The remaining 43% were considered partial failures or "challenged" with time and/or cost overruns and/or other problems (Standish-Group, 2013).

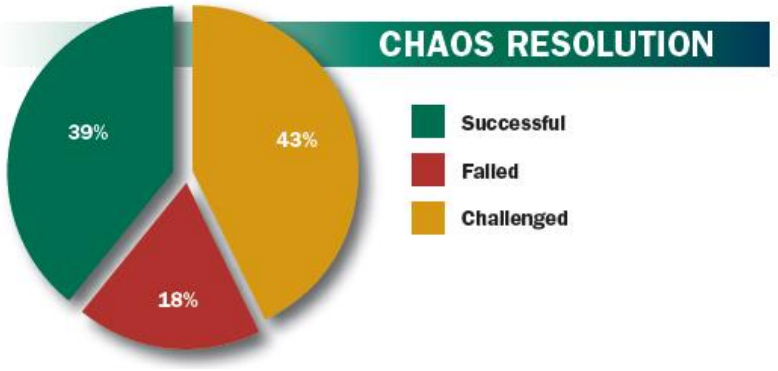


Figure 1.1: Project resolution results from 2012 CHAOS research

Table 1.1 tracks the progress of Standish Group for IT project performance over a period of eighteen years.

Table 1.1: Project resolution results from CHAOS research for the years 1994–2012

Project Status	**Year**									
	1994	**1996**	**1998**	**2000**	**2002**	**2004**	**2006**	**2008**	**2010**	**2012**
Succeeded	16%	27%	26%	28%	34%	29%	35%	32%	37%	39%
Failed	31%	40%	28%	23%	15%	18%	19%	24%	21%	18%
Challenged	53%	33%	46%	49%	51%	53%	46%	44%	42%	43%

Unfortunately in high-income developing countries such as Saudi Arabia, there are no statistical reports about the success or failure rates of IT projects. There is however one study, carried out by Alfaadel et al. (2012), which showed that the failure rate of IT projects in Saudi Arabia is approximately 52%. In developing countries, Heeks (2002) categorised many IT projects as failures, "*Alongside the successes, many information systems in developing countries can be categorised as failing either totally or partially*" (p. 101). Furthermore, the rise in IT project failure is said to be a result of the increasing organisational impact of information technology (Heeks, 2002).

This research contributes to the study of this complex and challenging issue by developing a conceptual framework for IT project success, examining the relationships between critical success factors (CSFs) and the project success criteria (PSC) from the perspective of the CIOs in Saudi Arabia.

1.2. Definition of CIO, IT, and IT Projects

The title Chief Information Officer (CIO) will be used to represent the following terms: IT director, IT manager and IT executive. The researcher has developed simple acceptable definitions of IT. In this thesis, information technology (IT) or information systems (IS) will be used interchangeably to express all the technical, financial, organisational, managerial, and social dimensions of IT functions/departments within an organisation. Lastly, IT projects which the researcher is concerned with are those that have impact on the performance of the organisation overall, such as Enterprise Resource Planning (ERP), and Health Information System (HIS). They represent significant investment and impact to the recipient organisation.

1.3. Saudi Arabia: An Overview

The Kingdom of Saudi Arabia (KSA) is the cradle of Islam, being the birthplace of the Muslim Prophet Muhammad (peace be upon him). It was established in 1932 by King Abd-al-Aziz. KSA is the largest country on the Arabian Peninsula, occupying 2,240,000 sq.km. (864,869 sq. miles). The latest national statistics from 2010 reported that the total Saudi population had risen to 30,770,000 including 10,070,000 non-nationals (MinistryofEconomyandPlanning, 2015). Three administrative provinces are home to the majority of the population, i.e. Riyadh, Mecca and the Eastern Province, and the capital city is

Riyadh. KSA's neighbouring countries are Kuwait, the United Arab Emirates, Qatar, Bahrain, Oman, Jordan, Iraq and Yemen.

Saudi Arabia is one of the most devout and insular countries in the Middle East, with no political parties, professional associations or labour unions (Vidyasagar and Rea, 2004). It owes its transition from an underdeveloped desert kingdom to one of the wealthiest countries in the region to its natural sources of petroleum; it is now the world's largest producer and exporter of oil. However, in recent years Saudi Arabia has sought to decrease its dependence on its oil reserves by increasingly diversifying its economy with sectors such as religious tourism, private investment, and non-oil exports, which it hopes will also lead to increasing economic growth (Alodadi and Benhin, 2015).

The government plays an essential role in the development of the industrial and economic sectors. The Ministry of Economy and Planning prepares plans for economic and social development that contain long-term economic goals. These five-year economic development plans have governed Saudi Arabian economic development for over forty years. The last development plan to be approved by the Saudi Council of Ministers was the Ninth Five-Year Development Plan; it allocated $385 billion (SR1.4 trillion) to projects in all sectors through 2014. The objectives of this plan are the improvement of the standard of living, decreasing unemployment, balancing economic development across all regions, and enhancing the competitiveness of the country's economy. The budget for this plan rose by approximately 67% compared with the Eighth Five-Year Development Plan. Table 1.2 illustrates how this budget is intended to be spent. Half of the government's spending will be allocated to the development of the country's human resources, including education and training – reinforcing the Kingdom's goal of creating a knowledge-based society. Social and healthcare development are set to benefit from 19% of the budget, while economic resource development will be allocated 15.7%, transportation and communications development 7.7%, and municipal and housing services 7%.

Table 1.2: Ninth five-year plan allocations (Source: Ministry of Economy and Planning)

Development Sector	**Allocation ($ Billions)**	**Share (%)**
Human Resources	195.0	50.6
Social and Health	73.0	19.0
Economic Resources	60.7	15.7
Transportation and Communications	29.6	7.7
Municipal and Housing Services	26.8	7.0
Total Expenditure	385.1	100

The aim of the Saudi government is ultimately to increase the Gross Domestic Product (GDP). It hopes to achieve this aim by raising productivity in all the sectors of the economy, promoting public services, and achieving general prosperity for its citizens. The improving business environment, boosted by privatisation and liberalisation, has already afforded the Saudi economy an advantage by attracting foreign investors into the country. In December 2005, Saudi Arabia joined the World Trade Organisation (WTO); this represented a significant advance in the country's development possibilities, as it gave Saudi products greater access to global markets, which in turn creates jobs and encourages foreign investment.

Saudi Arabia is seen by many as a perfect investment opportunity, and is one of the world's twenty-five most competitive economies investment (Saudi Arabian General Investment Authority, 2015). There are a number of reasons why Saudi Arabia is attractive to foreigners investors: (1) Saudi Arabia is ranked 3rd in the world for "fiscal freedom" and it has the 3rd most rewarding tax system in the world; (2) it is one of the world's 20 largest economies, currently ranked 19th, and it possesses the largest economy in the Middle East and North Africa (MENA) region; (3) economic growth was 3.6% in 2014, which means that it is one of the world's fastest growing economies; (4) it accounts for 38% of total Arab GDP; (5) it is home to 18% of the world's oil reserves; (6) it is ranked 49th out of 189 countries for the overall ease of conducting business globally; and (7) it is currently the largest recipient of Foreign Direct Investment in the Arab world. The Saudi government has ambitions to make KSA one of the top ten world destinations for investment (Saudi Arabian General Investment Authority, 2015).

1.4. Information Technology in Saudi Arabia

Progress and prosperity have increased in Saudi Arabia in recent times thanks to considerable growth and development in all aspects of life. One of the reasons behind this growth is that the Kingdom has begun to focus attention on rapidly growing and fast evolving sectors, for example the Information and Communication Technology (ICT) sector. This shift of attention has been initiated by the leadership of the Kingdom who have acknowledged the vital role of ICT in building an information-based society, characterised by the production, penetration and processing of information. It has been seen that countries which embrace Information Society enjoy an accelerated rate of growth and development which boosts their economies

and enhances progress. With this in mind, Saudi Arabia developed a National Communications and IT Plan (NCITP) in 2005 as part of the 8th economic development plan. There are two components to the NCITP: a five-year plan for Communications and IT in the Kingdom, and a long-term perspective for Communications and IT. The actions included in the five-year plan will ensure that the country progresses towards the long-term perspective. The long-term vision for ICT in Saudi Arabia is: "The transformation into an information society and digital economy so as to increase productivity and provide communication and IT services for the sectors of the society in all part of the country and build a solid information industry that becomes a major source of income" (Ministry of Communications and Information Technology, 2006).

The NCITP comprises seven general objectives, sixty-two implementation policies, twenty-six specific goals and ninety-eight projects. Some of the proposed projects relating to IT project success are:

1. Increasing ICT project budgets in public sector organisations.
2. The creation of high-level ICT posts.
3. The creation of ICT directorates in departments which currently lack them.
4. Putting into effect the funding and implementation of ICT projects.
5. Providing special competitive incentives for ICT posts in government agencies.
6. Recognition of ICT professional competence certificates in selection for employment and in promotion.
7. Preparing an action plan for e-Government and implementing it.
8. Setting up a unified framework for ICT project specifications.
9. Unifying the specifications of typical government ICT applications.
10. Establishing frame agreements for the procurement of ICT systems.
11. Supporting the application of best practices in ICT centres.
12. Providing ICT training for Government employees.
13. Formulating ICT plans in Government institutions.

There are many initiatives now in place as an outcome of the NCITP, which include e-government, e-health and e-learning. The main initiative is the e-government programme (YESSER) which enables the implementation of e-government. This programme has been funded by the Saudi government with 3 billion SR. In order to increase the success rate of IT projects, one of the main functions of this programme is to unify the process of managing IT

projects and use of the best practices of international standards such as those from the Project Management Institute (PMI) (Yesser, 2015).

1.5. Significance of CIO Role

Chief Information Officers (CIOs) are corporate executives who manage and oversee their enterprise's IT systems. They are responsible for creating and implementing the IT management practices in the workplace (Smaltz et al., 2006).

During the mid-1990s a new type of IS executive arose within more progressive firms; they were given the title of CIO and were responsible for the company's entire information resources (Chun and Mooney, 2009). Prior to the development of the CIO position, the role of technical manager was significantly less business-focused. The early CIOs had to redefine their role from technical manager to business manager, business strategist and process innovator. Their importance has grown along with the role of IS within organisations, and they need to be capable of leading processes that will add value to them (Preston et al., 2008). Thus, CIOs have risen from being service providers to executive-level leaders, often reporting directly to the chief executive officer (CEO). Through the adoption of IS within the socio-technical environments, the CIOs managerial skills and competency have a significant impact on the business (Chun and Mooney, 2009). While most modern CIOs are adept at helping CEOs with business strategising, some have chosen, or have been forced, to keep to a more traditional role focusing on technology rather than business. In this instance they would report to the chief operations officer (COO) or the chief financial officer (CFO), and are responsible for dealing with existing IS infrastructure maintenance and leverage to keep costs down.

It has been argued that business performance can be enhanced and improved when an organisation recognises how much of an asset the CIO is to them strategically. The CIO plays a critical role in using IT to create value in the business (Preston et al., 2008).

A lot of studies in the literature approached the issue of IT project success from the perception of stakeholders, project managers and end users. As the problem described is an organisational issue and is not concerned with a specific project only, it is very important to gain a higher view from the executives' level. Hence, the CIO, who has an overview of most of the IT projects within the organisation and is involved in many issues related to these projects, should possess in-depth organisational and managerial knowledge regarding IT projects, and would be authorised to access information relating to current and future

organisational strategies (AlShitri, 2008). The role of a CIO provides a critical interface between the business and ICT. As a member of the top management team (TMT), the CIO holds an extremely visible and complex position comprised of numerous roles. It is essential to understand the characteristics of the CIO as there is a critical need to effectively manage Information Technology (IT) innovations. The CIO plays a central role in not only managing the current IT needs of organisations but also in proactively using IT to fundamentally change the way in which businesses operate and compete.

The importance of the CIO's role in assessing the project's success (the CSFs and project success criteria) has been investigated by (Nah et al., 2007) and Nah and Delgado (2006). Moreover, there was a view expressed by some organisations that the evaluation of a project should not be conducted by the project manager or the project team, since they had a vested interest in the outcome (Thomas and Fernández, 2007). Further to the mentioned above, all the IT projects within the organisation are under the management of the CIO, and these projects are commonly interrelated or interdependent. Hence, it is very critical for the CIO to ensure the real success of these projects, whereas favouritism in the assessment of any project will affect other projects, which then will adversely impact on the organisation's overall performance since these core projects are aligned with the organisation's strategy (EFQM-MultiProject, 2010). According to the EFQM (2010), the CIO assesses the project's implementation success in a multiproject management environment, therefore, the CIO should set the project's objectives and criteria prior to its start, to be measured at its completion to ensure that a fair and honest assessment is done. As a result, it is very important to tackle the problem from the CIO's perspective.

1.6. Research Problem

IT project success research has focused on the technical issues such as data integration and conversion, while giving limited consideration to the organisational and behavioural dimensions (AlShitri, 2008). However, it has been suggested by other researchers that issues preventing successful IT projects relate to project management and organisational behaviour rather than to the technology (Davis, 2016, Fan, 2010). Furthermore, the challenges facing IT project performance are largely organisational and not technical in nature (Abdullah, 2013). Numerous studies have distinguished deficiencies in the treatment of organisational aspects as being a substantial cause of IT projects' failures, and other studies have found that organisational factors were behind the projects' successes (Doherty et al., 2003, Hung et al.,

2014, Hussein et al., 2007, Nasir and Sahibuddin, 2011). In addition to that, McManus and Wood-Harper (2007) found that management issues accounted for 65% of the factors identified with failed projects. Moreover, Peng and Nunes (2010) suggests that IT project failure in China can be attributed to organisational issues such as lack of top management support and lack of IT expertise. Also, Al-Braithen (2010) asserted that there has been too little consideration of the important role of social factors in shaping IT project success. Hussein et al. (2007) found that organisational factors are, indeed, highly significant in ensuring project success. Furthermore, in a comprehensive study on the CSFs in 43 articles during the period of 1990 to 2010, Nasir and Sahibuddin (2011) suggested that organisational factors (94%) overwhelmed technical factors (6%) in terms of importance regarding IT project success.

With respect to Saudi Arabia, the situation is quite similar. The difficulties relating to IT project development and implementation are more organisational and behavioural than technical in nature (Al-Mudimigh et al., 2011, Al-Turki, 2011, El-sofany et al., 2012). Alshitri (2008) found, in his study of 54 Saudi organisations, that the implementation of IT projects has been problematic, and that adopting formal project management methodology is not widespread.

In developing countries, there has not been much research on project CSFs (Abdullah, 2013). This is despite the fact that these countries have a vast potential market for IT projects so more research should be directed to these regions, and scholars have a chance to further investigate the CSFs for these nations (Ngai et al., 2008). Moreover, Dezdar and Ainin (2011c) identified that there was a gap in the literature as many of the CSF studies focused on developed countries. In addition, the majority of the studies on IT project CSFs itemise the factors without examining the interactions amongst the factors (Al-Braithen, 2010, King and Burgess, 2006, Nandhakumar et al., 2005). Consequently, McLeod and MacDonell (2011) suggested further work needs to be done to investigate the interrelationships among the CSFs.

Few studies have explored how project success is distinct in practice, as the existing literature has concentrated on measuring the rate of IT project failure (Dezdar, 2011, Thomas and Fernandez, 2008). Even though there are intensifying theoretical and empirical studies on IT project failures, some of these studies are derived from the private sector (Gauld, 2007), and less attention has been directed toward IT success in the public sector (Hussein et al., 2007). Indeed, the failure rate of IT projects is higher (84%) in the public sector (Gauld, 2007).

The available literature on the CSFs of IT projects in Saudi Arabia are limited in terms of exploring the impact of the CSFs on the project success criteria (PSC) in general and from the CIO's perspectives in particular. Al-Turki (2011) stated in his study on ERP implementation practices that there is no reported attempt to identify critical success factors for implementing ERP in Saudi Arabia. However, several attempts have been made to identify and investigate the factors that are responsible for IT projects' failure (Alghobiri, 2003). Alfaadel et al.'s (2012) study was the first to discuss the success (CSFs and PSC) in IT projects in general within the Saudi context. On the other hand, their research was very limited. They did not take into account the CSFs' interrelationships and the relationships between CSFs and project success criteria. In addition, they used very limited factors in their study without providing an in-depth literature review of the investigated factors. Other studies have the same limitations and are often directed toward a particular project, such as Enterprise Resource Planning (ERP) (Al-Mashari and Al-Mudimigh, 2003, Al-Shamlan and Al-Mudimigh, 2011, Al-Turki, 2011, Aldammas and Al-Mudimigh, 2011, Aldayel et al., 2011, Alghathbar, 2008), Portals (Al-Mudimigh et al., 2011) and Health Information Systems (HISs) (Abouzahra, 2011).

While a few studies in the project management literature concentrate on the critical factors that affect project success, many of these studies generate only lists of critical success factors, and each list varies in its scope and purpose (Egbeniyoko, 2014). As a result, few studies discuss both CSFs and project success criteria, and insufficient numbers of experimental studies have tried to examine significant associations between CSFs and project success criteria. One of the contributions focusing on the linkage between the CSFs and project success criteria was published by Gunathilaka et al. (2013). Gunathilaka et al. (2013) found that in the literature the relative importance of the CSFs and project success criteria is inadequate and the linkage between them is relatively unexplored. On a conceptual perspective, the link appeared clearly, instead, with the empirical perspective no evidence is shown, which indicates the importance of the CSFs and their linkage to project success criteria. Therefore, Gunathilaka et al. (2013) see a need for future research on this subject area.

Some of the studies in the literature mentioned earlier approached the issue of IT project success from the perception of project managers and end users (Davis, 2014). Moreover, there were limited studies examining the perception of success from a senior management point of view (Davis, 2014). Therefore, as the problem described is an organisational issue and is not

concerned with a specific project only, it is very important to gain a higher view from the executives' level. Hence, the CIO, who has an overview of most of the IT projects within the organisation and is involved in many issues related to these projects, should possess in-depth organisational and managerial knowledge regarding IT projects, and would be authorised to access information relating to current and future organisational strategies (Al-Taie et al., 2015, AlShitri, 2008, Hu et al., 2014, Louchart, 2012). As a result, it is very important to tackle the problem from the CIO's perspective.

In summary, the majority of studies have been conducted in developed countries (Dezdar and Ainin, 2011c, Ngai et al., 2008). Also, most of these studies list the factors without investigating their impacts on project success (Gunathilaka et al., 2013), and there is a need to investigate the CSFs interrelationships (McLeod and MacDonell, 2011). Lastly and importantly, the data commonly were collected based on either the project managers' or end users' perspectives, whereas the CIO would have a more comprehensive view of IT projects (Al-Taie et al., 2015, Hu et al., 2014).

In view of that, in order to close this gap and to further understand IT project performance problems requires an understanding of the relationships between all the factors that lead to IT project success, and their impact on project success criteria. Therefore, a study into public organisations in Saudi Arabia may help to identify the CSFs and verify their impact on IT project success criteria within the Saudi organisations from the CIO's perspectives.

1.7. The Expected Value of the Study

This study will contribute to existing knowledge in different ways. First, it provides a synthesis and integrated analysis of both CSFs and project success criteria literature. The second contribution is presenting empirical evidence on the status of IT project success in Saudi Arabian public organisations from the CIOs' perspectives. Third, it manages to identify the CSFs for IT project success and develops a conceptual framework for Saudi Arabian public organisations. The fourth contribution is to examine the level of perceptions of the CSFs and project success criteria in Saudi Arabian public organisations. The fifth contribution is to examine the impact of the CSFs on projects success criteria (PMS and PS). The last contribution is to examine the CSFs interrelationships in Saudi Arabian public organisations.

Therefore, the anticipated contribution of this study to the academic community is that it will fill a gap in the literature in developing countries in general, and in Saudi Arabia in particular,

by emphasising the Saudi context. The outcomes of this research should also aim to benefit and guide public organisations in Saudi Arabia, as well as other developing countries in the region.

1.8. Research Aim and Objectives

The overall aim of this study is to investigate the critical success factors of IT project success within Saudi Arabian public organisations from the CIO's perspective. This study will be conducted to achieved the following objectives:

1. To investigate the critical success factors (CSF) of IT projects in Saudi Arabian public organisations and their level of perceptions from the CIO perspectives.
2. To investigate the criteria for evaluating IT project success (PSC) in Saudi Arabian public organisations and their level of perceptions from the CIO perspectives.
3. To examine the influence of organisational, project and CIO characteristics on CSF and PSC.
4. To develop a framework and measurement model of IT project success through the effect of CSF on PSC.

1.9. Research Questions

In order to achieve the aim of the research, the following main research questions were formed:

1. What are the critical success factors (CSF) of IT projects and their level of perception from the CIO perspectives in the Saudi Arabian public organisations?
2. What are the criteria for the evaluating IT project success (PSC) from the CIO perspectives in the Saudi Arabian organisations?
3. Is there any relationship between organisational, project, and CIO characteristics with CSF and PSC that can moderate the IT project success framework?
4. What is the measurement model or framework that best explain the IT success project in the Saudi Arabian organisations?

1.10. Research Methodology Overview

In order to investigate the research problem and to achieve the research objectives, a two-phase approach will be adopted using a quantitative research method. Phase one consists of

two stages. The first stage is the literature review, which identified a number of factors that should be further investigated in the next stage. In the second stage (exploratory study), the factors were refined with fewer constructs that have been perceived as important by the CIOs surveyed. To test these factors and identify the CSFs, a quantitative method using a questionnaire is used.

In phase two (explanatory phase), this study empirically tests the proposed research conceptual framework. Therefore, in order to achieve this goal, a quantitative method is used, using a survey approach. A research questionnaire has been developed and used to gather empirical data from CIOs in Saudi Arabian public organisations to assess the level of perceptions of the CSFs and project success criteria and to examine the relationships between CSFs and project success criteria (PSC).

In the explanatory phase, two types of statistical analyses were used: descriptive statistics and inferential statistics. Descriptive statistics refer to the transformation of the data into a form that will make them easy to understand and interpret (e.g. frequencies, central tendencies, dispersions and averages), whereas inferential statistics try to identify relationships between variables (e.g. ANOVA and regression) (Cohen, 2000) and model validation. Different statistical techniques will be used in the analysis of the data based on their relevance to the research requirement. The researcher will use the following techniques where applicable: descriptive statistics (frequencies, percentage, mean, and cross-tabulation) and inferential statistics (ANOVA, factor analysis and Partial Least Squares-Structural Equation Modelling (PLS-SEM)).

1.11. Motivation and Significance of the Study

The motivation for this study has been derived from the high rate of IT project failures and abandonments in the world in general (Standish-Group, 2013) and in Saudi Arabia in particular (Alfaadel et al., 2012). In fact, the failure of the implementation of the Health Information System (HIS) project in our organisation has encouraged me to investigate the project success further as that project had consumed a great deal of resources (it cost around 22 million US Dollars), lasted for more than three years, and then was finally abandoned. This has been the main motivation for the current study. Particularly in Saudi Arabia, the lack of project success empirical research is another impetus for selecting this domain.

Literature suggests that various implementation factors play critical roles in determining the success of an information system (Abdullah, 2013, Bukamal and Wadi, 2016, Dezdar, 2011, Egbeniyoko, 2014). Consequently, the importance of IT project success in practice, the lack of empirical research, and the need to develop knowledge specifically for the benefit of high-income developing countries in general, and in Saudi Arabia in particular, indicate that expanding the existing knowledge of the critical success factors (CSFs) and project success criteria (PSC) with respect to CIOs in Saudi Arabian public organisations is an important topic for research.

1.12. Thesis Structure

This section outlines the eight thesis chapters (Figure 1.2) and briefly introduces the main elements addressed in each.

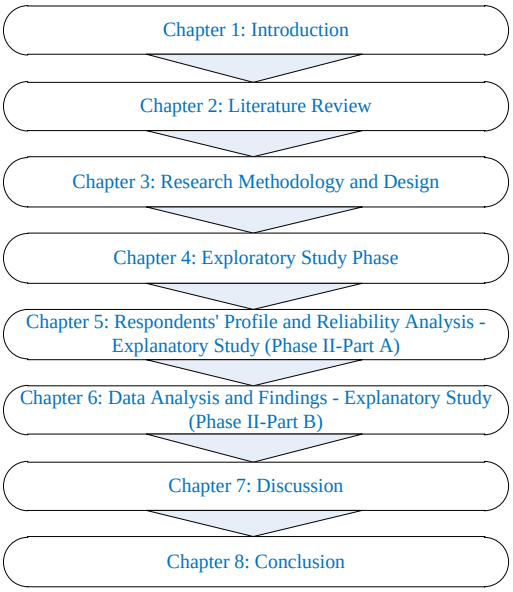


Figure 1.2: Thesis structure

Chapter One presents the background to the research area and the problem definition. The significance of the CIO role and contribution of the research are described. The research aim and objectives, research questions, research methodology overview, motivation, and the structure of the thesis are also presented.

Chapter Two introduces the subject of projects, project management, and an overview of IT projects. IS theories (The Delone and McLean IS success theory and the Critical success factors (CSFs) approach) are described. Also, it discusses the CSFs commonly recognised as being essential to the successful implementation of IT projects and the key measures of IT

project success (project success criteria (PSC)). Lastly, the components of the proposed framework are presented.

Chapter Three presents the methodological perspectives of this research. The research paradigm, research approach, research methods, research techniques, IT research methods, data collection techniques, and sampling are described. The research design and the methods adopted are discussed in greater detail. The reasons for why a research questionnaire survey was chosen are discussed in this chapter.

Chapter Four presents the research conceptual framework. The exploratory study, the aim of which is to identify the CSFs in Saudi Arabian public organisations, is presented. Also, the research conceptual framework and its components are described.

Chapter Five presents the descriptive analysis of the organisational variables (CIOs, organisational and IT characteristics), and examines the impact of these variables on the CSFs and the PSC. Also, it presents the level of CIOs perceptions of IT project CSFs' elements and the perceptions of project success criteria in Saudi Arabian public organisations. Lastly, exploring the relationships between the CSFs and the PSC are presented.

Chapter Six tests the conceptual framework using partial least squares (PLS). Two assessments are presented. The measurement model assessment tests the reliability and validity, and the structural model assessment examines the relationship between constructs as well as the model's predictive capabilities.

Chapter Seven discusses interpretations based on the study findings for project success. It justifies the research findings and links them with previous work in the field as well as with the findings of the exploratory study (Chapter 4), and the explanatory phase (Chapters 5 and 6).

Chapter Eight, provides a summary of this study and the main findings obtained. It addresses the contributions that this thesis makes to the field. Finally, it discusses the limitations of the research, and it suggests possible future research.

Chapter 2 : Literature Review

2.1. Overview

Based on the discussed research aim and objectives, this thesis is concerned with IT project success. It focuses mainly on two concepts, namely, CSFs and project success criteria. Therefore, the purpose of this chapter is to carry out a literature search on these concepts to understand the key issues involved in IT project success with respect to CIOs in Saudi Arabian public organisations, and to acquire a general view of the principal approaches in this field. This helps to provide guidelines to develop the research conceptual framework for conducting the current research, and also suggests ways of encapsulating the findings from the work. Therefore, sections 2.2 and 2.3 of this chapter introduce project and project management concepts. Section 2.4 presents the importance of the CIO role, and section 2.5 presents IT projects. Section 2.6 presents information system success theories, and section 2.7 presents project success concepts. Section 2.8 presents the theoretical components, and section 2.9 presents the knowledge gap.

2.2. Project Concept

A project usually includes a complex set of processes which may explain why so many projects fail to achieve their overall aim. There are many definitions and descriptions for the term 'project' in the literature as follows:

- Project Management Institute (PMI) (2013) defined a project as "*a temporary endeavour undertaken to create a unique product, service, or result*" (p. 5).
- Ohara (2005) defined a project as "*value creation undertaking based on specifics, which is completed in a given or agreed timeframe and under constraints, including resources and external circumstances*" (p. 15).
- Cooke-Davies (2001) defined a project in the following way "*a human endeavour may legitimately be regarded by its stakeholders as a project when it encompasses a unique scope of work that is constrained by cost and time, the purpose of which is to create or modify a product or service so as to achieve beneficial change defined by quantitative and qualitative objectives*" (p. 20).

- Projects are viewed less as isolated sequences of events aimed at a short-term goal with limited impact, and more as long-term strategic interventions which, to be accepted, have to enhance the economic, social and environmental wellbeing of the various project stakeholders (Lim and Mohamed, 1999, Wateridge, 1998).

The PMI definition is more comprehensive compared to the other definitions. The word 'temporary' means that the project has a certain starting point and a certain end point, and the word 'unique' means that the end product has its own characteristics and features. Projects vary from each other in terms of size, scope, business, etc., and it is challenging to have a comprehensive classification for projects (Shenhar and Dvir, 2004). However, there are two famous methods for projects' classification. The first one is the Goal-and-Methods Matrix presented by Turner and Cochrane (1993), and the second one is the Diamond Framework **(**Novelty, Complexity, Technology, and Pace - NTCP Model) presented by Shenhar and Dvir (2004). Conventionally, projects are divided into phases which together are called the project life cycle. These phases can be categorised as the following: initial phase, intermediate phase and final phase (PMI, 2013). In order to increase the chance of project success, the project environment is critical (PMI, 2013). Gilbert (1983) illustrates the project's environment as a sequence of intersecting loops (see Figure 2.1).

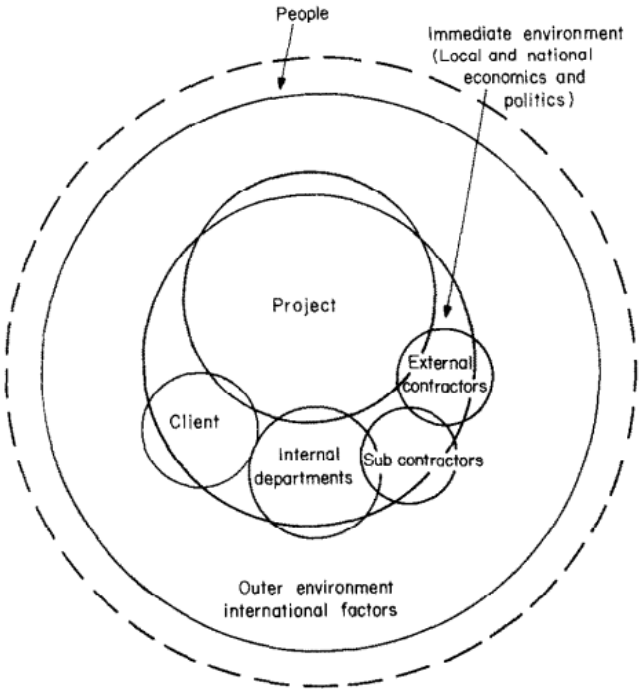


Figure 2.1: The project and its environment (Source: Gilbert, 1983)

The outer dotted-line loop shows that people are everywhere within the project. The outer solid-line loop (outer environment) shows the international economics and political environment, and the inner solid-line loop (immediate environment) shows the local and national economics and politics. No more than two of the inner loops have a common overlap, and this represents the control interface, across which instructions and reports flow.

Several scholars have stressed that project selection is critical for portfolio and programme success (Cooper et al., 2002, Killen et al., 2008, Müller et al., 2008). When selecting projects, organisations should depend on a strategy rather than on financial approaches (Cooper et al., 2002, Killen et al., 2008), and this strategy approach results in allocating resources to different types of projects and leads to increased portfolio performance. Organisations have in general two alternatives when deciding which projects to start. Firstly, treating all projects equally, the decision can be aligned on a scoring matrix, and secondly, categories can be created in order to group projects in a meaningful way. Therefore, prioritisation is vital in order to make the most out of the organisation's limited resources.

2.3. Project Management Concept

The foundation of project management can be traced back as early as civilisation itself. However, modern project management has its roots in the Second World War and was developed in the construction and the defence industry during the industrial revolution. Most recently, the demand for project management has increased as the number of projects has increased dramatically in a broad range of industries (Cooke-Davies and Arzymanow, 2003).

2.3.1 What is Project Management?

There are many definitions and descriptions for the term project management in the literature as follows:

- PMI (2013) defined project management as "*the application of knowledge, skills, tools, and techniques to project activities to meet project requirements*" (p. 6). Project management is accomplished through the application and integration of the project management processes of initiation, planning, executing, monitoring, controlling and closing (PMI, 2013).
- Project management is expressed in the planning, organising, monitoring and controlling of all the aspects of a project and the motivation of all the involved

stakeholders to achieve the project objectives safely and within the agreed time, cost and performance criteria (APM, 2006).

- Project management is also articulated as a professional's capability to deliver, with due diligence, a project product that fulfils a given mission, by organising a dedicated project team, effectively combining the most appropriate technical and managerial methods and techniques, and devising the most efficient and effective breakdown and implementation routes (Ohara, 2005).
- Project management is described as a collection of tools and techniques to direct the use of diverse resources toward the accomplishment of a unique, complex, one-time task within time, cost and quality constraints (Atkinson, 1999, Olsen, 1971).

As mentioned above, there are different definitions for project management, however, the APM definition covers all the important elements such as planning, monitoring, control, and motivation. These all contribute to the perception of the predefined goals by helping to assist with success criteria such as time and cost.

2.3.2 Project Management International Standards

The importance of standards in project management and the role that they play has been a subject of much discussion for many years (Duncan, 1995), yet standardisation has been shown to offer a number of benefits. Some of these identified benefits apply to both technological and professional standardisation and include encouragement of technological innovation, and competition and convenience (Crawford and Pollack, 2008).

2.3.2.1 Project Management Institute (PMI)

The standard considered by some to be the most significant Project Management standard has been developed by the PMI and is known as the PMBOK Guide, currently in its fifth edition (PMI, 2013). The PMBOK Guide is approved as an American National Standard by American National Standard Institute (ANSI) and is recognised by the Institute of Electrical and Electronics Engineers (IEEE) as an IEEE standard. The PMI (2013) explains that many of the techniques and knowledge that are required for project management are unique to this field. However, simply knowing and applying these skills and techniques, now regarded as best practice, do not guarantee that the project management will be successful.

In the PMBOK guide, projects are divided into five phases, known as project management process groups. Within these process groups, suitable processes must by chosen by the project team in order for the project to be successful and its objectives to be met. These process groups are: initiating, planning, executing, monitoring and controlling and closing. Project management is also divided into nine knowledge areas by the Guide: project integration management, project scope management, project time management, project cost management, project quality management, project human resource management, project communications management, project risk management and project procurement management. The PMBOK is now widely regarded as a de facto international standard for project management knowledge (Crawford and Pollack, 2008).

2.3.2.2 Association for Project Management BOK (APM)

The International Project Management Association (IPMA) was established in 1965, and has since evolved into a network, or federation, to which belong 30 national project management associations representing approximately 20,000 members. The majority of these are based in Europe but some are also in Africa and Asia. The UK Association for Project Management (APM) is the largest member of the IPMA; it was established in 1972 and it currently has a membership numbering more than 13,500 individuals and 300 corporate members (APM, 2006). It has created its own knowledge standard, the APM Body of Knowledge which is currently in its fifth edition. The differences between this and the PMBOK Guide centre on what is considered relevant and how this information is conveyed (Crawford and Pollack, 2008).

In the APM, project management is described as the discipline of managing projects successfully. It should be applied to the project from the very beginning stages of concept definition, right through to implementation and maintenance – it covers the whole project lifecycle. Project management is understood as comprising everything that is an element in the process of achieving the project objectives safely and within a pre-determined time period, at an agreed cost and quality, with the required technical specifications, and additional performance criteria. Project management provides the single point of integrative responsibility that is required to ensure that the entire project is managed effectively, and that the objectives are achieved. The APM book (the BOK) is divided into four main categories: project management, organisational issues, tools and techniques and general management.

These four categories are then subdivided into 40 elements/processes of project management (APM, 2006).

2.3.2.3 PRojects IN Controlled Environments 2 (PRINCE2)

PRINCE stands for Projects IN Controlled Environments and is a management approach owned and promoted by the Office of Government Commerce (OGC, part of UK treasury). PRINCE was first published in 1989 and was developed from a previous method called Project Resource Organisation Management and Planning Technique PROMPT (a project management method created in 1975 by Simpact Systems Ltd.). In 1996, a consortium of 150 European organisations contributed to and published a version 2 of PRINCE (PRINCE2, 2011). Although PRINCE2 was originally targeted at the public sector, the private sector is increasingly adopted it and its importance is growing globally (Fox, 2007).

The project management process in PRINCE2 is divided into four stages. These stages are: pre-project stage, initiation stage, continuation stage and closing stage (PRINCE2, 2011). The model further divides these stages into three main sections: directing, managing and delivering, and seven processes: starting up, initiating, directing, controlling stage, managing product delivery, managing stage boundary and closing.

2.3.2.4 Project and Program Management for Enterprise Innovation (P2M)

The Engineering Advancement Association of Japan (ENAA) is a non-profit organisation founded in 1978. It engaged in continuous research and development projects for three years and subsequently composed its Project & Program Management System for Enterprise Innovation (P2M) in autumn 2001. A compilation of P2M, which includes project management practices unique to Japan, was undertaken by ENAA, supported by the METI (Ministry of Economy, Transport and Industry). The aim of this was to boost the international competitiveness of Japan's companies to enable Japan to play a leading role in the global economy. P2M differs from the knowledge systems of the West in two main ways; project creation and capability building. The former refers to programmed integrated management, while the latter refers to 11 discrete management elements, such as portfolios, targets, financing, information systems, and communications (ENNA, 2015).

2.3.2.5 ISO 21500

ISO 21500 is a globally acknowledged project management standard, and is employed as a foundational reference for the application of project management knowledge and good practices (Zandhuis and Stellingwerf, 2013). ISO 21500 provides a professional approach to project management, and the value of this approach is that it can be applied to the majority of projects. The benefits of this approach have been proven in practice, through the contributions of hundreds of experts in the project management profession from many parts of the globe. These project managers' expertise is based on the experiences of thousands of project practitioners worldwide, together with numerous in-depth studies. The structure of ISO 21500 is as follows: (Clause 1) Scope; (Clause 2) Terms and definitions; (Clause 3) Project management concepts; (Clause 3) Project management process; (Annex A) Process group processes mapped to subject groups (Zandhuis and Stellingwerf, 2013).

2.3.3 Project Management Maturity (PMM)

Statistical process control (SPC) techniques were applied by the Total Quality Management movement, which generated the concept of process maturity. The application of these techniques was shown to enhance the maturity of any technical process, which in turn leads to a decrease in the inherent variability of the process, and an advance in the mean performance of the process (Cooke-Davies, 2001).

The concept of process maturity developed into a measure of organisational process maturity through the "Capability Maturity Model" for software organisations, which was widely adopted. It was developed by the Software Engineering Institute of Carnegie-Mellon University in the period 1986-1993. A key concept in this model is that as organisations progress towards maturity, they pass through a series of five stages. These stages are initial level, repeatable level, defined level, managed level and optimising level. As an organisation advances through these levels, it can expect to enjoy increasing software process capability, which leads to enhanced software productivity (Cooke-Davies and Arzymanow, 2003).

It was a natural development for the concept of organisational maturity to transfer from software development processes to project management, given that software is developed through projects. There has therefore been a corresponding interest in employing the concept of maturity to software project management (Morris et al., 2006). Possibly because of this, several project management maturity models were developed with a definite connection to the

philosophy of the project management profession. The two best-known models of this type are the Organisational Project Management Maturity Model (OPM3) introduced by the Project Management Institute (PMI), and the Portfolio, Programme and Project Management Maturity Model (P3M3) developed by the Office of Government Commerce (OGC) which has produced PRINCE2.

2.3.4 Project Management Office (PMO)

A Project Management Office (PMO) is a group or department established as part of a business, agency or enterprise, whose role is to define and uphold the entity's standards for project management. The PMO's principal goal is to reap benefits for the organisation by standardising and adhering to project management policies, processes and methods (PMI, 2013).

Over a period of time, the PMO usually becomes recognised within the organisation as the source for guidance, documentation, and metrics related to the management and implementation of projects. In addition, a PMO may become involved in tasks which are related in some way to the project or in follow-up activities after the project has been completed. The areas reported on by the office to executive management include project activities, issues and requirements. This reporting regime is used as a strategic tool to maintain the momentum of implementers and decision makers so that the project keeps moving forward towards consistent, business- or mission-focused goals and objectives (PMI, 2013). An industry standard such as PMBOK or PRINCE2 is usually employed as a basis for the PMO's project management principles, practices and processes.

2.4. The Importance of the CIO Role

The increasing pace of technological innovation, access to telecommunications and the growing affluence of emerging economies have changed the role of Information Technology (IT) and the way IT is perceived within the organisation. IT is now moving from a support function to playing a crucial part in the execution of corporate strategy (Willcocks et al., 2015).

As one of the most important human resources, an IT leader has the responsibility to strategically leverage the full potential of IT as well as to overcome resistance to change. Since the mid-1980s this individual has typically been titled the chief information officer

(CIO). While business dependence on enterprise systems (ES) – both operationally and strategically – has grown, the CIO has increasingly been considered as the highest ranking executive in charge of their firm's IT management practices, and the knowledge possessed by this person is consistently considered as the most important factor (Hu et al., 2014).

CIOs are often members of the firm's C-level executive team. C-level, also called the C-suite, is an adjective used to describe high-ranking executive titles within an organization. The letter C, in this context, stands for chief. Officers who hold C-level positions are typically considered the most powerful and influential members of an organisation; consequently, these executives set the organisation's strategy, make higher-stakes decisions and ensure the day-to-day operations align with fulfilling the organisation's strategic goals.

As a member of the top management team (TMT), the CIO has been identified as a strategic visionary in charge of a firm's IT deployment and utilization, and this person has the responsibility to align IT with organisational process, strategy and business requirements (Li and Tan, 2013). The CIO possesses both strategic IT and strategic business knowledge in order to facilitate systems routines into daily business process and work activities. Also, the CIO holds a strategic position within the firm in order to combine the two forms of knowledge together, and facilitate systems routinised into daily business process and work activities (Hu et al., 2014). Further, the structural power of the CIO is particularly important to create discretion when working with other top executives, and develop mutual understanding on IT investment and deployment issues, thus to achieve agreement within the TMT on strategic IT decisions in support of business strategy (Banker et al., 2011).

As the role of the CIO has evolved, so have the definitions (Al-Taie et al., 2015). McLeod et al. (1995) have an insightful view of what a CIO is and what a CIO does. According to them, "the CIO concept regards the information services (IS) manager as a top-level executive, participating with other executives in charting the strategic course of the firm" (p. 30). For the purpose of this literature review, the definition by Grover et al. (1993) will be adopted as it is believed it encapsulates the true essence of the ever-multifaceted role of the CIO. They define the CIO as, "The highest-ranking IS executive who typically exhibits managerial roles requiring effective communication with top management, a broad corporate perspective in managing information resources, influence on organisational strategy, and responsibility for the planning of IT to cope with a firm's competitive environment" (p. 108).

In the early 1990s, the role of the CIO had moved away from the traditional focus on IT operations to a more strategic role where CIOs are expected to deliver not only improved efficiency but also make a significant contribution to the overall strategy and the competitiveness of the organisation (Chun and Mooney, 2009). This view is shared by Cash and Pearlson (2004) who suggest that if a CIO's concern is around IT management issues as opposed to innovation and business leadership, there is a strong possibly that these CIOs will fail to make a positive contribution to the overall organisation. Onan and Gambill (2002) argue that, "responsibilities have moved away from just being in charge of data processing for all information services of an enterprise, to someone who also fully understands a company's strategy and business plans" (p. 90).

The role of the CIO has gradually been moving from a focus on technology to a focus on business performance. As pointed out in a research study conducted by the Nolan Norton Institute (2001), "the brokering, ambassadorial and advisory roles of the information executive have increased tremendously" (p. 125). It appears from the literature that CIOs, in addition to being technology leaders must also be business leaders, in other words CIOs must bring both a technology and a business perspective to their role (Gottschalk, 2000).

Previous studies into the CIO role suggest that CIOs perform both a tactical and a strategic role (Lindström et al., 2006, Planes and Castillo, 2002). Gottschalk (1999) has found evidence that the CIO can perform up to six key roles within their organisation (chief architect, change leader, product developer, technology provocateur, chief operating strategist and coach) (Louchart, 2012). Whereas, Sojer et al. (2006) have identified five generic roles that CIOs perform, namely; enabler, driver, supporter, cost cutter and project manager. Cash and Pearlson (2004) on the other hand suggest that the CIO fulfils four primary roles; business strategist, IT functional leader, technology advocate and change agent.

Polansky et al. (2004) identify CIO responsibilities to be IT strategy, IT governance, IT organisation and staffing, technology architecture, technology awareness, corporate governance, business intelligence, business transformation, customer care and Internet and e-business. The above CIO responsibilities indicate that the CIO is an information technology and communications executive with finance and human resources as a flow on effect, not a driving factor. Polansky et al. (2004) discussed the future addressing: 1. Responsibilities will continue to shift from technical/operational to a strategic/management focus; 2. The CIOs success will be redefined to encompass strategic, enterprise-wide business goals and

objectives; 3. The focus of the CIO and the mission of IT will be redirected away from internal customers, and focused more towards external customers, partners, service providers and other links in the extended value chain; 4. Human capital management will become a key CIO responsibility; 5. CIO responsibilities will include IT portfolio management, IT investment management and risk assessment; 6. Business continuity and disaster recovery will continue to be seen as primary CIO responsibilities; 7. Actionable business intelligence will become a standard deliverable from IT; 8. Increasing importance on Governance will require the CIO to develop a deeper understanding and intuitive grasp of corporate finance and accounting processes; 9. CIOs will assume a greater leadership role with a focus on shaping and creating a world economy fuelled by information.

Cash and Pearlson (2004) suggest that CIOs should focus their time and energy on the future and on the strategic horizon of the organisation, think of themselves as CEOs of an IT company. Earl and Feeny (2000) note that factors such as; the increasing pace of technological innovations and the increasing competition within established and emerging markets have transformed organisations' use of technologies in such a way, that quite frequently IT issues have a direct impact on the execution of corporate strategy. CIOs are to some degree involved in the formulation of corporate strategy in setting not only IT plans but business strategies as well (Chun and Mooney, 2009).

Increasingly, CIOs are expected to take on the role of change agent or strategic change agent and play a greater part in enabling changes and implementing transformation (Peppard, 2010). It was demonstrated that although often assimilated to a technical role, the CIO role is very much a business role. Also, It was suggested that CIOs, providing they possess strong business acumen should be considered by other executives as individuals who can make a tremendous contribution to strategy and large change programmes. There is a strong body of research in the CIO literature that supports the idea that CIOs like other executives must possess adequate leadership capabilities (Banker et al., 2011, Chun and Mooney, 2009, Hu et al., 2014, Polansky et al., 2004, Preston et al., 2008).

According to Jablokow et al. (2010), CIOs as the leader of the IT function must bridge the cognitive gaps existing between the IT function of the other business functions of the organisation; build and manage a team of individuals each specialising in solving particular issues, be heavily involved in business process management; and manage change. To be accepted within the executive suite, the CIO is expected to create a vision for the IT function

and to share this vision with executive peers. The CIO is one of the few individuals within organisations that has an overall view of key business processes (Takanen, 2008).

The CIO holds an extremely visible and complex position comprised of numerous roles and requiring a diverse set of skills, abilities, attributes, and knowledge (Takanen, 2008). The person with this title has a tremendous amount of responsibility and serves many constituencies. It is important for CIOs to gain credibility and promote initiatives that advance the mission of the institution (Chun and Mooney, 2009). Therefore, the CIO must understand the mission and strategic direction of the institution and its leadership. This is the only way to communicate effectively with executive leaders and gain their support (Takanen, 2008). The CIO must be able to communicate resource and project needs in a way that puts him/her in the proper goal specific institutional context. This is a critical part of being an effective technology leader (Louchart, 2012).

The role of a CIO provides a critical interface between the business and ICT. The appointment of a CIO, or recognition of an equivalent senior manager acting in this role, reinforces an institution's commitment to technology (Peppard, 2010). A CIO combines a keen understanding of institutional business needs and a perspective of users' needs, with the experience and knowledge in the mobilising ICT to meet those needs (Preston et al., 2008). Therefore, it is essential to understand the characteristics of CIOs as there is a critical need to effectively manage Information Technology (IT) innovations. CIOs play a central role in not only managing the current IT needs of organisations but also in proactively using IT to fundamentally change the way in which businesses operate and compete (Louchart, 2012). CIOs coordinate project management techniques with strategic planning initiatives to control costs, manage implementation timelines, improve product quality, and manage stakeholder value (Chun and Mooney, 2009).

CIOs assume many influential roles in addition to overseeing the IT function, such as managing the firm’s information resources, offering vision for the role of IT in the firm, promoting IT as an agent of business change, redesigning firm strategy, and ultimately creating business value (Hu et al., 2014). The CIO can have formal and informal interactions and develop a shared vision with all TMT members (Banker et al., 2011). They concluded that CIOs should possess/develop knowledge of the business; understanding of the organisational context; the ability to influence the organisation; technical expertise; external

networking; management of the information technology operation and the capacity to innovate using new information technologies.

The CIO of the organisation is one of the key persons responsible for the deployment and management of IT. A study by Adelakun and Jennex (2002) revealed that IT executives, CIOs and IS managers assess success of an IS project by focusing on costs, savings, user satisfaction, value to the organisation and how well the IS interacts within the organisational infrastructure.

Research also indicates that characteristics of CIO may influence the type of strategies they formulated for the business and hence their perception on project success (Li and Tan, 2013). Such research is linked to the study of alignment of IT strategy to the business performance from the CIO perspectives. In other research, focus on the knowledge and skills of CIO and other types of CIO typologies are made to understand business (Broadbent and Kitzis, 2005, Seddon et al., 2008, Smaltz et al., 2006). Some evidence lead to the conclusion that different types of CIO such as competencies, experience, personality, etc. may influence how a CIO form strategies in IT (Hooper and Bunker, 2013, Li and Tan, 2013). It is possible to believe that these different forms of strategies can also influence their perceptions on project success, though no direct link can be found in these studies.

In summary, a thorough review of the literature on the role of the CIO and his/her knowledge, skills, and characteristics revealed that the CIO is a critical player in assessing the project success. Hence, the importance of this position shows that the CIO has an overview of most of the IT projects within the organisation and is involved in many issues related to these projects. Also, the CIO possesses in-depth organisational and managerial knowledge regarding IT projects, and would be authorised to access information relating to current and future organisational strategies (Al-Taie et al., 2015, Hu et al., 2014). Therefore, the project success assessment by the CIO would be critical and beneficial to the organisation. Moreover, there was a view expressed by some organisations that the evaluation of project success should not be conducted by the project manager or the project team, since they had a vested interest in the outcome (Thomas and Fernández, 2007). As a result, it is very important to tackle the problem from the CIO's perspective.

In addition, it is important to note as well, the different characteristics of CIOs that may lead to how success is assessed. Therefore, some demographic aspect of the CIOs such as

education, organisation background, experience, age, gender, are worthy of exploration, in order to investigate if these variables are moderating the effect of CSF on PSC. However, despite the fact that studies have been conducted to identify CIO typologies for understanding organisational success and leadership impact, it is beyond the scope of this work to provide such investigations. Formulation of typologies according to leadership styles and personally are not going to be covered.

2.5. IT Projects

Information Technology (IT) has become the cutting edge of global competition. Companies and organisations are keen to invest in information technology due to its potential as a strategic enabling tool to support growth and enhance quality. Despite the differences between IT and IS, in most literature, these two terms are used interchangeably (Lee, 2004). In this study, IS and IT are treated alike. IT projects (information Systems (IS)) is a discipline that unites the IT and the business domain. Silver et al. (1995) defines that "information systems are implemented within an organisation for the purpose of improving the effectiveness and efficiency of that organisation" (p. 362). Hence, the blend between people, organisation and technology is the major concern in IS. There is an abundance of IS domain literature merging between the business and technology realms such as enterprise planning system (ERP) and health information system (HIS).

ERP (Enterprise Resource Planning) system is an integrated, enterprise wide system, which automates core corporate activities such as manufacturing, human resource, finance and supply chain management (El Sawah et al., 2008), and it optimises the stream of data and resources throughout the entire supply chain. ERP provides an integrated view of core business processes, often in real-time, using common databases maintained by a database management system, and it tracks business resources such as cash, raw materials, purchase orders, and payroll (Poranki et al., 2015). ERP allows information to flow between all business functions. Investments in IT have become the biggest category of capital expenditure over the last ten years in United States-based businesses (Poranki et al., 2015). Enterprise system software is now a multi-billion dollar industry that produces components that support a variety of business functions. The ERP system is considered a vital organisational tool because it integrates varied organisational systems and facilitates error-free transactions and production, and as a result, more small enterprises are using ERP and it is no longer considered the domain of big businesses alone. Although the initial outlay for implementing

ERP is high, and the process is complex, costs are reduced in the long run due to increased efficiency (Zhang et al., 2003). Installing the system results in easier access to reliable information and elimination of redundant data and operations, therefore time management is maximised and room for error is reduced (Poranki et al., 2015).

HIS (Health Information System) has the capability of providing early warnings and alerts, supporting management of patient and health facilities, enabling planning, supporting and stimulating research, allowing health situation and trend analysis, supporting global reporting, and underpinning communication of health challenges to diverse users (Onademuren, 2014). Given that it has so many valuable uses, it is essential that the HIS's dissemination and communication attributes are optimal; the diversity of its users – policy-makers, planners, managers, healthcare providers, communities, individuals – demands this to be the case (Onademuren, 2014). The four key functions of the health information system (HIS), which provide the underpinnings for decision-making, are data generation, compilation, analysis and synthesis, and communication and use (Onademuren, 2014). In order to convert data into information for health-related decision making, the HIS collects and analyses data from the health sector (and other relevant sectors) and ensures their overall quality, relevance and timeliness (Onademuren, 2014).

It is imperative to reiterate that, in the current study, the main intention was to identify the factors that may affect the successful IT projects. Thus, in order to check the extent of successful system implementation, the issue of evaluation came into the picture.

Evaluation research is a discipline that serves numerous purposes such as assessing system performance, system usability, data and system quality, returns of investment and many more. Willcocks (1992) describes evaluation as "establishing by quantitative and/or quality means the worth of information technology (IT) to the organisation" (p. 245). Evaluation research has extended its applications progressively into other fields, and IS evaluation is one of them; its main functions being to improve and to guide future developments in IS. Also, it is a technique used to evaluate IS effectiveness. In this thesis, evaluation is used to determine the extent of IT project success. However, to assess and to state whether an IT project is successful or not remains quite subjective.

Evaluating an IT project is definitely not a straightforward task that is free from any complication. There are factors and aspects that seriously need to be reflected on when

performing the evaluation process. Among the difficulties of evaluating IT projects are: whose perspectives should be used to consider whether the project is successfully implemented? (Carlsson, 2003).

According to Beynon-Davies et al. (2004), the most frequently evaluated criteria in IS research are functionality, usability, quality (i.e., system, data, and service quality) and facilitating criteria (i.e., user satisfaction, ease of use, and usefulness). Even though there are evaluation studies on the socio-technical criteria (i.e., stakeholders satisfaction and impact on the organisation), the research is limited in number (Beynon-Davies et al., 2004). Therefore, this study was developed to include the socio-technical measures in the conceptual framework. To sum up, it is important to conduct IS evaluation since it relates to the issues of IS success and failure. Evaluation helps one identify the weaknesses of the current system in the organisation and elicits ideas on ways to overcome limitations.

Kwon and Zmud (1987) classified IS implementation literature into five research groupings; namely, mutual understanding research, political research, prescriptive research, process research and factors research. However, factors research seems to have the largest number of followers; its emphasis is on identifying individual, organisational, technological, socio-technical and project factors relating to project implementation successes and failures (Abdullah, 2013). Ideally, if the related factors are backed by the management then, most likely, the project will be successful. Although the findings from this type of research are reasonably consistent, the large majority of the existing studies concentrate on developed nations with developing countries receiving little academic attention (Peng and Kurnia, 2010).

Among the five IS implementation research groupings, factors research seems to be the most suitable one to use in order to realize the objectives of this study. The main challenge with factors research is to determine the definition of project success, which varies depending on perspective, time and location (Berg, 2001, Delone and McLean, 2003). Therefore, it is important from the beginning of the study that success is clearly defined so that it can be used as a guide throughout the research. Section 2.7 is used to deliberate more about the project success definition employed in the current study.

Despite being the most popular approach, factors research has been subject to several criticisms. Heeks (2002) highlights that first, it does not inform how the implementation factors should be implemented; second, what establishes a successful implementation, differs

across studies; and third, success can be further divided into total success or partial success. Thus, it is challenging to determine factors for successful implementation and, in addition, factors research merely lists the factors, whereas, in reality, the factors overlap and there are relationships between them (Cooke-Davies, 2002, Fortune and White, 2006). Robey et al. (2002) add that past research did not explain how the list of CSFs affect the organisation and that many lack a theoretical framework that can clarify the occurrence of the business outcome with or without the CSFs.

In order to confront some of the criticisms mentioned above, the study has been used to analyse interrelationships among the CSFs. The chances of having a successful project can be maximized by comprehensively understanding these relationships. Examining and addressing the interrelationship of factors research gap indirectly fulfils the research objectives.

Despite the abundance of IT project success framework research, not much research has been done in developing countries (Abdullah, 2013). There are possibilities that the common implementation factors found in developed countries are not relevant in developing nations. The current study, then, is an attempt to apply and explore factors research in developing countries; specifically, in Saudi Arabia. To further understand the research problem, a theoretical framework is developed. The framework combines some known IS theories that are deemed appropriate for this study. The objective in developing a framework is to help explain the investigated factors and the implementation outcomes. It is envisaged that the framework is able to provide insights to the project success.

2.6. Information System Success Theories

Theories are required for the following reasons: they explain how a topic is studied; elucidate key assumptions; organise knowledge; provide predictability; and facilitate understanding (Bourke et al., 2010). Essentially, theory helps to explain how things work and why things happen (Germov, 2014); it assists in interpreting and analysing data in order to provide knowledge (Bourke et al., 2010). Thus, theories are useful to help practitioners and academics comprehend the concept in which they believe (Costley, 2006). As the main intention of this study is to identify the factors that may affect the IT projects success, the two theories that support this aim are the DeLone and McLean IS success and the CSF theories.

2.6.1 DeLone and McLean Model of IS Success Theory

The Delone and McLean (2003) IS success theory provides a comprehensive model to evaluate IS success. As discussed earlier, it is difficult to define IS success because it varies depending on whose perspective of success is being measured. Hence, success can be thought of as a multidimensional variable. This theory is amongst the well-accepted theories in the IS literature due to its comprehensiveness. Due to this unique characteristic, the measurement for IS success can involve six interrelated dimensions. The model implies that IS success can be evaluated in terms of its quality (system, information and service), its use (intention to use/use, user satisfaction) and net benefits (Delone and McLean, 2003).

DeLone and McLean admit that their original model (DeLone and McLean, 1992) is not definitive and they emphasized the need for additional research to test and validate their model. Ten years later, Delone and McLean (2003) have reformulated their original success model based on research contributions and on changes in the role and management of information systems. The reformulated model is presented in Figure 2.2.

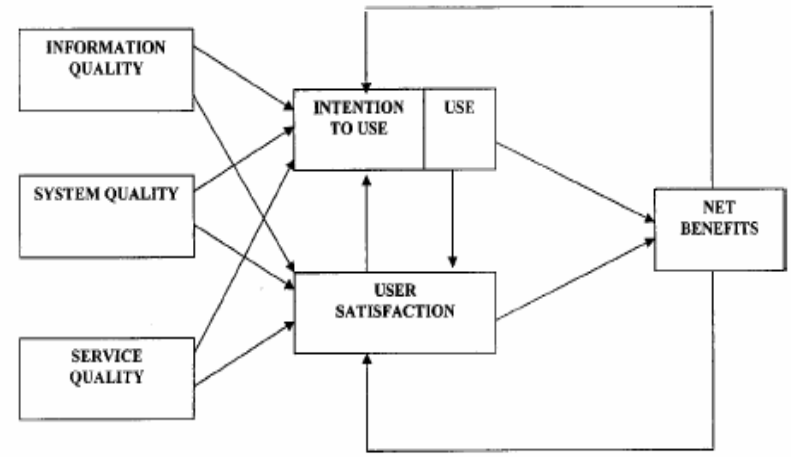


Figure 2.2: The revised DeLone and McLean's IS success model (Source: (Delone and McLean, 2003))

The updated model (Delone and McLean, 2003) consists of six major dimensions: information quality, system quality, service quality, intention to use/use, user satisfaction, and net benefits. These dimensions are organised and interrelated in a different way from the original model. Quality has three major dimensions: Information Quality, Systems Quality, and Service Quality. Each should be measured or controlled for separately, because singularly or jointly, they will affect subsequent Use and User Satisfaction (Delone and McLean, 2003). Use and User Satisfaction are closely interrelated. Use must precede User Satisfaction in a

process sense, but positive experience with Use will lead to greater User Satisfaction in a causal sense. Similarly, increased User Satisfaction will lead to increased Intention to Use and thus Use, and as a result of this Use and User Satisfaction, certain Net Benefits will occur (Delone and McLean, 2003). In this study, the Delone and McLean (2003) IS success theory is used as a part of the project success measurements.

2.6.2 Critical Success Factors (CSFs) Theory

Critical success factors (CSFs) is a well-known technique used within the field of information systems. The concept was initially proposed by Daniel (1961), and then developed by Rockart (1979) to enable CEOs to identify the key objectives within a business so that strategies could be developed to meet those objectives. Rockart (1979) refers to CSFs as: *"the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation"* (p. 85). Rockart goes on to stress the importance of a successful outcome in these aforementioned areas as this is vital for management targets to be achieved. Rockart (1979) therefore proposes that management should focus their continued attention on these key areas of activity and ensure that they are given regular progress updates by the relevant staff. Boynton and Zmud (1984) defined CSFs as: "*those few things that must go well to ensure success and which organisation management must give special and continued attention to bring about high performance"* (p. 17).

Saraph et al. (1989) defined CSF as those critical areas of managerial planning and action that must be practised in order to achieve effectiveness, which is unique to an industry. Williams and Ramaprasad (1996) describe CSFs as the necessary and sufficient conditions for project success. Hartono et al. (2007) used the following words to describe their interpretation of CSF: "*success antecedents are those key factors that organisations can manage so that the management of information system is favourably received and the implementation is deemed as successful"* (p. 257).

According to Thierauf (1982), inadequate results in these key areas will result in the business failing to achieve its objectives. McPherson and Baptista Nunes (2006) stated that one established management research method is CSFs. This enables the identification of key elements in the change process which will need to be carefully monitored; any issues arising from these elements will need to be resolved if the change is to be successful (McPherson and Baptista Nunes, 2006).

The idea behind the use of CSFs is *"the determination of the set of factors that the manager considers critical for his or her success. Once identified, these factors are stated as his or her objectives and the information required to monitor their performance is then identified"* (Dadashzadeh, 1989). Leidecker and Bruno (1984) refer to CSFs as *"those characteristics, conditions or variables that, when properly sustained, maintained, or managed, can have a significant impact on the success of a firm competing in particular industry"*. According to Pinto and Slevin (1987), critical success factors are *"factors which, if addressed, [would] significantly improve project implementation chances"* (p. 22).

Within the corporate environment, the concept of CSFs is a recognised top-down approach for identifying the core needs of management (Rockart, 1979). Indeed the examination of CSFs can be used to study project performance (Dai and Wells, 2004). When addressed accordingly, CSFs will greatly improve a project's chances of success (Pinto and Rouhiainen, 2001). It is Rockart (1979), however, who provides the definitive concept of CSFs. His theory is clearly based on the synergy between environmental conditions and business characteristics. Rockart (1979) states the importance of developing corporate strategies which focus on the key factors that will lead to the success of a business. For this reason they should provide the foundation of an IS. The use of CSFs can therefore help to implement strategy, according to Rockart.

Key Success Factors (KSFs) are a similar approach to CSFs, used within the area of strategic management. Indeed they are used interchangeably in the literature. Grunert and Ellegaard (1992), identify four key ways in which KSFs are used: as a vital ingredient within a management information system; as a unique characteristic of a company; as a learning tool for managers; and as a means of describing the major skills and resources necessary to achieve success within a given market. KSFs are defined by Grunert and Ellegaard (1992) as "*skills and resources with high leverage on customer perceived value and relative costs of a business"* (p. 4). The terms KSF and CSF have been used interchangeably in the literature.

More and more IS departments and consultants use the CSF approach, as popularised by Rockart (1979) and other researchers, to help with strategic planning. Peffers et al. (2003) state that *"senior managers have found CSFs to be appealing for IS planning because they help justify the development of strategically important new systems, the benefits of which might be hard to quantify"* (p. 4). Heads of departments at UK universities have utilised the CSF approach to identify their organisational information needs (Pellow and Wilson, 1993) as

demonstrated in a number of case studies. According to Ramaprasad and Williams (1998), *"there is a great deal of attention devoted to the concept in the IS literature as many argue that the use of CSFs can have a major impact on the design, development, and implementation of IS"*.

Rockart (1979) states that the CSF approach can be highly beneficial to managers for the following reasons:

- It can enable a manager to identify the key elements of a business which require the most attention and which should be closely and regularly monitored.
- It encourages the manager to devise strategies for those key areas and require progress updates on those strategies.
- Through identifying the CSFs, a precise and cost-effective approach to data collection can be implemented.
- Rather than focusing on data that is easy to compile, the CSF process helps to identify data which is more relevant to the goals and aims of the management.
- The process recognises the temporal nature of certain factors, whereas CSFs are more manager-specific. This approach embraces the notion of development and momentum and suggests that the IS should be in a constant state of change, with new reports being generated in response to strategic developments within the business, changes within the corporate environment or any restructuring of the organisation. This approach proposes that changes within an IS should be viewed as "an inevitable and productive part of IS development" rather than a sign of "inadequate design".
- The CSF approach need not be confined solely to the area of IS design as current studies have found that the approach can offer further benefits to the management process.

Since the introduction of the CSFs approach, it has been used and applied in different environments, and it has become a popular approach to determine the essential factors that an organisation must have in order to attain organisational goals. Amberg et al. (2005), for example, undertook a review of various dimensions of CSFs and identified five major CSF usage categories:

1. Hierarchy vs. Group CSF, which relates to industry-specific CSFs (Van Bullen and Rockart, 1986).
2. Temporary vs. Ongoing CSFs (Khandelwal and Ferguson, 1999).

3. Internal vs. External CSFs (Flynn and Arce, 1997).
4. Building vs. Monitoring CSFs (Van Bullen and Rockart, 1986).
5. Strategic vs. Tactical CSFs (De Sousa, 2004).

By identifying the CSFs, required resources may be allocated accordingly to meet priority issues (Abdullah, 2013). In this study, the CSFs approach is used to identify the possible factors that may influence the project success criteria.

2.7. Project Success Concept

To develop a success model of IT project success, one must firstly articulate what constitutes that success, and importantly, what are the necessary and sufficient factors or the critical factors for realising that success. Essentially, what is project success and what are the attributes of that success, particularly with regard to an IT project?

The definition of success, according to the Canadian Oxford Dictionary (Barber, 1998), is *"the accomplishment of an aim; a favourable outcome"*. But defining the notion of "project success" or "project failure" has proved to be problematic. Pinto and Slevin (1988) proposed that concepts in project management have not been regularly addressed in the literature and, where they have been addressed, the investigators were unable to reach a consensus on definitions. It would appear that defining the success of a project presents a major challenge to investigators, whereas a number of authors seem to assume that it is a concept which is universally known and understood (Ika, 2009). The one thing we can be assured of is that, within the field of project management, the notion of success is inclusive, ambiguous and multifaceted, and the definition of this concept is bound to a specific context.

One way of approaching the issue is to examine the nature of project success in terms of efficiency and effectiveness. However these concepts are often viewed as being interchangeable by many authors and practitioners, resulting in some confusion in the project management literature (Belout, 1998). In the words of the famous American author Drucker (2006), efficiency is to "do things right," or to maximise output for a given quantity of inputs or resources, and effectiveness is to "do the right things," or to attain the project's goals and objectives. Drucker (2006) considers effectiveness more important than efficiency. Project success therefore corresponds to a project's efficiency and effectiveness (Belout, 1998).

Depending on the subject being studied, research on project success tends to fall into one of the following categories: either they focus on project success criteria (or dimensions) or they study CSFs. It is therefore necessary to distinguish between success criteria (the measures by which the success or failure of a project or business will be judged) and success factors (any input to the management system which leads directly or indirectly to the success of the project or business). These two concepts need to be clarified because it is not uncommon to come across a discussion whereby the distinction between them is blurred or they are viewed as having the same meaning (Lim and Mohamed, 1999).

According to the Canadian Oxford Dictionary (Barber, 1998) a factor is *"a circumstance, fact, or influence contributing to a result"* whereas a criterion is *"a principle or standard that a thing is judged by."* The criteria for project success may therefore refer to a number of standards or principles used to determine or assess project success, whereas critical success factors specifically refer to events, circumstances and conditions that contribute to project results. Both success factors and success criteria are discussed in the literature yet few empirical studies have attempted to examine the relationship between CSFs and success criteria (Ika, 2009).

Research into success criteria and CSFs has shown that it is just not possible to come up with a definitive list that will fulfil the needs of all projects. This is due to the fact that they can vary greatly from one project to the next due to variables such as project scope, complexity and uniqueness (Wateridge, 1998). However, according to Lim and Mohamed (1999) and Westerveld (2003) the notion of a universal set of project success criteria, on one hand, and a universal grouping of CSFs, on the other, would seem to be acquiring more attention. In the following subsections, studies on project success criteria and CSFs will be discussed.

2.7.1 Project Success Criteria

The definition and measurement of project success is one of the fundamental research issues in IT project success, and this concept has been studied since the 1970s (Joosten et al., 2011). In 1986 the PMI identified the importance of defining and measuring project success. A number of studies have examined the causes of project success and failure (Shenhar et al., 2002), but "there has been little attempt in the past to define the criteria for success" (Wateridge, 1998). A criterion can be defined as: *"A principle or standard by which anything is or can be judged"* according to Lim and Mohamed (1999). Success criteria is defined by

Cooke-Davies (2002) as *"the measures by which success or failure of a project will be judged"* (p. 1). Thomas and Fernandez (2008) conclude that *"it is widely accepted that success is a multi-dimensional construct; what is not agreed is which dimensions best represent success"* (p. 734).

As a result, the definition of the concept of success remains very broad. Implicitly or explicitly, researchers generally discuss project success with the conviction that they are talking about project management success or more than successful project management (the project success). A distinction is necessary between "project management success" and "project success." Project success has long been considered the ability to fall within time, cost, and quality constraints. The "time/cost/quality triangle", "iron triangle," or the "golden triangle," that some professionals call the "Holy Trinity" or the "triangle of virtue" sufficed as a definition of project success (Cuellar, 2013, Davis, 2016).

Having said this, not all projects that have been delivered on time, within budget and to high quality have proved to be successful. An example of this is the second generation Ford Taurus car, which was completed on time in 1995 but turned out to be a commercial failure (Shenhar et al., 2005). However, some projects that have exceeded time and budget constraints are generally considered successful (Cuellar, 2013). Examples include the Fulmar North Sea Oil project, Sydney Opera House, Concorde, the Thames Barrier and the first generation Ford Taurus car (Cuellar, 2013, Shenhar et al., 2005). Hazebrouck (1993) cited in Ika (2009) commented: *"projects that were perceived as failures at their launch would later become models of success, while others considered successes at their launch turned into catastrophes"*. Similarly, initial project success does not guarantee long-term success; failure can still result from unwanted risk events in the stage following project implementation (Peng and Nunes, 2008).

It should be noted that there is a distinction between the concepts of project success and project management success (Davis, 2014). Furthermore, the project management objectives are dissimilar to the project objectives (Marchewka, 2014). The definition of project success is still ambiguous and unclear when discussed within project management literature with the only firm conclusion being that it involves efficiency and effectiveness.

The notion of project success indicates a complete and thorough evaluation of the success of a project. As a result, project success has traditionally been depicted in the form of the iron

triangle, the golden triangle or the triple constraint (Abdullah, 2013, Baker et al., 2008, Brewer and Dittman, 2013, Brown and Hyer, 2010, Davis, 2014, Davis, 2016, Egbeniyoko, 2014, Ika, 2009, Pinto, 2004) demonstrating budgetary, time and quality targets. Most project managers feel that they have achieved project completion when a project is finished on time, within budget and according to specifications. According to Cooke-Davies (2002) a typical distinction is made between project management success in a stricter sense and project success in a broader sense. Frequently, it is assumed that project management success can be evaluated in terms of adherence to planning. According to this viewpoint, project success denotes the extent to which the defined project objectives are fulfilled (Cooke-Davies, 2002, Ika, 2009).

Project management success constitutes an internal and somewhat short-term perspective of a project, whereas project success denotes a more external perspective that includes long-term criteria (Agarwal and Rathod, 2006, Davis, 2014, Marchewka, 2014). For some time now, project management literature has criticised project success criteria, viewing the iron triangle as an inadequate method for assessing the success of complex projects (Abdullah, 2013, Baccarini, 1999, Chan et al., 2002, Davis, 2016). According to Joosten et al. (2011), limiting the success evaluation to the iron triangle leads to problems with the measurability of further success parameters. Therefore, the development of IT project evaluation frameworks which go beyond the iron triangle is justified.

According to some researchers the quality criterion involves meeting functional and technical specifications, whereas others state that the quality is an ambiguous, multifaceted and subjective notion which opens itself up to various interpretations by different project stakeholders (Davis, 2014). The conclusion reached by Cuellar (2010) is that project success may be seen as objective when it is denoted by measurable constructs such as time, schedule and scope, as well as subjective and relative, if the opinions of multiple stakeholders are taken into consideration.

Statistics of IT project failures included in the Standish Chaos Report (2013) have been quoted by researchers for many years. Standish results are criticised for many reasons, such as non-random sampling and incorrect interpretation of the results (Jørgensen and Moløkken-Østvold, 2006), unclear research methodology (Glass, 2006) and ignoring the forecasting biases (Eveleens and Verhoef, 2009). Gemino et al. (2007) states that changing or improving the sample selection, population, respondents or method of data collection may result in

notably different results with regard to the budget/schedule/functionality measures of IT projects.

Acccording to Standish, the definition of a failed project is one that was cancelled or abandoned. This approach is very clear cut: if a project did not commence productively or was abandoned shortly after it began, it should surely be treated as a failure. Challenged projects are characterised as those which: (1) exceeded the budget; (2) exceeded the schedule and (3) failed to supply the required functionality. Although Standish uses the logical "and" to link the aforementioned statements, it is clear that there should be an "or" instead (Gemino et al., 2007, Jørgensen and Moløkken-Østvold, 2006). Therefore the definition of a "challenged project" should be one that has failed to satisfy one or more of the project success criteria, which is commonly referred to as the "iron triangle."

A "successful" project, on the other hand, would be one which fulfils all three criteria. This enables us to obtain a logically consistent categorisation of the projects. Nevertheless, it is important to address the issue of whether IT project categorisation against the above criteria properly describes the concept of project success.

A finding by Eveleens and Verhoef (2009) is vital for assessing the project success criteria used in the Standish reports. This discovery is that Standish only compares the actual data with the initial project forecasts and does not consider the forecasting biases. These authors point out that different organisations have different approaches to forecasting. For example, some would present the lowest possible estimates, others would endeavour to make their forecasts as precise as possible whilst others would veer towards fulfilling the Standish criteria and overestimate the project parameters to the point that all projects are always "successful."

Regardless of the approaches to forecasting utilised by a given company, there may be deviations of the actual values from the initial plan. This can be due to various reasons and these reasons may affect the outcome of whether a project is deemed to be a success or a failure. A departure from the initial plan may occur due to several reasons, for example poor forecasting, or as a result of poor project performance or management or unexpected changes coming from inside or outside an organisation which were not anticipated during the initial planning stages. Eveleens and Verhoef (2009) commented that part of the project's success that's related to estimation deviation is highly context-dependent. The addition of the context

analysis to the project success evaluation framework may increase the validity of such framework and bring the success evaluation in line with the expectations of the stakeholders.

The issue of client satisfaction is introduced by Baker et al. (2008), making project success a "virtuous square of criteria" incorporating time, cost, quality and client satisfaction. Van Aken as cited in (Westerveld, 2003) refers to project success as: "The satisfaction of all stakeholders". Subsequent articles (Davis, 2014, Egbeniyoko, 2014) demonstrate that project success criteria becomes more comprehensive when set against the traditional parameters of time, cost and quality. It includes the satisfaction of the end users and the stakeholders as well as the benefits to the organisation. If project success criteria are known, there are still a specific number of conditions that must be met in order for a project to be a success.

A survey carried out by Karlsen et al. (2005) demonstrated that the highest-rated success criterion among Norwegian project managers was whether a system "works as expected and solves the problem," whereas the iron triangle criteria were ranked on positions 7, 8 and 9. Similarly, a study of Australian project managers (Collins and Baccarini, 2004) found that 53% of the respondents regarded time, budget and quality as insufficient criteria for project assessment. The "satisfaction of the client" made up the most common additional criterion, despite the fact that it is a subjective measure compared to the objective measures of the iron triangle. Project managers prefer the iron triangle criteria, whereas top managers are more interested in business outcomes (Nelson, 2005). However, it should be noted that fulfilling functional requirements does not necessarily mean that organisational goals or specific business outcomes will be achieved. In fact Davis (2016) stated that inadequate project definition and insufficient articulation of the product requirements may lead to a project that meets the specifications but fails to provide a useful product. According to Nelson (2005), even if a product is useful it may not provide sufficient commercial value to an organisation due to the evolving business environment or organisational strategy.

The definition of project success may vary depending on the stakeholder carrying out the evaluation (Atkinson, 1999, Thomas and Fernandez, 2008). Nelson (2005) proposed that different stakeholders, such as users, project managers, team members, sponsors or top management, are interested in different elements of the project's success. However, it is important to note that different stakeholders will have varying criteria for project success as their expectations of a project will be different. Therefore, there is no general consensus regarding which criteria to use when measuring IT project success.

According to Baccarini (1999), project success should be measured via two categories: product success, which involves fulfilling the customer's organisational expectations, and project (management) success, which involves meeting the criteria for time, budget and functionality. The former category was regarded as the more important of the two. It is also possible that a project can be successful in one of the categories but unsuccessful in the other.

Ensuring a successful project implementation seems to be a challenging task for most practitioners; for this reason, many prior studies have striven to determine the best approach or best practice in implementing a successful IT project (Grol and Grimshaw, 2003) (Kucukyazici et al., 2010). Correspondingly, defining the constituents of a successful project implementation is no less complicated. It seems that success itself is multifaceted and difficult to define (Berg, 2001, Markus and Tanis, 2000, Seddon et al., 1999). Markus and Tanis (2000) explain that success is a subjective matter which has many dimensions that are challenging to explain. As such, Markus and Tanis (2000) define success as a multidimensional, dynamic and relative concept. Success is multidimensional when it is defined in terms of an implementation project or business result. Success is dynamic when what was successful yesterday may not be applicable today. In this regard, the definition of success fluctuates over time (Berg, 2001, Kaplan and Shaw, 2004). Success is relative when the meaning of success differs between different groups of users. For managers, success may mean that the project is delivered on time. For end-users, success may mean that the system provides all the functionalities, has an adequate user interface and an acceptable response time (Seddon et al., 1999). From the diverse success definitions, it is clear that success is dependent on the opinions of the stakeholders (Davis, 2014). Thus, it is vital for the current study to determine the target stakeholder and the success measurements.

Hence, the review suggests two type of success criteria for projects, which the researcher denotes as project management success (PMS) and project success (PS). Project management success criteria is identified in the literature as internal and short-term, as represented by the triple constraint of completing the project within the stipulated cost, scope, and time (Agarwal and Rathod, 2006, Davis, 2014, Marchewka, 2014). However, based, on the business and organisation point of view, project success needs to be extended beyond the cost, scope and time. The theory of IS success model indicates that IS success extends the concept into the element use and usefulness of the system to the stakeholders and the net benefits it gives to the organisation (Delone and McLean, 2003). Therefore, it is important to take into

consideration that both criteria should be included in order to evaluate the true success of any IT or IS project.

2.7.2 Studies on CSFs

Determining the critical success factors (CSFs) that are positioned behind project success has been a key research question in previous research (Plant and Willcocks, 2007). Implementation of an IT project is a complex process including many factors and conditions which can potentially influence successful implementation. These factors might have a positive effect on the outcome of the project implementation, whereas the lack of these conditions could create trouble through the implementation (Egbeniyoko, 2014). Consequently, it is worthwhile to study the factors that determine whether the implementation of the project will be successful. Many studies have been conducted during recent years to identify the factors affecting the success and failure of IT project implementation.

In an IT project, CSFs could be recognized as the few key areas where things must go right for the implementation to succeed (Finney and Corbett, 2007). These factors are crucial for realizing the predetermined corporate goals, and are vital to the overall success of the system implementation. The CSFs of the IT project implementation might involve technical subjects as well as contextual issues which consist of the cultural and social impact on the interaction between the users and the system (Dezdar, 2011). The CSF method is an attractive method for researchers and managers because it facilitates the identification and prioritization of critical factors that need to be met for project to succeed (Brown and He, 2007).

Loh and Koh (2004) focused on the critical success factors of system implementation and discovered that the identification and management of critical factors and their relevant components at each stage of the implementation project lead to successful implementation. The literature varies regarding what factors are vital for the project implementation success or responsible for its failure (Zhang et al., 2005). Critical success factors of ERP implementation projects have been investigated from several diverse points of view (Abdullah, 2013, Dezdar and Ainin, 2012, Nah et al., 2001). Many researchers have recognized a range of factors that could be critical to the success of the system implementation.

CSFs can be identified through the use of various techniques. Some studies found in the literature and the research methods they applied are summarised in Table 2.1. Each one of these approaches has its own particular strengths and weaknesses (Khandelwal and Ferguson,

1999). Based on a study of the research methods used to investigate CSFs, Shah and Siddiqui (2002) found that the survey method is the most commonly used method to identify CSFs.

Table 2.1: CSFs most commonly used research methods

Research method	**References**
Literature review	(Al-Mashari and Zairi, 1999, Asemi and Jazi, 2010, Esteves and Pastor, 2000, Khalifa et al., 2000, Ram and Corkindale, 2014, Rerup Schlichter and Kraemmergaard, 2010, Tarhini et al., 2015, Umble and Umble, 2001)
Surveys	(Abdullah, 2013, Dezdar and Ainin, 2012, Doherty and King, 2001, Egbeniyoko, 2014, Ijaz et al., 2014, Mukti, 2000, Nah et al., 2003, Nizamani et al., 2014)
Interviews	(Almajed and Mayhew, 2013, Lawley et al., 2001, Parr et al., 2013, Rockart, 1986)
Case studies	(Holland and Light, 1999, Ijaz et al., 2014, Melander, 2016, Ozorhon and Cinar, 2015, Sumner, 1999, Yeoh and Koronios, 2010)
Combination of methods	(Dezdar, 2011, Khandelwal and Ferguson, 1999, Parr et al., 1999)

Several research studies have been conducted in the area of project success to identify CSFs that affect the success and/or failure of projects over the years (Belassi and Tukel, 1996, Garg and Agarwal, 2014, Ozorhon and Cinar, 2015, Pinto and Mantel Jr, 1990, White and Fortune, 2002, Zouine and Fenies, 2014). However, these studies are not solely focused on IT industry projects. IT projects are different from other types of projects because they have distinctive characteristics (Fairley, 2009, Jain, 2008). High complexity and high chances of project failure are examples of IT projects' characteristics (Rodriguez-Repiso et al., 2007). It has been agreed amongst some researchers that different types of industry require different types of project management (Cooke-Davies and Arzymanow, 2003, ENNA, 2015, Zwikael and Globerson, 2006). Moreover, no project success factor will be applicable to all projects (Abdullah, 2013).

In reality, for a specific IT project such as Enterprise Resource Planning (ERP) or a Health Information System (HIS), there is no general agreement about which set of factors represents the key to success. Furthermore, the set of CSFs is different, even for the same project in different cultures, as identified by different studies. These studies have been carried out amongst countries that have different cultures, government regulations, and economics, which make the set of CSFs differ (Ngai et al., 2008). It was Slevin and Pinto (1986) who proposed a scientific basis for success that comprises ten key success factors: project mission, top

management support, project schedule/plan, client consultation, personnel, technical tasks, client acceptance, monitoring and feedback, communication, and troubleshooting. Pinto and Slevin (1988) then extended this list with four additional factors considered outside the project implementation process and therefore outside the team's control: characteristics of the project team leader, power and politics, environmental events, and urgency.

Based on a review of literature and former experiences, Holland and Light (1999) developed a research framework of CSF. In this framework, the CSFs were grouped into strategic and tactical factors. Both groups were originally based on Slevin and Pinto's work (1987). Vatanasombut and Gray (1999) identified 51 critical success factors that were classified into 12 categories.

In 2003, Nah et al. (2003) conducted a survey of Chief Information Officers (CIOs) from Fortune 1000 companies on their perceptions of the CSFs in ERP implementation. Top management support, project champions, ERP teamwork and composition, project management, and change management programmes and culture were the five most critical factors identified by the CIOs. Umble et al. (2003) identified in their case study of successful ERP implementation that software selection steps and implementation procedures are critical success factors. In their review of different resources such as journals and conference proceedings across ten different countries, Ngai et al. (2008) identified eighteen CSFs for the successful implementation of ERP. They found the most frequently cited CSFs were 'top management support' and 'training and education'.

Yeoh and Koronios (2010) derived a set of critical factors from the literature and conducted a three-round Delphi case study. The respondents comprised fifteen experts who were then asked which critical success factors would mostly influence IT project. Their analyses proposed three major critical success factor categories: organisational related factors (clear vision, business case, and management support and project champion); process related factors (team composition, project management, methodology and change management); and technical related factors (data related factors and infrastructure related factors). These were then corroborated in three case studies with organisations that had implemented IT projects to validate the absence or presence of the identified critical success factors in their implementation processes. The authors' final findings indicated that nontechnical factors such as organisational and process-related factors are more influential than technological factors.

Hartono et al. (2007) summarised the CSFs identified in empirical studies in some key information management systems such as: decision support systems, expert systems, data warehouses, group decision support systems, organisational decision support systems, executive information and management information systems. They ranked the success factors for each of the individual information systems studied. Their study indicated that there is no key success antecedent factors uniform across all systems for achieving implementation success. Instead, Hartono et al. (2007) noted that organisations must think through carefully what benefits they need most from the system and then manage the corresponding success antecedent accordingly.

On the other hand, some researchers consider critical failure factors (CFF) when studying IT project success. For example, some IT projects fail as a result of poor knowledge management, poor project management, inadequate reuse of past experiences and lessons learned, and/or insufficient understanding of the technology and its limitations (Desouza and Evaristo, 2006, Thomas and Fernandez, 2008). Furthermore, the Royal Academy of Engineering and the British Computer Society found significant difficulties in managing IT projects such as project complications, poor project definition, and no lessons learned from past projects (Rodriguez-Repiso et al., 2007). Some studies examined problems arising from a lack of fit between the organisation's business objective and the information system (Clark et al., 2007), while others identified perceived user friendliness of the system and level of user experience (Hartono et al., 2007).

The available literature about the success of IT projects in general using both the CSFs and PSC in Saudi Arabian public organisations is limited. The Alfaadel et al. (2012) study was the first to discuss the success (CSFs and PSC) in IT projects in general within the Saudi context. They found in their study that the most important critical success factors are clear statement of requirements, top management support, and proper project planning. However, their research was very limited. They did not take into account the CSFs' interrelationships and the influence of the CSFs on PSC. In addition, they used very limited factors in their study without providing an in-depth literature review of the investigated factors

Moreover, there are several studies on the implementation of particular projects like Enterprise Resource Planning (ERP) and Health Information Systems (HISs). Al-Mashari and Al-Mudimigh (2003) found in their case study of a failed ERP implementation for a major middle-eastern manufacturer (Comp Group) that the critical failure factors (CFFs) are: scope

creep, lack of ownership and transfer of knowledge, lack of change management, lack of communications, lack of performance measurement, and propensity to isolate IT from business affairs. Alghathbar (2008) found from his experience of implementing an ERP at the largest university in Saudi Arabia (King Saud University) that hiring a project manager in the early stages of implementing the project, having the head of the organisation as the sponsor, good communication between top management and users, good project team and key users, change management, and incentives for the project team, would all increase the success of the project.

As most studies in Saudi context are conducted on ERP systems, Al-Turki (2011) found in his study on ERP implementation practices that management commitment, the existence of a clear strategic objective, change management, and training were found to be critical for the success of ERP implementation. Aldammas and Al-Mudimigh (2011) found in their two case studies of ERP systems in the Air Force and Saudi Telecom Co. (STC) that top management decisions are very important for project success. Al-Shamlan and Al-Mudimigh (2011) found in their case study of MADAR ERP systems that top management commitment, communication, and training are critical for project success.

Moreover, Abouzahra (2011) found in his study of 52 HIS projects that the main factors behind healthcare IT project failure are unclear scope, failure to manage risks, failure to identify stakeholders, and miscommunications. Al-Mudimigh et al. (2011) found in their two case studies of portal implementation at the Saudi Food and Drug Authority (SFDA) and Saudi Stock Exchange Market that the top five factors affecting success are organisational which are good communication, user acceptance, top management support, clear goals and objectives, and project monitoring and controlling.

Lastly, some of studies have developed a framework in order to study the CSFs and their impact on PSC. Therefore, through an exhaustive review of the literature, it can be seen that different project success frameworks have been suggested by many scholars. Table 2.2 shows the summary of these frameworks which highlights the investigated success factors for each framework.

Table 2.2: Summary of project success frameworks

Framework	Investigated Factors	Comments	Approach	Country
Nah et al. (2007)	Top management support, project management, enterprise-wide communication ERP teamwork and composition.	• Specific project (ERP) • Uses organisational culture as a moderator • Uses project success as a dependent variable	Questionnaire	Malaysia
Bradley (2008)	ERP integration, project manager (full time, experience and reporting level), use of consultants, top management evolvement, champion and steering committee, user resistance, and training quality and quantity.	• Specific project (ERP) • Uses ten factors from the IT and ERP literature • Uses project success as a dependent variable	Case study	N/A
Chung et al. (2008)	User related variables (output, job relevance, image, result demonstrability, compatibility and system reliability) and project related variables (internal support, function and consultant support).	• Specific project (ERP) • Classifies the success of ERP systems into two categories; the success of ERP adoption and implementation • Uses project success as a dependent variable	Questionnaire	N/A
El Sawah et al. (2008)	Top management support, company wide support, Egyptian organisational culture, effective project management, users' training and involvement, consultants' and vendors' support, business process reengineering, careful package selection and minimal customisation.	• Specific project (ERP) • Uses organisational culture as a moderator • Uses project success as a dependent variable	Questionnaire	Egypt
Tarawneh (2011)	Formal methodology, clear business objective, executive support and minimised project scope, standard software infrastructure, understanding requirements and managing requirements changes, reliable estimates, user involvement, experienced project manager, and organisational culture.	• Software projects • Uses organisational culture as a factor • Uses project success as a dependent variable	Combination of questionnaire and interview	Jordan
(Dezdar, 2011)	Project management, enterprise-wide communication, ERP teamwork composition & competence, business process reengineering, vendor support, and system quality.	• Specific project (ERP) • Uses organisational culture as a moderator • Uses project success as a dependent variable	Questionnaire	Iran
Annamalai and Ramayah (2013)	Management support, business goals and objectives, perceived ERP benefits, cross-functional teams, in-house training, process re-engineering, project tracking, visible project phases, project phase update, interdepartmental cooperation, communication, ERP architecture, strategic IT planning, data analysis, and vendor support.	• Specific project (ERP) • Groups the CSFs into three domains: organisational, project and technological CSFs • Uses organisational culture as a moderator	Questionnaire	India
(Abdullah, 2013)	Top management support, project management, enterprise-wide communication, ERP teamwork composition, business plan & vision, change management, and system selection.	• Specific project (HIS) • Uses respondent demographic data as a moderating variables such as age and gender • Uses project success as a dependent variable	Questionnaire	Malaysia
(Egbeniyoko, 2014)	Top management support, project management, project team, change management, adequate budget, communication, project team, technical infrastructure, clear business case, organisation nature, executive sponsor, data management & integration, software selection & vendor support, implementation methodology, user participation, user training,	• Specific project (Business intelligent systems) • Uses project success as a dependent variable	Combination of questionnaire and interview	UK

Framework	Investigated Factors	Comments	Approach	Country
	and user intuition & competencies.			
(Garg and Agarwal, 2014)	Top management support, user involvement, business process reengineering, project management , project team composition.	• Specific project (ERP) • Uses project success as a dependent variable	Combination of questionnaire and interview	India
(Zouine and Fenies, 2014)	Top management support, ERP fit, business process reengineering, project management , training and education, system quality, organisational impact, vendor consultant quality, individual impact, workgroup impact, and information quality.	• Specific project (ERP) • Uses project success as a dependent variable • Uses project success criteria as CSFs such as organisational impact	Literature review	N/A
(Bansal and Agarwal, 2015)	Top management support, project management, project teamwork competence, vendor, enterprise system selection process, and implementation strategy.	• Specific project (ERP) • Uses project success as a dependent variable • Includes CSFs interrelationships	Questionnaire	India
(Bukamal and Wadi, 2016)	Top management support, business process reengineering, vendor support, ERP fit, and training user.	• Specific project (ERP) • Uses project success as a dependent variable	Questionnaire	Bahrain

2.7.3 Critique on Studies of CSFs

While the conclusions and contributions that arose from the studies discussed in the previous sub sections are valuable, common characteristics of some of these studies however are: (1) existing studies were focused on a specific project such as ERP (Dezdar, 2011) and HIS (Abdullah, 2013), (2) different studies used different CSFs (Annamalai and Ramayah, 2013, Bradley, 2008, Dezdar and Ainin, 2011c), (3) they lack clearly defined success measures (Abouzahra, 2011, Ngai et al., 2008, S Al-Mudimigh et al., 2010), (4) relationships between the CSFs have not been well explored (Bukamal and Wadi, 2016, Dezdar and Ainin, 2012, Nah et al., 2007), and (5) some of these studies identified the CSFs from the point of view of a project manager, project team or end users (Aldayel et al., 2011, Davis, 2014, Ogunlana, 2010, Turner et al., 2009) while others just listed the CSFs that have been collected from the literature without any empirical testing of the impact of the CSFs on the project success criteria (PSC) (Al-Mudimigh et al., 2011, Aldammas and Al-Mudimigh, 2011, Saleh et al., 2013).

These existing studies seem to be more concerned with identifying and classifying the critical success factors for a specific IT project such as ERP and HIS (Abdullah, 2013, Dezdar, 2011, Nah et al., 2007). In addition to that, the existing studies used different sets of critical success factor variables, often depending on the research interest and background, and research findings seem fragmented, isolated and subjective, making it difficult to compare findings or have a common set of CSF variables upon which the industry can rely (Egbeniyoko, 2014).

Therefore, it is impossible to list a definite set of all critical factors useful in stimulating successful project implementation because they differ between projects, companies and countries (Abdullah, 2013). A variable taken solely from one perspective can only explain a small proportion of how well the factor contributes to the overall system success (Abdullah, 2013). Thus there is perhaps a need to identify, synthesise and harmonise the most re-occurring CSFs used in various studies into a common set of critical factors for practical purposes and professional best practice. This could also help to resolve some of the CSF research conundrums.

Furthermore, some of the mentioned studies have not clearly defined the qualities and measures of the project success to be realised in their framework, making the perceived outcome of the project implementation initiative subjective. Moreover, there seems to be a lack of formal studies that analyse the relationships among success factors (Abdullah, 2013, Egbeniyoko, 2014) so the relationships between the critical success factors have not been well-explored in existing project success studies. Some of the critical factor studies have not explicitly linked to outcomes, arguing that, the relationship between the critical success factors and how they explicitly link to and influence each other affects the final outcome (Egbeniyoko, 2014). Hwang and Xu (2008) emphasised that the relationship between the critical factors and success measures should be given greater attention in future studies, noting that most CSF studies investigate either the critical factors or project success criteria and not both. They suggested that researchers should start including both sets of variables in their models, and test the effect of the critical success variables on the project success criteria (Abdullah, 2013, Dezdar and Ainin, 2012, Egbeniyoko, 2014).

Finally and importantly, the CSFs and project success criteria have generally been examined from the point of view of project managers, project team, and end users rather than CIOs (Aldayel et al., 2011, Davis, 2014, Ogunlana, 2010, Turner et al., 2009), who possess enough managerial and organisational knowledge about IT projects, and would have the authority to access further information regarding current and future corporate strategies (Al-Taie et al., 2015, Hu et al., 2014). Investigating the CSFs from the CIOs point of view is important (Davis, 2014) and will add more valuable insights from a higher level of administration. This point is of particular importance to this study as it highlights an important gap in the project success research that this study seeks to address.

2.8. Theoretical Components

In this section, the components of the proposed framework adopted by this study are described. "A theoretical framework is a conceptual model for how one theorizes or makes logical sense of the relationships among the several factors that have been identified as important to the [research] problem" (Sekaran and Bougie, 2010) (p. 87). Thus, Sekaran and Bougie (2010) emphasize models or theoretical frameworks to assist in clarifying associations among variables of interest, the theory underlying these relations, and the direction of the relationship. A framework serves to focus the scope, to identify the conceptual variables to be extracted and to make explicit relationship to the synthesizing question of the analysis (Kukafka et al., 2003).

In IS literature, the term model is considered equivalent to the term theoretical framework (Levy and Ellis, 2006). Another label that has been associated with theoretical framework is that of conceptual framework. On the other hand, there is a difference between a conceptual and theoretical framework. A conceptual framework introduces the concepts and main thoughts of the study but not the relation between the concepts. Alternatively, a theoretical framework provides a thorough explanation of the theories underlying the framework, which includes the variables (i.e., independent, dependent, moderating, intervening variables); relations between the variables; and the constructs or latent variables of the study (Cavana et al., 2001). Some scholars tend to agree that theoretical and conceptual frameworks are alike, therefore in this thesis, the researcher has chosen to use both terms to describe the independent and dependent variables and their relationships.

Several hypotheses have been formulated to advocate relationships among the variables. As a result, it was decided that the theoretical framework in this study was mainly a combination of the critical success factors theory for the independent variables and the DeLone and McLean IS success theory and others such as Baccarini (1999) and Van Der Westhuizen and Fitzgerald (2005) for the dependent variables. IS success theories are combined because it is difficult to realize the research objectives using a single theoretical framework. Moreover, integrating multiple theoretical frameworks helps in explaining complex issues.

2.8.1 Deriving the Dependent Variable

A dependent variable is the main variable of interest in any research (Sekaran and Bougie, 2010). An alternative name for the dependent variable is the endogenous variable. Henceforth, the two labels are used interchangeably throughout the thesis. In this study, project success criteria is the main dependent variable. In the context of the study, project success refers to project implementation which is effective and efficient. An effective implementation occurs when the project fulfils its objectives whereas an efficient implementation happens when the project is completed within the allocated time, effort and budget. An implementation could be effective, but not efficient, and vice versa.

From the stakeholders' perspective, each stakeholder has a different view on the project outcome. For the achievement of a complete perspective on the project success, these views have to be considered when doing the success measurement (Kronbichler et al., 2010). It is seldom the case that an IT project is either an outright success or an abject failure. Instead, the result and outcome of the IT project will be measured in degrees of success, meaning that the success criteria can be partly or completely fulfilled. When evaluating success, one should also bear in mind the distinction between hard and soft criteria. The former – for example time, cost and quality – are objective and measurable, whereas the latter are more subjective and more challenging to measure. Table 2.3 summarises the literature findings of the project success criteria.

Table 2.3: Project success criteria identified in the literature

Project Success Criterion	**Might and Fischer (1985)**	**Morris and Hough (1987))**	**Pinto and Slevin (1988)**	**Wateridge (1998)**	**Turner (1999)**	**Atkinson (1999)**	**Baccarini (1999)**	**Johnson (1999)**	**Lim and Mohamed (1999)**	**(Delone and McLean, 2003)**	**Van Der Westhuizen and Fitzgerald (2005)**	**Kerzner (2009)**	**Marchewka (2014)**
Within Time	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Within Budget	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Quality (System, Information, Service)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Project Stakeholder Satisfaction			✓	✓	✓	✓	✓		✓		✓		✓
Business Goals (Net Benefits)		✓		✓	✓	✓	✓		✓	✓	✓		✓
Use			✓	✓						✓	✓		

These project success criteria are common in IT field literature and they are: 1) within time; 2) within budget; 3) quality (system, information, service); 4) project stakeholder satisfaction; 5) business goals (net benefits); and 6) use. These criteria are consistent with the results of the review in section 2.7.1, which suggest the inclusion of the element project management success (PMS) and project success (PS).

Many researchers incorporate both the project management success and the project success components in the measurement of the project's success (Atkinson, 1999, Baccarini, 1999, Delone and McLean, 2003, Lim and Mohamed, 1999, Marchewka, 2014, Van Der Westhuizen and Fitzgerald, 2005, Wateridge, 1998). This provides the basis for an instrument to measure the dependent variable, project success criteria (PSC). Therefore, the success criteria that had been found in the literature (Van Der Westhuizen and Fitzgerald, 2005, Wateridge, 1998) will be used for this study. These criteria are time, budget/cost, quality, stakeholders' satisfaction, business goals and use. As a result, the following will contribute to project and project management success:

- it is completed on time
- it is completed on budget
- it is completed with all features and functions as initially specified
- it meets the needs of the project stakeholders
- it achieves its business goals and purpose
- the end product is used frequently (the degree and manner in which users utilise the capabilities of the end product)

Therefore, these measurement items will be the components of the dependent variable (project success criteria) in the research framework for further classification based on the CIO's perspectives. It is hypothesized that the project success criteria will comprise of measures of both project management success (PMS) and project success (PS).

Moreover, the project management literature argues that there is a positive relationship between project management success and project success (Bryde, 2008), and the link between them has been investigated by many researchers (Cooke-Davies, 2004, Din et al., 2011, Mir and Pinnington, 2014). However, there is an insufficient understanding of the relationships between project management success (PMS) and project success (PS). Relationships between these constructs are heavily dependent on the subjective and objective nature of how project

success is perceived and defined (Mir and Pinnington, 2014). Therefore, this study will try to find an empirical evidence for this relationship by selecting and validating appropriate measures for these constructs and then analysing the relationship between them. So, it is hypothesized that there is a positive statistical relationship between PMS and PS.

2.8.2 Deriving the Independent Variables

As the intention in this study is to gather the most appropriate factors for IT project success, the CSFs approach gives the best advantage to accomplish this task. As an exhaustive explanation of CSF theory was conducted in Section 2.6.2, it is the major theory used in the construction of the study's independent variables.

An independent variable has many labels such as explanatory variable, predictor variable, or exogenous variable. However, regardless of the label, the independent variable is recognized as having a causal effect on the dependent variable, or at least influencing the dependent variable (Saunders et al., 2011). In this study, the critical success factors form the independent variables. Critical success factors in the context of the study are defined as the key areas where "things must go right" for IT project success (Rockart, 1979).

In this study the factors from the literature are synthesized and classifications or categorizations created in order to simplify the theoretical framework and ensure comprehensiveness of the framework. It is envisaged that the new classification is able to make a contribution to the body of knowledge. Therefore, in order to compile potential factors that are required for project success, studies from similar domain such as IS and ERP are utilized.

Table 2.4 summarises the literature findings of the success factors that affect IT projects. The proposed list of factors is taken from a holistic view of project success in developed and developing countries.

Table 2.4: Success factors identified in literature

Success Factors	**Literature**
Top Management Support and Commitment	(Al-Mudimigh et al., 2011, Alaskari et al., 2013, Annamalai and Ramayah, 2013, Dezdar and Ainin, 2012, Fortune and White, 2006, Holland and Light, 1999, Jiang et al., 1996, Nasir and Sahibuddin, 2011, Shanks et al., 2000, Young and Jordan, 2008, Ziemba and Oblak, 2013)
Strategic Planning	(Al-Turki, 2011, Annamalai and Ramayah, 2013, Gunasekaran and Garets, 2003, Hong, 2009, Ojo et al., 2009)
Communication Management	(Al-Mashari and Al-Mudimigh, 2003, Alaskari et al., 2013, Annamalai and Ramayah, 2013, Dezdar and Ainin, 2012, Holland and Light, 1999, Jiang et al., 1996, Nah et al., 2007, Nasir and Sahibuddin, 2011, Rosario, 2000, Ross, 1999, Sumner, 1999, Ziemba and Oblak, 2013)
Project Management	(Al-Mashari et al., 2003, Alaskari et al., 2013, Dezdar and Ainin, 2012, Holland and Light, 1999, Murray and Coffin, 2001, Nah et al., 2007, Nasir and Sahibuddin, 2011, PMI, 2013, Rosario, 2000, Ross, 1999, Sumner, 1999, Ziemba and Oblak, 2013)
Project Team Competency	(Alaskari et al., 2013, Alghathbar, 2008, Annamalai and Ramayah, 2013, Dezdar and Ainin, 2012, Holland and Light, 1999, Jiang et al., 1996, Ross, 1999, Shanks et al., 2000, Sumner, 1999, Ziemba and Oblak, 2013)
Stakeholder Management	(Abouzahra, 2011, Bourne and Walker, 2008, Crawford, 2005, Morris et al., 2006, PMI, 2013, Shenhar and Dvir, 1996)
Partners and Suppliers Management	(Al-Mashari et al., 2003, Alaskari et al., 2013, AlShitri, 2008, Annamalai and Ramayah, 2013, Ifinedo et al., 2010, ISO9000, 2000, Kansal, 2007, Zhang et al., 2003)
Training and Education	(Al-Mashari et al., 2003, Aladwani, 2001, Alaskari et al., 2013, Annamalai and Ramayah, 2013, Finney and Corbett, 2007, Kumar et al., 2002, Mandal and Gunasekaran, 2003, Nasir and Sahibuddin, 2011, Robey et al., 2002)
Business Process Re-engineering	(Al-Mashari et al., 2003, Al-Mudimigh, 2007, Alaskari et al., 2013, Anderson and Rungtusanatham, 1994, Benner and Tushman, 2002, EFQM-MultiProject, 2010, Ziemba and Oblak, 2013)
IT Infrastructure Readiness	(Al-Mudimigh, 2007, Alaskari et al., 2013, Gupta, 2000, Kumar et al., 2002, Somers and Nelson, 2004)
Change Management	(Al-Shamlan and Al-Mudimigh, 2011, Alaskari et al., 2013, Bhatti, 2005, Esteves and Pastor, 2001, Gupta, 2000, Somers and Nelson, 2004, Ziemba and Oblak, 2013)
Risk Management	(Al-Mudimigh et al., 2001, Baccarini et al., 2004, Kemppainen et al., 2012, PMI, 2013, Ziemba and Oblak, 2013)

These factors are common in the IT literature, especially in ERP studies, and they are: (1) top management support and commitment; (2) strategic planning; (3) communication management; (4) project management; (5) project team competency; (6) stakeholders management; (7) partners and suppliers management; (8) training and education; (9) business process re-engineering; (10) IT infrastructure readiness; (11) change management; (12) risk management. These twelve factors were found to be highly important based on the strength in

the citations and, hence, described below in the subsequent subsections. However, this list is intended to guide an exploratory study in order to confirm the factors that are worthy of further investigation, and test for their relationships with PSC using the deductive approach (Sekaran and Bougie, 2010). The outcome of this exploratory study (chapter 4) will lead to the formulation of the final hypotheses that shows the impact of CSF on the project success criteria (PSC), and these factors are expected to be highly correlated with the project success criteria (dependent variable).

2.8.2.1 Top Management Support and Commitment (TMS)

Many researchers identified "top management support and commitment" as one of the crucial factors in IT project success, and it is the most cited CSF in the literature (Abdullah, 2013, Bukamal and Wadi, 2016, Dezdar and Ainin, 2012, Fortune and White, 2006, Nah et al., 2007, Somers and Nelson, 2004). Top management support and commitment refers to top management's willingness to champion projects within the organisation and to allocate the resources required for IT projects' success (Egbeniyoko, 2014, Holland and Light, 1999, Shanks et al., 2000, Stratman and Roth, 2007). The amount of resources allocated depends on the attitude of the top management to the project, and the commitment of all the employees in the enterprise to the project might be reinforced by top management sponsorship and support. Overall organisational commitment can be raised by top management, and then IT project success can be increased by organisational commitment (Bingi et al., 1999, Hung et al., 2014, Zouine and Fenies, 2014). Top managers should dedicate time to reviewing plans, following up on results and facilitating management problems. This should be done through their involvement (personal belief of the importance of IT), participation (in IT planning), liaison with the CIO (objectives, business environment, changing priorities, project development policies) and provision of authority and financial resources with long-term commitments (Garg and Agarwal, 2014, Leyh, 2016, Young and Jordan, 2008).

Furthermore, the project has to be recognised as a main priority by top management (Altuwaijri and Khorsheed, 2011, Bukamal and Wadi, 2016, Nah and Delgado, 2006, Ozorhon and Cinar, 2015, Shanks et al., 2000, Wee, 2000, Ziemba and Oblak, 2013). This means, the better the support given through TMS, the more likely the various different projects administered in the organisation are to experience success.

2.8.2.2 Strategic Planning (SP)

Strategic planning establishes a clear vision and measurable objectives for the use of IT in an organisation, prescribes strategies to achieve this vision with the knowledge of the available IT capabilities and opportunities, provides measures for success and possibly suggests concrete initiatives for implementing the developed strategies (Ojo et al., 2009). It improves key stakeholders' understanding of IT opportunities and limitations, assesses current performance, identifies human resource requirements, and clarifies the level of investment required. Strategic IT planning generally serves as a mechanism for managing and directing all IT resources in line with organisational strategies and priorities (Ojo et al., 2009).

According to Gunasekaran and Garets (2003), "the ultimate goal of IT strategic planning is to provide a broad and stable vision of how IT contributes to the long-term success of the organisation". There are documented approaches to IT strategic planning (Cassidy, 2005, Gunasekaran and Garets, 2003, Gunasekaran and Garets, 2004). IT strategy refers to a global level of thinking about IT and its integration with the rest of an organisation. Enterprise architecture concepts focus on the importance of aligning IT strategies to both cross-cutting (organisation-wide) and mission-specific requirements. The project management system should be integrated within the organisation's strategy, and the selection of projects should be carried out in line with the organisation's strategy (EFQM-MultiProject, 2010).

2.8.2.3 Communication Management (CM)

Communication management is important in IT project success, and therefore, IT project goals and expectations should be communicated with all the parties affected by the project, and open communication can leverage successes and facilitate enterprise-wide learning (Dezdar, 2011, Falkowski et al., 1998, Wee, 2000). Communication includes the announcement of project progress to the rest of the organisation (Egbeniyoko, 2014, Holland and Light, 1999, Wickramasinghe and Gunawardena, 2010). In order to keep users informed about the project's progress, communication means methods such as regular e-mail updates, newsletters, bulletins, and weekly meetings can be employed, and this communication needs to be two-way to avoid any misunderstanding occurring during the collection of the project's requirements (Garg and Agarwal, 2014, Nah et al., 2007).

To enhance IT project effectiveness and efficiency, the users and the project team should be kept up to date about the project objectives, plan, and activities (Abdullah, 2013, Dezdar and

Ainin, 2012, Sumner, 1999). Moreover, goals and objectives should be communicated in IT project implementation, and users' input and feedback should be received, managed and treated which may help the project to be successful (Rosario, 2000, Tarhini et al., 2015).

2.8.2.4 Project Management (PM)

PMI (2013) defined project management as "*the application of knowledge, skills, tools, and techniques to project activities to meet project requirements*" (p. 6), and it is accomplished through the application and integration of the project management processes of initiation, planning, execution, monitoring, controlling and closing (PMI, 2013). Project management, which refers to determining timetables, milestones, equipment, workforce, and budgets, is vital in the complex environment of IT projects (Dezdar and Ainin, 2012). Successful IT project implementation requires excellent project management which includes a clear definition of objectives, development of both a work plan and a resource plan, and careful tracking of project progress (Egbeniyoko, 2014, Umble et al., 2003). Effective project management is crucial because project success is usually assessed on whether the allocated time and budget are exceeded or not (Dezdar and Ainin, 2012).

Setting up an official implementation plan, giving a realistic time frame, arranging periodic meetings for observing project status, having a qualified project manager and participating project team members are commonly the five core components of IT project management (Zhang et al., 2005). Many scholars emphasise the fact that the scope of the project should be clearly established and controlled, and any suggested changes should be assessed along with the organisation's goals (Muscatello and Chen, 2008, Nah et al., 2007). Moreover, any additional time and cost of the suggested alterations should be evaluated and coordinated with all the affected parties of the project (Nah et al., 2007), and all conflict issues should be managed (Rosario, 2000). In order to track the project's progress, project indicators should be clearly examined on a periodic basis (Abdullah, 2013, Murray and Coffin, 2001, Rosario, 2000). From the best practical point of view, project management related methods, tools, techniques, and processes should be managed and continuously improved to optimise the use of resources and ensure stakeholder satisfaction (EFQM-MultiProject, 2010).

Hence, having an effective PM capability within the organisation is considered crucial to the success of any project. It is supposed to be influencing the project success criteria in the organisation.

2.8.2.5 Project Team Competency (PTC)

IT projects impact the most functional departments in any organisation, therefore, the importance of project teams has been emphasised in the IT project literature (Dezdar and Ainin, 2012, Nah et al., 2007). The IT project team should recruit the best individuals in the organisation (Abdullah, 2013, Aldammas and Al-Mudimigh, 2011, Dezdar, 2011, Nah et al., 2007, Shanks et al., 2000). Furthermore, research has shown that companies demonstrated their commitment to IT projects by assigning the best people to them (Abdullah, 2013, Dezdar, 2011). The IT project team should work closely with the external experts so that they can gain the necessary knowledge and improve their technical and business skills to facilitate project success (Dezdar and Ainin, 2012, Holland and Light, 1999). In addition, the project manager and the project team should be authorised to make decisions (Dezdar and Ainin, 2011a, Shanks et al., 2000).

Compensation and incentives should be given to the team to assist them in working together and achieving the project goals within the allocated time and budget (Nah et al., 2007, Wee, 2000). In order to influence business processes, the project team should have the proper technical and business skills, and have to incorporate business functions with the capabilities of the system (Nah et al., 2007). The collaboration between consultants and the project team has a direct impact on IT project success (Egbeniyoko, 2014, Haines and Goodhue, 2000). The extent to which the CIO perceives that the organisation has a good team may have positive influence to project success.

2.8.2.6 Stakeholder Management (SHM)

PMI (2013) defined stakeholders as "*persons or organisations, who are actively involved in the project or whose interests may be positively or negatively affected by the performance or completion of the project*" (p. 23). The project, its deliverables, and the project team members can be influenced by stakeholders. In order to determine the project requirements, the project management team must identify both internal and external stakeholders. Identifying stakeholders and understanding their relative degree of influence on a project is critical. Even though stakeholders often have very different or conflicting objectives, an important role of the project manager is to manage their expectations (PMI, 2013).

Many researchers mentioned stakeholder management as one of the factors that impact IT project success (Crawford, 2005, Morris et al., 2006, Shenhar and Dvir, 1996, Winter et al.,

2006). Communication and cooperation between stakeholders have been strongly related to project success (Diallo and Thuillier, 2005). Project success and failure are directly linked to stakeholders' perceptions (Bourne and Walker, 2008). Poor stakeholders management is one of the influencing factors on the implementation of IT projects (Yeo, 2002).

2.8.2.7 Partners and suppliers management (PSM)

It is important for the IT vendor's staff to be knowledgeable about both business processes and system functions. The vendor should be carefully selected, since vendor support plays a crucial role in shaping the ultimate outcome of implementation (Zhang et al., 2003). Project success is found to be positively associated with the IT vendor employed (Kansal, 2007).

Price has no meaning without a measure of the quality being purchased, and without adequate measures of quality, business drifts to the lowest bidder, with low quality and high costs being the inevitable result (Deming, 2000). Organisations should select their suppliers on the basis of quality rather than solely on price, so the supplier becomes an extension of the buyer's organisation to a certain extent (AlShitri, 2008). Therefore, a mutually beneficial relationship between an organisation and its suppliers will enhance the ability of both to create value (ISO9000, 2000).

2.8.2.8 Training and Education (TE)

The need to include training as a critical part of IT project implementation has been referenced by a substantial number of citations (Bukamal and Wadi, 2016, Dezdar and Ainin, 2011c, Finney and Corbett, 2007). The need for training in general has been mentioned by many researchers. However, some researchers have specifically mentioned the need for project team training (Kumar et al., 2002), and others have focused on user training (Mandal and Gunasekaran, 2003, Robey et al., 2002). Finney and Corbett (2007) suggested that the training should encompass the development of IT skills. Aladwani (2001) recommended that the training should be hands-on.

2.8.2.9 Business Process Reengineering (BPR)

Business Process Re-engineering (BPR) is defined as 'the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical measures of performance such as cost, quality, service, job satisfaction and speed' (Altinkemer et al., 1998)(p. 381). In the phase of configuring the enterprise system, a great amount of

reengineering processes may happen to gain the best practices offered by the system (Ram et al., 2013). Whenever possible, the embedded best practice should be accepted by enterprises (Ram and Corkindale, 2014). In order to minimize the customizations needed, organisations should be willing to change their business rules to fit the enterprise system (Olugbara et al., 2014). Reengineering process should be continued with any new updates to take full advantage of the enterprise system capabilities (Ram and Corkindale, 2014). Organisations may thus be required to improve or re-engineer their business processes to align them with an ERP's business model (Olugbara et al., 2014).

BPR is a strategy to create a conducive platform to facilitate successful ERP implementation. Hence, organisations perform BPR to restructure processes to eliminate inefficient and non-value adding operations and to align their ongoing business activities with industry best practices (Ram and Corkindale, 2014). The business process gap between organisational and ERP processes was found to be the likely cause of ERP project failure (Hawari and Heeks, 2010). Various authors have found a significant positive relationship between BPR and IT project overall success (Al-Shamlan and Al-Mudimigh, 2011, Altamony et al., 2016, Hawari and Heeks, 2010, Olugbara et al., 2014, Ram and Corkindale, 2014). Therefore, it is not surprising that BPR has been found to be a critical factor for IT project success (Ram and Corkindale, 2014).

2.8.2.10 IT Infrastructure Readiness (ITIR)

IT infrastructure has been increasingly considered by many researchers and practitioners as a vital factor of IT project success (Esteves and Pastor, 2016, Gupta et al., 2014, Liu et al., 2014, Tarhini et al., 2015). IT infrastructure is a comprehensive term that includes equipment, networks, and applications (Doom et al., 2010). It is made up of physical assets (Esteves and Pastor, 2016), intellectual assets (Liu et al., 2014), shared services (Tarhini et al., 2015), and their linkages (Gupta et al., 2014). The way in which the IT infrastructure components are composed and their linkages determines the extent to which information resources can be delivered. Linkages between the IT infrastructure components, as well as descriptions of their contexts of interaction, are important for ensuring integrity and consistency among the IT infrastructure components (Tobie et al., 2016).

However, it is critical to assess the IT readiness of the organisation, including the architecture and skills (Esteves and Pastor, 2016, Somers and Nelson, 2004). If necessary, infrastructure might need to be upgraded or refurbished (Kumar et al., 2002). IT projects depend on

sophisticated IT infrastructure (Gupta, 2000). The IT infrastructure shared services and the human IT infrastructure components, in terms of their responsibilities and their needed expertise, are both vital for any system to be successful (Abdelghaffar and Azim, 2010, Liu et al., 2014). Therefore, adequate IT infrastructure is critical for IT project success (Al-Mudimigh, 2007, Esteves and Pastor, 2016, Gupta et al., 2014).

2.8.2.11 Change Management (CHM)

Change management is one among the most prevalent factors that led to success in ERP implementation (Al-Shamlan and Al-Mudimigh, 2011, Masa'deh, 2013). Change management may be a set of tools, processes, activities and principles that support employee understanding and organisational shifts from a current state to desired future state through the implementation of ERP systems to realize the organisational outcome (Al-Shamlan and Al-Mudimigh, 2011, Altamony et al., 2016). Many organisations involved in IT project implementation have major concern about change management (Altamony et al., 2016, Bhatti, 2005). Underestimating the efforts involved in change management by organisations may cause many IT projects to fail (Al-Shamlan and Al-Mudimigh, 2011, Somers and Nelson, 2004). One of the main obstacles faced by most firms is the resistance to change (Jinno et al., 2017). Hence, a positive employee attitude and building user acceptance are vital to the change (Altamony et al., 2016).

The way organisations do business and the ways people do their jobs will need to change in order to implement an IT project successfully (Jinno et al., 2017). Nah et al. (2001) suggest a change methodology as a useful technique for identifying, managing, and tracking changes in implementing an IT project (Ahmad and Cuenca, 2013). Training is one of the important issues in change management (Al-Shamlan and Al-Mudimigh, 2011). For successful ERP System performance, change management is measured as a significant factor (Al-Shamlan and Al-Mudimigh, 2011, Altamony et al., 2016, Masa'deh, 2013).

2.8.2.12 Risk Management (RM)

Risk is involved in every human endeavour (Baccarini et al., 2004, Liu et al., 2014). Projects are unique undertakings which involve a degree of uncertainty (De Bakker et al., 2010). Risk in projects can be defined as the chance of an event occurring that is possible to have a negative impact on project goals (De Bakker et al., 2010, Zhao and Singhaputtangkul, 2016). IT implementation project risks are described as uncertainties, liabilities or vulnerabilities that

may cause the project to deviate from the defined plan (Ahmad and Cuenca, 2013). Risk management is the competence to handle unexpected crises and deviation from the plan, and it is to minimize the impact of unplanned incidents in the project by identifying and addressing potential risks before significant consequences occur (Ram and Corkindale, 2014).

There are two approaches in the literature that describe risk management in projects: the evaluation approach and the management approach (De Bakker et al., 2010). The evaluation approach considers risk management as an analysis process aimed at determining risk factors. The management approach considers risk management to be a management instrument by which information is collected and analysed to support the decision making process in a particular project. If the appropriate risk management strategy is followed, the risk of project failure is noticeably reduced (Liu et al., 2014). Therefore, to achieve a successful delivery of IT project, risk management is an essential factor (De Bakker et al., 2010).

2.9. Knowledge Gap and Conceptual Framework

Despite the fact that several gaps can be found in the literature, studies into ERP projects in both developed and developing countries have greatly improved our understanding of the concept of the CSFs and project success criteria (PSC), however, there remins much to be investigated.

The relative importance of the CSFs and project success criteria has been found inadequate and the linkage between them is relatively unexplored in general (Gunathilaka et al., 2013) and in Saudi Arabia in particular (Al-Braithen, 2010). The CSFs and project success criteria have generally been examined from the point of view of project managers, project team, and end users rather than CIOs (Aldayel et al., 2011, Davis, 2014, Ogunlana, 2010, Turner et al., 2009), who possess considerable managerial and organisational knowledge about IT projects, and would have the authority to access further information regarding current and future corporate strategies (Al-Taie et al., 2015, Hu et al., 2014). Investigating the CSFs from the CIOs point of view is important (Davis, 2014) and will add more valuable insights from a higher level of administration.

In response to this gap, the current research aims to improve our understanding of project success in developing countries in general and in Saudi Arabia in particular through the proposal of a comprehensive framework. Furthemore, the scope of this research is being expanded beyond traditional locations in developed nations to encompass the experiences of

organisations within developing areas and this may result in alternative perspectives on the CSFs and project success criteria (Figure 2.3). As mentioned earlier, the outcome of the exploratory study (chapter 4) will lead to the formulation of the research conceptual framework and the final hypotheses that shows the impact of CSF on the project success criteria (PSC)

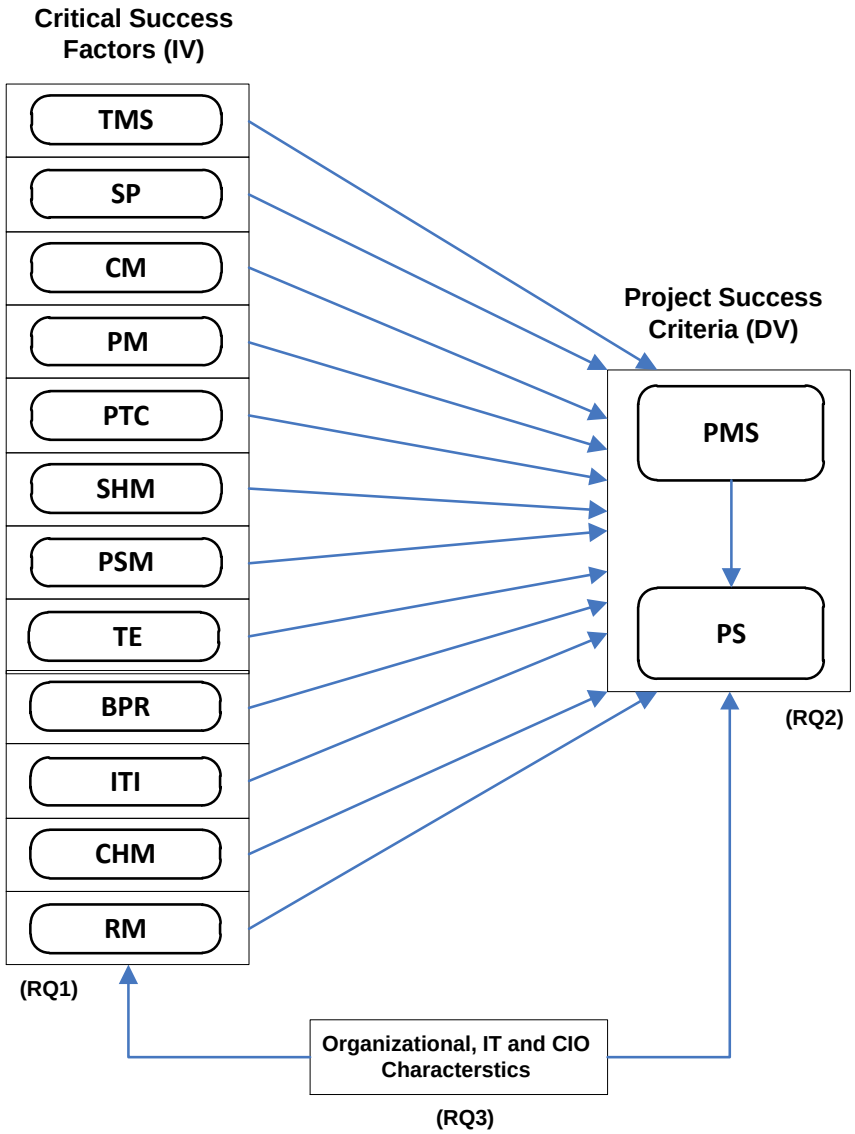


Figure 2.3: Preliminary conceptual framework

2.10. Summary

This chapter started with an introduction to the project and project management concepts including definitions. The importance of the CIO role in assessing project success was presented, and different aspects of the IT projects (evaluation and implementation) were introduced. The Delone and Mclean IS success (Delone and McLean, 2003) and the CSFs theories were discussed with their background, definition, and benefits. Following this, a clear understanding of the concept of project success was presented from the literature, as this forms an essential part of the initial foundation for the research conceptual framework. The components of the research conceptual framework were critical success factors (CSFs) as the independent variable and project success criteria (PSC) as the dependent variable. In addition, some research into the influence of CIO characteristics are also investigated. In conclusion, this chapter provided an overview of project success as a discipline, based on a historical review, and it is concluded with the research gap.

The following chapter details the research methodology employed in this study, and describes the operational plan that was undertaken in order to complete the study.

Chapter 3 : Research Methodology and Design

3.1. Overview

Chapter Two provided a literature review of the research area. This chapter presents an overview of the research methodology and design of the research. Research is "*an organised, systematic, database, critical, objective, scientific, inquiry or investigation into a specific problem, undertaken with the purpose of finding answers or solutions*" (Sekaran and Bougie, 2010) (p. 4). All research is based on some underlying assumptions or beliefs about what constitutes 'valid' research, what the 'underlying nature of phenomena' is and which research approaches are appropriate, and researchers, therefore, should be explicit about the philosophical assumptions underlying their research (Orlikowski and Baroudi, 1991). Research is the expansion of human knowledge, and research methodology deals with methods for doing this. Therefore, the research process adopted is an important aspect to increase the rationality of the research according to Creswell and Clark (2011).

Information system research is a multi-disciplinary topic and very much a social, rather than an entirely technical science (Avison and Pries-Heje, 2005). Its foundations can be found in philosophy and in the organisational and behavioural sciences, as well as in mathematics and the natural sciences. However, there is no single methodology that covers all the necessary knowledge required to conduct IS research (Land, 1992). Researchers need to be aware of the available research philosophies, research approaches, research strategies, methodological choices, time horizons and techniques and procedures in order to make the appropriate choice of research methodology.

The chapter details the research process adopted and continues with an explanation of the data collection and data analysis methods employed by the researcher including a justification for the approach and method. The sampling method used by the researcher is discussed and justified. Lastly, it discusses the ethical considerations of this study.

3.2. Research Philosophies

The research 'onion' is a methodology that was developed by Saunders et al. (2011). According to the research 'onion', as shown in Figure 3.1, the entire process is in the form of an onion comprising of various layers. The research philosophies, research approaches, research strategies, methodical choices, time horizons and techniques and procedures form the different layers of the onion depicting each of the research process. The process involves peeling each layer at a time to reach the centre which is the detail of how we actually collect data for the research.

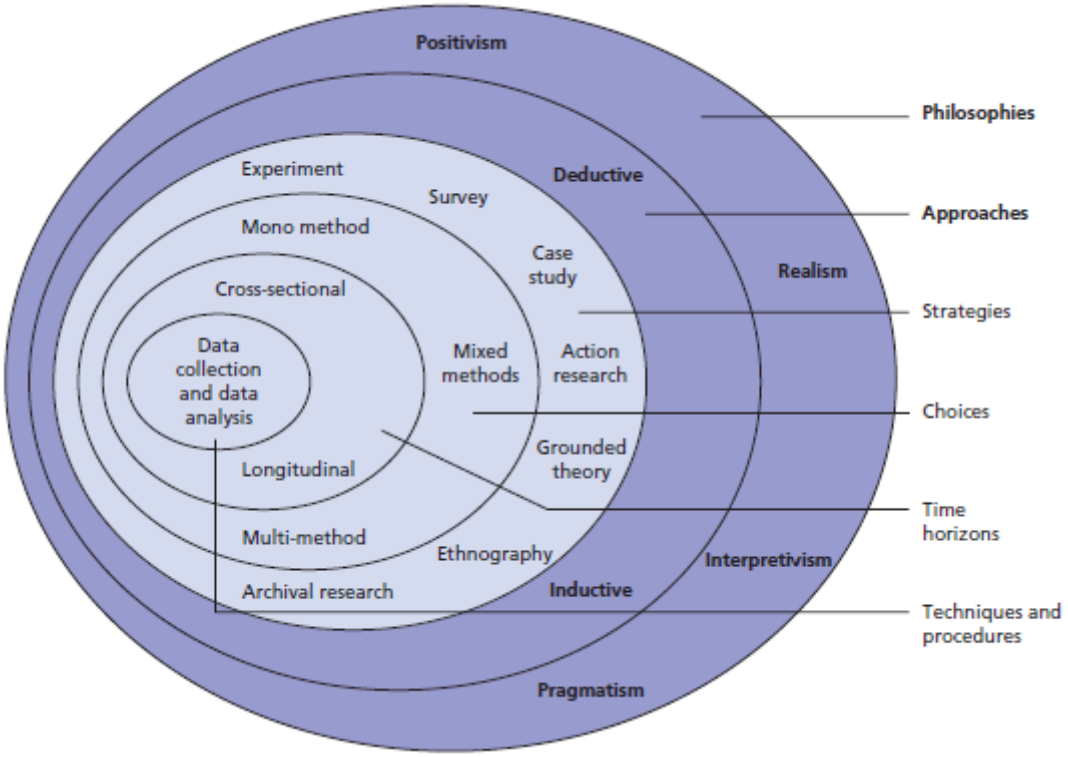


Figure 3.1: The research onion (Source: © Mark Saunders, Philip Lewis and Adrian Thornhill 2011)

Research philosophy forms the outermost layer of the research 'onion'. Saunders and Tosey (2012) define four different philosophies in order to guide researchers in different disciplines. The main philosophies are: (1) positivism; (2) realism; (3) interpretivism; (4) pragmatism. A researcher who is concerned with observing and predicting outcomes is concerned with law-like generalisations such as cause and effect; reflecting the philosophy of positivism. She or he adopts what is often referred to as 'scientific method' to propose and test theories with data which are highly structured and usually measurable and in which the research is not influenced by the researcher's values. This usually involves large samples of quantitative data

and statistical hypothesis testing. Where a theory is not confirmed by findings (based on the analysis of these data) there is a need to revise the theory.

Like positivism, realism is a philosophical position associated with scientific enquiry (Saunders et al., 2011). Realism states that reality exists independent of the mind and that what a researcher's senses show her or him is the truth, although the researcher is influenced by world views and their own experiences (Saunders et al., 2011). Philosophers distinguish between two forms of realism: direct realism and critical realism. A researcher reflecting a direct realist position argues that what is experienced through our senses provides an accurate representation. In contrast, a researcher reflecting a critical realist position argues that what is initially experienced through senses is subsequently processed subjectively by the mind (Saunders et al., 2011). For the critical realist researcher this means that there is a need to find out both what is immediately experienced and the structures and relationships that lie beneath this; in other words to consider the underlying complexity. Consequently, collection techniques and analysis procedures are varied utilising either or both quantitative and qualitative data (Saunders et al., 2011).

Where the researcher is more concerned with gathering rich insights into subjective meanings than providing law-like generalisations, she or he is more likely to reflect the philosophy of interpretivism (Saunders et al., 2011). This philosophy relates to the study of social phenomena in their natural environment. It focuses upon conducting research amongst people rather than upon objects, adopting an empathetic stance so as to understand their social world and the meaning they give to it from their point of view (Saunders et al., 2011). Unlike the positivist, the interpretivist researcher considers research is value bound, what is being researched being a function of a particular set of circumstances and individuals at a specific time (Saunders et al., 2011). Data collection and analysis are, therefore, likely to involve qualitative data from in-depth study with small samples.

For researchers who adopt the philosophy of pragmatism, the importance of research is in the findings' practical consequences (Saunders et al., 2011). They consider that no single viewpoint can ever give the entire picture and that there may be multiple realities. This does not mean that a pragmatist researcher would always use a variety of data collection techniques and analysis procedures; rather the research design should enable credible, reliable and relevant data to be collected that support subsequent action (Saunders et al., 2011).

3.3. Research Approaches

The next layer of the research 'onion' is the research approach. The design of the research determines the choice of research approach adopted. If the research involves developing a theory and hypothesis (or hypotheses) and design a research strategy to test the hypotheses then the approach classifies as a deductive approach. On the other hand, the inductive approach involves data collection and developing a theory based on the analysis of the data. Saunders et al. (2011) said "*it is useful to attach these research approaches to the different research philosophies, deduction owes more to positivism and induction to interpretivism, although we believe that such labelling is potentially misleading and of no real practical value*" (p. 124).

Deduction possesses several important characteristics (Saunders et al., 2011). First, there is the search to explain causal relationships between variables. Deduction dictates that the researcher should be independent of what is being observed. An additional important characteristic of deduction is that concepts need to be operationalised in a way that enables facts to be measured quantitatively. The final characteristic of deduction is generalisation.

Traditionally, research methods have been divided into two main areas, namely, a quantitative and a qualitative researches (Creswell, 2013, Myers, 1997). Myers (1999) states that quantitative research is usually associated with the positivist philosophy, whilst qualitative research relates to the interpretivism philosophy. Each has been used with success in different domains.

Quantitative research was originally developed in the natural sciences to study natural phenomena (Myers, 1997). According to Creswell (2013), quantitative research is defined as "*an inquiry into social or human problems, based on testing a theory composed of variables, measured with numbers and analysed with statistical procedures in order to determine whether the predictive generalisations of the theory hold true"* (p. 1-2). It includes a set of methods and techniques such as survey and experiments. These quantitative methods and techniques allow researchers to answer scholarly and pragmatic questions about the relationships among factors in the phenomenon studied (Chen and Hirschheim, 2004). They tend to be specialised in quantities in the sense that numbers come to represent values and levels of theoretical constructs and concepts and the interpretation of the numbers is viewed as strong scientific evidence of how a phenomenon works (Avison and Pries-Heje, 2005). The

advantage of quantitative methods is that it is possible to measure the reactions of a great many people to a limited set of questions, thus facilitating comparison and statistical aggregation of the data.

In contrast, qualitative research was developed in the social sciences to enable researchers to study social and cultural phenomena (Myers, 1997). According to Creswell (2013), qualitative research is defined as "*an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting"* (p. 1-2). It includes some methods and techniques such as interviews and documents. These qualitative methods and techniques permit researchers to study selected issues in depth and detail. They emphasise the description and understanding of the situation behind the phenomenon (Chen and Hirschheim, 2004). The advantage of qualitative methods typically is that they produce a wealth of detailed information about a much smaller number of people and cases. This increases understanding of the cases and situations studied but reduces generalisation (Denscombe, 2010).

Punch (2005) stated that quantitative research allows the researcher to establish relationships among variables but it is weak when it comes to exploring the reasons for these relationships; while qualitative research can be used to help explain the factors underlying the broad relationships that are established. The shortcomings associated with information collected by quantitative or qualitative methods have generated a sense of dissatisfaction among users with the quality of the data that these methods can provide (Punch, 2005).

Accordingly, this section justified the deductive approach taken in this study, with the focus given on finding the relationship between the constructs or variables identified to explain the phenomena. In this case the focus is finding the concepts that best explain the success of projects (PMS and PS) by the critical success factors, through hypothesis testing and validation of the project success model through structural analysis. However, this deductive approach is limited to the context of which this study is conducted, which is a small group of CIO population.

3.4. Research Strategies

Peeling away the research approach exposes the next layer of the onion: the research strategy. According to Marshall and Rossman (2010), a research strategy is "*a road map, an overall plan for undertaking a systematic exploration of the phenomenon of interest*" (p. 30). Depending on the problem under investigation, the choice of a research strategy is influenced by the research aim and objectives, the available knowledge, the time and resources available, and the research philosophy adopted (Saunders et al., 2011). Many research strategies have been identified for the social sciences. The research strategy is how the researcher intends to carry out the work (Saunders et al., 2011). This can include a number of different strategies, such as experimental research, surveys, case study research, action research, grounded theory, or ethnography. The following subsections will provide a brief description of these strategies, and this will provide a foundation from which to choose a suitable research strategy for the current research.

Experimental research refers to the strategy of creating a research process that examines the results of an experiment against the expected results (Saunders et al., 2011). It can be used in all areas of research, and usually involves the consideration of a relatively limited number of factors (Saunders et al., 2011). The relationship between the factors are examined, and judged against the expectation of the research outcomes.

Surveys tend to be used in quantitative research projects, and involve sampling a representative proportion of the population (Bryman and Bell, 2011). The surveys produce quantitative data that can be analysed empirically. Surveys are most commonly used to examine causative variables between different types of data.

Case study is an appropriate strategy when the objectives of the research are to find the answers to questions about '*how*' and '*why'* something is happening; this helps to understand and explain the nature and complexity of the studied topic (Yin, 2014). Case study can offer an insight into the specific nature of any example, and can establish the importance of culture and context in differences between cases (Creswell, 2013). It is employed to provide a description of phenomena, to develop theory, and to test theory (Saunders et al., 2011).

Action research is characterised as a practical approach to a specific research problem within a community of practice (Bryman, 2012). It involves examining practice to establish that it corresponds to the best approach. It tends to involve reflective practice, which is a systematic

process by which the professional practice and experience of the practitioners can be assessed (Saunders et al., 2011). This form of research is common in professions such as teaching or nursing, where the practitioner can assess ways in which they can improve their professional approach and understanding (Wiles et al., 2011).

Grounded theory is a qualitative methodology that draws on an inductive approach whereby patterns are derived from the data as a precondition for the study (May, 2011). For example, interview data may be transcribed, coded and then grouped accordingly to the common factors exhibited between respondents. This means that the results of the research are derived fundamentally from the research that has been completed, rather than where the data is examined to establish whether it fits with pre-existing frameworks (Flick, 2015). Its use is common in the social sciences (Bryman, 2012).

Ethnography involves the close observation of people, examining their cultural interaction and their meaning (Bryman, 2012). In this research process, the observer conducts the research from the perspective of the people being observed, and aims to understand the differences of meaning and importance or behaviours from their perspective.

Based on theses explanations, the researcher used surveys as the major research strategies to gather data and evidences. The design of the surveys was conducted following the deductive approach in order to produce quantitative data that can be used to explain the phenomena under study and empirically test the hypotheses generated using statistical tools and techniques.

3.5. Research Choices

The next layer of the research ‘onion’ is the research choice where the choices outlined in the research onion include the mono method, the mixed method, and the multi-method (Saunders et al., 2011). As the names of these approaches suggest, the mono-method involves using one research approach for the study. The mixed-methods required the use of two or more methods of research, and usually refer to the use of both a qualitative and a quantitative methodology. In the multi-method, a wider selection of methods is used (Bryman, 2012). The main difference between the mixed and the multi-method is that the mixed-method involves a combined methodology that creates a single dataset (Flick, 2015). The multi-method approach is where the research is divided into separate segments, with each producing a specific dataset; each is then analysed using techniques derived from quantitative or qualitative

methodologies (Feilzer, 2010). Accordingly, this research, applied the quantitative methodology as the dominant methodology, or means of data collection and analysis. However, other evidences in the form of literature review, descriptive analysis and researchers' own experience are also used to support the conduct of this research.

3.6. Time Horizons

Peeling away the research choice exposes the next layer of the onion: the time horizon. The time horizon is the time framework within which the project is intended for completion (Saunders et al., 2011). Two types of time horizons are specified within the research onion: the cross sectional and the longitudinal (Bryman, 2012). The cross sectional time horizon is one already established, whereby the data must be collected. This is called the 'snapshot' time collection, where the data is collected at a certain point (Flick, 2015). This is used when the research is concerned with the study of a particular phenomenon at a specific time. Accordingly, this research applied the cross sectional approach in studying the phenomena.

On the other hand, a longitudinal time horizon for data collection refers to the collection of data repeatedly over an extended period, and is used where an important factor for the research is examining change over time (Goddard and Melville, 2004). This has the benefit of being used to study change and development. Furthermore, it allows the establishment of some control over the variables being studied. The time horizon selected is not dependent on a specific research approach or methodology (Saunders et al., 2011).

3.7. Techniques and Procedures

The innermost layer of the research 'onion' is data collection and analysis. Data collection and analysis is dependent on the methodological approach used (Bryman, 2012). The process used at this stage of the research contributes significantly to the study's overall reliability and validity (Saunders et al., 2011). The type of data collected can be separated into two types: primary and secondary.

Primary data is that which is derived from first-hand sources. This can be historical first-hand sources, or the data derived from the respondents in survey or interview data (Bryman, 2012). However, it is not necessarily data that has been produced by the research being undertaken (Flick, 2015). For example, data derived from statistical collections such as the census can constitute primary data. Likewise, data that is derived from other researchers may

also be used as primary data, or it may be represented by a text being analysed (Flick, 2015). The primary data is therefore best understood as the data that is being analysed as itself, rather than through the prism of another's analysis.

Secondary data is that which is derived from the work or opinions of other researchers (Newman, 2006). For example, the conclusions of a research article can constitute secondary data because it is information that has already been processed by another. Likewise, analyses conducted on statistical surveys can constitute secondary data (Kothari, 2004). However, there is an extent to which the data is defined by its use, rather than its inherent nature (Flick, 2015). Newspapers may prove both a primary and secondary source for data, depending on whether the reporter was actually present. Therefore, the most effective distinction of the two types of data is perhaps established by the use to which it is put in a study, rather than to an inherent characteristic of the data itself (Flick, 2015).

3.8. Sampling Techniques

In conducting IS research, it is necessary to decide the population, the sample of organisations, and the sample frame. The population is "*the universe of units from which the sample is to be selected*" (Bryman, 2012) (p. 174) and is "*the aggregate of all cases that conform to some designated set of specification*" (Frankfort-Nachmias and Nachmias, 2000). The sample is "*the segment of the population that is selected for investigation*" (Bryman, 2012) (p. 174). The sample frame is "*an objective list of 'the population' from which the researcher can make his or her selections*" (Denscombe, 2010) and is "*the listing of all units in the population from which the sample will be selected*" (Bryman, 2012) (p. 174).

In order to generalise from the findings of a survey, the sample must not only be carefully selected to be representative of the population; it also needs to include a sufficient number. In providing better representation, a large sample may be considered as more effective than a small one. However, samples between 30 and 250 cases are frequently used with surveys in social research (Denscombe, 2010). It is very important for any researcher who is forming a representative sample to consider the ability of the sample to represent the population. This depends on the accuracy of the sample and not the size of the sample in relation to the size of the population. If samples are properly selected, they can be sufficiently accurate and representative and may reflect precisely the characteristics of the aggregate (Frankfort-Nachmias and Nachmias, 2000).

The literature shows that there are many types of sampling techniques but all fall into one of two broad categories, namely probability sampling and non-probability sampling. The choice between these depends on the nature of the research problem, the availability of good sampling frames, the desired level of accuracy in the sample, and the method by which data are to be collected (De Vaus, 2004).

The probability sample is based on chance selection procedures. In this technique, every element in the population has a known, non-zero probability of being selected (Bryman, 2012, Denscombe, 2010). This technique has the advantage of eliminating a researcher's bias in choosing the sample, reducing the possibility of sampling error, and making possible the generalisation of findings derived from a sample to the population (Bryman, 2012). There are four main types of probability sampling technique: simple random sampling, systematic sampling, stratified sampling, and cluster sampling (Bryman, 2012, De Vaus, 2004, Denscombe, 2010, Frankfort-Nachmias and Nachmias, 2000).

Simple random sampling means that each member of the population should have an equal chance of being chosen and selected as a subject. *Systematic sampling* operates on the same principles of simple random sampling, but introduces some system into the selection of people or events. *Stratified sampling* means stratifying or dividing the population into sub-groups or strata so that the elements within each sub-group are more alike than are the elements in the population as a whole, and then taking a simple random sampling in each sub-group. *Cluster sampling* means assigning the sampling units into groups, called clusters, where the clusters are naturally formed groups such as companies, or location units.

Non-probability sampling is based on the subjective judgment of the researcher. In this technique, some elements have a greater probability of being included in the sample, though the probability inclusion for each member is unknown (Bryman, 2012, Gilbert, 2008). There are a number of reasons that encourage researchers to choose non-probability sampling. Researchers tend to choose non-probability sampling over probability sampling because probability sampling is time-consuming and very expensive, while non-probability samples are convenient and economic (Frankfort-Nachmias and Nachmias, 2000). Other situations in which researchers choose non-probability sampling are if the population cannot be defined; when sampling frames are unavailable; or if the population is so widely dispersed that cluster sampling would be too inefficient (De Vaus, 2004) There are four types of non-probability

sampling methods: convenience sampling, purposive sampling, quota sampling, and snowball sampling (Bryman, 2012, Denscombe, 2010).

Convenience sampling involves population members who are easily located and willing to participate. *Purposive sampling***,** also called judgment sampling, is sampling in which units are selected with a specific purpose in mind. *Quota sampling* is aimed at producing representative samples without a random selection of cases. *Snowball sampling* means that the researcher makes initial contact with a small group of people who are relevant to the researcher's topic and then uses these to establish contacts with others (Bryman, 2012, Denscombe, 2010).

The design of this research follows a survey method of which the population is used to get the data. Since the population is small, an attempt was made by the researcher to get as many samples from the total population to explain about the phenomena. No sampling technique was applied as high proportion of samples from the population is considered needed to represent the population (Bryman, 2012). This approach is also considered non-probabilistic and case study approach (Yin, 1990), as the population also represents a case that is context specific to CIO population of the Saudi Arabian Public Sectors listed in the e-Government portal. Further details of the research philosophy and approach is provided in the sections that follow.

3.9. Choice and Justification of the Research (Philosophy, Approach, Strategy, Time Horizon, Data Collection)

From the ontological point of view, it is anticipated that the positivist philosophy is suitable for this study as it is concerned with the nature of the relationships between the CSFs and the project success criteria. Also, the positivist philosophy can be justified from the epistemological perspective by objectively and independently exist from the experience of the sample units (the CIOs). This study aims to test a set of hypotheses related to the research problem that are formulated and modelled based on mature approach (CSF) and seeks to deductively verify or confirm this approach using the scientific method.

The choice of a positivist philosophy for this research can also be justified methodologically as this research employs a set of objective measurements to quantitatively test the hypothesized relationships among the research constructs in a value-free position for the researcher. This study adopted the quantitative positivist paradigm for different reasons. First,

this study is based on mature approach of CSF, therefore, the quantitative positivist paradigm will be best aligned with the aim of this research as it is seeking to confirm the impact of the CSFs on the project success criteria. Second, the quantitative positivist paradigm is confirmed as the most dominant paradigm in information systems research (Chen and Hirschheim, 2004, Saunders et al., 2011, Straub et al., 2004).

Furthermore, a quantitative positivist paradigm seeks generalizable results through the hypothetic-deductive testability of theories which support the research objective of gaining valid, reliable and generalizable results that can improve the effectiveness and the efficiency of IT projects in Saudi Arabian public organisations. Moreover, the decision has been made to adopt the quantitative positivist paradigm with the consideration of the desire to involve a large number of Saudi Arabian CIOs in this study which would be unachievable with a qualitative interpretive paradigm. Straub et al. (2004) and Bryman and Bell (2011) argue that the quantitative positivist paradigm provides a set of powerful, objective, and replicable statistical methods to analyse numeric data to examine theories by estimating hypothesized coefficients and assessing their significance.

This research employed a survey strategy of inquiry to collect data required to answer the research questions and test the research hypotheses. Remenyi (1998) and Palvia et al. (2003) state that questionnaire surveys can be used to capture data from individuals that cannot be easily observed. Moreover, Cohen (2000) states that questionnaires can be used to determine points of view regarding ideas, activities, previous experiences and future plans. The main advantage of a questionnaire survey is that it is the cheapest way of collecting data, and it can be conducted by a single researcher (Bryman, 2012). Another advantage is that the respondent can complete the questionnaire when it is convenient and can check personal records if necessary. These advantages are critical for the purpose of this research since other methods are costly and time consuming and would result in difficulties in data analysis.

Moreover, this study adopted a cross sectional survey strategy as a main data collection as it fitted with the situational characteristics of this research in terms of time, cost, and the specificity of its population. Furthermore, due to the demands of the philosophy (positivism), approach (deduction) and strategy (survey), quantitative mono-method choice was considered as the research data collection. Figure 3.2 shows the whole process of the undertaken research using the research famous model of Saunders (the onion model).

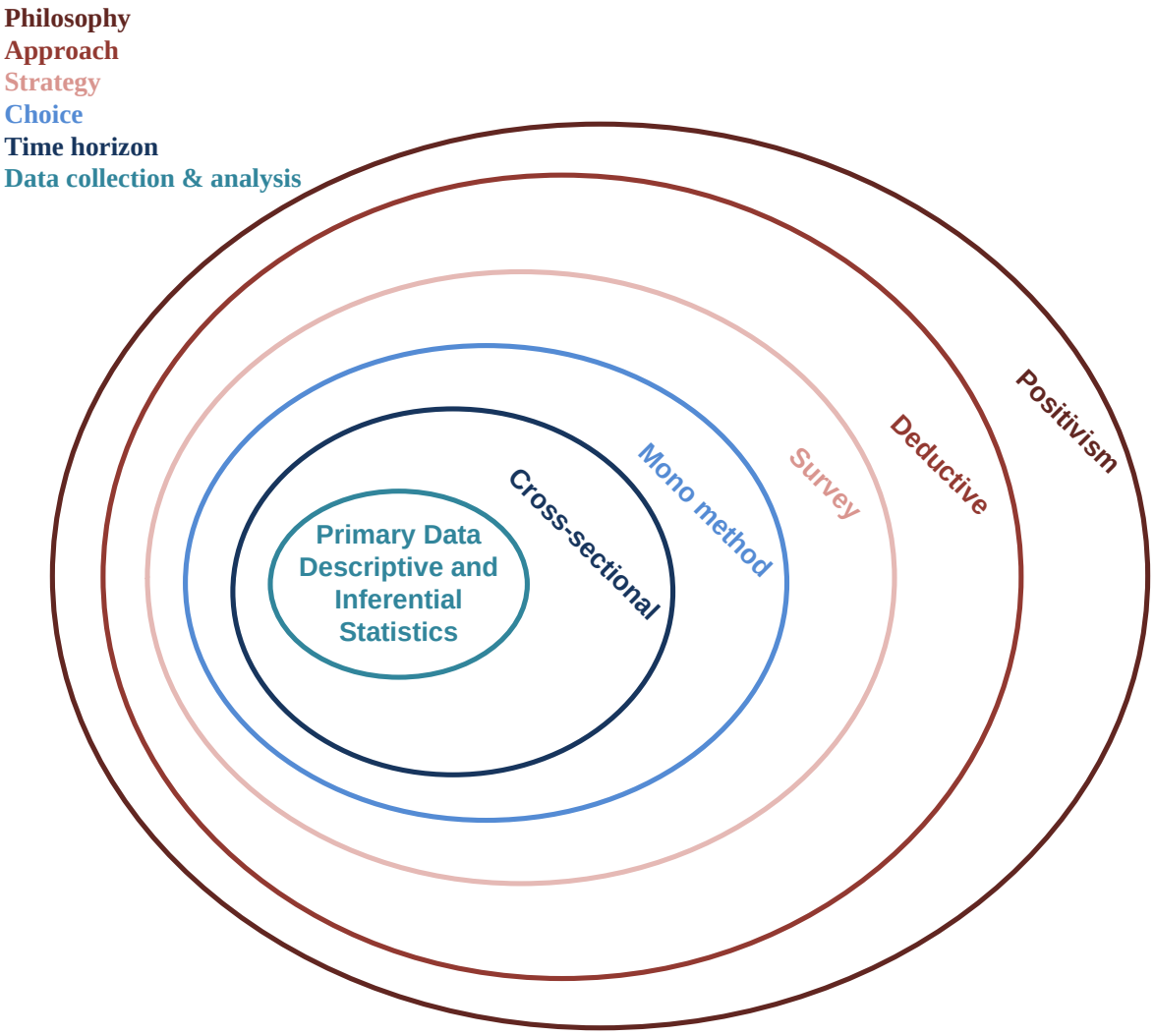


Figure 3.2: The onion model for the current research

The aim of this study is to capture the perception of CIOs about the CSFs and project success criteria. The CIO, who has a big picture of most of the IT projects in the organisation, is involved in many issues related to those projects, and is assumed to possess significant organisational and managerial knowledge regarding the IT projects, and to be authorised to access more information relating to current and future organisational strategies. For that reason, the researcher targeted CIOs from several organisations that are listed in the Saudi National e-Government Portal as participants in the research. The list as provided in the portal is assumed to comprise of organisations that are lined with the Saudi government. These are either public organisations or government subsidiary companies.

3.10. Research Design

Punch (2005) states that a research design is the starting point when planning for empirical data collection. Moreover, Sekaran and Bougie (2010) state that a good research design had a clearly defined purpose, and had consistency between the research questions and the proposed research method. The design should cover all of the main ideas involved in the data collection and analysis; from the approach, the basic framework, and the procedures being employed through to publication of the results. The research design, as shown in **Error! Reference source ot found.**, sets out how the research will be carried out in a systematic manner in order to provide results within a particular timescale.

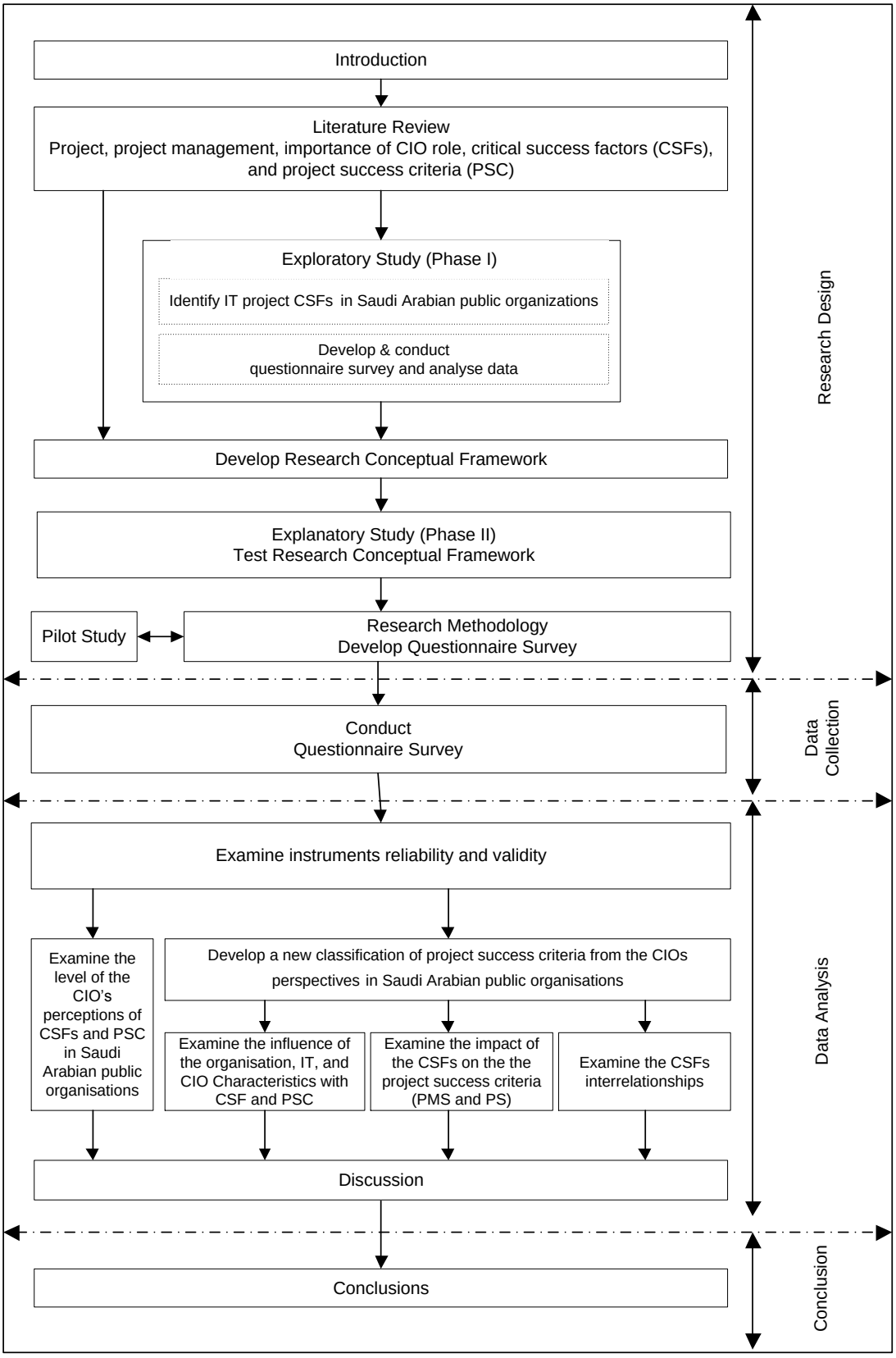


Figure 3.3: Research design

3.11. The Exploratory Phase: Research Conceptual Framework Development

In this research, the exploratory phase is the first step in investigating aspects of project success in Saudi Arabia. The exploratory phase helps in understanding different components as well as their perceived interaction for the phenomenon under examination (Krathwohl, 2009). In particular, it assists in identifying the potential factors that may influence the project success criteria in such an environment.

Moreover, the conduct of this phase is needed for developing a conceptual framework that will help the researcher to hypothesise and test certain relationships in order to improve the understanding of the phenomena (Sekaran and Bougie, 2010). During the construction of the conceptual framework, the researcher carried out the following processes. First, the researcher conducted an intensive literature review on IT project success to understand the problem and to identify the success factors, and the success criteria that are used to determine whether the project is successful or not. Then, the actual study was performed using deductive approach with the aim of confirming the outcomes of the literature and identifying the CSFs in Saudi Arabian public organisations.

3.11.1 Literature Review

To conduct the study of the CSFs, the project success criteria, and their possible relationships, clearly the 'descriptive/interpretive' method was appropriate to focus on the literature and actual current events. According to Punch (2005), a descriptive study sets out to collect, organise, and summarise information about the matter being studied; it is concerned with making complicated things understandable.

In this research, the literature review is a very important stage of the exploratory phase in order to understand the topic under investigation and clarify important issues, revealing how this topic is treated and studied. Marshall and Rossman (2010) argue that "*a thoughtful and insightful discussion of related literature builds a logical framework for the research that sets it within a tradition of inquiry and a context of related studies*" (p. 28). Therefore, the literature review has been adopted as the first stage to build the research context. The researcher has explored the literature on all the issues related to project success, which helped to provide a detailed understanding of its research and its application within organisations.

These issues include the project and project management concepts, the CSFs, and the project success criteria.

3.11.2 The Survey

The aim of this stage of the exploratory phase is to shortlist the 12 success factors identified from the literature review, and to select those factors that are most important to a number that is appropriate for quantitative research. This preliminary procedure is important given the small number of sample size for analysis in the actual study. In order to achieve this goal, a survey strategy is adopted to rank the importance of the results obtained from the literature review conducted earlier, on the success factors in order to identify the CSFs in Saudi Arabian organisations.

Hence, the study was conducted based on the samples selected from all the CIOs listed from Saudi National e-Government portal (142 CIOs). The list of the 12 identified success factors was converted into a questionnaire that was used for the CIOs to rank based on their perspective on how important are they. The quantitative finding of the exploratory work is aimed at finalising the design of the research conceptual framework which will be tested in the explanatory phase. The outcomes filtered the twelve success factors to be included in the final stage of building the research framework. The exploratory study is presented in Chapter 4.

3.12. Explanatory Phase: Research Conceptual Framework Testing

The explanatory study follows the deductive approach to research problem defined earlier. In the explanatory phase, the research problem is formulated in testable forms so that the relationship amongst the research constructs can be described and explained. The most popular and common research strategy, the survey strategy, is adopted in this phase to gather quantitative data, which can be analysed using different statistical methods in order to provide an accurate research generalisation (Yin, 2014). Therefore, this study aims to give a positivist understanding of the phenomenon under study by empirically examining and testing the research conceptual framework.

This phase empirically tests the research conceptual framework using a survey. Therefore, a self-completion questionnaire survey was used to obtain information about the CSFs and

project success criteria at the CIOs' level. Such data will be used to assess the level of project success perceptions (factors and criteria) and to examine the relationships between CSFs and project success criteria. In the area of CSFs and project success criteria, many research studies have been conducted using questionnaire surveys to collect information (e.g., (Dezdar and Ainin, 2012, Nah et al., 2007).

This section begins with the population and sample. Then, development of the questionnaire survey instrument, the pilot study, the sampling strategy, the distribution of the questionnaire, the statistical data analysis and the instrument validation techniques. The outcomes of this study are covered in more details in Chapters 5 and 6.

3.12.1 Population and Sample

Total population sampling technique was employed. Since the population of this study was relatively small (142), there was no need for determining sample size in order to achieve accuracy. Instead the entire population was considered as the sample size because it was possible to collect data from the whole population. Total population sampling is a type of *purposive sampling* technique that involves examining the entire population that have a particular set of characteristics (CIOs in this research) (Lund, 2016). Since total population sampling involves all members within the population of interest, it is possible to get deep insights into the phenomenon of interest. Total population sampling has a wide coverage of the population of interest reducing risk of missing potential insights from members that are not included (Lund, 2016). Therefore, the researcher tried to reach all of the CIOs in Saudi public related organisations. The list of all the agencies was obtained from the following link from the Saudi National e-Government Portal (e-Government, 2013), and the contact information of the CIOs was obtained from the e-Government programme (Yesser).

3.12.2 The Questionnaire Survey Development

The components of the questionnaire of the explanatory phase are the critical success factors (CSFs) and project success criteria (PSC). The outcome of the literature review (section 2.8.1) and the exploratory study (chapter 4) assisted to identify the CSFs (eight factors) whose impact needs to be tested on project success criteria (PSC). Also, the outcome of the literature review helped to identify the components of PSC (section 2.8.1). These two variables (CSFs

and PSC) will be the basis of the explanatory phase (questionnaire). Therefore, a research questionnaire was developed and used to gather empirical data from CIOs in Saudi Arabian organisations in order to examine the relationships between the CSFs and project success criteria (PSC). In the questionnaire, two measurement instruments were used to measure CSFs (as independent variables) and project success criteria (as dependent variable), and each instrument will have suitable measurement scales. In the literature review, many questionnaires were examined, and it was determined that none fully met the requirements of this research. Therefore, it was necessary to develop a new research questionnaire. However, the questionnaires developed in the literature review did give some insights into developing the questionnaire required for this research.

It should be noted that the aim of the questionnaire survey was to measure the respondents' perceptions for each identified CSF and project success criteria in order to evaluate their relationships. Therefore, the questionnaire should cover the scope of these areas. The items developed for measuring the CSFs and project success criteria were collected from different resources (AlShitri, 2008, Altameem, 2007, Bryde, 2008, Delone and McLean, 2003, Dezdar and Ainin, 2012, EFQM-MultiProject, 2010, Marchewka, 2014, Nah et al., 2007, Stratman and Roth, 2007, Van Der Westhuizen and Fitzgerald, 2005), and they are presented in the following tables (Tables 3.1-3.9). The European foundation for quality management (EFQM) material has been used in the survey since it is a suitable input for the development of questionnaires (Eskildsen and Dahlgaard, 2000). Descriptions of the CSFs and project success criteria will be presented in the next chapter (chapter 4).

Table 3.1: Items used for measuring top management support and commitment (TMS)

Item Code	Item	Source
TMS1	Sufficient incentive is provided by top management	(Dezdar and Ainin, 2012, Nah et al., 2007)
TMS2	IT projects are viewed as a strategic decision by top management	
TMS3	There is sufficient top management commitment	
TMS4	Top management is actively supporting IT projects.	
TMS5	IT projects are received explicit identification from top management as a critical priority	
TMS6	Top management encourages and participates in IT projects	(Altameem, 2007, Dezdar and Ainin, 2012, Nah et al., 2007)
TMS7	Top management commits and shares long term policies with others	
TMS8	Top management support allocate enough budget and resources	(Dezdar and Ainin, 2012, Nah et al., 2007)
TMS9	Top management create the environment for IT projects to succeed	(Bryde, 2008, Dezdar and Ainin, 2012, Nah et al., 2007)

Table 3.2 Items used for measuring strategic planning (SP):

Item Code	Item	Source
SP1	Our IT capabilities are constantly reviewed against strategic goals.	(Stratman and Roth, 2007)
SP2	IT plans are redesigned as required to meet evolving conditions.	
SP3	Strategic IT planning is a continuous process.	
SP4	Written guidelines exist to structure strategic IT planning in our organisation.	
SP5	Top management is involved in strategic IT planning	
SP6	Strategic IT planning includes inputs from all functional areas	

Table 3.3: Items used for measuring communication management (CM)

Item Code	Item	Source
CM1	There are effective communications between project team members and users.	(Dezdar and Ainin, 2012, Nah et al., 2007)
CM2	There are effective communications amongst functional departments.	
CM3	There are effective communications to get the users' requirements and comments.	
CM4	There are enough communication channels (presentations, newsletter, etc.) to inform users about the objectives of the IT projects.	
CM5	IT projects progress are communicated amongst stakeholders	
CM6	All stakeholders and team members willingly keep each other informed.	

Table 3.4: Items used for measuring project management (PM)

Item Code	Item	Source
PM1	Scope of each IT project is clearly established.	(Bradley, 2008, Dezdar and Ainin, 2012, Nah et al., 2007, Zhang et al., 2003)
PM2	A detailed project plan (i.e., what activities to cover at what stage) with measurable results is provided for each IT project	
PM3	The responsibility for all parts of each IT project is assigned.	
PM4	The activities across all affected parties are coordinated properly for each IT project.	
PM5	There is a formal management process to monitor suppliers' activities.	
PM6	Each IT project progress is reviewed on a periodic basis.	

Table 3.5: Items used for measuring project team competences (PTC)

Item Code	Item	Source
PTC1	Each IT project has a well experienced project manager who is dedicated to the project.	(Bradley, 2008, Dezdar and Ainin, 2012, Nah et al., 2007, Zhang et al., 2003)
PTC2	A variety of cross-functional team members are selected	
PTC3	The people selected for each IT project team have the best business and technical knowledge.	
PTC4	Each IT project team is empowered to make decisions relating to the project.	
PTC5	Each IT project team is working on the project full-time as their only priority.	

Table 3.6: Items used for measuring stakeholders management (SHM)

Item Code	Item	Source
SHM1	Structured stakeholder analysis is conducted on a regular basis to understand their expectations, identify synergies and risks.	(EFQM-MultiProject, 2010)
SHM2	Stakeholders' relationships are managed along and across IT projects	
SHM3	IT projects requirements are thoroughly understood, they reflect stakeholder needs and the capability of the organisation.	
SHM4	Stakeholders are recognized for their contribution to efficient IT projects	
SHM5	The roles and responsibilities of all stakeholders are identified	

Table 3.7: Items used for measuring partners and suppliers management (PSM)

Item Code	Item	Source
PSM1	The partners & suppliers communicate well with our organisation.	(Dezdar, 2011, Ifinedo, 2008, Muscatello and Chen, 2008, Wang et al., 2007, Zhang et al., 2005), (AlShitri, 2008, Dezdar, 2011, Huang et al., 2004, Uzoka et al., 2008)
PSM2	The partners & suppliers personnel have enough experience for implementing IT projects	
PSM3	The partners & suppliers provide quality services.	
PSM4	The training offered by the partners & suppliers is adequate to increase the user's proficiency in each IT project usage.	
PSM5	The partners & suppliers provide suitable formal documents (user manual, operation guide, etc.) required for each IT project.	
PSM6	IT product/service quality is regarded as the most important factor in selecting suppliers.	(AlShitri, 2008, Dezdar, 2011)
PSM7	Long-term cooperative relations with partners and suppliers are established	
PSM8	Detailed information regarding partners and suppliers performance is maintained	

Table 3.8: Items used for measuring training and education (TE)

Item Code	Item	Source
TE1	Specific IT skills training is given to team members in all IT projects.	(AlShitri, 2008, Dezdar, 2012)
TE2	Specific user training needs were identified early in the implementation of each IT project	(Stratman and Roth, 2007)
TE3	A formal training program has been developed to meet the requirements of each IT project users	
TE4	Training materials have been customized for each specific job	
TE5	Employees are tracked to ensure that they have received the appropriate training.	
TE6	Our organisation provides regular training sessions	(Altameem, 2007)
TE7	The resources for education and training have been put in place	
TE8	Education and training are encouraged and supported	

Table 3.9: Items used for measuring dependent project success (PSC)

Item Code	Item	Source
PSC1	IT projects are completed on-time.	(Atkinson, 1999, Baccarini, 1999, Johnson, 1999, Kerzner, 2009, Lim and Mohamed, 1999, Marchewka, 2014, Might and Fischer, 1985, Morris and Hough, 1987, Pinto and Slevin, 1988, Turner, 1999, Van Der Westhuizen and Fitzgerald, 2005, Wateridge, 1998)
PSC2	IT projects are completed on-budget.	(Atkinson, 1999, Baccarini, 1999, Johnson, 1999, Kerzner, 2009, Lim and Mohamed, 1999, Marchewka, 2014, Might and Fischer, 1985, Morris and Hough, 1987, Pinto and Slevin, 1988, Turner, 1999, Van Der Westhuizen and Fitzgerald, 2005, Wateridge, 1998)
PSC3	IT projects are completed with all features and functions as initially specified.	(Atkinson, 1999, Baccarini, 1999, Delone and McLean, 2003, Johnson, 1999, Kerzner, 2009, Lim and Mohamed, 1999, Marchewka, 2014, Might and Fischer, 1985, Morris and Hough, 1987, Pinto and Slevin, 1988, Turner, 1999, Van Der Westhuizen and Fitzgerald, 2005, Wateridge, 1998)
PSC4	IT projects meet the needs of the project stakeholders.	(Atkinson, 1999, Baccarini, 1999, Lim and Mohamed, 1999, Marchewka, 2014, Pinto and Slevin, 1988, Turner, 1999, Van Der Westhuizen and Fitzgerald, 2005, Wateridge, 1998)
PSC5	IT project achieve its business goals and purpose.	(Atkinson, 1999, Baccarini, 1999, Delone and McLean, 2003, Lim and Mohamed, 1999, Marchewka, 2014, Morris and Hough, 1987, Turner, 1999, Van Der Westhuizen and Fitzgerald, 2005, Wateridge, 1998)
PSC6	End products of IT projects are used.	(Delone and McLean, 2003, Pinto and Slevin, 1988, Van Der Westhuizen and Fitzgerald, 2005, Wateridge, 1998)

The CSFs and project success criteria instruments were structured into a questionnaire. The logic of the questions in these instruments was descriptive. These instruments requested the respondents' perceptions of the CSFs and project success criteria. All the questions made use of a five-point Likert-type scale with anchors ranging from "strongly agree" to "strongly disagree"; each question states an opinion and obtains the respondents' degree of agreement or disagreement. This scale provides answers in the form of coded data that are comparable and can be readily manipulated. For example:

Regarding the IT projects in your organization: To what extent do you agree with each of the following statements? *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Top management participates in IT projects.	○	○	○	○	○

The questionnaire was divided into four sections as follows: Section one sought to gather information about the characteristics of the respondents and their background (nationality, gender, age, educational level, field of study, years of experience, managerial level, CIO type, and experience as CIO). Section two contained questions about the organisational and IT characteristics (organisation's category, organisation size, IT department size, IT projects' yearly budget, existence of formal project management methodology/standard information, existence of project management office (PMO), systems development, and external government support). Section three covered the project success criteria. Section four covered the CSFs (top management support and commitment, strategic planning, communication management, project management, project team competency, stakeholders management, Partners and suppliers management, training and education); most of these questions were tested by Nah et al. (2007), Dezdar and Ainin (2012) and others. The questionnaire survey instrument can be seen in Appendix B.

3.12.3 The Pilot Study

Remenyi (1998) indicated that a questionnaire instrument needs to be pre-tested before it is finally administered in order to detect possible shortcomings in its design and administration. Conducting a pilot study is a vital step for identifying any problems with the proposed method of data collection. It permits a preliminary assessment of the research questions or hypotheses; it may lead to changing or omitting some of them, or to developing new ones. It often provides the researcher with thoughts, approaches, and indications. It also aims to ensure that the wording of the questionnaire's items is clear, and thus the respondents are able to understand each question clearly and quickly. The pilot test also aims to assess the time needed for filling in the questionnaire.

After the questionnaire had been developed, it was sent to six IT experts (two CIOs, one IT professional, one IT consultant, and two IT assistant professors) to participate in the pilot study. They were asked whether: 1) the items were stated in a shared vocabulary; and 2) the

items were precise and unambiguous. They could answer these questions and provide suggestions for additional items. The participants returned the questionnaires with their comments. Based on their responses and in order to improve the clarity of the instrument, certain adjustments were incorporated into the final version of the questionnaire such as the length and the clarity of each question. The content validity of the instrument was thereby addressed. Then, prior to data collection, an application containing all the research instruments was submitted to the Research Ethical Committee at the School of Computing Science in the University of East Anglia, and approval was granted (see appendix C).

3.12.4 Ethical Considerations

"*Ethics define what is or is not legal to do, or what moral research procedure involves*" (Newman, 2006). This research intends to follow the four standards of good practice: (1) to do positive good, (2) non-malfeasance, (3) informed consent, and (4) confidentiality and assurance of anonymity (Bošnjak, 2001). No invasive or sensitive information is required or collected during the research, therefore no ethical issues are expected.

The participants were encouraged to respond rather than being asked to do so in a way that may have been considered unpleasant (Dillman and Salant, 1994). The participants' privacy was protected from misrepresentation and exploitation (Zikmund et al., 2012). In line with ethical guidelines, the respondents were not asked for any private information and any information they did give was kept confidential. Prior to the study, they were issued with a sheet outlining the purpose of the research and detailing their rights as participants; this included their right to withdraw from the study at any time, and to contact their researcher if they had any queries or concerns.

An application was made to the Research Ethical Committee at the School of Computing Science at the University of East Anglia prior to data collection which detailed the research instruments, and approval was subsequently granted (see appendix C).

3.12.5 Data Collection Procedure

At this stage, the questionnaire survey was ready to be distributed for the explanatory phase. The response rate is usually influenced by several factors, which include the nature of the topic and the sample, the length of the questionnaire, and the manner in which the particular

survey is conducted (De Vaus, 2004, Remenyi, 1998). The timing of the survey is another important factor that influences the response rate of a survey.

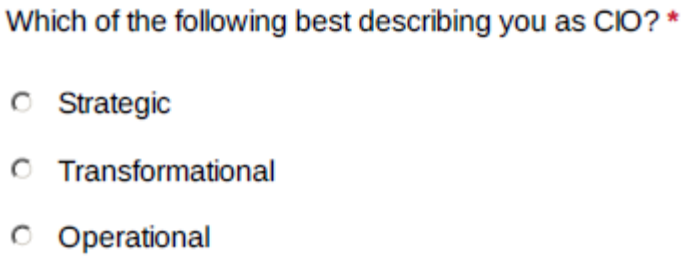
The web link of the improved questionnaire, together with a covering letter explaining the purpose of the survey/study, were emailed to the target people (CIOs). A general invitation was sent to all the CIOs in the organisations as listed in the Saudi National e-Government Proal (142 CIOs) directly or indirectly using email and the LinkedIn social network in order to maximise the response rate. The distribution took place during the period from 1st September 2013 to 30th December 2013. In the beginning, the response rate was low so the researcher had to start sending a personal invitation by name to each of the CIOs in order to gain more attention and increase the response level. Then later, on a weekly basis, a follow up email was sent to remind the respondents to complete the questionnaire and to solve any problems they may face, and clarify any ambiguity. Even though the response rate increased after the individual invitations, the researcher tried sending the questionnaire through the e-Government programme (Yesser) to stress the importance of this research and to improve the understanding of project success in Saudi organisations.

This procedure increased the response rate to an acceptable level so that the researcher was satisfied. A copy of Yesser's invitation to the CIOs can be seen in Appendix D. A total of 76 questionnaires were returned, of which 3 were spoilt, leaving 73 for the analysis (a response rate of 51.4%). The level of the response rate has been attributed to both the direct and personal/email approach used by the researcher and by Yesser.

3.12.6 Statistical Data Coding and Analysis

3.11.5.1. Data Coding

The researcher followed one strategy for coding the questionnaire. For non-scaleable answers, the coding starts with number 1 for the first category and 2 for the next and so on. For example, for the question related to the CIO type:



Answers were coded as follows: Strategic was coded as 1, Transformational was coded as 2, and Operational was coded as 3. This was repeated for the other data about the respondents' backgrounds.

The CSFs and project success criteria scales use a five-point Likert response scale to indicate the extent to which the respondent agrees or disagrees with each statement. The reason behind this is to ensure higher statistical variability among survey responses. Therefore, to distinguish between CIOs in Saudi organisations, since they differ in their perceptions of IT project implementation success, the 5-point response scale was: 'strongly disagree' coded as 1, 'disagree' coded as 2, 'neutral' coded as 3, 'agree' coded as 4, and 'strongly agree' coded as 5.

3.11.5.2. Statistical Data Analysis

Two types of statistical analysis are used in this study; descriptive statistics and inferential statistics. Descriptive statistics refer to the transformation of the data into a form that will make them easy to understand and interpret (e.g. frequencies, central tendencies, dispersions and averages), whereas inferential statistics try to identify relationships between variables (e.g. ANOVA and regression) (Cohen, 2000, Sekaran and Bougie, 2010).

Different statistical techniques were used in the analysis of the questionnaires' data based on their relevance to the research requirement. These techniques included, where applicable, descriptive statistics (frequencies, percentage, mean, and cross-tabulation), and ANOVA using the statistical package for social sciences (SPSS 22), and testing the research conceptual framework using Partial Squares Least Structural Equation Model (PLS-SEM) which is one of the second generation data analysis techniques. The software that has been used is SmartPLS 3.0. The following subsections provide an explanation of these techniques.

3.11.5.3. Descriptive Statistics

Frequency analysis produces a table of frequency counts, percentages and mean for the value of individual variables (CIOs, organisational characteristics and IT characteristics). It was used in this study to provide descriptive information of data such as frequency, percentage and means of the response. Cross-tabulation is a way of displaying data so that we can readily depict an association between two variables (De Vaus, 2004). It was used in this study to

examine the level of perceptions of CSFs and project success criteria in Saudi Arabian public organisations.

3.11.5.4. ANOVA

The one-way ANOVA tests the differences in a single interval dependent variable among two, three, or more groups formed by the categories of a single categorical independent variable (Garson, 2006). The 'Sig.' or '*p*' probability value of a one-way ANOVA indicates whether the difference between groups is 'statistically significant'. The probability value of .05 or less on the F test leads the researcher to conclude that the effect is real and not due to chance of sampling, however, probability values do not identify the degree to which the two variables are associated with one another. If *F* is significant, then the researcher concludes there are differences in group means, indicating that the independent variable has an effect on the dependent variable.

In this study, a one-way ANOVA was used to examine the variance between the means of CIOs, organisational characteristic and IT characteristic variables in response to the CSFs. In this test, the CIO, organisational characteristic and IT characteristic variables were considered as '*independent variables*', and the CSFs were considered as '*dependent variables*'. One-way ANOVA can distinguish between those independent variables which have a significant relationship with the dependent variables and those which do not have a significant relationship.

3.11.5.5. Factor Analysis

Factor analysis is a multivariate statistical technique that examines the underlying structural pattern among research variables to identify a common set of dimensions (Egbeniyoko, 2014). A reason for choosing this technique is that as an advanced multivariate statistical technique, factor analysis has the superior advantage of not only reducing data variables, but also handling the problem of multi-collinearity, which is common in standard multiple regressions and can make the interpretation and conclusions arising from such techniques unsatisfactory and questionable (Hair, 2010). It does this by reducing the dataset of a group of interrelated variables to smaller clusters of uncorrelated variables or factors that can then be used in further regression (Hair, 2010). Factor analysis is used in this study for construct validity for all the research variables (CSFs and project success criteria). Also, it is used to classify

different types of project success criteria (PSC) on the basis of the CIOs perspectives within Saudi Arabian public organisations.

3.11.5.6. Partial least squares model analysis

Most first generation techniques for data analysis such as linear regression, LOGIT, ANOVA and MANOVA, are capable of assessing only one level of relationship between dependent and independent variables. SEM techniques such as LISREL1 and Partial Least Squares (PLS) are considered a second generation instrument for data analysis. It is a mixed methodology, which consists of confirmatory factor analysis, regression, and path analysis (Gefen et al., 2000). By modelling the relationships between several variables at the same time, SEM is able to deal with a number of interrelated research issues by means of systematic examination (Gefen et al., 2000). From the more frequently used statistical methods of path analysis and multiple regressions, SEM is more advantageous because it allows the examination of several relationships in a single analysis. It also means that there is a possibility of testing overall models rather than separate coefficients (Gefen et al., 2000). Lastly, SEM has the capability to test research models with several dependent variables.

The researcher tested the research conceptual framework by using the variance-based PLS-SEM technique which is suitable for predicting the validity of models (Chin, 1998). For conducting the actual analyses, the researcher used the PLS-SEM algorithm as implemented by the software SmartPLS in release 3.03 (Ringle et al., 2014). PLS uses R^2 statistics and does not place strict demands on sample size and data normality (Hair, 2010). Two assessments are supported by PLS-SEM (Hair et al., 2011): (1) the measurement model assessment – here the psychometric properties, i.e., item reliability, convergent and discriminant validities of the measurement scales are examined; and (2) the structural model assessment – this aspect presents information related to item loadings and the strength of paths in models. The path significance levels using t-values are estimated by the bootstrap method (Hair et al., 2012).

Measurement model estimation provides empirical measures of the relationships between the indicators and the constructs (Hair Jr et al., 2014). Empirical measures enable researchers to compare the theoretically established measurement model with reality, as represented by the sample data (Hair Jr et al., 2014). Measurement model estimation enables the researcher to evaluate the reliability and validity of the constructs' measures. In order for the measure to be

more accurate, multivariate measurement involves using several variables to indirectly measure a concept.

Assessment of the structural model provides empirical measures of the relationships between the constructs (Hair Jr et al., 2014). The empirical measures enable researchers to compare the theoretically established structural model with reality as represented by the sample data, and therefore to decide if the proposed theory has been empirically confirmed (Hair Jr et al., 2014). PLS-SEM assessment of the structural model examines the model's ability to predict. This involves examining the model's predictive capabilities and the relationships between the constructs.

3.13. Summary

This chapter provided the research philosophy, approach, and strategies; an outline of the methodologies in information systems research; the population and sampling techniques; the research design; and the questionnaire survey. Then, the selected methodology for each phase was described. Having outlined the research instruments and methods, the next chapter will present the research conceptual framework development process and describe its components.

Chapter 4 : Exploratory Study (Phase I)

4.1. Overview

Chapter Three presented the research methodology employed in this study, and described an operational plan that was undertaken in order to complete the study. This chapter provides the research conceptual framework development process and its components. Developing a conceptual framework will help the researcher to hypothesise and test certain relationships in order to improve the understanding of the situation (Sekaran and Bougie, 2010). During the construction of the conceptual framework, the researcher carried out the following processes. First, the researcher conducted an intensive literature review on IT project success to understand the problem and to identify the success factors, and the success criteria that are used to determine whether the project is successful or not. Then, the actual study was performed using deductive approach with the aim of confirming the outcomes of the literature and identifying the CSFs in Saudi Arabian public organisations. Section 4.2 displays the research conceptual framework development process, and section 4.3 presents the details of the findings of the exploratory study. Section 4.4 presents the research framework and its components.

4.2. Overview of Research Conceptual Framework Development Process

Although the existing studies and frameworks have elucidated project success from different perspectives and assisted the researcher in gaining an overall conceptual understanding of existing project success research, the researcher believes that developing a framework empirically from the Saudi Arabia context will broaden knowledge in the area of CSFs and project success criteria within Saudi organisations. This is an area which has not been previously explored in depth by researchers. Therefore, the researcher will draw attention to the scope of the proposed research conceptual framework:

- It is based on empirical study within the Saudi context.
- It is based on high level executives' (CIOs') perspectives.

- It is built to address IT projects in general rather than a specific project such as ERP or HIS.
- It is focused on organisational rather than technical factors.
- It includes new factors such as stakeholders management.
- It includes the project success criteria as a dependent variable.
- It tests the impact/influence of the CSFs on the PSC developed based on the CIOs' perceptions of project success criteria.

Therefore, the research conceptual framework presents a holistic picture of the critical success factors (CSFs) that influence the project success criteria in public organisations in Saudi Arabia. The content of the framework consists of two essential components. The first component of the research conceptual framework is the project success criteria that needs to be tested as a dependent variable in the model in the explanatory phase, and these criteria have already been identified and discussed in the literature (see chapter 2). The second component is to identify the critical success factors that may have an influence on the project success criteria and can be included in the model. Therefore, the conceptual framework derived from the literature as illustrated in Chapter 2 is verified in this prelimanary work.

The researcher has adopted a two stage procedure in an attempt to strengthen the decision with the choice of variables to be tested in the explanatory study (Figure 4.1).

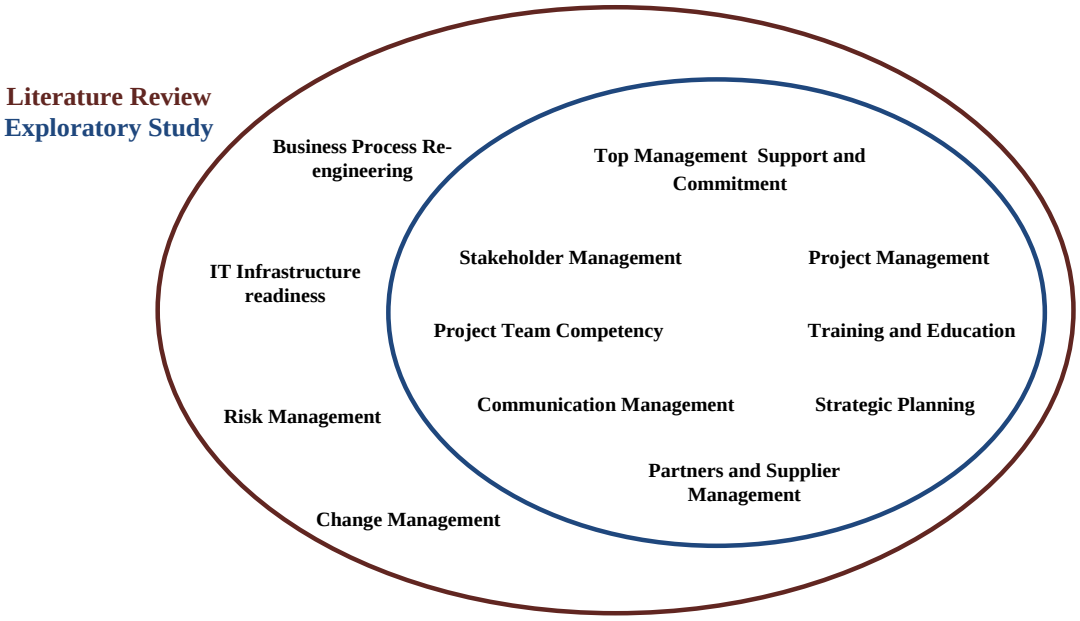


Figure 4.1: Research conceptual framework development process

The first stage was the literature review, which suggested a number of factors that should be involved in the preliminary conceptual framework as the base for the study. This includes twelve factors, which are depicted in Table 2.4 (section 2.8.2). These factors are common in the IT field literature, especially in ERP studies, and they are: (1) top management support and commitment; (2) strategic planning; (3) communication management; (4) project management; (5) project team competency; (6) stakeholders management; (7) partners and suppliers management; (8) training and education; (9) business process re-engineering; (10) IT infrastructure readiness; (11) change management; (12) risk management.

The second stage was the exploratory study, the objective of which was to examine the importance of the factors mentioned in the literature (stage one) in a different environment with different cultures in order to focus on a practical number of factors to be included in the research model. Therefore, this exploratory study has been conducted in one of the high-income developing countries. The study was conducted with CIOs in the public sector in Saudi Arabia using a survey approach. The outcomes of the questionnaire filtered the twelve success factors which had been proposed by the literature review to eight factors which would be included in the final stage of building the research framework. These factors are: (1) top management support and commitment; (2) strategic planning; (3) communication management; (4) project management; (5) project team competency; (6) stakeholders management; (7) partners and suppliers management; (8) training and education. The research framework was tested later in the explanatory phase in more depth to find out the effect of the final list of the success factors on the project success criteria. The following section will present the discussion of the exploratory study in more detail.

4.3. Exploratory Study

Using the factors that had been found in the literature, the exploratory study seeks to identify the CSFs in Saudi Arabian public organisations by sorting them based on their importance from the CIO's perspective in order to focus on a practical number of factors to be included in the research conceptual framework. This is due to the restrictions imposed in the use of too many variables in a study within relatively small sample. The researcher, therefore, needs to justify the focus of the research on a smaller number of acceptable variables in the actual explanatory phase.

4.3.1 Questionnaire Survey Process

In order to successfully rank the factors according to their importance, a quantitative method using a questionnaire was employed, and data analysis consisting of descriptive statistics and frequency distributions was utilised. The list of the success factors has been prepared in order of their importance using statistical mean ranking, and scores with a mean item response of 4 or higher are considered as critical success factors. The target population of this study was all the CIOs in Saudi Arabian public organisations (142 CIOs).

The questionnaire consisted of two sections (see appendix A). In section one, the respondents were required to fill in details of their demographic profile such as gender, age, position and experience. Section two required the respondents to indicate their perceptions of the factors that perceived to have influence on IT project success using a five-point Likert-type scale with anchors ranging from "strongly agree" to "strongly disagree". Having designed the survey form, the questionnaire was sent to four IT experts (one IT professional, one consultant and two CIOs) for validating and piloting the instrument. Only those who had at least five years' experience of IT management were chosen. The reason for that was to consult people with significant levels of practical experience. Based on their responses and in order to improve the clarity of the instrument, certain adjustments were incorporated into the final version of the questionnaire such as the wording and the clarity of each item. Then, the content validity of the instrument was thereby addressed.

The web link for the improved questionnaire, together with a covering letter explaining the purpose of the survey/study, was emailed to all the CIOs in the Saudi government sector (142). Also, invitations were sent to the CIOs directly or indirectly using the LinkedIn social network in order to maximise the response rate. The distribution took place during January 2013. A total of 41 questionnaires were returned, of which 2 were spoilt leaving 39 for the analysis (a response rate of 27.5%). Following the data collection, the responses were coded to enable them to be computer processed. The software package used for the analysis was SPSS 22 (statistical package for the social sciences) for Windows.

4.3.2 Exploratory Study Findings

Table 4.1 presents the characteristics of the respondents. As can be seen, the majority of the respondents were Saudi and all but one of them were male. Also most of the respondents were above 30 years old, and held a university degree (Bachelor /Master). Most of CIOs had more

than 10 years' experience. 35.9% were ministeries organisations; 12.8% were authorities organisations; 7.7% were corporation organisations; 17.9% were hospital organisations; 23.1% were higher education organisations; and 2.6% respondents indicated that their organisations belonged to the category 'other'. This is fairly representative of the numbers/sectors of the public organisations in Saudi Arabia.

Table 4.1: Characteristics of the respondents

Measure	Categories	Frequency	Percent	Cumulative Percent
Nationality	Saudi	31	79.5	79.5
	Non Saudi	8	20.5	100.0
Gender	Male	38	97.4	97.4
	Female	1	2.6	100.0
Age	<26	1	2.6	2.6
	26-30	1	2.6	5.2
	31-35	10	25.6	30.8
	36-40	11	28.2	59
	>40	16	41.0	100.0
Last Educational Qualification	Below Bachelor	2	5.1	5.1
	Bachelor	10	25.6	30.7
	Master	23	59.0	89.7
	Phd	4	10.3	100.0
Field of Study	Computing	28	71.8	71.8
	Engineering	3	7.7	79.5
	Management	8	20.5	100.0
Experience	6-10	8	20.5	20.5
	11-15	12	30.8	51.3
	16-20	12	30.8	82.1
	>20	7	17.9	100.0
Organisations Category	Ministeries	14	35.9	35.9
	Authorities	5	12.8	48.7
	Corporations	3	7.7	56.4
	Hospitals	7	17.9	74.4
	Higher Education	9	23.1	97.4
	Other	1	2.6	100.0

Based on the survey's results, the researcher summarised and classified all the factors that affect IT project success, as illustrated in Table 4.2. The researcher decided that the mean should be four or greater (where the average responses should be equal to "agree") as a threshold in order for the factor to be considered a critical factor. This then minimised the number of the factors and made the data set more manageable. In addition to the threshold, the results show a natural break between stakeholders management (4.15) and change management (3.69). The results show that eight factors have means above 4, and are therefore

selected as CSF variable for the actual study. Those factors are: top management support and commitment (4.79), project management (4.54), project team competency (4.36), communication management (4.36), strategic planning (4.36), training and education (4.31), partners and suppliers management (4.18) and stakeholders management (4.15).

Table 4.2: IT project success factor in Saudi Arabia

No.	IT Project Success Factor	Mean
1	Top Management Support and Commitment	**4.79**
2	Project Management	**4.54**
3	Project Team Competency	**4.36**
4	Communication Management	**4.36**
5	Strategic Planning	**4.36**
6	Training and Education	**4.31**
7	Partners and suppliers management	**4.18**
8	Stakeholders Management	**4.15**
9	Change Management	3.69
10	Business Process Re-Engineering	3.64
11	IT Infrastructure Readiness	3.64
12	Risk Management	3.33

4.4. Research Conceptual Framework Components

Based on the findings of the literature and the exploratory study, the researcher was then able to develop the conceptual framework of IT project success in order to achieve the research aim, which is to investigate the impact/influence of the critical success factors (CSFs) on projects success criteria (PSC) within Saudi Arabian public organisations context from the CIO's perspective. Figure 4.2 shows conceptual framework with the direction of the hypothesize relationship between all the selected variables. The framework also includes the role of CIO characteristics as moderator on the CSF or PSC.

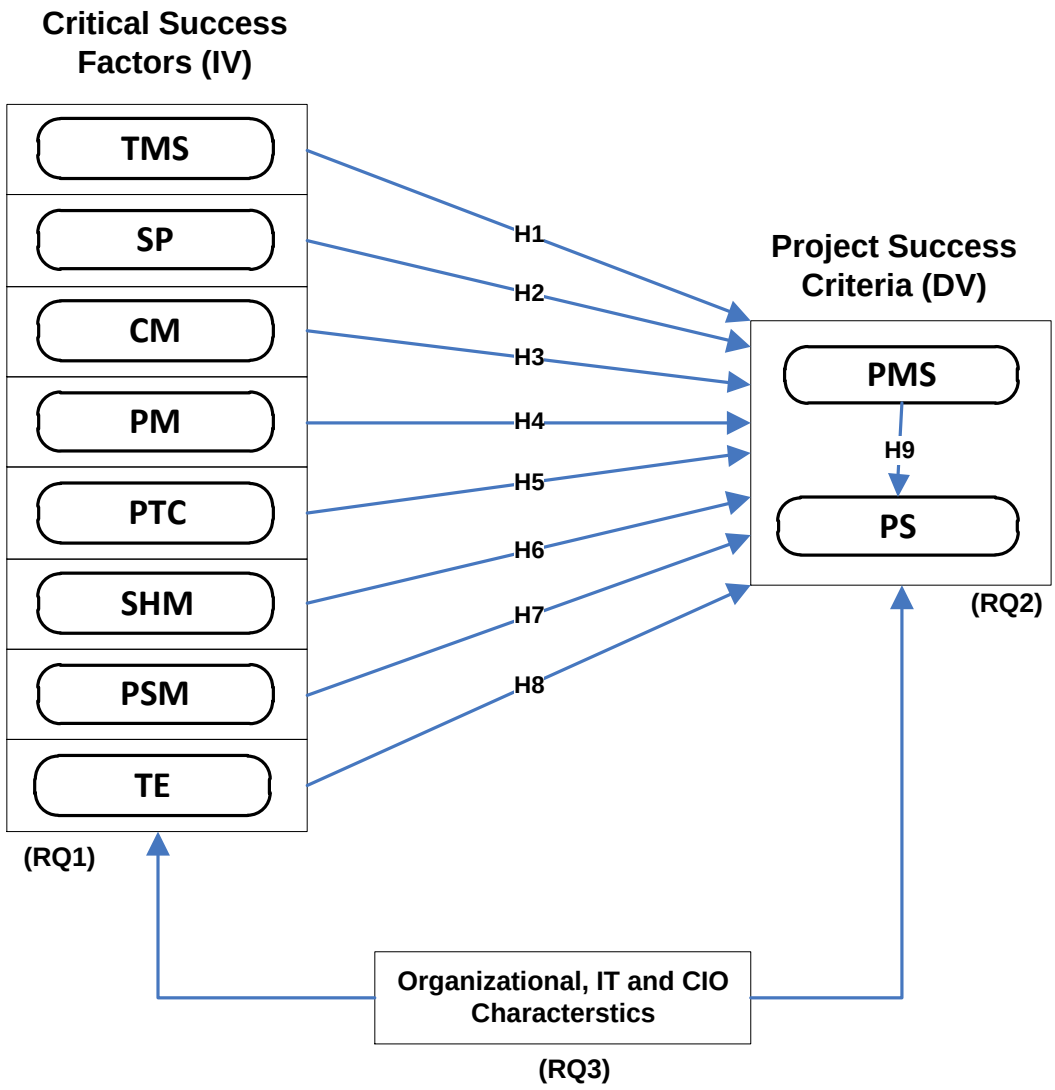


Figure 4.2: Research conceptual framework

The figure (Figure 4.2) illustrates the direction of the relationship between variables. The eight factors selected from the exploratory study results are placed on the left as the independent variables. These factors are conceptually categorized as the critical success factor dimension as discussed in chapter 2 and each were hypothesized (from H1 until H8) to have a significant effect on either project management success (PMS) or project success (PS). This study, therefore, seeks to investigate these links by testing the following hypotheses:

H1a: Top management support (TMS) has a significant effect on PMS

H1b: Top management support (TMS) has a significant effect on PS

H2a: Strategic planning (SP) has a significant effect on PMS

H2b: Strategic planning (SP) has a significant effect on PS

H3a: Communication management (CM) has a significant effect on PMS

H3b: Communication management (CM) has a significant effect on PS

H4a: Project management (PM) has a significant effect on PMS

H4b: Project management (PM) has a significant effect on PS

H5a: Project team competency (PTC) has a significant effect on PMS

H5b: Project team competency (PTC) has a significant effect on PS

H6a: Stakeholder management (SHM) has a significant effect on PMS

H6b: Stakeholder management (SHM) has a significant effect on PS

H7a: Partner and supplier management (PSM) has a significant effect on PMS

H7b: Partner and supplier management (PSM) has a significant effect on PS

H8a: Training and education (TE) has a significant effect on project success PMS

H8b: Training and education (TE) has a significant effect on PS

The PSC dimension is placed on the right to indicate the position of the dependent variable. This illustrates these variable as being influenced by factors on the left. As identified in the review, the concept of PSC, which is categorized as the project success dimension, is derived from both literature on project management and IS success model. Project success denotes the extension of success to the benefit of the project and the extent is acceptable by the users and the stakeholders in achieving the organisation goal. On the other hand, project management success denotes the success of any particular IT project with the commonly defined triple constraint of cost, time and scope. As discussed in chapter 2, this study will try to find an empirical evidence for the effect of project management success (PMS) on project success (PS). Therefore this study, seeks to investigate this link by testing the following hypothesis:

H9: project management success (PMS) has a significant effect on project success (PS)

In view of the importance of CIO roles and the different characteristics/types they have, there is a possibility that any one of these characteristics can impose a certain level of influence on the CSF and PSC. Data collected in the exploratory study indicates their differences in experience, age, academic qualification and the types of organisations they worked with.

Therefore, the framework indicates these characteristics as variables that may influence the CIO perceptions about CSF or PSC. The arrow indicates the elements of CIO being treated as the independent variable for both conceptual variables under the focus of this study.

4.5. Summary

This chapter provides the results of an exploratory study with the main purpose of exploring and selecting the most important success factors to be included the research. Based on the findings, the conceptual framework was developed that shows the relationships of each of the variables, which depicted the critical success factors (CSF) as independent variables and project success criteria (PSC) as a dependent variable. The study also includes the role of CIO characteristics in potentially influencing both the IV and the DV of the study. The following chapters (5 and 6) will present the explanatory phase, where the actual survey was conducted in order to test the proposed framework.

Chapter 5 : Respondents' Profile and Reliability Analysis - Explanatory Study (Phase II - Part A)

5.1. Overview

The main purpose of this chapter is to provide the result of the analysis of the data from the explanatory phase study, in the form of descriptive respondent profile, and the reliability analysis of the variables measured in the study (CSF and PSC). This section seeks to analyse and test if any of the CIO types or characteristics measures impose any influence on either CSF or PSC. Section 5.2 presents the descriptive analysis of the CIOs and organisational variables. Section 5.3 presents standard deviation and standard errors of means, and section 5.4 presents normality assessment. Section 5.5 presents the construct analysis, and section 5.6 presents the descriptive analysis of constructs. Sections 5.7 and 5.8 present the influence of the organisational variables with the CSFs and PSC. Sections 5.9 and 5.10 present the level of perception of the CSFs and the project success criteria. Section 5.11 explores the relationships between the CSFs and the project success criteria (PSC)s.

5.2. Descriptive Statistics

Following the data entry using the SPSS program, descriptive statistics were used to produce frequency analysis and cross-tabulation to describe and provide a general idea about the nature of the data collected. Frequency analysis was used in this study to provide descriptive information of the data such as frequency, percentage and mean values of the response. Descriptive statistics were also generated for describing the CIOs' profiles, organisations' characteristics and IT characteristics. In addition, cross-tabulation was used in this study to explore any relationships or peculiarity in the CIO characteristics. A copy of the survey is provided in Appendix B.

5.2.1. CIOs' Profiles

The findings indicate that some small variability exist in the characteristics of CIOs. Common characteristics can also be observed among the CIOs, as they are mostly Saudis, male, have basic bachelor's degree, have IT background, have long years of experience, and the CIO types mostly strategic and transformational. The effect of the differences in these characteristics on CFS, PMS and PS are further analysed using ANOVA in separate sections that follows.

Table 5.1 illustrates a summary of the statistics of the demographic characteristics of the participants. It shows the frequency distribution of the CIOs' nationality, gender, age, educational level, educational background, experience, respondent level, CIO type, experience as CIO, and experience as number of IT projects. Results indicate that the majority of the respondents are Saudi (90.4%) and male (97.3%). None of the respondents' ages were less than 26. Among the 73 respondents, sixty one (83.5%) were older than 35 years. The results show that the vast majority of the respondents (98.6%) hold at least Bachelor degrees. It should be noted also that 36 respondents hold Master degrees, and that 1 respondent's education level is lower than a Bachelor degree.

The majority of the respondents hold a degree in the computing field (84.9%), seven (9.6%) in management, and three (4.1%) indicated 'other'. 86.3% of the respondents have worked for more than 10 years. The majority of the respondents (87.6%) were at most two levels below the organisation's top management. Thirty-four (46.6%) of respondents classified themselves as strategic, twenty-five (34.2%) as transformational, and fourteen (19.2%) as operational. Thirty-nine (53.4%) of the respondents had less than 6 years' experience as CIO. Thirty-five (48.0%) of respondents had experience less than 6 in terms of the number of accomplished IT projects which have had an effect at the organisational level. This is consistent with the CIO experience, as the number of IT projects increases as the CIO's experience increases.

The findings indicate that some small variability exist in the characteristics of CIOs. Common characteristics can also be observed among the CIOs, as they are mostly Saudis, male, have basic bachelor's degree, have IT background, have long years of experience, and the CIO types mostly strategic and transformational. The effect of the differences in these characteristics on CFS, PMS and PS are further analysed using ANOVA in separate sections that follows.

Table 5.1: Summary statistics of demographic characteristics of the respondents

Characteristics	Categories	Frequency	Percent
Nationality	Saudi	66	90.4
	Non Saudi	7	9.6
Gender	Male	71	97.3
	Female	2	2.7
Age	<26	0	0
	26-30	4	5.5
	31-35	8	11.0
	36-40	14	19.1
	>40	47	64.4
Educational Level	Below Bachelor	1	1.4
	Bachelor	21	28.8
	Higher Diploma	2	2.7
	Master	36	49.3
	PhD	13	17.8
Educational Background	Computing	62	84.9
	Management	7	9.6
	Accounting	0	0
	Engineering	1	1.4
	Other	3	4.1
Experience	< 6	1	1.4
	6-10	9	12.3
	11-15	12	16.4
	16-20	19	26.0
	> 20	32	43.9
Respondent Level	One	45	61.6
	Two	19	26.0
	Three	5	6.9
	Four	1	1.4
	More than four	3	4.1
CIO Type	Strategic	34	46.6
	Transformational	25	34.2
	Operational	14	19.2
Experience as CIO	< 6	39	53.4
	6-10	21	28.8
	11-15	11	15.1
	15+	2	2.7
Experience as Number of IT Projects	< 6	35	48.0
	6-10	22	30.1
	11-15	6	8.2
	15+	10	13.7

5.2.2. Organisations' and IT Project Characteristics

This section analysed the variability of the respondents in relation to the types of organizations they worked with. Table 5.2 illustrates a summary of the statistics of the demographic characteristics of the organisation and IT department, at which the respondents work. It shows the frequency distribution of the organisations' category, organisations' size, IT department size, IT projects' yearly budget, existence of formal project management, PMO existence, systems development, and the existence of external government support. Twenty-

five (34.2%) were ministeries organisations; nine (12.3%) were authorities organisations; six (8.2%) were corporation organisations; eleven (15.1%) were hospital organisations; seventeen (23.3%) were higher education organisations; and five respondents indicated that their organisations belonged to the category 'other'. They included banking (2); institute (1); municipality (1); and programme (1). This is fairly representative of the numbers/sectors of the public organisations in Saudi Arabia.

The number of employees was used to measure an organisation's size. The study categorised organisations into five groups according to their size: micro (0-99); small (100-249); medium (250-449); large (500-999); very large (more than 999). Two (2.7%) were micro, six (8.2%) were small, five (6.8%) were medium, six (8.2%) were large, and fifty-four (74.0%) were very large. The number of employees was also used to measure an IT department's size. The study categorised IT departments into five groups according to their size: micro (0-9); small (10-24); medium (25-49); large (50-99); very large (more than 99). Three (4.1%) were micro, seven (9.6%) were small, sixteen (21.9%) were medium, thirty (41.1%) were large, and seventeen (23.3%) were very large. The IT projects' yearly budget is the amount that is spent on IT in the respondent's organisation. Three organisations (4.1%) spend less than 1,000,000 SR (170,000 £); nineteen (26.0%) between 1,000,000 and 4,999,999 SR; nineteen (26.0%) between 5,000,000 and 10,000,000 SR; thirty two (43.8%) above 10,000,000 SR. This is consistent with the size of the organisations. The bigger the organisation is, the greater its budget for IT.

Forty-nine (67.1%) of the organisations have a formal project management methodology. Most of these organisations (46.6%) are adopting one of the most popular international standard which is PMI (Project Management Institute). Thirty-seven (50.7%) of the organisations have a PMO, and most likely, the existence of a PMO will be associated with the existence of project management methodology. The results show whether the organisations' IT departments develop systems, or outsource them. 6.8% of respondent organisations develop systems in-house, 11.0% outsource their systems, and 82.2% develop some systems in-house and outsource others. Forty-seven (64.4%) neither receive financial nor consultations services from the external government support (such as the Yesser programme). Twenty-six (35.6%) receive financial and consultation services, and none receive financial only or consultation services only.

Table 5.2: Summary statistics of demographic characteristics of the organisation and IT

Characteristics	Categories	Frequency	Percent
Organisations Category	Ministeries	25	34.2
	Authorities	9	12.3
	Corporations	6	8.2
	Hospitals	11	15.1
	Higher Education	17	23.3
	Other	5	6.8
Organisation Size	Under 100	2	2.7
	100-249	6	8.2
	250-499	5	6.8
	500-999	6	8.2
	1000+	54	74.0
IT Department Size	Under 10	3	4.1
	10-24	7	9.6
	25-49	16	21.9
	50-99	30	41.1
	100+	17	23.3
IT Projects' Yearly Budget	< 1,000,000 SR	3	4.1
	1,000,000 - 4,999,999 SR	19	26.0
	5,000,000 - 10,000,000 SR	19	26.0
	> 10,000,000 SR	32	43.8
Existence of Formal Project Management	PMI	34	46.6
	PRINCE2	3	4.1
	ISO 21500	2	2.7
	Other	10	13.7
	None	24	32.9
PMO Existence	Yes	37	50.7
	No	36	49.3
Systems Development	In-house developed	5	6.8
	Professional company	8	11.0
	Both	60	82.2
External Government Support Existence	Financial	0	0
	Consultations	0	0
	Both (financial and consultation services)	26	35.6
	None	47	64.4

The existence of the variability in the type of organizations are further analysed using Analysis of variance below, to find if they moderate or affect any of the critical success factors, PMS and PS.

5.3. Standard Deviation and Standard Errors of Means

In analysis, standard deviation (SD) is a measure of how much the data deviates from the mean, whereas standard error of the mean is an indication of how well a particular sample represents the population (Field, 2009). The SD is a measure of dispersion, and thus when its value is relatively small and approaches zero, the data will be well represented by the mean. A large SD means that the data clusters more widely around the mean, therefore the mean is a

poorer representation of the data. The standard error (SE) is another method of measuring the disparity of the data from the mean. When the variables of this study were analysed, the SD values were lay between 0.619 and 1.316 and the SE values were lay around 0.281. Since the SD and SE values are not too large, it can be concluded that the mean value is an appropriate representative score to use, and that the sample was sufficiently representative of the population. In the next section, the normality of the data will tested.

5.4. Normality Assessment

There are four fundamental assumptions that have the potential to affect most statistical analysis techniques. These assumptions are: normality, homoscedasticity, linearity and the absence of correlated errors. Hair (2010) states the importance of addressing all of these factors, however stresses that the most fundamental test is examining normality which refers to "*the shape of the data distribution for an individual metric variable and its correspondence to the normal distribution, the benchmark for statistical methods*" (Hair, 2010). The assessment of normality was necessary because the current study employed ANOVA statistical analysis technique that required an assumption of normality (Tabachnick and Fidell, 2013).

The use of any specific statistical analysis procedure should be justified by examining normality and gaining a preliminary demonstration of the distribution of data for each variable. There are two ways to measure normality, namely skewness and kurtosis. Skewness is a measure of symmetry, or the balance of distribution. Kurtosis measures whether the data are peaked or flat in relation to the normal distribution (Hair, 2010).

For a distribution to be normal, its skewness and kurtosis should fall between -2.00 and +2.00 (Garson, 2012). In this study, normality test shows acceptable scores of skewness and kurtosis for all variables. Skewness values range between -1.262 and 0.228, and kurtosis values range between -1.234 and 1.732 (see Appendix E). Thus, the researcher assumed sufficient levels of normality. This allows for the use of ANOVA on some of the CIO characteristics variables against CSF and PSC. However, the effect size is expected to be small due to the limited samples.

5.5. Analysis of Constructs (CSF and PSC)

In a deductive explanatory approach, the multivariate variables that are used and identified for the study need to be verified for reliability of the measurement (Hair, 2010, Sekaran and Bougie, 2010). The tool to use can be Factor Analysis (FA) or the measurement model in the structural model using Partial Least Square (PLS). In this research, the measurement model for all the factors are performed using PLS on CSF and PSC to verify and validate the reliability in the measurement of the emerging factor(s) .

5.5.1. Reliability Analysis

The first criterion to be evaluated prior to any explanatory analysis is typically construct reliability. The concept of reliability is highly important to ensure that the constructs are represented with the items that highly correlated with one another and are meant to measure the same thing, as conceptualise by the researcher. This is also providing a high degree of confidence that the measurements used are reliable and rightfully reflect the phenomena that the researcher attempted to measure.

Construct reliability tests the degree to which individual items used in a construct are consistent in their measurements (Nunnally and Bernstein, 1994). It is "*a statement about the stability of individual measures across replications from the same source of information (within subjects in the case)*" (Straub, 1989). However, there are four methods commonly used for assessing reliability, namely, (1) the test-retest method, (2) the alternate-form method, (3) the split-halves method, and (4) the internal consistency method (Nunnally and Bernstein, 1994). Among the four methods mentioned above, the first three have some limitations, particularly for field studies. These limitations include, for example, requiring two independent administrations of the instrument on the same group of people, and requiring two alternate forms of the measuring instrument. In contrast, the internal consistency method works quite well in field studies because it does not require either the splitting or repeating of items. Instead, it requires only one administration. It is the most general form of reliability estimation (Nunnally and Bernstein, 1994). Therefore, the internal consistency method was used in evaluating the reliability of the survey instruments in this study.

Internal consistency reliability can be assessed using two measures. The traditional criterion for internal consistency is Cronbach's Alpha, which provides an estimate of the reliability based on the inter-correlations of the observed indicator variables. Cronbach's Alpha assumes

that all indicators are equally reliable. However, the Cronbach Alpha value is criticised because its value increases with the numbers of indicators, and PLS-SEM prioritises the indicators according to their individual reliability (Hair Jr et al., 2014). Due to Cronbach's Alpha's limitations in the population, it is more appropriate to apply a different measure of internal consistency reliability, which is referred to as composite reliability (CR). The composite reliability varies between 0 and 1, with higher values indicating higher levels of reliability. It is generally interpreted in the same way as Cronbach's Alpha in Factor Analysis. Specifically, composite reliability values of 0.60 to 0.70 are acceptable in exploratory research, while in more advanced stages of research, values between 0.70 and 0.90 can be satisfactory (Nunnally and Bernstein, 1994). Table 5.3 shows sufficient scores of Cronbach Alpha and CR that exceeded .7 for all constructs. Thus, the researcher assumed sufficient levels of construct reliability, which allows for further inferential analysis to be performed.

Table 5.3: Construct reliability

Construct	Composite Reliability	Cronbach's Alpha
TMS	.934	.921
SP	.909	.882
CM	.913	.885
PTC	.897	.856
SHM	.875	.834
PM	.895	.859
PSM	.905	.880
TE	.951	.942
PSC	.862	.807

5.5.2. Factor Analysis

The SPSS program was used to perform factor analysis; each scale being factor analysed separately using principal component analysis. When the items in a scale loaded on more than one factor, the rotated (varimax, quartimax if necessary) solution can be used (De Vaus, 2004). The detailed results are listed in Table 5.4. From Table 5.4, it was clear that all of the items for the CSFs had high factor loadings greater than 0.65 on Factor 1 except for PSC (project success criteria). Moreover, the factor analysis showed that the items in all the scales formed a single factor (unidimensional) except for PSC (project success criteria).

Table 5.4: Results of factor analysis for the CSFs and PSC

Scales	Factor Number	Eigenvalues	Factor Loading									% of Variance
			Items									
			1	2	3	4	5	6	7	8	9	
TMS	1	5.54	.744	.717	.745	.770	.794	.755	.824	.823	.878	61.6
SP	1	3.78	.787	.799	.762	.813	.807	.792				63.0
CM	1	3.82	.727	.788	.759	.833	.806	.867				63.7
PM	1	3.53	.766	.787	.798	.707	.829	.706				58.8
PTC	1	3.20	.897	.731	.882	.738	.736					64.0
SHM	1	3.01	.751	.676	.802	.821	.821					60.3
PSM	1	4.37	.735	.781	.822	.757	.710	.752	.656	.684		54.6
TE	1	5.70	.878	.777	.846	.866	.823	.823	.865	.868		71.2
PSC	1	2.37	.873	.879	.874	-.221	-.108	-.108				
	2	2.01	.173	.114	.117	.796	.893	.754				

In the case of the 'project success criteria' scale, two components seemed to emerge with eigenvalues greater than 1.0. Next, the researcher examined both the scree plot and the item loadings in order to further interpret the dimensionality of the 'project success criteria' scale. The scree plot showed a clear break after the third component (see Figure 5.1). Furthermore, the combined result of these analyses indicates fairly strong support for the hypothesis that the 'project success criteria' scale can be considered as two dimensions. From the Table 5.4, it was clear that Items 1, 2, and 3 (PS1, PS2, and PS3) constituted dimension 1 and items 4,5, and 6 (PS4, PS5, and PS6) constituted dimension 2. Therefore, the construct of 'project success criteria' has two dimensions, namely, "PMS" (PS1, PS2, and PS3) and "PS" (PS4, PS5, and PS6).

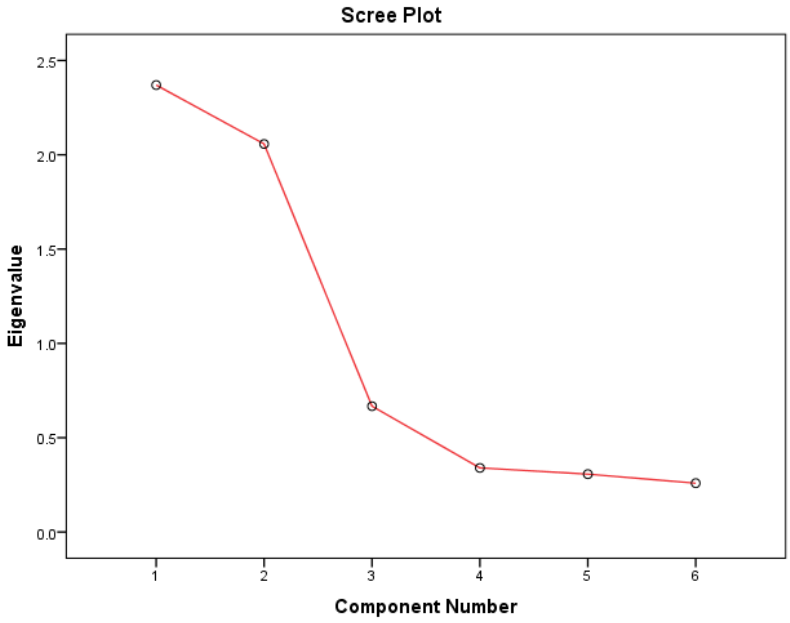


Figure 5.1: Project Success Criteria scree plot

5.6. Descriptive Analysis of the Constructs (CSF and PSC)

This section shows the result of the descriptive analysis of all the major constructs in the study. Both CSF and PSC measurement items have been tested for reliability in the previous section and therefore adequate to reflect the constructs they represented. Descriptive analysis of these constructs is done in this section to examine the perception level of CIOs in relations to CSF and PSC. Table 5.5 below, provides the summary of the results, which indicate the relatively low and similar standard deviation scores in all the responses. The mean score indicates the moderately high perception of the CIOs on all the constructs measured. The highest level of perceptions if found on the availability of communication management and project management capability within the organisations of which the CIOs work. Training and education found the lowest in mean score, which indicates the least in terms of the CIO perceptions of their applicability in the organisations.

Table 5.5: Descriptive summary of CSF and PSC

Construct	**Descriptive Statistics**		
	Sample n	**Mean**	**Std. Dev.**
Top Management Support	73	3.67	.776
Strategic Planning	73	3.58	.835
Communications	73	3.80	.727
Project Management	73	3.78	.671
Project Team Competency	73	3.43	.776
Stakeholders Management	73	3.55	.661
Partners and Suppliers Management	73	3.63	.695
Training and Education	73	3.32	.978
Project Management Success	73	3.48	.778
Project Success	73	3.98	.698

In looking into project success criteria (PSC), perceptions of CIOs on project success is found much higher than their perceptions on project management success. This indicates the perception of success of CIOs are more focus on the long term aspect of the project than the short term success. The CIOs may not be able to rate accurately the project management success, but are able to view success from the net benefit and stakeholder point of view.

The subsequent section further investigates the effect of CIO characteristics and other variables that are linked to the organisation and the IT department of which the CIO works.

5.7. Influence of the Organisation, IT, and CIO Characteristics with CSF

This section is designed to examine the effect of respondents' variables (*nationality, age, educational level, educational background, CIO management type, experience as CIO, experience as number of projects, levels from the head of the organisation, organisation category, organisation size, IT department size, IT projects' budget, project management existence, PMO existence, IS development, external government support*) on *CSFs*. This is in line with the researcher's attempt to answer RQ3, which is finding if there any relationship between organisational, project, and CIO characteristics with CSF and PSC that can moderate the IT project success framework. A one-way ANOVA is used to examine the variance between the means of the CIOs' profile, organisational characteristics and IT characteristic variables in response to the *CSFs and PSCs*. As a result, the researcher can identify the effect of these variables in relation to the CIO perceptions of CSF in Saudi Arabian public organisations.

The researcher commences with the alternative hypothesis that 'there are statistically significant differences between the organisational variables and the CSFs'. The following subsections present the results of the ANOVA analysis on each of the CIO characteristics measured on critical success factors variables.

5.7.1 Respondent Nationality

The one-way ANOVA test was carried out to examine whether the mean of respondents' nationality and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.6, show that there was no statistically significant difference between the respondent nationality variable and the CSFs. This is because the 'Sig.' value is larger than .05 for all the CSFs. The results suggest that the independent variable 'respondent nationality' has no statistically significant effect on the CSFs. Due to the homogeneity of the respondents' nationality, who are mostly Saudis, the result is expected to have no significant different.

Table 5.6: Nationality with CSFs

	Nationality	
	F-test	Significance
Top Management Support	.059	.808
Strategic Planning	.056	.813
Communication Management	.558	.458
Project Management	.867	.355
Project Team Competency	2.265	.137
Stakeholders Management	.259	.612
Partners & Suppliers Management	.011	.917
Training & Education	.312	.578

5.7.2 Respondent Gender

The one-way ANOVA test was carried out to examine whether the mean of the respondents' gender and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.7, show that there was no statistically significant difference between the respondent gender variable and the CSFs. This is because the 'Sig.' value is larger than .05 for all the CSFs . The results suggest that the independent variable 'respondent gender' has no statistically significant effect on the CSFs. Gender is also expected to have no significant different as, most of the respondents are male.

Table 5.7: Gender with CSFs

	Gender	
	F-test	Significance
Top Management Support	.096	.758
Strategic Planning	2.017	.160
Communication Management	.845	.361
Project Management	.334	.565
Project Team Competency	.161	.689
Stakeholders Management	.928	.339
Partners & Suppliers Management	.253	.616
Training & Education	.034	.855

5.7.3 Respondent Age

The one-way ANOVA test was carried out to examine whether the mean of the respondents' age and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.8, show that there was no statistically significant difference between the respondent age variable and the CSFs . This is because the

'Sig.' value is larger than .05 for all the CSFs. The results suggest that the independent variable 'respondent age' has no statistically significant effect on the CSFs. The lack of significant different indicates that, regardless of age, the perception of CIOs on all the CSF constructs are similar.

Table 5.8: Age with CSFs

	Age	
	F-test	Significance
Top Management Support	.639	.593
Strategic Planning	1.392	.253
Communication Management	1.668	.182
Project Management	1.377	.257
Project Team Competency	1.794	.157
Stakeholders Management	1.789	.158
Partners & Suppliers Management	.935	.429
Training & Education	1.381	.256

5.7.4 Respondent Educational Level

The one-way ANOVA test was carried out to examine whether the mean of the respondents' educational level and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.9, show that there was no statistically significant difference between the educational level variable and the CSFs . This is because the 'Sig.' value is larger than .05 for all the CSFs . The results suggest that the independent variable 'educational level' has no statistically significant effect on the CSFs.

Table 5.9: Educational level with CSFs

	Educational Level	
	F-test	Significance
Top Management Support	1.255	.296
Strategic Planning	.553	.698
Communication Management	2.012	.103
Project Management	1.820	.135
Project Team Competency	.666	.618
Stakeholders Management	.492	.742
Partners & Suppliers Management	2.136	.086
Training & Education	.983	.423

5.7.5 Respondent Educational Background

The one-way ANOVA test was carried out to examine whether the mean of the respondents' educational background variable and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.10, show that there was no statistically significant difference between the educational background variable and the CSFs . This is because the 'Sig.' value is larger than .05 for all the CSFs. The results suggest that 'educational background' has no statistically significant effect on the CSFs.

Table 5.10: Educational background with CSFs

	Educational Background	
	F-test	Significance
Top Management Support	2.675	.054
Strategic Planning	1.966	.127
Communication Management	1.391	.253
Project Management	.215	.885
Project Team Competency	1.540	.212
Stakeholders Management	.583	.628
Partners & Suppliers Management	.261	.854
Training & Education	1.095	.357

5.7.6 Respondent Experience

The one-way ANOVA test was carried out to examine whether the mean of the respondents' experience and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.11, show that there was no statistically significant difference between the respondent experience variable and the CSFs. This is because the 'Sig.' value is larger than .05 for all the CSFs . The results suggest that the variable 'respondent experience' has no statistically significant effect on the CSFs.

Table 5.11: Respondent experience with CSFs

	Respondent Experience	
	F-test	Significance
Top Management Support	.258	.904
Strategic Planning	.429	.787
Communication Management	.434	.784
Project Management	.980	.425
Project Team Competency	.984	.422
Stakeholders Management	.628	.644
Partners & Suppliers Management	.957	.437
Training & Education	.333	.855

5.7.7 Respondent Level

The one-way ANOVA test was carried out to examine whether the mean of the respondents' level within the organisation and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.12, show that there was no statistically significant difference between the respondent level variable and the CSFs . This is because the 'Sig.' value is larger than .05 for all the CSFs . The results suggest that variable 'respondent level' has no statistically significant effect on the CSFs .

Table 5.12: Respondent level with CSFs

	Respondent Level	
	F-test	Significance
Top Management Support	.209	.933
Strategic Planning	1.208	.316
Communication Management	1.910	.119
Project Management	.987	.421
Project Team Competency	1.746	.150
Stakeholders Management	1.018	.404
Partners & Suppliers Management	1.250	.299
Training & Education	.886	.477

5.7.8 CIO Type

The one-way ANOVA test was carried out to examine whether the mean of the respondents' CIO type and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.13, show that there were statistically significant differences between the CIO type variable and strategic planning (F = 8.977 and p

= .000), project management (F = 5.344 and p = .007), and stakeholders management (F = 8.860 and p = .000), training and education (F = 3.514 and p = .035). The results suggest that the 'CIO type' has a statistically significant effect on strategic planning, project management, stakeholders management, and training and education.

Table 5.13: CIO type with CSFs

	CIO Type	
	F-test	Significance
Top Management Support	1.846	.166
Strategic Planning	**8.977**	**.000**
Communication Management	2.783	.069
Project Management	**5.344**	**.007**
Project Team Competency	2.180	.121
Stakeholders Management	**8.860**	**.000**
Partners & Suppliers Management	1.221	.301
Training & Education	**3.514**	**.035**

Due to significant effect of CIO types with some CSF variable, post hoc analysis with cross-tabulation of mean scores is shown Table 5.14 below. The finding reveals that both strategic and transformational type are significantly higher in strategic planning, project management, stakeholder management, and training and education, compared to operational type.

Table 5.14: Cross tabulation by mean score of CSF by CIO Type

CIO Type – Cross Tabulation of Mean Score	**Strategic**	**Transformational**	**Operational**
Strategic Planning	3.72	3.81	2.81
Project Management	3.90	3.89	3.27
Stakeholder Management	3.72	3.64	2.94
Training and education	3.38	3.52	2.83

5.7.9 Experience as Number of Projects

The one-way ANOVA test was carried out to examine whether the mean of experience as number of projects variable and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.15, show that there was a statistically significant difference between the 'experience as number of projects' variable and training and education (F = 3.880 and p = .042). The results suggest that 'experience as number of projects' has a statistically significant effect on training and education.

Table 5.15: Experience as number of projects with CSFs

	Experience as Number of Projects	
	F-test	Significance
Top Management Support	.496	.686
Strategic Planning	.552	.648
Communication Management	1.723	.171
Project Management	1.159	.332
Project Team Competency	1.018	.390
Stakeholders Management	1.966	.127
Partners & Suppliers Management	1.193	.319
Training & Education	**2.880**	**.042**

Further analysis shown in Table 5.16 below indicates that the higher the number of projects the CIO handled in the past, the higher emphasis given to training and education.

Table 5.16: Cross tabulation by means score of CIO experience and CSF

Number of project experience	< 6	6 - 10	11 - 15	15+
Training and Education	3.3	3.31	3.15	3.56

5.7.10 Experience as CIO

The one-way ANOVA test was carried out to examine whether the mean of the number of years' experience as CIO and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.17, show that there was a statistically significant difference between the experience as CIO variable and strategic planning ($F = 3.043$ and $p = .035$). The results suggest that 'experience as CIO' in number of years has a statistically significant effect on strategic planning. This section concludes that the more experienced CIOs will have more emphasis on strategy, compared to the less experienced CIOs.

Table 5.17: Experience as CIO with CSFs

	Experience as CIO	
	F-test	Significance
Top Management Support	.835	.479
Strategic Planning	**3.043**	**.035**
Communication Management	1.210	.313
Project Management	2.478	.069
Project Team Competency	1.997	.123
Stakeholders Management	2.581	.061
Partners & Suppliers Management	1.277	.289
Training & Education	2.661	.055

Table 5.18 shows the result of the post hoc analysis, which indicates the mean distribution of significant CSF factors with CIO experiences in years. The result indicates that long years of experience is significantly related with high emphasis on strategic planning.

Table 5.18: Cross tabulation by means score of CIO experience and CSF

CIO Experience in Years	**< 6**	**6 - 10**	**11 - 15**	**15+**
Strategic Planning	3.68	3.19	3.74	4.58

5.7.11 Organisation Category

The one-way ANOVA test was carried out to examine whether the mean of the organisation category variable and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.19, show that there was no statistically significant difference between the organisation category variable and the CSFs. This is because the 'Sig.' value is larger than .05 for all the CSFs . The results suggest that 'organisation category' has no statistically significant effect on the CSFs.

Table 5.19: Organisation category with CSFs

	Organisation Category	
	F-test	Significance
Top Management Support	.523	.758
Strategic Planning	.952	.454
Communication Management	.825	.537
Project Management	1.336	.260
Project Team Competency	1.435	.223
Stakeholders Management	.650	.663
Partners & Suppliers Management	1.018	.414
Training & Education	.848	.521

5.7.12 Organisation Size

The one-way ANOVA test was carried out to examine whether the mean of the organisation size variable and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.20, show that there was no statistically significant difference between the organisation size variable and the CSFs. This is because the 'Sig.' value is larger than .05 for all the CSFs . The results suggest that 'organisation size' has no statistically significant effect on the CSFs.

Table 5.20: Organisation size with CSFs

	Organisation Size	
	F-test	Significance
Top Management Support	.459	.765
Strategic Planning	1.029	.399
Communication Management	1.111	.359
Project Management	1.600	.185
Project Team Competency	1.734	.153
Stakeholders Management	1.597	.185
Partners & Suppliers Management	.597	.666
Training & Education	.731	.574

5.7.13 IT Department Size

The one-way ANOVA test was carried out to examine whether the mean of the IT department size variable and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.21, show that there was no statistically significant difference between the IT department size variable and the CSFs . This is because the 'Sig.' value is larger than .05 for all the CSFs . The results suggest that the independent variable 'IT department size' has no statistically significant effect on the CSFs.

Table 5.21: IT department size with CSFs

	IT Department Size	
	F-test	Significance
Top Management Support	.907	.465
Strategic Planning	.323	.861
Communication Management	1.552	.197
Project Management	.832	.510
Project Team Competency	1.614	.181
Stakeholders Management	1.842	.131
Partners & Suppliers Management	.019	.999
Training & Education	.872	.485

5.7.14 IT Projects' Budget

The one-way ANOVA test was carried out to examine whether the mean of the IT projects' budget variable and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.22, show that there were statistically significant differences between the IT projects' budget variable and strategic planning (F = 2.870 and p = .043), and project management (F = 3.347 and p = .024). The results suggest that the variable 'IT projects' budget' has a statistically significant effect on strategic planning, and project management.

Table 5.22: IT projects' budget with CSFs

	IT Projects' Budget	
	F-test	Significance
Top Management Support	2.134	.104
Strategic Planning	**2.870**	**.043**
Communication Management	1.379	.257
Project Management	**3.347**	**.024**
Project Team Competency	2.500	.067
Stakeholders Management	2.397	.076
Partners & Suppliers Management	.511	.676
Training & Education	1.250	.299

The result in Table 5.23 however, indicates unclear direction of the relationship as projects high mean scores of strategic planning and project management are significantly high in the direction of less than 1 million SAR and more than 10 million SAR.

Table 5.23: Significant CSFs with IT projects' budget

IT yearly budget	**< 1,000,000 SR**	**1,000,000 - 4,999,999 SR**	**5,000,000 - 10,000,000 SR**	**> 10,000,000 SR**
Strategic planning	3.83	3.4	3.23	3.86
Project management	4.39	3.52	3.62	3.96

5.7.15 Project Management Existence

The one-way ANOVA test was carried out to examine whether the mean of the project management existence variable and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.24, show that there were statistically significant differences between the project management existence variable and project management (F = 4.439 and p = .039), and stakeholders management (F = 4.537 and p = .037). The results suggest that 'project management existence' has a statistically significant effect on project management and stakeholders management.

Table 5.24: Project management existence with CSFs

	Project Management Existence	
	F-test	Significance
Top Management Support	.811	.371
Strategic Planning	3.099	.083
Communication Management	1.390	.242
Project Management	**4.439**	**.039**
Project Team Competency	3.951	.051
Stakeholders Management	**4.537**	**.037**
Partners & Suppliers Management	1.289	.260
Training & Education	1.926	.170

Table 5.25 shows the direction of the relationship. Organisations with formal project management existence is related with high project management and stakeholder management perception.

Table 5.25: Significant CSFs with project management existence

Formal Project Management Existence	**PMI/prince2/ISO 21500/Other**	**None**
Project management	3.89	3.54
Stakeholder Management	3.66	3.32

5.7.16 PMO Existence

The one-way ANOVA test was carried out to examine whether the mean of PMO existence variable and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.26, show that there was no statistically significant difference between the PMO existence variable and the CSFs . This is because the 'Sig.' value is larger than .05 for all the CSFs . The results suggest that the independent variable 'PMO existence' has no statistically significant effect on the CSFs.

Table 5.26: PMO existence with CSFs

	PMO Existence	
	F-test	Significance
Top Management Support	1.557	.216
Strategic Planning	3.087	.083
Communication Management	.267	.607
Project Management	1.873	.176
Project Team Competency	.149	.701
Stakeholders Management	1.420	.237
Partners & Suppliers Management	.028	.868
Training & Education	.980	.326

5.7.17 Information Systems Development

The one-way ANOVA test was carried out to examine whether the mean of the systems development variable and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.27, show that there was a statistically significant difference between the systems development variable and partners' and suppliers' management ($F = 3.514$ and $p = .035$). The results suggest that 'systems development' has a statistically significant effect on partners' and suppliers' management.

Table 5.27: Systems development with CSFs

	Systems Development	
	F-test	Significance
Top Management Support	2.752	.071
Strategic Planning	.861	.427
Communication Management	.158	.854
Project Management	2.101	.130
Project Team Competency	.892	.414
Stakeholders Management	1.054	.354
Partners & Suppliers Management	**3.514**	**.035**
Training & Education	.902	.411

Further analysis indicates that companies with an in-house developed system has significantly low perception on partners and suppliers management (Table 5.28).

Table 5.28: Significant CSFs with systems development

System Development characteristics	**In-house developed**	**Professional company**	**Both**
Partners and suppliers management	2.85	3.73	3.68

5.7.18 External Government Support

The one-way ANOVA test was carried out to examine whether the mean of the external government support variable and the means of the CSFs are statistically significantly different.

One-way ANOVA analysis results, as shown in Table 5.29, show that there were statistically significant differences between the external government support variable and communication management ($F = 4.301$ and $p = .042$), project management ($F = 6.881$ and $p = .011$), project team competency ($F = 4.403$ and $p = .039$), and partners' and suppliers' management ($F = 5.380$ and $p = .023$). The results suggest that the independent variable 'external government support' has a statistically significant effect on communication management, project management, project team competency, and partners' and suppliers' management.

Table 5.29: External government support with CSFs

	External Government Support	
	F-test	Significance
Top Management Support	2.440	.123
Strategic Planning	2.965	.089
Communication Management	**4.301**	**.042**
Project Management	**6.881**	**.011**
Project Team Competency	**4.403**	**.039**
Stakeholders Management	3.270	.075
Partners & Suppliers Management	**5.380**	**.023**
Training & Education	.484	.489

Further analysis in Table 5.30 below indicates the companies without government support has significantly high perception on communication management, project management, project team competence, partners and suppliers' management.

Table 5.30: Significant CSFs with external government support

Government Support	**Yes**	**No**
Communication Management	3.57	3.93
Project Management	3.51	3.93
Project team competence	3.17	3.57
Partners and suppliers management	3.38	3.77

5.8. Influence of the Organisation, IT, and CIO Characteristics with PSC

Similar to the previous section, this section investigates if any of the organisation, IT and CIO characteristics has any influence on the PSC. Table 5.31 below provides the summary of Anova results.

Table 5.31: Organisation, IT and CIO characteristics with PSC (PMS and PS)

Construct	PMS		PS	
	F-test	**Sig.**	**F-test**	**Sig.**
Nationality	.097	.757	.202	.654
Gender	1.448	.233	.143	.707
Age	.860	.466	.995	.401
Education Level	1.374	.258	1.124	.345
Educational Background	.669	.616	2.112	.089
Experience	1.472	.220	.205	.935
Respondent Level	1.183	.326	1.135	.347
CIO Type	1.043	.358	.406	.668
Experiences as CIO	.879	.457	.609	.612
Experience as number of IT Project	.399	.754	.970	.412
Organisations Category	.048	.999	1.306	.272
Organisation Size	.114	.977	.448	.773
IT Department Size	.719	.582	1.174	.330
IT Projects' Yearly Budget	1.179	.324	1.332	.271
Existence of forma project management	.075	.990	.844	.502
PMO existence	.277	.600	.803	.373
System development	1.310	.276	**4.324**	**.017**
External Government Support Existence	1.044	.310	1.253	.267

The results shows no significant relationship between all the variables (CIO characteristics organizational characteristics, IT characteristics) investigated except for the variable system development with project success. This means there is no CIO characteristics and organisation and IT Characteristics variables that have impact on project success criteria (PMS and PS) except for the variable system development with PS. There was a statistically significant difference between the *systems development* variable and *PS* as the project success is increased when the IT project is outsourced

5.9. Level of Perception of the CSFs

The analysis is further extended to explore the perceptions of CIO by categorizing the data into high, medium and low. The categorization is further analysed according to different types of organisation in Saudi Arabia. In the following subsections, frequency analysis is used to identify the extent to which the items of the CSFs in Saudi Arabian public organisations are actually perceived. Therefore, these items will be classified in terms of CIOs' level of perception. The researcher suggests three categories: high-level perception, middle-level perception and low-level perception. The items of the project CSFs will be classified as, for

example, high-level perception, if the mean of those items falls in the range of the high perception category. In this research, after calculating the overall mean of each item of the CSFs, the calculation results showed that the high average is 4.10 and the low average is 2.94. Thus, to identify the category range of project CSFs element of each level of perception, the researcher will follow the following equation to obtain the category range of the perception level;

$$HighScoreMean - LowScoreMean = (4.10 - 2.94)\ /3 = 0.38$$

Identifying the new range for each level of perception is then achieved by adding the category range 0.4 to the minimum average 2.94 and so on. Thus, the new category ranges are as follows:

High level perception range (H) = 3.72 – 4.10

Middle level perception range (M) = 3.33 – 3.71

Low level perception range (L) = 2.94 – 3.32

Therefore, considering the level for perception for each item is based on its average and by comparing it with the perception level range. The results will be discussed further later in chapter 7 (section 7.2.4).

Analysis in this section is added as additional information to describe about the nature of CSF and PSC in relation to different types of organisations in Saudi Arabia.

5.9.1 Top Management Support and Commitment (TMS)

Top management should create and maintain an environment in which IT people can become fully involved in pursuing IT projects and the organisation’s objectives. The results of the study show that most respondents perceive 'IT top management support and commitment' at a high degree. Most elements fall in the high- and middle-level perception categories. It can be seen from Table 5.32 that the means of 'IT top management support and commitment' elements ranges from 3.15 to 3.93.

The results show that the top management support and commitment elements relating to participating in IT projects, sharing long term plans, allocating sufficient budget and resources, and actively supporting IT projects, are highly perceived. The results suggest that creating the environment for IT projects to succeed, viewing IT projects as a strategic

decision, having long-term top management commitment, and considering IT projects as a critical priority are perceived at a middle level, and providing sufficient reward is perceived at a low level. The results show that the 'top management support and commitment' perceptions in corporations and hospitals are in the high-level category, while ministries, authorities, higher education and 'other' organisations are perceived 'top management support and commitment' at the middle-level perception category.

Overall analysis also indicates the overall high scores for corporations and hospitals for top management support. While others are found to be moderate. This indicates that the organizations are well supported by the management.

Table 5.32: The level of perception in relation to top management support

	Statement	Organisations Categories (Mean)						Mean	Level of Perception Range
		Ministries	Authorities	Corporations	Hospitals	Higher Education	Others		
TMS1	Top management participates in IT projects	4.00	3.67	3.67	4.00	3.41	3.80	3.78	H
TMS2	Top management shares long term plans	3.88	3.78	4.00	3.91	3.47	3.60	3.76	H
TMS3	Top management allocates sufficient budget and resources	3.96	4.11	3.50	4.10	3.82	4.00	3.93	H
TMS4	Top management creates the environment for IT projects to succeed	3.72	3.44	3.50	4.10	3.59	3.80	3.69	M
TMS5	Sufficient reward is provided by top management	3.12	3.11	3.50	3.30	3.06	3.00	3.15	L
TMS6	IT projects are viewed as a strategic decision by top management	3.52	4.00	4.33	3.80	3.29	4.00	3.67	M
TMS7	There is long-term top management commitment	3.68	3.56	4.00	3.90	3.24	3.80	3.62	M
TMS8	Top management is actively supporting IT projects	3.80	3.78	3.67	4.20	3.59	3.60	3.78	H
TMS9	IT projects receive explicit identification from top management as a critical priority	3.64	3.44	3.83	3.80	3.35	3.60	3.58	M
Average **Level of Perception**		3.70 M	3.65 M	3.78 H	3.90 H	3.42 M	3.69 M	3.66	

5.9.2 Strategic Planning (SP)

The results of the study show that most respondents perceptions of 'strategic planning' in the middle-level range of perception. It can be seen from Table 5.33 that the mean of 'strategic planning' elements ranges from 3.39 to 3.94.

The results suggest that the strategic planning element relating to planning as a continuous process is highly perceived. The results suggest that the following elements: IT capabilities are constantly reviewed against strategic goals, IT plans are redesigned as required to meet evolving conditions, written guidelines exist to structure strategic IT planning in the organisation, top management is involved in IT strategic planning, and IT strategic planning includes inputs from all functional areas, are perceived at a middle level. The results show that the 'strategic planning' perceptions in hospitals and 'other' organisation are in the high-level category, while ministries, authorities, and higher education organisations are in the middle-level category, and corporations are in the low-level category.

Table 5.33: The level of perception in relation to strategic planning

	Statement	Organisations Categories (Mean)						Mean	Level of Perception
		Ministries	Authorities	Corporations	Hospitals	Higher Education	Others		
SP1	Our IT capabilities are constantly reviewed against strategic goals.	3.52	3.11	2.83	3.90	3.18	3.60	3.39	M
SP2	IT plans are redesigned as required to meet evolving conditions.	3.68	3.78	3.17	4.00	3.29	4.00	3.63	M
SP3	Strategic IT planning is a continuous process.	3.84	4.44	3.83	4.00	3.88	3.80	3.94	H
SP4	Written guidelines exist to structure strategic IT planning in our organisation.	3.48	3.22	3.33	3.40	3.12	4.40	3.40	M
SP5	Top management is involved in IT strategic planning.	3.60	3.00	3.17	3.70	3.24	4.20	3.46	M
SP6	IT strategic planning includes inputs from all functional areas.	3.56	3.89	3.00	4.20	3.41	4.00	3.64	M
Average		3.61	3.57	3.22	3.87	3.35	4.00	3.58	
Level of Perception		M	M	L	H	M	H		

5.9.3 Communication Management (CM)

The results of the study show that most respondents vary (middle - high) in their perception of 'communication management'. All elements fall in high- and middle-level perception

categories. It can be seen from Table 5.34 that the mean of 'communication management' elements ranges from 3.53 to 4.1.

The results show that the communication management elements relating to the existence of effective communications between project team members and users, the existence of effective communications to obtain users' requirements and comments, and IT projects' progress being communicated amongst stakeholders, are highly perceived. The results suggest that the existence of effective communications amongst functional departments, sufficient communication channels to inform users about the objectives of the IT projects, and all stakeholders and team members willingly keeping each other informed are perceived at a middle level. The results show that the 'communication management' perceptions in hospitals, higher education, authorities, and 'others' are in the high-level category, and ministries and corporations are in the middle-level category.

Table 5.34: The level of perception in relation to communication management

	Statement	Organisations Categories (Mean)						Mean	Level of Perception
		Ministries	Authorities	Corporations	Hospitals	Higher Education	Others		
CM1	There are effective communications between project team members and users.	4.12	4.00	3.83	4.40	4.06	4.00	4.10	H
CM2	There are effective communications amongst functional departments.	3.76	3.00	3.17	4.10	3.82	4.20	3.71	M
CM3	There are effective communications to obtain the users' requirements and comments.	3.84	4.44	4.00	4.40	4.00	4.60	4.10	H
CM4	There are enough communication channels (presentations, newsletter, etc) to inform users about the objectives of the IT projects.	3.44	3.67	3.33	4.10	3.71	3.40	3.61	M
CM5	IT projects progress are communicated amongst stakeholders.	3.68	3.78	3.67	4.00	3.82	3.80	3.78	H
CM6	All stakeholders and team members willingly keep each other informed.	3.40	3.44	3.33	4.10	3.41	3.80	3.53	M
Average		3.71	3.72	3.56	4.18	3.80	3.97	3.80	
Level of Perception		M	H	M	H	H	H		

5.9.4 Project Management (PM)

The results of the study show that most respondents' perceptions are high in 'project management'. All elements fall in the high- and middle-level perception categories. It can be

seen from Table 5.35 that the mean of 'project management' elements ranges from 3.51 to 3.97.

The results show that the 'project management' elements relating to the following statements: the scope of each IT project is clearly established, a detailed project plan with measurable results is provided for each IT project, the responsibility for all parts of each IT project is assigned, and each IT project's progress is reviewed on a periodic basis, are highly perceived. The results suggest that the elements relating to properly coordinating activities across all stakeholders' parties for each IT project, and the existence of a formal management process to monitor each IT project activity, are perceived on a middle level. The results show that the 'project management' perceptions in corporations, hospitals, and 'others' are in the high-level category, while ministries, authorities, and higher education organisations are in the middle-level category.

Table 5.35: The level of perception in relation to project management

	Statement	Organisations Categories (Mean)						Mean	Level of Perception
		Ministries	Authorities	Corporations	Hospitals	Higher Education	Others		
PM1	The scope of each IT project is clearly established.	3.88	3.78	4.17	4.20	3.94	4.20	3.97	H
PM2	A detailed project plan (i e , what activities to cover at what stage) with measurable results is provided for each IT project.	3.68	3.67	4.33	4.10	3.65	4.20	3.82	H
PM3	The responsibility for all parts of each IT project is assigned.	3.60	3.89	4.50	4.10	3.82	4.60	3.90	H
PM4	The activities across all stakeholders' parties are coordinated properly for each IT project.	3.52	3.67	3.50	4.00	3.59	3.60	3.63	M
PM5	There is a formal management process to monitor each IT project activities.	3.36	3.33	4.00	4.00	3.29	3.80	3.51	M
PM6	Each IT project's progress is reviewed on a periodic basis.	3.68	3.78	4.00	4.00	3.65	4.40	3.81	H
Average		3.62	3.69	4.08	4.07	3.66	4.13	3.77	
Level of Perception		M	M	H	H	M	H		

5.9.5 Project Team Competency (PTC)

The results of the study show that most respondents vary in their levels of perception in 'project team competency'. It can be seen from Table 5.36 that the mean of 'project team competency' elements ranges from 2.94 to 3.78.

The results show that the 'project team competency' element relating to selecting a variety of cross-functional team members is highly perceived. The results suggest that the elements relating to selecting people for each IT project team who have the best business and technical knowledge, and each IT project team being empowered to make decisions relating to the project, are perceived at a middle level. They also suggest that the elements relating to each IT project having a highly dedicated experienced project manager, and each IT project team working on the project full-time as their only priority, are perceived at a low level. The results show that the 'project team competency' perceptions in hospitals are in the high-level category; authorities, corporations, higher education, and 'other' organisations are in the middle-level category; and ministries are in the low-level category.

Table 5.36: The level of perception in relation to project team competency

	Statement	Organisations Categories (Mean)						Mean	Level of Perception
		Ministries	Authorities	Corporations	Hospitals	Higher Education	Others		
PTC1	Each IT project has a highly experienced project manager who is dedicated to the project.	3.00	3.22	3.50	3.80	3.41	3.60	3.32	L
PTC2	A variety of cross-functional team members are selected.	3.40	4.00	3.83	4.20	3.82	4.20	3.78	H
PTC3	The people selected for each IT project team have the best business and technical knowledge.	3.16	3.56	3.50	4.10	3.47	4.00	3.50	M
PTC4	Each IT project team is empowered to make decisions relating to the project.	3.32	3.56	4.17	4.00	3.41	3.60	3.56	M
PTC5	Each IT project team is working on the project full-time as their only priority.	3.04	2.78	3.33	3.30	2.59	2.80	2.94	L
Average		3.18	3.42	3.67	3.88	3.34	3.64	3.42	
Level of Perception		L	M	M	H	M	M		

5.9.6 Stakeholders Management (SHM)

The results of the study show that most respondents' perceptions of 'Stakeholders Management' at a middle level. Most elements fall in the middle-level perception categories. It can be seen from Table 5.37 that the mean of 'Stakeholders Management' elements ranges from 3.26 to 3.75.

The results show that the 'Stakeholders Management' element relating to IT projects' requirements reflecting stakeholder needs and the capability of the organisation is highly

perceived. The results suggest that managing the stakeholders' relationships along and across IT projects, recognising stakeholders for their contribution to efficient IT projects, and identifying the roles and responsibilities of all stakeholders, are perceived on a middle level. They also suggest that conducting structured stakeholder analysis on a regular basis to understand their expectations is perceived on a low level. The results show that the 'Stakeholders Management' perceptions in hospitals are in the high-level category; ministries, authorities, corporations, higher education, and 'other' organisations are in the middle-level category.

Table 5.37: The level of perception in relation to Stakeholders Management

	Statement	Organisations Categories (Mean)						Mean	Level of Perception
		Ministries	Authorities	Corporations	Hospitals	Higher Education	Others		
SP1	Structured stakeholder analysis is conducted on a regular basis to understand their expectations, identify synergies and risks.	3.08	3.22	3.67	3.50	3.35	3.00	3.26	L
SP2	Stakeholders' relationships are managed along and across IT projects.	3.32	3.67	3.67	3.80	3.35	3.40	3.47	M
SP3	IT projects' requirements reflect stakeholder needs and the capability of the organisation.	3.68	3.67	3.50	4.10	3.65	4.20	3.75	H
SP4	Stakeholders are recognised for their contribution to efficient IT projects.	3.52	3.56	3.33	3.70	3.71	3.80	3.60	M
SP5	The roles and responsibilities of all stakeholders are identified.	3.40	3.67	4.17	4.00	3.53	4.00	3.65	M
Average		3.40	3.56	3.67	3.82	3.52	3.68	3.55	
Level of Perception		M	M	M	H	M	M		

5.9.7 Partners and suppliers management (PSM)

The results of the study show that most respondents perceptions' of 'partners and suppliers management' at a middle level. All elements fall in middle- and high-level perception categories. It can be seen from Table 5.38 that the mean of 'partners and suppliers management' elements ranges from 3.47 to 3.85.

The results show that the 'partners and suppliers management' elements relating to good communication with partners and suppliers, and establishing long-term cooperative relations with partners and suppliers, are highly perceived. The results suggest that the elements relating to partners and suppliers personnel having sufficient experience for implementing IT projects, partners and suppliers providing quality services, the training offered by the partners

and suppliers being adequate to increase the users' proficiency, the partners and suppliers providing suitable formal documents for each IT project, IT product/service quality being regarded as the most important factor in selecting suppliers, and maintaining detailed information regarding partners' and suppliers' performance, are perceived at a middle level. The results show that the 'partners and suppliers management' perceptions in corporations, hospitals, authorities and 'others' are in the high-level category, and ministries and higher education organisations are in the middle-level category.

Table 5.38: The level of perception in relation to partners and suppliers management

	Statement	Organisations Categories (Mean)						Mean	Level of Perception
		Ministries	Authorities	Corporations	Hospitals	Higher Education	Others		
PSM1	The partners and suppliers communicate well with our organisation.	3.68	3.89	4.33	4.10	3.76	3.80	3.85	H
PSM2	The partners' and suppliers' personnel have sufficient experience for implementing IT projects.	3.68	3.67	3.83	3.80	3.18	3.60	3.58	M
PSM3	The partners and suppliers provide quality services.	3.52	3.89	3.67	3.80	3.41	3.40	3.58	M
PSM4	The training offered by the partners and suppliers is adequate to increase the user's proficiency in each IT project usage.	3.36	3.89	3.33	3.90	3.12	3.80	3.47	M
PSM5	The partners and suppliers provide suitable formal documents (user manual, operation guide, etc) required for each IT project.	3.40	3.44	3.83	3.80	3.41	4.20	3.56	M
PSM6	IT product/service quality is regarded as the most important factor in selecting suppliers.	3.52	4.00	4.00	3.80	3.47	4.20	3.69	M
PSM7	Long-term cooperative relations with partners and suppliers are established.	3.72	3.89	3.67	4.00	3.29	4.40	3.72	H
PSM8	Detailed information regarding partners' and suppliers' performance is maintained.	3.32	3.11	3.67	4.20	3.59	3.40	3.51	M
Average		3.53	3.72	3.79	3.93	3.40	3.85	3.62	
Level of Perception		M	H	H	H	M	H		

5.9.8 Training and Education (TE)

The results of the study show that all of the 'training and education' elements fall within the middle- and low-level perception categories. It can be seen from Table 5.39 that the mean of 'training and education' elements ranges from 3.13 to 3.49.

The results show that the 'training and education' elements relating to specific IT skills training being given to team members in each IT project, specific user training needs being

identified early in the implementation of each IT project, a formal training programme being developed to meet the requirements of each IT project user, and education and training being encouraged and supported, are perceived at a middle level. The results suggest that the elements relating to customising training materials for each specific job, tracking employees to ensure that they have received the appropriate training, providing regular training sessions, and implementing the resources for education and training, are perceived at a low level. The results show that the 'training and education' perceptions in hospitals and 'other' organisations are in the high-level category; authorities are in the middle-level category; and ministries, corporations and higher education organisations are in the low-level category.

Table 5.39: The level of perception in relation to training and education

	Statement	Organisations Categories (Mean)						Mean	Level of Perception
		Ministries	Authorities	Corporations	Hospitals	Higher Education	Others		
TE1	Specific IT skills training is given to team members in each IT project.	3.32	3.56	3.33	3.80	3.24	4.40	3.47	M
TE2	Specific user training needs were identified early in the implementation of each IT project.	3.48	3.44	3.17	3.90	3.29	3.80	3.49	M
TE3	A formal training programme has been developed to meet the requirements of each IT project user.	3.28	3.33	3.17	3.80	3.47	3.40	3.40	M
TE4	Training materials have been customised for each specific job.	3.20	3.44	3.17	3.60	3.06	3.20	3.25	L
TE5	Employees are tracked to ensure that they have received the appropriate training.	3.08	2.89	3.00	4.10	2.82	3.80	3.18	L
TE6	Our organisation provides regular training sessions.	3.00	3.44	3.17	3.50	2.82	4.00	3.17	L
TE7	The resources for education and training have been put in place.	3.12	3.22	3.00	3.30	2.82	3.80	3.13	L
TE8	Education and training are encouraged and supported.	3.20	3.78	3.50	4.00	3.18	3.60	3.43	M
Average		3.21	3.39	3.19	3.75	3.09	3.75	3.31	
Level of Perception		L	M	L	H	L	H		

5.10. Level of Perception of Project Success Criteria

In this section, frequency analysis is used to identify the extent to which the items of the project success criteria in Saudi Arabian public organisations are actually perceived. Again, the researcher suggests three categories: high-level perception, middle-level perception and low-level perception. In this research, after calculating the overall mean of each item of the

project success criteria, the calculation results showed that the high average is 4.14 and the low average is 3.40. Thus, to identify the category range of project success criteria element of each level of perception, the researcher will follow the following equation to obtain the category range of the perception level;

$$HighScoreMean - LowScoreMean = (4.14 - 3.40)\ /3 = 0.24$$

Identifying the new range for each level of perception is then achieved by adding the category range 0.24 to the minimum average 3.40 and so on. Thus, the new category ranges are as follows:

High level perception range (H) = 3.90 – 4.14

Middle level perception range (M) = 3.65 – 3.89

Low level perception range (L) = 3.40 – 3.64

The results of the study show that most of the items of the project success indicators fall in the middle and high-level perception category. It can be seen from Table 5.40 that the mean of project success elements ranges from 3.40 to 4.14.

The results show that the 'project success criteria' elements relating to IT projects meeting the needs of the project stakeholders, the IT project achieving its business goals and purpose, and the end products of IT projects being used, are highly perceived. The results suggest that IT projects being completed on budget, and IT projects being completed with all features and functions as initially specified are perceived at a middle level, and IT projects being completed on time is perceived at low level. The results show that the 'project success criteria' perception in corporations and 'others' are in the high-level category; ministries, authorities, and hospitals are in the middle-level category; and higher education is in the low-level category.

Table 5.40: Level of project success criteria perception

	Statement	Organisations Categories (Mean)						Mean	Level of Perception
		Ministries	Authorities	Corporations	Hospitals	Higher Education	Others		
PSC1	IT projects are completed on-time.	3.44	2.89	4.00	3.30	3.35	3.80	3.40	L
PSC2	IT projects are completed on-budget.	3.64	3.89	3.83	4.10	3.65	3.80	3.76	M
PSC3	IT projects are completed with all features and functions as initially specified.	4.00	3.78	3.33	3.80	3.53	4.60	3.82	M
PSC4	IT projects meet the needs of the project stakeholders.	4.00	3.89	4.00	4.00	3.71	4.40	3.94	H
PSC5	IT projects achieve their business goals and purpose.	4.16	4.00	4.50	4.00	3.71	4.40	4.06	H
PSC6	End products of IT projects are used.	4.16	4.11	4.33	4.10	3.94	4.60	4.14	H
Average		3.90	3.76	4.00	3.88	3.65	4.27	3.85	
Level of Perception		M	M	H	M	L	H		

In concluding this section it is interesting to see that hospitals mostly scored the highest in the perception.

5.11. Summary

This chapter presented the first part of the analysis of the quantitative data gathered by the questionnaire survey that is concerned with the respondents' descriptive statistics including the organisational variables (CIOs, organisations' characteristics, IT characteristics).

The results also suggested that there were significant differences between organisational variables (educational level and background, CIO type, experience as number of projects, organisation size, IT projects' budget, project management existence, information systems development and external government support) and the CSFs.

The level of perception of the CSFs is provided. The results suggested that CSF perceptions in the hospital sector are at the highest level compared to the other sectors. Also, the results suggested that there were lack of such perceptions in training and education in IT departments in Saudi Arabian public organisations. Furthermore, additional analysis using factor analysis classified the project success criteria based on the CIOs perspectives into two types (PMS and PS). Further analysis to test the impact of the CSFs on the PSC (PMS and PS) will be provided in the next chapter.

Therefore, the following chapter will present in more detail the second part of the quantitative analysis in order to examine the constructs reliability, validity, and test the hypotheses and the conceptual framework using the structural equation model (smart PLS version 3).

Chapter 6 : Data Analysis and Findings (Measurement and Structural Models Assessments) - Explanatory Study (Phase II - Part B)

6.1. Overview

This chapter presents the analysis of the second part of the explanatory phase involving the use of more advanced modelling assessment to address the fourth research objective, which is to develop a framework and measurement model of IT project success through the effect of CSF on PSC. It consists of two main assessments: the measurement model assessment, and the structural model assessment as a whole framework. For measurement analysis, the validity and reliability of the study constructs are examined quantitatively using the collected data. It starts by assessing the reliability of the research constructs using internal consistency reliability. Then, it continues by assessing the research constructs' validity using convergent validity, discriminant validity, content validity, construct validity and criterion-related validity.

Using these represented constructed concepts, the structural assessment is then addressed to examine the research framework. In the structural assessment, an inferential analysis is carried out to assess the research models and hypotheses. Section 6.2 presents the measurement model assessment, and section 6.3 provides the structural model assessment in more detail.

6.2. Evaluation of the measurement model

Measurement model estimation provides empirical measures of the relationships between the indicators and the constructs (Hair Jr et al., 2014). The empirical measures enable researchers to compare the theoretically established measurement model with reality as represented by the sample data (Hair Jr et al., 2014). Measurement model estimation enables the researcher to evaluate the reliability and validity of the construct measures. In order to make the measure

more accurate, multivariate measurement involves using several variables to indirectly measure a concept. Figure 6.1 shows a systematic approach to the assessment of measurement model results.

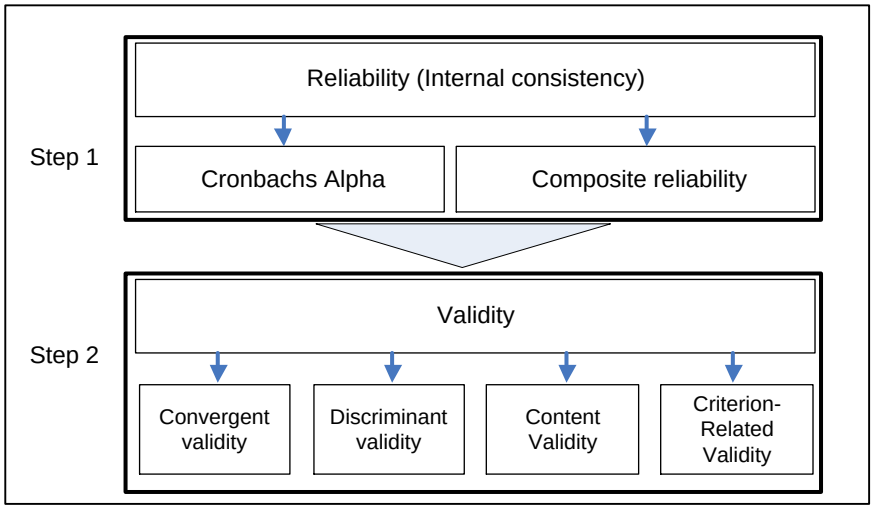


Figure 6.1: Measurement model assessment procedure

The following subsections describe the tests undertaken to examine the constructs in this study, including internal consistency reliability (Cronbach's Alpha, composite reliability [CR]), and validity (convergent, discriminant, content and criterion-related).

6.2.1 Internal Consistency Reliability

The first criterion to be evaluated is typically construct reliability. The report on the measures of construct reliability was reported earlier in section 5.5 and the updated report including the two new constructs of PSC (PMS and PS) are presented in this section. Internal consistency reliability can be assessed using two measures. The traditional criterion for internal consistency is Cronbach's Alpha, which provides an estimate of the reliability based on the inter-correlations of the observed indicator variables. Cronbach's Alpha assumes that all indicators are equally reliable. However, the Cronbach Alpha value is criticised because its value increases with the numbers of indicators, and PLS-SEM prioritises the indicators according to their individual reliability (Hair Jr et al., 2014). Due to Cronbach's Alpha's limitations in the population, it is more appropriate to apply a different measure of internal consistency reliability, which is referred to as composite reliability (CR). The composite reliability varies between 0 and 1, with higher values indicating higher levels of reliability. It is generally interpreted in the same way as Cronbach's Alpha. Specifically, composite reliability values of 0.60 to 0.70 are acceptable in exploratory research, while in more

advanced stages of research, values between 0.70 and 0.90 can be satisfactory (Nunnally and Bernstein, 1994). Table 6.1 shows sufficient scores of Cronbach Alpha and CR that exceeded .7 for all constructs. Thus, the researcher assumed sufficient levels of construct reliability.

Table 6.1: Construct reliability

Construct	Composite Reliability	Cronbach's Alpha
TMS	.934	.921
SP	.909	.882
CM	.913	.885
PM	.895	.859
PTC	.897	.856
SHM	.875	.834
PSM	.905	.880
TE	.951	.942
PMS	.916	.863
PS	.868	.771

6.2.2 Convergent validity

Convergent validity tests the degree to which items designed to load on the same construct do, in fact, load on that construct (Carmines and Zeller, 1979). It is the extent to which a measure correlates positively with alternative measures of the same construct. Therefore, the items that are measures (indicators) of a specific construct should converge or share a high proportion of variance. The outer loadings of the indicators and the average variance extracted (AVE) are used to establish convergent validity (Hair Jr et al., 2014). High outer loadings with 0.70 and above on a construct indicate that the associated indicators have much in common, which is captured by the construct. Items with outer loadings between 0.40 and 0.70 should be considered for removal from the scale only when deleting the indicator leads to an increase in the CR or the AVE above the threshold value. Items with very low outer loadings (below 0.40) should be removed from the scale (Hair et al., 2011). A common measure to establish convergent validity on the construct level is the AVE. This criterion is defined as the grand mean value of the squared loadings of the indicators associated with the construct. An AVE value of 0.50 or higher indicates that, on average, the construct explains more than half of the variance of its indicators. Conversely, an AVE of less than 0.50 indicates that, on average, more error remains in the items than the variance explained by the construct (Hair Jr et al., 2014).

Convergent validity occurs when each measurement item correlates strongly with its assumed construct. Indicator loading values should exceed 0.7 on their constructs, meaning that more than 50% of the indicator's variance is caused by the construct (Hair et al., 2012). Furthermore, the AVE should exceed 0.5; this value ensures that the explained variance is greater than the variance caused by a measurement error. Table 6.2 shows that all the quality criteria are fulfilled: indicator loadings exceeded 0.4, and AVE scores exceeded 0.5 for all constructs (Hair et al., 2012).

Table 6.2: Convergent validity test

Construct	Items	Factor Loadings	Average Variance Extracted
TMS	TMS1	.762***	.614
	TMS2	.732***	
	TMS3	.718***	
	TMS4	.772***	
	TMS5	.772***	
	TMS6	.747***	
	TMS7	.837***	
	TMS8	.830***	
	TMS9	.870***	
SP	SP1	.760***	.628
	SP2	.838***	
	SP3	.793***	
	SP4	.799***	
	SP5	.786***	
	SP6	.770***	
CM	CM1	.717***	.636
	CM2	.775***	
	CM3	.758***	
	CM4	.834***	
	CM5	.819***	
	CM6	.871***	
PM	PM1	.769***	.587
	PM2	.797***	
	PM3	.793***	
	PM4	.687***	
	PM5	.821***	
	PM6	.724***	
PTC	PTC1	.881***	.637
	PTC2	.772***	
	PTC3	.897***	
	PTC4	.719***	
	PTC5	.703***	
SHM	SHM1	.738***	.593
	SHM2	.643***	
	SHM3	.833***	
	SHM4	.729***	
	SHM5	.868***	
PSM	PSM1	.696***	.542
	PSM2	.789***	
	PSM3	.798***	
	PSM4	.744***	
	PSM5	.735***	
	PSM6	.753***	

Construct	Items	Factor Loadings	Average Variance Extracted
	PSM7	.671***	
	PSM8	.701***	
TE	TE1	.877***	.708
	TE2	.819***	
	TE3	.839***	
	TE4	.868***	
	TE5	.837***	
	TE6	.786***	
	TE7	.851***	
	TE8	.849***	
PMS	PSC1	.684***	.783
	PSC2	.694***	
	PSC3	.655***	
PS	PSC4	.738***	.688
	PSC5	.816***	
	PSC6	.688***	

*** p<0.001

6.2.3 Discriminant validity

Discriminant validity tests the degree to which items measuring one construct relate exclusively to the construct and not to another (Churchill Jr, 1979). It is the extent to which a construct is truly distinct from other constructs by empirical standards. Thus, establishing discriminant validity implies that a construct is unique and captures phenomena not presented by other constructs in the model. Two measures of discriminant validity can be used. One method for assessing discriminant validity is by examining the cross loadings of the indicators. Specifically, an indicator's outer loading on the associated construct should be greater than all of its loadings on the other constructs. The presence of cross loadings that exceed the indicators' outer loadings represents a discriminant validity problem (Hair Jr et al., 2014). The Fornell-Larcker criterion is a second and more conservative approach to assessing discriminant validity. It compares the square root of the AVE values with the latent variable correlations. Specifically, the square root of each construct's AVE should be greater than its highest correlation with any other construct. This criterion can also be stated as the AVE should exceed the squared correlation with any other construct. The logic of this method is based on the idea that a construct shares more variance with its associated indicators than with any other construct (Fornell and Larcker, 1981).

Applying the first method to assess discriminant validity by examining the cross loadings of the indicators revealed that all indicators were loaded higher on their respective constructs than on any other construct, as all the correlations were above the cut-off of 0.3 recommended by (De Vaus, 2004). For example, item 1 in scale 1 (TMS) had correlations of .762, .457,

.332, .383, .366, .289, .439, .364 and .373 with the eight success factors. Since the value of scale 1 (TMS) was the mean of the nine items, the high correlation between scale 1 and its item 1 (.762) was expected. In addition, since item 1 showed relatively smaller correlations with the other scales, it was concluded that item 1 in scale 1 had been assigned appropriately to this scale. All other items were similarly examined (Table 6.3).

Table 6.3: Discriminant validity test

Factor	Item No.	Scale							
		TMS	**SP**	**CM**	**PM**	**PTC**	**SHM**	**PSM**	**TE**
TMS	1	**.762**	.457	.332	.383	.366	.289	.439	.364
	2	**.732**	.467	.336	.376	.238	.335	.345	.264
	3	**.718**	.379	.441	.304	.27	.425	.504	.394
	4	**.772**	.506	.615	.494	.521	.467	.526	.489
	5	**.772**	.369	.460	.281	.376	.361	.564	.407
	6	**.747**	.394	.307	.262	.393	.289	.492	.316
	7	**.837**	.642	.514	.502	.417	.461	.552	.443
	8	**.830**	.483	.443	.410	.350	.360	.453	.378
	9	**.870**	.558	.502	.401	.388	.402	.517	.454
SP	1	.563	**.760**	.511	.427	.334	.48	.305	.456
	2	.497	**.838**	.385	.501	.414	.421	.439	.464
	3	.405	**.793**	.326	.524	.346	.463	.367	.384
	4	.435	**.799**	.511	.472	.417	.525	.434	.581
	5	.572	**.786**	.569	.531	.439	.562	.394	.477
	6	.481	**.770**	.511	.523	.444	.643	.432	.522
CM	1	.319	.463	**.717**	.361	.486	.443	.371	.412
	2	.529	.466	**.775**	.389	.363	.511	.533	.458
	3	.322	.249	**.758**	.524	.599	.510	.585	.430
	4	.463	.445	**.834**	.514	.533	.542	.658	.576
	5	.493	.593	**.819**	.541	.495	.546	.563	.529
	6	.536	.527	**.871**	.607	.543	.571	.664	.597
PM	1	.226	.437	.417	**.769**	.453	.58	.324	.271
	2	.239	.462	.387	**.797**	.470	.516	.450	.323
	3	.415	.471	.445	**.793**	.681	.601	.594	.489
	4	.453	.468	.657	**.687**	.557	.647	.613	.597
	5	.517	.508	.553	**.821**	.715	.614	.552	.573
	6	.463	.543	.466	**.724**	.491	.464	.455	.464
PTC	1	.342	.395	.540	.691	**.881**	.621	.509	.556
	2	.372	.295	.549	.701	**.772**	.562	.558	.458
	3	.438	.502	.521	.584	**.896**	.648	.589	.611
	4	.420	.439	.504	.440	**.719**	.432	.562	.483
	5	.304	.386	.398	.437	**.703**	.474	.455	.531
SHM	1	.372	.469	.437	.602	.552	**.738**	.459	.395
	2	.322	.323	.469	.372	.542	**.643**	.426	.36
	3	.356	.577	.519	.587	.439	**.833**	.485	.541
	4	.256	.327	.465	.510	.479	**.729**	.330	.530
	5	.451	.577	.602	.676	.661	**.868**	.612	.665
PSM	1	.238	.166	.502	.523	.527	.496	**.696**	.439
	2	.437	.364	.595	.496	.548	.518	**.789**	.497
	3	.378	.423	.486	.498	.497	.515	**.798**	.615
	4	.388	.510	.515	.532	.631	.574	**.744**	.709
	5	.536	.251	.405	.326	.414	.402	**.735**	.447
	6	.472	.394	.560	.410	.493	.307	**.753**	.441
	7	.519	.390	.522	.392	.393	.440	**.671**	.435

Factor	Item No.	Scale							
		TMS	**SP**	**CM**	**PM**	**PTC**	**SHM**	**PSM**	**TE**
	8	.561	.408	.601	.626	.498	.520	**.701**	.451
TE	1	.423	.609	.524	.489	.564	.662	.565	**.877**
	2	.371	.545	.577	.47	.509	.493	.444	**.819**
	3	.365	.474	.545	.507	.578	.546	.635	**.839**
	4	.404	.562	.522	.602	.678	.638	.642	**.868**
	5	.438	.525	.566	.548	.634	.662	.540	**.837**
	6	.393	.333	.419	.378	.415	.429	.551	**.786**
	7	.503	.448	.503	.401	.484	.460	.638	**.851**
	8	.432	.434	.538	.446	.530	.542	.629	**.849**

These scales have relatively high loadings and minimal cross loadings. Comrey and Lee (1992) have classified the degree of loading into five categories ranging from poor (below 0.45) to excellent (0.71 or above). The results of the factor analysis in Table 6.4 do not have any poor loadings, as the minimum factor loading was 0.51, which is considered a fair loading according to Comrey and Lee's classification. The results also suggest that 83.6% of the item loadings are excellent, while only 1.6% of factor loadings are fair, therefore, discriminant validity can be assumed.

Table 6.4: Summary of factor loadings according to Comrey and Lee's classification

Loading Type	Loading range	Number of items	Percentage
Poor	0.32 to 0.44	0	0 %
Fair	0.45 to 0.54	0	0 %
Good	0.55 to 0.62	0	0 %
Very good	0.63 to 0.70	6	11.3 %
Excellent	0.71 or above	47	88.7 %
Total			100 %

Discriminant validity was also assessed using the Fornell-Larcker criterion that required that the AVEs of the constructs should be greater than the square of the correlations among them, thereby indicating that more variance was shared between the component and its block of indicators than with any other component. Table 6.5 shows off-diagonal figures as correlations among constructs, while diagonal figures indicate the square root of the average variance extracted between the constructs and their measures. As can be seen, each construct's AVE exceeded the squared correlations of this construct with any other construct. Therefore, discriminant validity can be assumed.

Table 6.5: Discriminant validity test (Fornell-Larcker Method)

Construct	TMS	SP	CM	PM	PTC	SHM	PSM	TE	PMS	PS
TMS	**.784**									
SP	.615	**.791**								
CM	.560	.575	**.798**							
PM	.495	.628	.623	**.766**						
PTC	.474	.503	.633	.726	**.798**					
SHM	.479	.638	.655	.736	.694	**.766**				
PSM	.618	.503	.714	.639	.674	.636	**.737**			
TE	.498	.598	.632	.577	.660	.661	.682	**.841**		
PMS	.277	.272	.275	.240	.098	.245	.268	-.019	**.783**	
PS	.567	.481	.390	.460	.354	.217	.391	.245	-.023	**.688**

6.2.4 Content Validity

Content validity is not evaluated numerically. Its determination is subjective and judgmental, and is carried out by various reviewers with some knowledge of the subject matter. In this research, however, it was argued that the eight scales for the CSFs, and two scales for project success criteria had content validity since the development of these measurement items was based mainly on an extensive review of the literature and detailed evaluations by academicians and practitioners from IT fields in the explanatory study.

6.2.5 Criterion-Related Validity

The criterion-related validity in this study was determined by examining the multiple correlation coefficients computed for the eight measures of the CSFs and the two measures of project success criteria (PMS and PS). The multiple correlation coefficient computed for the eight the CSFs and PMS was 0.379 and PS was 0.665. This means that the CSFs explain 38% of the variation in PMS and 67% of the variation in PS. Thus, taken together, the model have a high degree of criterion-related validity (Cohen, 2000).

6.3. Evaluation of the Structural Model

This section continues the analysis and focuses on the structural model that represents the underlying theory of the path model. The purpose is to test that the framework proposed in the study is significant, by means of statistical significant of the composite of the independent variables (the eight CSF) with project success criteria (PS and PMS). The structural model estimates cannot be examined until the reliability and validity of the constructs are established

earlier. Once the construct measures have been confirmed as reliable and valid, the next stage is to assess the structural model results as presented in this section.

Assessment of the structural model provides empirical measures of the relationships between the constructs (Hair Jr et al., 2014). The empirical measures enable the researchers to compare the theoretically established structural model with reality as represented by the sample data, and therefore to decide if the proposed theory has been empirically confirmed (Hair Jr et al., 2014). PLS-SEM assessment of the structural model examines the model's ability to predict.

This involves examining the model's predictive capabilities and the relationships between the constructs. Figure 6.2 shows a systematic approach to the assessment of structural model results.

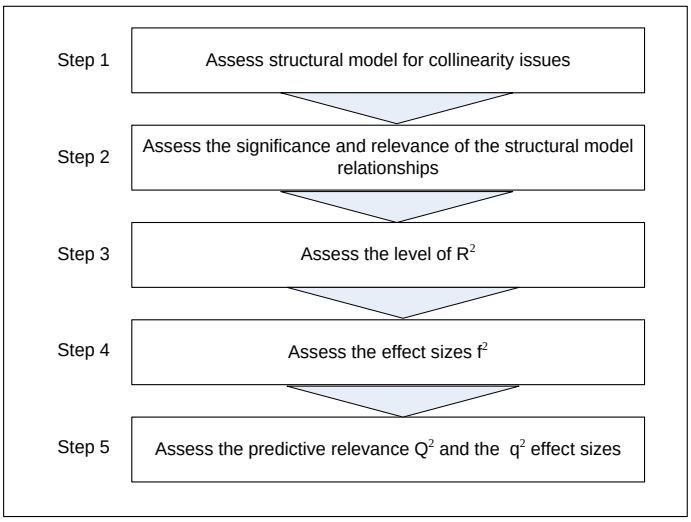


Figure 6.2: Structure Model Assessment Procedure (Source (Hair Jr et al., 2014))

The assessment of the structural model examines the relationship between constructs as well as the model's predictive capabilities (Smith et al., 2014). The primary evaluation criteria for PLS-SEM results are the coefficients of determination (R^2 values) as well as the level and significance of the path coefficients.

6.3.1 Collinearity Assessment

The first step is to establish that the model does not have any collinearity issues. The reason for this is that the estimation of path coefficients in the structural model is based on ordinary least squares (OLS) regressions of each endogenous latent variable on its corresponding predecessor constructs. Just as in a regular multiple regression, the path coefficients may be biased if the estimation involves significant levels of collinearity among the predictor

constructs (Hair Jr et al., 2014). Tolerance and VIF values are used to assess collinearity. A VIF analysis was performed for each set of predictor constructs in the model (TMS, SP, CM, PM, PTC, SHM, PSM, TE). From Table 6.6 it can be seen that all VIFs were above 0.20 and well below 5.0, which indicates that the model does not exhibit collinearity problems (Smith et al., 2014).

Table 6.6: Collinearity statistics

Construct	Tolerance	VIF
TMS	0.455	2.197
SP	0.391	2.557
CM	0.371	2.693
PM	0.325	3.074
PTC	0.334	2.993
SHM	0.303	3.296
PSM	0.317	3.153
TE	0.373	2.68

6.3.2 The Project Success Framework

In order to obtain an estimate for the structural model relationships (i.e., the path coefficients) according to the hypothesized model, the PLS-SEM algorithm procedure has been run with 73 cases (research sample size) and 5000 bootstrap subsamples as a minimum (Hair et al., 2011) on smart PLS version 3. Such estimates represent the hypothesised relationships among the constructs, and the path coefficients have standardised values between -1 and +1. Estimated path coefficients close to +1 represent strong positive relationships (and vice versa for negative values) that are almost always statistically significant (i.e., different from zero in the population). The closer the estimated coefficients are to 0, the weaker the relationships. Very low values close to 0 are usually nonsignificant (i.e., not significant different from zero). Whether a coefficient is significant ultimately depends on its standard error that is obtained by means of bootstrapping. The bootstrap standard error allows the computing of the empirical *t* value. Critical *t* values are 1.65 (significance level = 10 percent), 1.96 (significance level = 5 percent), and 2.58 (significance level = 1 percent) (Hair Jr et al., 2014).

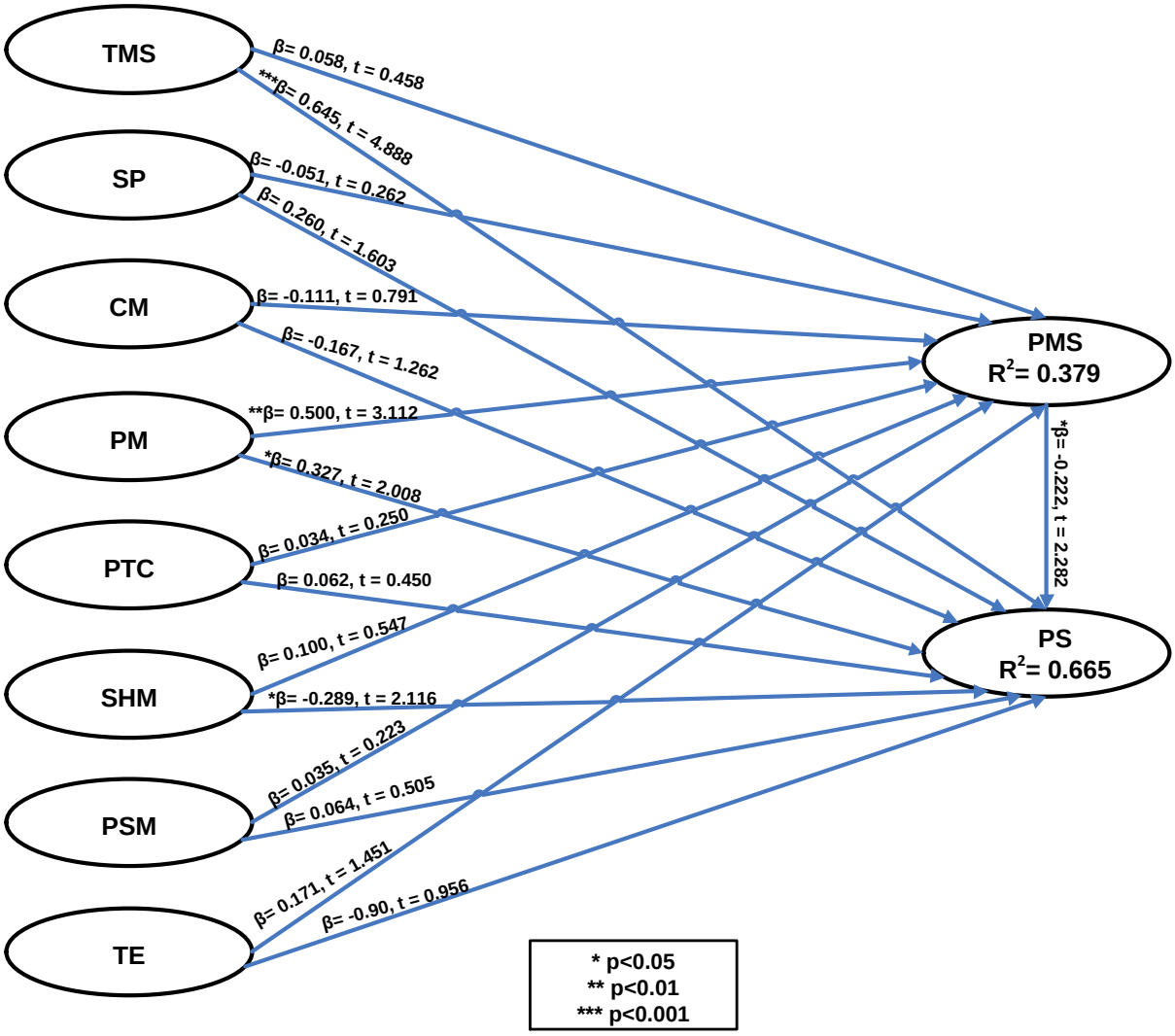


Figure 6.3: PLS results for research model

Figure 6.3 shows the PLS results for all the main relationships of the model as hypothesized. The figure shows the model with the coefficient of determination (R^2 value) for PMS is 0.379. The research model explains about 38% of the variance in the dependent variable (PMS). The value for R^2 can be considered moderate (Hair Jr et al., 2014). The coefficient of determination (R^2 value) for PS is much higher at 0.665. The research model explains about 67% of the variance in the dependent variable (PS). The value for R^2 can be considered substantial (Hair Jr et al., 2014). Thus, the model constructs exhibited a sufficient level of predictive validity. The result indicates the high contribution of the composite of eight CSF construct on PSC in the original proposed model, with the highest effect on project success derived from Delone and McLean (2003) success criteria.

Regarding the model's main relationships, it shows that there is a statistically significant positive effect of top management support and commitment (TMS) on the dependent latent variable (PS) at the level of $p < 0.01$ and $t >= 4.888$. The exogenous construct (top management support and commitment (TMS)) significantly contributes to explaining the endogenous latent variable (PS) with a total effect of 0.645.

Furthermore, the results above shows that there is a statistically significant positive effect of project management (PM) on the dependent latent variable (PMS) at the level of $p < 0.01$ and $t >= 3.112$ and PM with project success (PS) at the level of $p< 0.05$. The exogenous construct (project management (PM)) significantly contributes to explaining the endogenous latent variable (PMS) with a total effect of 0.500 and the endogenous latent variable (PS) with a total effect of 0.327.

Also, the results above shows that there is a statistically significant negative effect of stakeholders management (SHM) on the dependent latent variable (PS) at the level of $p < 0.05$ and $t > =2.116$. The exogenous construct (stakeholders management (SHM)) significantly contributes to explaining the endogenous latent variable (PS) with total effect of -0.289.

In contrast, all other independent constructs of CSF (communication management, strategic planning, partners and suppliers management, project team competency, and training and education) have no statistical significance on the dependent latent variables (PMS and PS), and they do not contribute to explaining the endogenous latent variables (PMS and PS).

As hypothesize earlier, project management success (PMS) is also expected to lead to project success (PS) in the overall success model. This relationship is supported in the result showing significant level of $p < 0.05$ and $t > =2.282$. Figure 6.4 shows the revised model after the original framework went through PLS-SEM analysis with elimination of all the insignificant variables. The model indicates that only three CSF constructs (TMS, PM, and SHM) contribute to explaining the large part of variance in PS ($R^2 = 0.638$) and one on PMS ($R^2 = 0.352$). Therefore, the model is revised from eight CSF constructs to only three to explain about project success in Saudi Arabia.

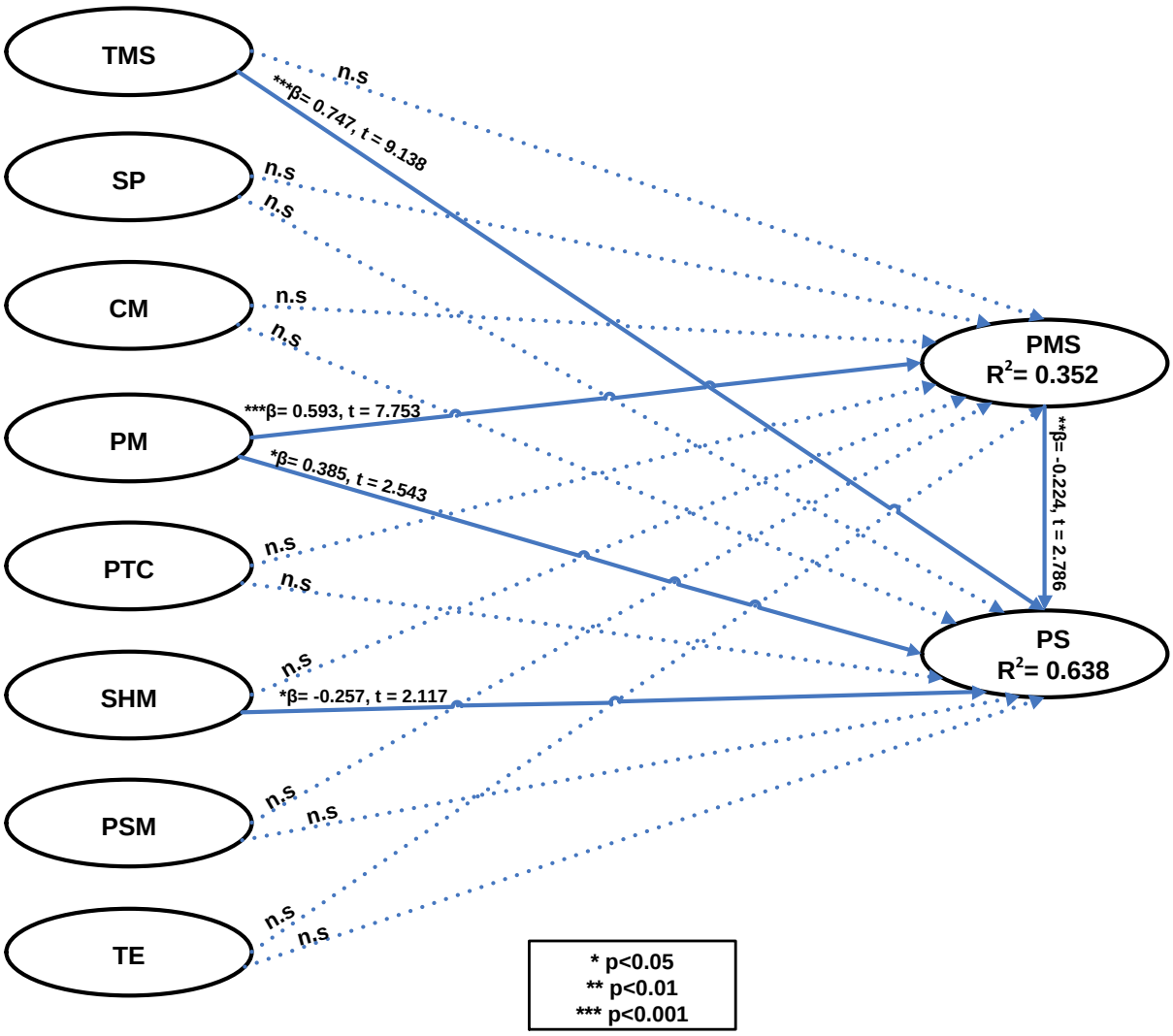


Figure 6.4: PLS results for research model (Refined)

In this context, the model allows the researcher to conclude that two components of project success criteria emerge as hypothesized, indicating PMS is significantly giving impact on PS. Project management success is attributed by the availability of project management processes only, whereas project success (PS) in the form of extended benefit of the project to users and stakeholders, are attributed to top management support and commitment, availability of project management processes, and stakeholder management. The revised hypotheses are shown in Table 6.7 below:

Table 6.7: Revised hypotheses

	Hypothesis	Project Management Success (PMS)	Project Success (PS)
H1	Top Management Support	H1a: Not Supported	**H1b: Supported**
H2	Strategic Planning	H2a: Not Supported	H2b: Not Supported
H3	Communication Management	H3a: Not Supported	H3b: Not Supported
H4	Project Management	**H4a: Supported**	**H4b: Supported**
H5	Project Team Competency	H5a: Not Supported	H5b: Not Supported
H6	Stakeholders Management	H6a: Not Supported	**H6b: Supported**
H7	Partners & Suppliers Management	H7a: Not Supported	H7b: Not Supported
H8	Training & Education	H8a: Not supported	H8b: Not Supported
H9	Project Management Success	-	**H9: Supported**

For the CSFs as dependent variables, the coefficient of determination (R^2 value) for PM is 0.450. The CSFs (TMS and CM) explains 45% of the variance in the dependent variable (PM). The value for R^2 can be considered moderate (Hair Jr et al., 2014). The coefficient of determination (R^2 value) for PTC is 0.612. The CSFs (CM, TE and PM) explains 61.2% of the variance in the dependent variable (PTC). The value for R^2 can be considered substantial (Hair Jr et al., 2014). The coefficient of determination (R^2 value) for SHM is 0.627. The CSFs (CM, TE and PM) explains 62.7% of the variance in the dependent variable (SHM). The value for R^2 can be considered substantial (Hair Jr et al., 2014). A snapshot of the whole model (R^2 and β values) from Smart PLS is shown in Figure 6.5.

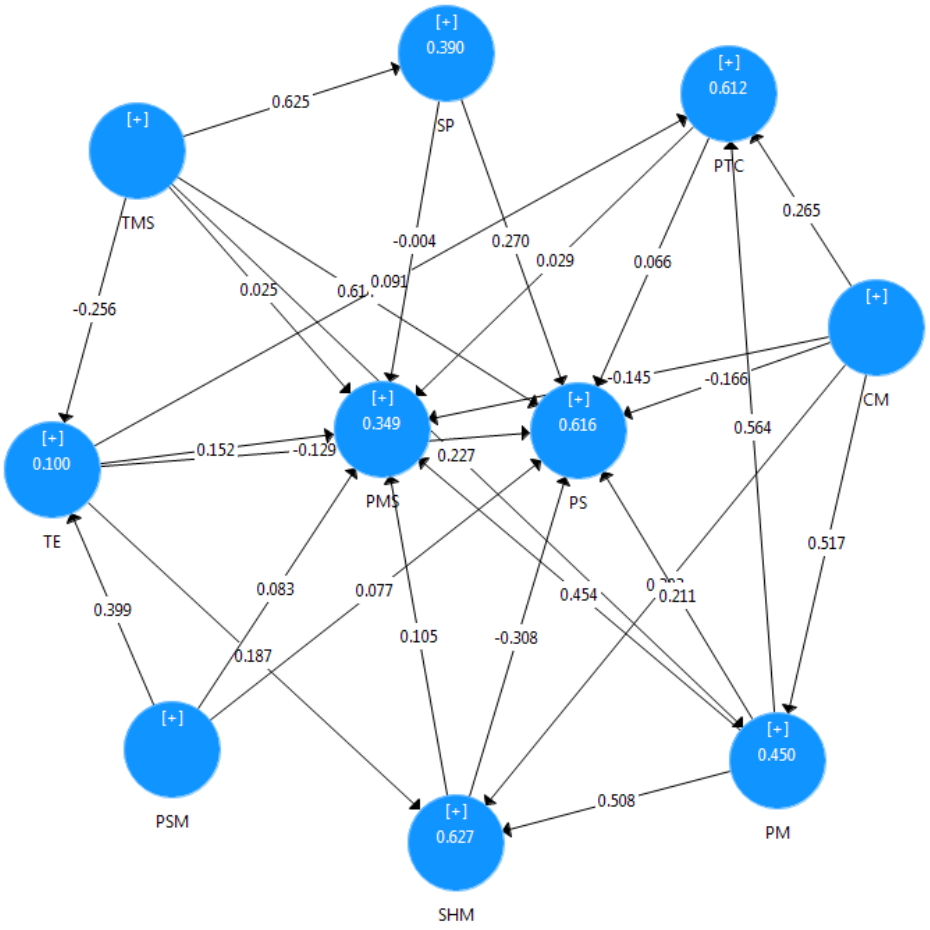


Figure 6.5: Snapshot of the whole model (R^2 and β values)

6.3.3 Assess the effect size f^2

In addition to evaluating the R^2 values of all endogenous constructs, the change in the R^2 value when a specified exogenous construct is omitted from the model can be used to evaluate whether the omitted construct has a substantive impact on the endogenous constructs. This measure is referred to as the f^2 effect size. The effect size f^2 can be calculated as

$$f^2 = \frac{R^2_{included} - R^2_{excluded}}{1 - R^2_{included}},$$

Where $R^2_{included}$ and $R^2_{excluded}$ are the R^2 values of the endogenous latent variable when a selected exogenous latent variable is included in or excluded from the model. The change in R^2 values is calculated by estimating the PLS path model twice. It is estimated the first time with the exogenous latent variable included ($R^2_{included}$) and the second time with the exogenous latent variable excluded ($R^2_{excluded}$). Guidelines for assessing f^2 are that values of

0.02, 0.15, and 0.35, represent respectively small, medium, and large effects of the exogenous latent variables (Cohen, 2013). Table 6.8 shows the f^2 effect sizes for all the relationships between the exogenous constructs and the endogenous construct in the model.

Table 6.8: Effect sizes (f^2)

		TMS	CM	PTC	SHM	PSM	PM	SP	TE
f^2 Effect size	**PMS**	.002	.007	.001	.006	.001	.120	.001	.029
	PS	.503	.029	.004	.087	.004	.086	.065	.014

The result shows that the effect size of *top management support and commitment* on PS is .503 which is considered a large effect while the effect size of *project management* on PMS is .120 which is very close to be considered a medium effect. Also, the result shows that the effect sizes of all other CSFs are very small effects.

6.3.4 Assess the predictive relevance Q^2

Scholars have to also examine the Stone–Geisser's Q^2 value along with assessing the greatness of the R^2 values as a criterion of predictive accuracy, (Geisser, 1974, Stone, 1974). The Q^2 value is acquired by utilising the blindfolding technique for a certain oversight distance D.=. Blindfolding is a sample reuse procedure that overlooks each *d*th data point in the endogenous construct's indicators and appraisals the parameters with the remaining data points (Chin, 1998, Henseler et al., 2009). While running the PLS-SEM algorithm, the omitted data points are viewed as missing values and treated likewise, and then, the subsequent appraisals are used to predict the overlooked data points. The change between the omitted data points and the predicted ones is then used as input for the Q^2 measure. The blindfolding procedure is an iterative method that repeats till every data point has been omitted and the model re-assessed.

In the structural model, Q^2 values larger than zero for a certain endogenous latent variable indicate the path model's predictive relevance for this particular construct (Hair et al., 2011, Hair Jr et al., 2014). The blindfolding technique is applied to the endogenous latent variables (PMS and PS), and the result shows that the values for PMS (.201) and PS (.337) are larger than zero, therefore, its explanatory variables provide predictive relevance.

6.4. Summary

In this chapter, two assessments were used to test the research conceptual framework: (1) the measurement model assessment; and (2) the structural model assessment. In the measurement model assessment, internal consistency reliability, convergent validity, discriminant validity, content validity, construct validity and criterion-related validity were used to measure the reliability and validity of the instruments. After reliability and validity analyses were conducted, the two instruments for measuring the CSFs and project success criteria (PMS and PS) were deemed reliable and valid. Therefore, the data obtained from them can be used for subsequent data analysis. More details about the measurement model assessment have been described in section 6.2.

In the structural model assessment, further analysis using the bootstrap procedure showed that not all of the CSFs were of high importance; they varied in respect to their effects and relationships with the project success criteria (PSC) constructs (PMS and PS). The results show that top management support factor had a positive significant effect on PS, and stakeholders management factor had a negative significant effect on PS. Also, the results show that project management factor had a positive significant effect on PMS. Moreover, the coefficient of determination (R^2 value) for PS is substantial while it is moderate for PMS. Furthermore, the model shows that there are significant relationships between the CSFs. More details about the structural model assessment have been described in section 6.3.

The following chapter presents the discussion of the research findings. Having had an opportunity to scrutinise all the findings of this study and previous studies, the next chapter puts together the whole picture of project success in Saudi Arabian public organisations from the CIO's perspective.

Chapter 7 : Discussion

7.1. Overview

In the previous chapters, data analyses were conducted and the findings were presented in detail. The present chapter discusses the interpretations of the study findings. In particular, the researcher intends to link the findings of the survey with prior research conducted in the field of project success, as well as with the findings of the exploratory study presented in Chapter 4.

7.2. Research Findings and Discussion

7.2.1. CIOs' Profile

The CIOs' profiles are presented in Chapter 5 (section 5.2.1), and most of the respondents are Saudi, male, highly educated, with a computing background, strategically oriented, with great experience. Table 7.1 summarise the CIOs' profile.

Table 7.1: Summary of CIOs profile

CIOs' Background		Percent
Nationality	Saudi	90.4
Gender	Male	97.3
Age	Older than 35 years	83.6
Educational Level	At least bachelor degree	98.6
Educational Background	Computing	84.9
Experience	More than 10 years	86.3
Respondent Level	At most two levels	87.7
CIO Type	Strategic	46.6
Experience as CIO	Less than 6 years	53.4
Experience as number of projects	Under 6 projects	47.9

The fact that the majority of the respondents are Saudi does not seem surprising in the public sector in Saudi Arabia because the public sector is forced to take on Saudi IT workers. The reasons for this are that the Saudi government has developed a policy of 'Saudisation' as a way of replacing expatriates with Saudi workers, in order to help solve the problem of unemployment (Fakeeh, 2009). Also, the fact that the majority of the respondents are male is

not surprising either, because the Saudi Arabian culture manifests gender separation. Acker (2006) argues that gendered occupational structures have caused inequalities in organisation hierarchies and limited women's opportunities. In spite of the considerable role of women in Saudi society, evidence suggests that women in leadership positions are facing a different reality from their male counterparts due to organisational, personal and cultural challenges that impede their effectiveness as leaders (Al-Ahmadi, 2011).

Most of the respondents were older than 35 years, and had worked for more than 10 years which indicates that the CIOs are expert and well-qualified. Expert and well-qualified managers are more professional, knowledgeable and practised in the field, more familiar with alternative ways of doing business, and open to learning. Therefore, this should be beneficial to improving the performance of the IT projects in their organisations. The vast majority of the respondents hold a degree in computing. This is because organisations that manifest an advanced level of IT projects tend to recruit managers with certain qualifications that match the description of the vacant jobs. However, due to the shortage of IT professional workers in Saudi Arabia, some organisations are forced to recruit managers with different backgrounds (e.g. engineering). The respondents have indicated that they have a certain level of experience which is useful in understanding IT management and project implementation in their organisations. It is believed that they possess foresight, are organised, know how to lead, are good communicators, are pragmatic and empathetic, and possess a high level of knowledge based on the length of time they have spent in their jobs.

The majority of the respondents (87.7%) were at most two levels below the organisation's top management. This shows that the top management of these organisations seem to believe that IT is essential to the perception of their organisation's objectives. They prefer to be close to IT management which usually helps in ensuring full and lasting support. Almost half of the respondents classified themselves as strategic, where they are looking at the big picture and trying to move in a different direction or expand significantly. This helps them to monitor, arrange and prioritise the IT projects at the organisational level since the CIO position is considered as a higher level of management. Some of the respondents had an experience of less than 6 years and less than 6 projects as CIO, which indicates that in the IT track career it takes longer for IT staff to achieve executive positions.

7.2.2. Organisations' Profile and IT Characteristics

The organisations' profile and IT characteristics are presented in Chapter 5 (section 5.2.2). The distribution of the respondents in the organisation category is fairly representative of public organisations in Saudi Arabia. Most of the organisations are large, and more than half of their IT departments are large in terms of their number of employees. Most organisations' allocated budget is at least five million SR yearly for their IT projects, as the bigger the organisation is, the more money they allocate to IT. Most of the organisations have a formal project management methodology, and some of them are adopting one of the most world popular standard which is PMI (Project Management Institute). Almost half of the organisations have PMO. Probably, the existence of a PMO will be associated with the existence of project management methodology, and these methodologies will be adopted by the PMO in order to manage the IT projects within the organisations under a unified standard.

Most of the organisations develop some systems in-house and outsource others. Keenness to implement new technologies and systems, as well as the shortage of IT professionals, encourages some management to buy pre-packaged solutions (e.g. Enterprise Resource Planning [ERP]). Surprisingly, most of the organisations receive neither funds nor consultations services from the government (Yesser program). The reasons behind that may be either that the Yesser program is focusing on the organisations that have a large impact on civilians, such as the ministries of the interior, health and education, in order to make sure that the program succeeds in its mission, or that these organisations have not tried to follow the Yesser program's procedures and policies in order to obtain support.

7.2.3 Effect of the Organisational, IT and CIO Variables

The third research question was formulated to explore if there any effect or relationship between characteristics variables from demographic and organisational, on CSF or PSC. This analysis is considered important as, these variables could be important in influence the relationship between CSF and PSC in the success model that this research attempts to test. The effect of these variables is presented in Chapter 5 (see section 5.7). The one-way ANOVA analysis results show that there were no statistically significant differences between some demographic variables such as *respondent nationality, respondent gender, respondent age, educational level, respondent experience, respondent level, organisation category, IT*

department size, and PMO existence variables on the CSFs. This is because the 'Sig.' value is larger than .05 for all the CSF constructs.

On the other hand, the one-way ANOVA analysis results show that there were statistically significant differences between variables such *educational background, CIO type, experience as CIO, experience as number of projects, organisation size, IT projects' budget, project management existence, IS development, and external government support* on the CSFs as follows.

There were statistically significant differences between the *CIO type* variable and *strategic planning, project management, stakeholders management* and *training and education*. The finding reveals that both strategic and transformational type are significantly higher in strategic planning, project management, stakeholder management, and training and education, compared to operational type. It can be concluded that operational types of CIO are not focused on these element of success. The CIOs assist in closing the gap between organisational and IT strategies (Gottschalk, 1999), and the more the projects will be aligned with the organisation's goals, the more need for project management to be adopted and the more training should be conducted in order to create a suitable environment for project to be successful. This finding suggests that the choice of CIO based on types can be useful leading to project success. Likewise, operational type of CIO may need to reconsider changing their management nature.

There was a statistically significant different between the *experience as CIO* variable and strategic planning. The research indicates, the more experienced the CIO, the more strategic they become. The strategic role of the CIOs are becoming ever more complex, requiring an expansion of the organisational and structural possibilities for filling that role, and are expected to generate a wider plan for IT projects that should be aligned with the organisation's goals (Gottschalk, 1999). This requires significant amount of experience to be able to mature and able to effectively employ on the strategies. There was a statistically significant difference between the *experience as number of projects* variable and training and education. The number of years on the project indicates the high perception on the need for training and education. This lead to the understanding that, training and education is highly important, as experienced CIOs were recognizing the needs. The CIOs face the usual human resource roles such as staff training and education (Gottschalk, 1999), and they should

regularly evaluate training needs and provide professional development resources (Ware, 2003).

There were statistically significant differences between the *IT projects' budget* variable and *strategic planning*, as more money is allocated to IT projects, the more these projects need to be aligned with the organisation goals, which therefore requires good strategy. Also, there were statistically significant differences between the *IT projects' budget* and *project management*, as the more budget is allocated to IT projects, the more emphasis is given on having effective project management schemes, such assigning a qualified project manager and project team members, and more effective planning and management of projects through use of IT tools. Moreover, with great budget, project management tools and software can be acquired in order to facilitate the project monitoring.

There were statistically significant differences between the *project management existence* variable and *project management* and *stakeholders management* as adopting a project management methodology increases monitoring and controlling of all the project activities and parties such as stakeholders (Nah et al., 2007). There was a statistically significant difference between the *systems development* variable and *partners and suppliers management* as the involvement of the partner and supplier is more when the IT project is outsourced (Tafti, 2005). There were statistically significant differences between the *external government support* variable and *communication management, project management, project team competency*, and *partners and suppliers management* as the more government support is involved in implementing IT projects, the more project management and supplier management best practices can be adopted (Yesser, 2015).

This finding is considered highly useful in a situation when managers attempts to understand about project success or project management success in relation to their organisational settings. It is evidence that different types of management and organisational settings can lead to different strategy in how projects can be lead to success.

Likewise, ANOVA conducted between all the organisational, IT and CIO characteristics and PSC are found not significant. This means, if the overall score for PS and PMS are high, this value is not being affected by any of these variables.

7.2.4. The Level of Perceptions in Different Organisation Sectors

The survey results show that the CIOs in the hospital sector have the highest level of perception of all the CSFs compared with the other sectors (see Table 7.2). Furthermore, the CIOs in this sector has a high level of perception in project success criteria. The following may be an explanation for the high level of perceptions in the hospital sector. Most of the government hospitals have their own salary scales which can help them to attract qualified managers and skilled IT employees, because their scales are higher than the government salary scales. Due to their good education, top management are more willing to improve their organisations by paying attention to IT projects and becoming involved in all the stages that each project goes through, in order to ensure that the project produces the desired outcome. In addition, the recruitment processes in hospitals through self-employment programmes are more flexible than in other government sectors, which gives them an advantage as they are able to solve any turnover problem during the implementation of any IT project.

Furthermore, the government allocates generous budgets for the hospital sector (IT projects), due to the importance of human life and safety, which helps in recruiting the best people and consultants and obtaining the best available technology. Having a substantial budget helps to establish a good training program in order to improve the project teams and the users' knowledge, and to equip them with the skills that are needed for a project to succeed. In hospitals, the projects are interrelated and it is very important to establish a good relationship with the partners and to build trust, in order to ensure that this relationship helps the organisation to implement its projects smoothly. Stakeholders' needs and requirements are managed well in the hospitals because the stakeholders, such as the doctors and nurses (key people), are well educated and usually they are very demanding about satisfying patients with the correct treatment.

Table 7.2: Summary of the CSFs perceptions

Construct	Organisations Categories (Mean)					
	Ministeries	Authorities	Corporations	**Hospitals**	Higher Education	Other
Top Management Support	3.70	3.65	3.78	**3.90**	3.42	3.69
Strategic Planning	3.61	3.57	3.22	**3.87**	3.35	4.00
Communications	3.71	3.72	3.56	**4.18**	3.80	3.97
Project Management	3.62	3.69	4.08	**4.07**	3.66	4.13
Project Team Competency	3.18	3.42	3.67	**3.88**	3.34	3.64
Stakeholders Management	3.40	3.56	3.67	**3.82**	3.52	3.68
Partners and Suppliers Management	3.53	3.72	3.79	**3.93**	3.40	3.85
Training and Education	3.21	3.39	3.19	**3.75**	3.09	3.75

7.2.5. The Project Success Criteria in Saudi Arabian public organisations

Findings indicate that the traditional measures of the iron triangle (on-time, on budget and according to specifications) are less important to measure the project success from the CIO point of view. Other project success criteria (use, stakeholders needs, business goals and objectives) are the most important for the CIO (Table 7.3) since these criteria are critical at the organisation level (Davis, 2016).

Table 7.3: Project success criteria in Saudi Arabia

No.	IT Project Success Criteria	Mean
1	End products of IT projects are used	**4.22**
2	IT project achieve its business goals and purpose	**4.15**
3	projects meet the needs of the project stakeholders	**3.89**
4	IT projects are completed on-time	3.71
5	IT projects are completed on-budget	3.63
6	IT projects are completed with all features and functions as initially specified	3.48

Further analysis using factor analysis and SEM-PLS was used to classify different types of project success criteria (PSC). The results show that there was two types of success as hypothesized; project management success (PMS) and project success (PS). The literature clearly indicates the difference, as PMS is based on success within the triple constrain of cost, time and scope after project completion (Brown and Hyer, 2010, Ika, 2009, McLeod et al., 2012), and PM extents to the long term benefit of the project based on its benefit, use and usefulness upon completion as stipulated in the Delone and McLean Success Model (2003).

This research is therefore, in support of this difference. The measurement model confirmed and established in this research is considered as highly reliable, and can be used to measure project success in other settings.

The score for both PMS and PS are considered reasonably high. However, the score of PS is much higher than PMS. The results indicate the increase perception of CIOs in Saudi Arabia on the importance of PS, besides PMS. The CIO are in general, very much concerned with project success in the form of golden/iron triangle where the project is done on time within the allocated budget and meeting the quality targets. However, their concerned is much more on project success in the form of their extended benefit to users and stakeholders, as the CIOs are highly responsible at the overall contribution of all IT projects to the organisation goals. In other words, project managers often focus on technical aspects of a project (Davis, 2014). On the other hand, the CIO act as an executive whose concern is at the organisation level rather than at the project level. Therefore, this type of CIOs is concerned with the criteria that affect the whole organisation including the business goals (net benefits), the stakeholder satisfaction, and the use of the final project (McLeod et al., 2012).

7.2.6. The Project Success Framework and Contribution

In establishing the project success framework, the researcher has followed several steps in the research process, of which research questions and objectives were used as guides. In the early process, this research has established a set of factors that are called critical success factors (CSF), which began with the review of twelve factors. Further analysis has led to the shortlisted of eight factors. These factors were tested on the 73 CIOs on their level of perceptions for the reliability of the measurement model and the extent to which they are significantly related with the success criteria PSC. The process is then followed by the identification of two components of success (PSC), which are identified conceptually in the literature as PS and PMS.

The study used a deductive approach to test the model using SEM-PLS as analysis approach. This analysis has enable the research to confirm two important findings; 1 – the measurement model of the factors or constructs used in the study, 2 – the revised model of project success with the contribution of key factors, and elimination of insignificant factors.

In the SEM-PLS model, the result shows that all factors contribute to high coefficient of determination (R^2) score, which represent high variance accounted for by CSF on PSC.

Subsequent analysis indicates that the highest variance are attributed by top management support, project management, and stakeholder management. Project management has significant effect on the project management success (PMS) and project success (PS), top management support and stakeholders management have significant effect on project success (PS). Likewise, project management success is also observed as mediating the effect of project management (PM) on project success (PS). The model as shown in Figure 7.1, has been refined to indicate the strongest relationship that emerged from the analysis.

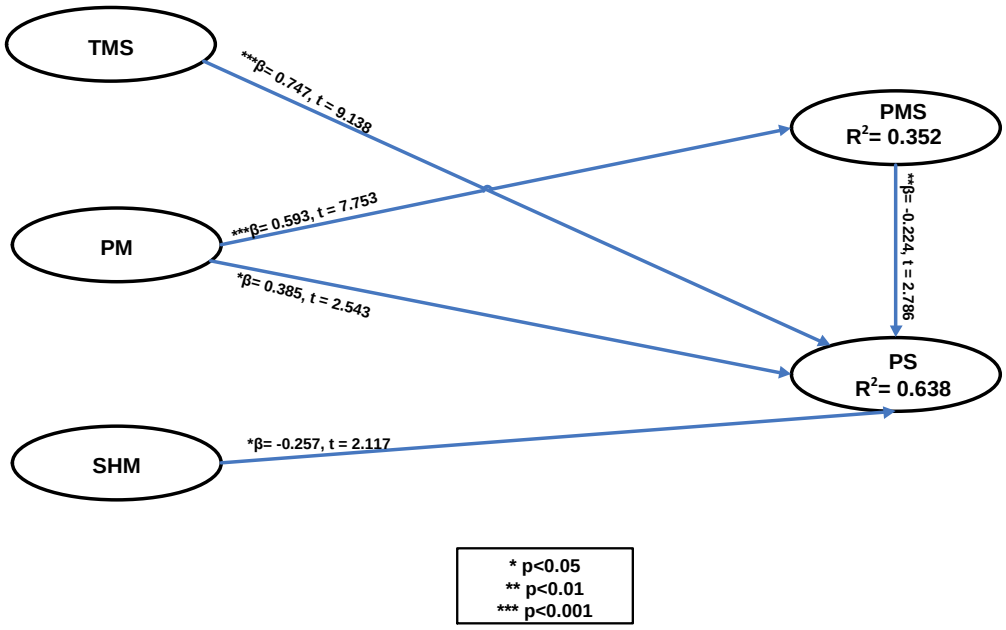


Figure 7.1: Research Framework

In contrast, all other independent variables (communication management, strategic planning, partners and suppliers management, and project team competency) have no statistical significance on the dependent latent variables (PMS and PS), and they do not contribute to explaining the endogenous latent variables (PMS and PS). The following subsections will discuss the results for each of the CSFs.

7.2.6.1. Top Management Support and Commitment

Top management support and commitment has been highlighted as a key factor in IT project success by many researchers. Thus, the findings from this research, was, indeed, in an agreement other researchers on the significant role of top management support in IT project success (Al-Mudimigh et al., 2011, Alaskari et al., 2013, Annamalai and Ramayah, 2013, Dezdar and Ainin, 2012, Fortune and White, 2006, Nasir and Sahibuddin, 2011, Ngai et al., 2008, Young and Jordan, 2008, Ziemba and Oblak, 2013). This is because IT projects are

large-scale and have an effect on a number of people and departments in any organisation. Consequently, this kind of project requires a lot of resources and should receive support and commitment from top management prior to its implementation. Top management sponsorship, championship, support, and participation are critical for IT project success, and public, explicit, and direct support for the project implementation must be present to emphasise the priority of the IT project (Nah et al., 2007). Top managers should mediate between different stakeholders in order to resolve any potential conflict (Dezdar and Ainin, 2012). Hence, top management support and commitment is a significant success factor, as seen in the literature review, mentioned in section 2.8.2 and summarised in Table 2.4. Therefore, this factor is considered in the exploratory study for further examination in order to confirm its importance.

In the exploratory study, the factors were listed in a questionnaire to be ranked based on their importance in the participants' point of view. The outcome of the questionnaire shows and confirms that top management support and commitment is very important as it was the top of the list with a mean value of 4.79 (see Table 4.2 in section 4.3.2). Therefore, top management support and commitment is considered to be part of the research conceptual framework in order to test its impact on the project success criteria (PMS and PS).

In the explanatory phase, it was found that the CIOs' perceptions of top management support factor are at a high level (see section 5.9). The measurement model shows that the top management support and commitment construct has been tested and found to be reliable and valid (see section 6.2). The structural model shows that top management support is a critical success factor; it has the highest impact on PS with a path coefficients value of 0.645 and a significance level of 4.888 (see section 6.3). This result is consistent with many previous studies such as Dezdar and Ainin (2012), Kamhawi (2007) and Al-Mashari et al. (2006). The result also indicates the strength in the relationship and predictive ability of top management support to ensure project success, whether it is for the short term or for the long term benefit.

As a result, it can be confirmed that top management support is vital for success, where the following roles should be deliberated carefully by top management during the IT project's implementation: sufficient incentive and commitment should be provided; IT projects should be viewed as a strategic decision; IT projects should be actively supported and treated as a critical priority; top management encouragement and participation should exist; sufficient budget and resources should be allocated, and the suitable environment for IT projects to

succeed should be created. As discussed above, it is concluded that proper top management support and commitment is expected to increase the success of IT projects in public organisations in Saudi Arabia from the CIO perspectives.

7.2.6.2. Strategic Planning

Strategic IT planning establishes a clear vision and measurable objectives for the use of IT in an organisation, prescribes strategies to achieve this vision with the knowledge of the available IT capabilities and opportunities, provides measures for success and possibly suggests concrete initiatives for implementing the developed strategies (Ojo et al., 2009). IT capabilities should be constantly reviewed against organisation strategic goals, and IT plans should be redesigned as required to meet evolving conditions (Stratman and Roth, 2007). Strategic IT planning should be a continuous process with written guidelines to structure strategic IT planning. Top management should be involved in strategic IT planning, and these plans should include inputs from all the functional areas in the organisation (Stratman and Roth, 2007). Strategic planning is an important success factor, as seen in the literature review in section 2.8.2 and summarised in Table 2.4 (Al-Turki, 2011, Annamalai and Ramayah, 2013, Gunasekaran and Garets, 2003, Hong, 2009). Therefore, this factor is considered in the exploratory study for further testing in order to confirm its importance.

In the exploratory study, the factors were listed in a questionnaire to be ranked based on their importance in the participants' point of view. The outcome of the questionnaire shows and confirms that strategic planning was important as it was ranked fifth in the list with a mean value of 4.36 (see Table 4.2 in section 4.3.2). Therefore, strategic planning is considered to be part of the research conceptual framework in order to test its impact on the success criteria (PMS and PS).

In the explanatory phase, it was found that the CIOs' perceptions of strategic planning are at a middle-level (see section 5.9). The measurement model shows that the strategic planning construct was tested and was found to be reliable and valid (see section 6.2). The structural model analysis using PLS shows that strategic planning has no direct impact on both PMS (β=-0.054, t=0.262) and PS (β=0.260, t=1.603). This indicates, strategic planning is not a critical contributor of project success in Saudi Arabia as perceive by CIO.

7.2.6.3. Communications Management

Communication management should be reliable and constant and begin from the early stage of the IT project implementation. Communication management is essential through the different phases of the IT project implementation to inform employees why change is needed, what is happening, and how it will benefit the organisation (Nah et al., 2007). Communication is necessary for creating general acceptance and understanding of the new systems. Thus, there should be effective communications between project team members, users, and amongst functional departments. Moreover, sufficient communication channels (presentations, video broadcasts over a local portal, frequent e-mail updates, bulletins, newsletters, weekly meetings, etc.) should exist in order to inform and update users and stakeholders about the objectives and the progress of the IT projects (Nah et al., 2007).

Communication management is an important success factor, as seen in the literature review in section 2.8.2 and summarised in Table 2.4 (Al-Mashari and Al-Mudimigh, 2003, Alaskari et al., 2013, Annamalai and Ramayah, 2013, Dezdar and Ainin, 2012, Nah et al., 2007, Nasir and Sahibuddin, 2011, Ziemba and Oblak, 2013). Therefore, this factor is considered in the exploratory study for further analysis in order to confirm its importance.

In the exploratory study, the factors were listed in a questionnaire to be ranked based on their importance in the participants' point of view. The outcome of the questionnaire shows and confirms that communication management was important as it was ranked fourth in the list with a mean value of 4.36 (see Table 4.2 in section 4.3.2). Therefore, communication management was considered to be part of the research conceptual framework in order to test its impact on the success criteria (PMS and PS).

In the explanatory phase, it was found that the CIOs' perceptions of communication management are at middle to high level (see section 5.9). The measurement model shows that the communication management construct was tested and was found to be reliable and valid (see section 6.2). The structural model analysis using PLS shows that communication management has no direct impact on both PMS (β=-0.111, t=0.791) and PS (β=-0.167, t=1.262). This indicates, communication management is not perceived to be a critical contributor of project success in Saudi Arabia as perceive by CIO.

7.2.6.4. Project Management

Project management has become a key activity in most modern organisations (Belout and Gauvreau, 2004, Dezdar and Ainin, 2012), and is crucial for success of projects. Since IT projects are challenging, costly, and risky, in order to achieve their desired benefits, the implementation of IT projects must be carefully managed and monitored. Consequently, project management is a methodology and perception that is expected to play a critical role in any project in general, and in IT projects in particular, for any organisation. Project management provides the single point of integrative responsibility needed for everything on the project to be managed effectively, and to ensure that a successful project is deliverable. Therefore, project management deals with various aspects of the project, such as planning, organisation, information system acquisition, personnel selection, and management and monitoring the IT project implementation (PMI, 2013).

Project management is an important success factor, as seen in the literature review in section 2.8.2 and summarised in Table 2.4 (Al-Mashari et al., 2003, Alaskari et al., 2013, Dezdar and Ainin, 2012, Murray and Coffin, 2001, Nah et al., 2007, Nasir and Sahibuddin, 2011, PMI, 2013, Rosario, 2000, Ziemba and Oblak, 2013). Therefore, this factor is considered in the exploratory study for further examination in order to confirm its importance.

In the exploratory study, the factors were listed in a questionnaire to be ranked based on the importance of the participants' point of view. The outcomes of the questionnaire confirm that project management is perceived to be very important, as it was ranked second in the list with a mean value of 4.54 (see Table 4.2 in section 4.3.2). Therefore, project management was considered to be part of the research conceptual framework, in order to test its impact on project success criteria (PMS and PS).

In the explanatory phase, it was found that the CIOs' perceptions of project management are at a high level (see section 5.9). The measurement model shows that the project management construct was tested and was found to be reliable and valid (see section 6.2). The structural model shows that project management is a critical success factor, and it has the highest positive impact on PMS with a path coefficients value of 0.500 and a significance level of 3.112 as well on PS (β=0.327, t=2.008). This result is consistent with Nah et al. (2007) and Dezdar and Ainin (2012), and in support of the results of previous other research (Al-Mashari et al., 2006, Dezdar and Ainin, 2011b, Kamhawi, 2007).

As a result, project management is seen as essential for success among CIOs in Saudi Arabia, and the following tasks should be considered carefully in each IT project: the scope should be clearly established; a detailed project plan with measurable results should be provided; the responsibility for all parts should be assigned; the activities across all affected parties should be coordinated properly; a formal management process should exist in order to monitor suppliers' activities; and project progress should be reviewed on a periodic basis. As discussed above, adopting a proper project management standard and methodology is expected to increase the success of IT projects in public organisations in Saudi Arabia from the CIO perspectives.

7.2.6.5. Project Team Competency

A project team should comprise the best business and technical knowledge in the organisation to maximise the chances of success of the IT project. The team should be cross-functional and possess the necessary technical and functional skills for design, implementation, and integration (Nah et al., 2007). An experienced project manager should be dedicated to one project only at one time as well as the rest of the project team should be committed to that project and be free from their department's tasks. The project team should be empowered to make decisions relating to the project (Nah et al., 2007). Project team competency is an important success factor, as seen in the literature review in section 2.8.2 and summarised in Table 2.4 (Alaskari et al., 2013, Alghathbar, 2008, Annamalai and Ramayah, 2013, Dezdar and Ainin, 2012, Ziemba and Oblak, 2013). Therefore, this factor is considered in the exploratory study for further testing in order to confirm its importance.

In the exploratory study, the factors were listed in a questionnaire to be ranked based on their importance in the participants' point of view. The outcome of the questionnaire shows and confirms that project team competency was important as it was ranked third in the list with a mean value of 4.36 (see Table 4.2 in section 4.3.2). Therefore, project team competency is considered to be part of the research conceptual framework in order to test its impact on the success criteria (PMS and PS).

In the explanatory phase, it was found that the CIOs' perceptions of project team competency are at low to middle level (see section 5.9). The measurement model shows that the project team competency construct was tested and was found to be reliable and valid (see section 6.2). The structural model analysis using PLS shows that project team competency has no direct impact both PMS (β=0.034, t=0.250) and PS (β=-0.062, t=0.450). This indicates,

project team competency is not perceived to be a critical contributor of project success in Saudi Arabia as perceive by CIO.

The outcome is inconsistent with previous research carried out in developing countries (Al-Mashari et al., 2006, Dezdar and Ainin, 2012, Ramayah et al., 2007), but is in line with the result of the study of Nah et al. (2007). One possible explanation might be that it is difficult to have the best team for the whole IT project if it lasts for years, as many departments cannot afford that, and they prefer to nominate less skilled employees to carry on the project, especially when the concerned department is forced to participate in the project implementation. Also, due to the limitations in highly qualified human resources in developing countries, it is challenging to have a dedicated project manager for one project and they might be assigned to more than one project at the same time.

7.2.6.6. Stakeholders Management

Stakeholders are persons or organisations who are actively involved in the project or whose interests may be positively or negatively affected by the performance or completion of the project (PMI, 2013). Therefore, identifying stakeholders and understanding their relative degree of influence on a project is critical. A project's success or failure is directly linked to its stakeholders' perceptions (Bourne and Walker, 2008). Poor stakeholders management is one of the influencing factors in conducting IT projects (Yeo, 2002).

Stakeholders management is an important success factor, as seen in the literature review section 2.8.2 and summarised in Table 2.4 (Abouzahra, 2011, Bourne and Walker, 2008, Crawford, 2005, Morris et al., 2006, PMI, 2013, Shenhar and Dvir, 1996). Therefore, this factor is considered in the exploratory study for further analysis in order to confirm its importance.

In the exploratory study, the factors were listed in a questionnaire to be ranked based on their importance in the participants' point of view. The outcome of the questionnaire shows and confirms that stakeholders management was important and it was ranked eighth in the list with a mean value of 4.15 (see Table 4.2 in section 4.3.2). Therefore, stakeholders management is considered to be part of the research conceptual framework in order to test its impact on the success criteria (PMS and PS).

In the explanatory phase, the CIOs' perceptions of stakeholders management are at a middle level (see section 5.9). The measurement model shows that the stakeholders management construct was tested and was found to be reliable and valid (see section 6.2). The structural model analysis using PLS shows that stakeholders management has a negative impact on PS with a path coefficients value of 0.289 and a significance level of 2.116.

Stakeholders and their interests may be affected by projects or project outcomes; thus, from an ethics and sustainable management perspective, they must not be ignored in project management process. Since any project has many stakeholders, whose interest may be related or in conflict, the project manager should manage the stakeholders' needs and assure their satisfaction in order to increase the chance of the project success.

7.2.6.7. Partners and Suppliers Management

Partners and suppliers' management plays a significant role in project success, as organisations select their partners and suppliers based on their quality rather than only on their price. Price has no meaning without a measure of the quality being purchased (Deming, 2000). The IT partners and suppliers should communicate well with the organisation, and their personnel should have sufficient experience in implementing IT projects with high quality services which may enhance the project success, including adequate training with suitable formal documents (user manual, operation guide, etc.). Partners' and suppliers' detailed performance information should be kept and maintained for regular review in order to either continue with the same partners and suppliers or to look for a better one so that long-term cooperative relations with partners and suppliers can be established. Therefore, technical expertise, domain knowledge, adequate manpower, project management skills and long existence in the field should be the characteristics of the partners and suppliers.

Partners and suppliers management is an important success factor, as seen in the literature review in section 2.8.2 and summarised in Table 2.4 (Al-Mashari et al., 2003, AlShitri, 2008, ISO9000, 2000, Kansal, 2007, Zhang et al., 2003). Therefore, this factor is considered in the exploratory study for further examination in order to confirm its importance.

In the exploratory study, the factors were listed in a questionnaire to be ranked based on their importance in the participants' point of view. The outcome of the questionnaire shows and confirms that partners and suppliers management was important and it was ranked as seventh in the list with a mean value of 4.18 (see Table 4.2 in section 4.3.2). Therefore, partners and

suppliers management is considered to be part of the research conceptual framework in order to test its impact on the success criteria (PMS and PS).

In the explanatory phase, it was found that the CIOs' perceptions of partners and suppliers management are at a middle level (see section 5.9). The measurement model shows that the partners and suppliers management construct was tested and was found to be reliable and valid (see section 6.2). The structural model analysis using PLS shows that partners and suppliers management has no direct impact on both PMS (β=0.035, t=0.223) and PS (β=0.064, t=.505). This indicates, partners and suppliers' management is not a critical contributor of project success in Saudi Arabia as perceived by CIO.

7.2.6.8. Training and Education

Training and education as a critical part of IT project implementation have been referenced by a considerable number of citations (Bukamal and Wadi, 2016, Dezdar and Ainin, 2011c). It is important to have a detailed plan for the training facilities and resources. Specific IT skills training should be given to the project team members, and a formal training programme with customised materials should be developed to meet the users' requirements before the implementation of the IT project. Training and education should be a continuous process in order to keep both the project team members and the end users up to date with the required technical and business skills in order to enhance the success of the new projects.

Training and education is an important success factor, as seen in the literature review in section 2.8.2 and summarised in Table 2.4 (Al-Mashari et al., 2003, Aladwani, 2001, Finney and Corbett, 2007, Kumar et al., 2002, Mandal and Gunasekaran, 2003, Robey et al., 2002). Therefore, this factor is considered in the exploratory study for further testing in order to confirm its importance.

In the exploratory study, the factors were listed in a questionnaire to be ranked based on their importance in the participants' point of view. The outcome of the questionnaire shows and confirms that training and education is important and it was ranked sixth in the list with a mean value of 4.31 (see Table 4.2 in section 4.3.2). Therefore, training and education is considered to be part of the research conceptual framework in order to test its impact on the success criteria (PMS and PS).

In the explanatory phase, the CIOs' perceptions of training and education are at low to middle levels (see section 5.9). The measurement model shows that the training and education construct was tested and was found to be reliable and valid (see section 6.2). The structural model analysis using PLS shows that training and education has no effect on both PMS (β=0.171, t=1.451) and PS (β=-0.90, t=.956).

While training and education is considered important either conceptually or empirically by other researchers, the constructs measure has no predictive ability to account for whether the project is going to be successful or not. However, training and education should not be ignored by top management, and there should be an allocated budget for training for both the end users and the project team with a clear career development plan for the IT project team members.

7.2.7. Project Success Perceptions of CIOs' and Other stakeholders

A comparisons of this study with other studies using different stakeholders perceptions of CSFs are shown in Table 7.4. These stakeholders are end user, project manager, operational manager, chief finance officer (CFO), and general manager (GM). First of all, it has to be emphasised that the list of CSFs used in prior studies can vary from the list in the current study. Therefore, the discussion will be limited to the common CSFs between those studies and the current study.

Table 7.4: CSFs perceived by CIO and other stakeholders

Current Study	**Preceding Studies**				
	(Abdullah, 2013)	**(Baccarini and Collins, 2003)**	**(Dezdar, 2011)**	**(Yingjie, 2005)**	**(Al-Mudimigh et al., 2011)**
CIO	**End User**	**Project Manager**	**Operational Manager**	**CFO**	**GM**
TMS	-	-	-	TMS	TMS
PM	-	-	PM	PM	PM
SHM	-	-	-	-	-
-	PTC	PTC	PTC	-	-
-	CM	CM	CM	-	CM

TMS: Top Management Support; PM: Project Management; PTC: Project Team Competency; CM: Communication Management; SHM: Stakeholders Management.

A study of the end user perceptions by Abdullah (2013) shows that there are two CSFs common between the end user and the CIO which are project team competence (PTC) and

communication management (CM). In the study of project manager perceptions by Baccarini and Collins (2003) shows that these two CSFs (PTC and CM) are also common between the project manager and the CIO. Moreover, operational manger perception has been examined by Dezdar (2011) shows that PTC and CM are also common between the operational manager and the CIO in addition to project management (PM). In the study of the CFO perceptions by Yingjie (2005) shows that there are two CSFs common between the CFO and the CIO which are top management support (TMS) and project management (PM). Finally, another stakeholder group (GM) perceptions have been studied by Al-Mudimigh et al. (2011) which shows there are three CSFs common between the GM and the CIO which are top management support (TMS), project management (PM), and communication management (CM).

The comparisons results show that the TMS and PM in CSF are common between the higher level of management (GM, CFO and CIO) which usually their effect at the organisation level. On the other hand, these results show that the lower level of management (project manager and operational manager) and the end user consider the PTC and CM as the most important factors which usually their effect at the project level.

Regarding the project success criteria, the traditional iron triangle criteria of on time, within budget, and to specification were used by project manager and project team. On the other hand, other measures of project success criteria (product and organisational success) such as final product use and organisation benefits were utilised by senior management such as CIO and CFO. Evaluation of the organisational success of the project required the use of broader criteria focused on the achievement of the organisational goals and objectives. As might be expected, the focus and scope of evaluation tended to be broaden, moving from the immediate project team staff (project manager and project team) to a higher level stakeholders such as a CIO.

For example, the project manager and project team may focus on the success of the project management process, while users are likely to concentrate on the use of the project product, considering success in relation to the impact of the IT project on their work and organisational roles (Davis, 2016). Senior management such as CIO are interested in the achievement of business objectives and the strategic benefits delivered by the project. The criteria used to evaluate project success are based on stakeholders' particular expectations of the project, with success reflecting the extent to which these expectations are perceived to have been met. In turn, expectations derive from and express value-based beliefs and desires about how a

project will serve stakeholders' interests. Thus, the assessment of project success is a value judgment. Different values, interests, needs, and expectations become relevant to particular stakeholders' interpretations depending on the social, economic, historical, and organisational context in which the project is suited.

Organisational and product success criteria require a longer time frame for evaluation than the that of the project management process success. This could be one of the reasons that CIO and other top management team consider the long term success (organisational and product success) and the project manager and project team consider the short term success (project management process success).

In conclusion, evaluating the project success is vary depending on a stakeholder's perspectives. Therefore, each stakeholder group has its own view of project success, using different CSFs and judging it according to different project success criteria which provides an understanding of how the wide range of project stakeholders make sense of a project in relation to their various perspectives.

7.3. Summary

This chapter has justified the study findings, through discussions that link them with previous work in similar contexts as well as with the findings of the exploratory study presented in Chapter 4. The findings have offered insight into how IT project success is influenced by contextual factors. In summary, this research has provided a more holistic view than that currently available in the literature on IT project success in developing countries. The next chapter reports the study's conclusions, its contribution to the field, and the limitations of the research. Recommendations are offered and issues for further research are suggested.

Chapter 8 : Conclusion

8.1. Research Overview

This final chapter draws conclusions for the current research. It starts by summarising the research and its major findings, and it then identifies the key contributions to the body of knowledge and implications for leaders and policy makers. It concludes by discussing the research limitations and addressing paths for future work.

Organisations all over the world have invested a great deal of resources in achieving goals through the implementation of major IT projects, and these have a significant effect at the organisational level. However, IT project success rates are still considered unsatisfactory and remain very low, hence, there was definitely a need to understand in greater depth the reasons behind this and also the key areas that must be considered in order to achieve a successful IT project. The importance of project success continuously motivates researchers to investigate this problem, and many project success frameworks have been proposed by different scholars.

Indeed, knowledge in the area of success factors of IT projects is highly needed in order to continuously help improve the capability of the organisations in ensuring success through IT projects. In addition, research undertaken in this area needs to be further enriched with various different approaches to ensure richness as well accuracy in the results and knowledge contributed. Accordingly, these motivate the conduct of this study, which seeks to further enhance our understanding of project success. This thesis is conducted to investigate and provide empirical evidence of project success in the Saudi Arabian public organisations from the CIOs' perspective, using a deductive approach.

This research is undertaken to achieve the following objectives: to investigate the critical success factors (CSF) of IT projects in Saudi Arabian public organisations and their level of perceptions from the CIO perspectives; to investigate the criteria for evaluating IT project success (PSC) in Saudi Arabian public organisations and their level of perceptions from the CIO perspectives; to examine the influence of organisational, project and CIO characteristics on CSF and PSC; to develop a framework and measurement model of IT project success through the effect of CSF on PSC.

In order to identify the CSF constructs, PSC constructs and formulate the conceptual framework that can be employed to study project success in Saudi Arabian organisations, an exploratory phase was conducted using survey questionnaire (Chapter 4). Due to the availability of many constructs relevant as CSF, the screening process was made in this study. Constructs that are relevant in the context of Saudi Arabia were identified and proposed as a research framework. The proposed framework hence consisted of the eight CSF construct as independent variables (top management support and commitment - TMS, strategic planning - SP, communication management - CM, project management - PM, project team competency - PTC, stakeholders management - SHM, partners and suppliers management - PSM, training and education - TE), and the dependent variable PSC (project management success and project success).

Subsequently, the explanatory phase started, which seeks to explain the relationship between the conceptualize variables and accordingly builds a model of project success. The first part of the phase involve the confirmation of the measurement model of CSF constructs and PSC constructs. The second part involves the confirmation of the composite model, which tests the model for fitness. The last part, focuses on hypothesis testing and refinement of the model to include the most important and significant contributors of CSF.

The measurement model assessment started by evaluating the constructs' reliability and validity, which satisfies the minimum criteria. In the measurement model, all the eight CSF constructs identified are found reliable and valid measures of CSF. On the other hand, PSC has been classified into two variables (PMS and PS), which is in line with the literature as conceptualize and discussed in Chapter 2. Therefore, these variables have been incorporated into the research framework for the research final testing in the explanatory phase.

Inferential analyses were then conducted to explore and test the hypotheses for relationship between variables. The study findings revealed that there were significant positive relationships between the CSFs measured and project success criteria in the structural model. Further analysis using the PLS bootstrap procedure showed that not all of the CSFs were of high importance; they varied in respect to their effects and relationships with the project success criteria (PMS and PS). The results show that project management availability, top management support, and stakeholder management are among the key factors that are significant in giving impact on project success criteria (PSC).

In summary, as best as possible, this research has led to objective and meaningful findings on project success factors and criteria. Indeed, various different interpretations can be made from the output of this research, the contribution of which are very important in the field of project management and IT strategies. While success can be attributed to many different organisational, technical and behavioural factors, this research identified key factors that contribute to success in IT projects from the CIO's perspectives. The findings show that CIOs are very much concerned with success in the form of project net benefit to users and stakeholders (PS) compared to short term project management success through completion within time, cost and scope (PMS). Hence, the contributor to such success are identified as the support from top management, the availability of project management capabilities in processes and procedures, and the capability to manage stakeholders effectively. In short, this research has delivered a holistic view of the project success in Saudi Arabia as one of the high-income developing countries.

8.2. The Response to the Research Questions

The current study was initiated based on the need to identify the critical success factors of IT projects in Saudi Arabia and seek to understand it from the CIO's perspective. In order to address this need, the research was designed using deductive quantitative approach by seeking to answer the following questions (section 1.9): 1) What are the critical success factors (CSF) of IT projects and their level of perception from the CIO perspectives in the Saudi Arabian public organisations?; 2) What are the criteria for the evaluating IT project success (PSC) from the CIO perspectives in the Saudi Arabian organisations?; 3) Is there any relationship between organisational, project, and CIO characteristics with CSF and PSC that can moderate the IT project success framework?; 4) What is the measurement model or framework that best explain the IT success project in the Saudi Arabian organisations? Therefore the achievement of this research are justified through answering these questions.

To answer question 1, the research found several factors that are potential contributors to project success. Preliminary exploration indicates the numerous amount of research conducted to identify these factors. Hence, through a synthesis of extant literature (section 2.8.2 and summarised in Table 2.4), it was determined that the these factors are: (1) top management support and commitment; (2) strategic planning; (3) communication management; (4) project management; (5) project team competency; (6) stakeholders management; (7) partners and suppliers management; (8) training and education; (9) business process re-engineering; (10)

IT infrastructure readiness; (11) change management; (12) risk management. The literature was the first stage in research that determine the potential constructs for CSF. Subsequently the exploratory phase of this study, led to the refinement of the following eight factors for inclusion in the explanatory phase of the research. These are (1) Top management support and commitment; 2) Strategic planning; 3) Project management; 4) Project team competency; 5) Communication management; 6) Training and education; 7) Partners and suppliers management; and 8) Stakeholder management. In the pursuit of identifying these factors, the research found that CIOs in general have moderately high perceptions on all of these factors. Such perceptions, however, have been observed to be much higher on certain factors such as strategic planning, top management support, and stakeholder management. Overall analysis also indicates that hospitals are performing the highest in all CSF as well as PSC. This indicates the high degree to which hospitals are imposing many of these elements to ensure project success and project management success in the organisations.

In a similar analysis mode for question 2, this research also confirmed, based on the findings from the literature on the criteria for project success. The research proposed that project success can be defined as long-term success (PS) and short-term success (PMS). The short term success is conceptualize as the completion of projects, which meet the defined term for time, cost and scope of the project. This concept is commonly defined in project management literature. On the other hand, the long-term success is conceptualized as the benefit of the project after its completion to the users and the stakeholders of the project, and also known as net benefit in the IS success model literature (Delone and McLean, 2003). Interestingly, the CIOs are in favour of project success rather than project management success when defining the criteria for project success. Being the top management themselves, this group of respondents are more likely to perceive success in a much more different manner than other lower level management group such as project managers, senior or middle managers. This explains the high perception on top management support and strategic planning and the strong link to success.

To answer question 3, the intention of the research is to investigate if, there are other variables that are under the categories to the organisations' and respondents' profile, and which may have influence on either the CSF or PSC. This is important, as analysis of the factors from both the independent and the dependent variables may be accounted for by the influence of other variables that are present in the study such as these. Among important highlights, the

findings indicate that some variables such as CIO type, and experiences impose some influence on one or more factors. The type of CIO, which was categorized into strategic, transformational and operational, provides indication that CIOs with more strategic and transformational inclination are more concerned with managerial and strategic agenda when defining project success. The type of factors of success also differs according to type of funding received for operating the organisations. Corporate sectors, without much funding from the government, seems to demonstrate more success than the government funded agencies. Many important variables such as size, organisation types and various other demographic variables are found to have no significant relation with CSF constructs. Another important finding is attributed to the fact that all the respondents, regardless demographic characteristics, organisational characteristics, or IT governance characteristics, impose no significant different with PSC. This indicate an agreement of all CIOs on what it means by success criteria. The evidence from this research indicates that the perception on criteria of project success need to comprise of both project success (PS) and project management success (PMS).

Finally, to answer question 4, through the measurement model and testing of hypotheses (H1 to H9) have helped the researcher test and refine the proposed framework for project success. The results of the tests are described in Section 6.3. The measurement model indicates that all the constructs investigated are reliable and valid for analysis. The revised framework indicates that only three out of eight factors are strong indicators of CSF. Based on these results, it is concluded that top management support, and project management availability have strong positive effects on project success criteria (PS), and project management also has strong positive effects on project success criteria (PMS). Interestingly, stakeholder management has negative impact on PS.

Further examination of the critical success factors indicate that these factors are actually interrelated. The findings show that the influence of top management support (TMS) is significant on strategic planning (SP), and on project management (PM). Also, the results suggest that the influence of partners and suppliers management (PSM) is significant on training and education (TE). Furthermore, the findings show that the influence of communication management (CM) is significant on project management (PM), on project team competency (PTC), and on stakeholders management (SHM). With regard to project management (PM), the results suggest that the influence of PM is significant on project team

competency (PTC), and on stakeholders management (SHM). Therefore, it is concluded that the links among the success factors should not be discounted in order to enhance the project success.

This section has re-emphasized the achievement of the research objectives in this study. By answering the research questions (section 1.9), the current study has provided additional insight to the body of knowledge concerning IT project success, particularly in understanding the pertinent factors that influence project success in Saudi Arabian organisations from the CIO's perspective. The overall findings confirm that organisational factors must not be ignored at any stage when implementing IT project. Most importantly, this study has established a framework (research outcomes model) that can assist practitioners and academicians in understanding the project success in Saudi Arabian public organisations from the CIO's perspective.

8.3. Research Contribution

The main contributions of this study are threefold. One is contribution to knowledge and theory, or similar research in project management and strategic planning in further investigating and understanding the constructs better based on the framework developed. The other is how much this work can lead to methodological understand of similar phenomena and can be repeated or used as a guide in a different setting and environment. The last is how much this knowledge can be used in practice and in teaching and learning of professionals about managing effective projects in organisations.

In terms of knowledge and theoretical contribution, this study has built a framework that combines two theoretical perspectives; the critical success factors (CSFs) and project success criteria (PS and PMS). The study has shown that both components (CSFs and PSC) could be used to complement each other. Therefore, the main contribution is that that not all the CSFs were statistically significant in their impacts on PSC. Top management support, project management and stakeholder management, are the only factors that have a significant impact on PSC. Indeed, this study can be used as a guide for further investigation and verification to strengthened the theory of IS or IT project success.

In addition, this study has also provided constructive insights into the CSFs interrelationships. Not many researches can be found that examined the relationships between CSFs (Abdullah, 2013). Investigating the interrelationships between the CSFs is important to identify the

possibilities of the factors being causally linked, which may indicate that one can reinforce the other. For example, the findings show that the influence of top management support is significant on both strategic planning and project management, and the influence of PM is significant on project team competency and stakeholders management. By exploring the relationships between the CSFs, a better understanding of the project success can be enhanced. Another contribution, Davis (2016) assert that there is a lack of research on project success from the senior management stakeholders perspectives. Therefore, this study has addressed this gap by considering the CIO's perspectives.

Another anticipated contribution of this study to knowledge is that it fills a gap in the literature on developing countries by emphasising the Saudi context. Furthermore, the research validated various constructs used in the framework, so there is a theoretical contribution that can be used to examine other emerging IT innovations.

In terms of methodological contribution, the measurement model that are verified and tested in this study can be used as a guide or instrument by other researchers who are investigating these constructs in a different context or setting. While the research is most relevant in the context of Saudi based organisations, similar research in a different culture and setting may indicate whether the findings are also applicable elsewhere. These constructs are, indeed, highly important to the study of project success as well other areas in the management science. Researchers, can also methodologically refer to this study for its analysis technique using structural modelling with Partial Least Square (PLS) tool. This thesis has helped to reduce the gap and provide a stimulus to other researchers to investigate the nature of project success in different countries.

Lastly, in contributing to practice, the outcomes of this research are expected to benefit and guide public organisations in Saudi Arabia, as well as other public organisations in developing countries in the region to effectively manage IT projects. Information technology are partly the key to successful organisations. The use of effective information technology begins with effective IT projects. Countries with limited resources, cannot afford the risk of failure. This research therefore, provide a model that is closely relevant to these countries. The lessons that are highly valuable, as the outcome of this research are that, while projects must be managed according to the common triple constraint factors (cost, time and scope), the key success is highly attributable to the extent to which it benefits the organisation in the long term. In this regards, the choice of CIO is also seen as highly crucial in ensuring success. This

is reflected in the finding that shows project success has strong link to top management support. The outcome of this research can be shared and applied in the training syllabus of managers to indicate the importance and relevance of each of the factors to project success.

8.4. Research Limitations

Like any other research, this study is not without limitations, although the findings of this study contribute to a better understanding of IT project success in Saudi Arabian public organisations. The limitations of this study can be divided into two areas. The first area of limitation is concerning the cross sectional survey methodology, and second is concerning with the representativeness of the data or sample to the population under study.

Methodologically, common method bias, are common in behavioural research. This is normally occurred when the dataset is extracted from self-report survey questionnaire. Bias can occur with the way the researcher ask the questions, with the questions are constructed, the different types of participants to which they're asked, etc.

Another related source of limitation is such that, the research employed survey questionnaires at a designated point in time (cross sectional). The degree to which the result can be interpreted will be highly context specific to the time of which the data is collected. The cross sectional surveys allow for empirical analysis of the phenomena by identifying variables and their relationships. However, in order to gain further understanding of the relationship, the design of the methodology should ideally cover a longer time period, especially when evaluation success of projects. This research did not address the continual process of implementing the project, nor did it account for the time between the perception and changes in performance.

The second area of limitation involve the samples used to draw the conclusion. Firstly, the sample used in this study represent a very small case of the actual CIO population. This means, this study may not represent all organisations in Saudi Arabia and its conclusion can only be derived from only a specific case of public organisations. In addition, the sample was drawn from the list published an e-Government website. This website may not be regularly updated and accurately report about the CIO population. Therefore, this limits our interpretation to only those organizations that are listed during the period of 1st September 2013 to 30th December 2013. Therefore, the extent to which the findings of this study can be

generalised in a different context depends on its validation and replication in other settings and regions.

In addition, for more robust use of statistical tools, the use of bigger samples may be required in the future. This research covered more than half of the population (51.4%) of the organisations listed in the sample frame. However, investigating all of the public organisations in Saudi Arabia would provide more confidence in the results. The researcher was not able to access all the CIOs in the organisations in the list due to the time and resource restrictions. In addition, the data were collected mostly from CIOs who were not easy to reach and mostly not able to spare their time for this research. To add to this limitation, the data are mostly collected from male CIOs, and only two females participated. This is due to the conservative nature of Saudi society which makes female recruitment difficult.

In summary, the approach in this study is quantitative. This means the interpretation of the research is restricted to what the study proved statistically and subjective explanation to the case of which the data represented. Not much insight can be gained other than what is guided by the literature and past studies, analysis based on statistical tools for deductive approach, and the experience of the researcher who have had long years of work experience, and some conversations with the respondents.

8.5. Future Work

These limitations give opportunities for expansion of this research and for future studies. The main path for future works would be to replicate it in other regions and contexts and validate the results. This research represents the viewpoints of CIOs about both the CSFs and project success criteria in restricted number of organisations that are mostly public organisations in Saudi Arabia. It is suggested that future research utilises other organisations, such as those of the private sectors, and CIOs in other countries, in order to test its generalisability and applicability. Comparing the different view of CIOs (top management) and project managers can also enrich the knowledge areas of project success.

In another path, a comparative study involving either more focus variables of CFS and PSC constructs would be very helpful and interesting. For more insight, the finding of the research should also be presented to the target audience of the research and gain more knowledge of the phenomena in greater depths. This research utilized a survey methodology and cross-sectional sample to collect data. Other research methods, including case studies, can provide

more thorough insights and ought to be considered in prospective research. Potential in-depth examinations, probably qualitatively, might be carried out to gain additional insights into both the CSFs and the project success criteria. In addition, future scholars could try to conduct a longitudinal study to determine the causal relationships between the CSFs and the project success criteria.

References

ABDELGHAFFAR, H. & AZIM, R. H. A. Significant factors influencing ERP implementation in large organizations: Evidence from Egypt. European, Mediterranean & Middle Eastern Conference on Information Systems (EMCIS), 2010. 1-16.

ABDULLAH, Z. S. 2013. Hospital information systems implementation framework: critical success factors for Malaysian public hospitals. *Curtin University*.

ABOUZAHRA, M. 2011. Causes of failure in Healthcare IT projects. *3rd International Conference on Advanced Management Science,* 19.

ACKER, J. 2006. Inequality regimes gender, class, and race in organizations. *Gender & society,* 20**,** 441-464.

ADELAKUN, O. & JENNEX, M. 2002. Stakeholder process approach to information systems evaluation.

AGARWAL, N. & RATHOD, U. 2006. Defining 'success' for software projects: An exploratory revelation. *International journal of project management,* 24**,** 358-370.

AHMAD, M. M. & CUENCA, R. P. 2013. Critical success factors for ERP implementation in SMEs. *Robotics and Computer-Integrated Manufacturing,* 29**,** 104-111.

AL-AHMADI, H. 2011. Challenges facing women leaders in Saudi Arabia. *Human Resource Development International,* 14**,** 149-166.

AL-BRAITHEN, M. A. 2010. *Understanding the perception of success in the development of an ERP system: an interpretive case study in a Saudi Arabian private organisation.* University of Salford.

AL-MASHARI, M. & AL-MUDIMIGH, A. 2003. ERP implementation: lessons from a case study. *Information Technology & People,* 16**,** 21-33.

AL-MASHARI, M., AL-MUDIMIGH, A. & ZAIRI, M. 2003. Enterprise resource planning: A taxonomy of critical factors. *European journal of operational research,* 146**,** 352-364.

AL-MASHARI, M., GHANI, S. K. & AL-RASHID, W. 2006. A study of the Critical Success Factors of ERP implementation in developing countries. *International Journal of Internet and Enterprise Management,* 4**,** 68-95.

AL-MASHARI, M. & ZAIRI, M. 1999. BPR implementation process: an analysis of key success and failure factors. *Business process management journal,* 5**,** 87-112.

AL-MUDIMIGH, A., ZAIRI, M. & AL-MASHARI, M. 2001. ERP software implementation: an integrative framework. *European Journal of Information Systems,* 10**,** 216-226.

AL-MUDIMIGH, A. S. 2007. The role and impact of business process management in enterprise systems implementation. *Business process management journal,* 13**,** 866-874.

AL-MUDIMIGH, A. S., ULLAH, Z. & ALSUBAIE, T. A. 2011. A framework for portal implementation: A case for Saudi organizations. *International Journal of Information Management,* 31**,** 38-43.

AL-SHAMLAN, H. M. & AL-MUDIMIGH, A. S. 2011. The Chang Management Strategies and Processes for Successful ERP Implementation: A Case Study of MADAR. *International Journal of Computer Science,* 8**,** 431-435.

AL-TAIE, M., LANE, M. & CATER-STEEL, A. 2015. A past to present journey: a critical analysis of the Chief Information Officer role.

AL-TURKI, U. M. 2011. An exploratory study of ERP implementation in Saudi Arabia. *Production Planning and Control,* 22**,** 403-413.

ALADWANI, A. M. 2001. Change management strategies for successful ERP implementation. *Business process management journal,* 7**,** 266-275.

ALASKARI, O., AHMAD, M., DHAFR, N. & PINEDO-CUENCA, R. 2013. Critical successful factors (CSFs) for successful implementation of lean tools and ERP systems.

ALDAMMAS, A. & AL-MUDIMIGH, A. 2011. Critical Success and Failure Factors of ERP Implementations: Two Cases from Kingdom of Saudi Arabia. *Journal of Theoretical and Applied Information Technology,* 28**,** 73-82.

ALDAYEL, A., ALDAYEL, M. & AL-MUDIMIGH, A. 2011. The Critical Success Factors of ERP implementation in Higher Education in Saudi Arabia A Case Study. *Journal of Information Technology and Economic Development,* 2**,** 1-16.

ALFAADEL, F., ALAWAIRDHI, M. & AL-ZYOUD, M. Success and failure of IT projects: a study in Saudi Arabia. Proceedings of the 11th WSEAS international conference on Applied Computer and Applied

Computational Science, 2012. World Scientific and Engineering Academy and Society (WSEAS), 77-82.

ALGHATHBAR, K. 2008. Practical ERP implementation in Government Organization. *International Conference on E-Learning, E-Business, Enterprise Information Systems, and E-Government.*

ALGHOBIRI, M. A. 2003. *IS implementation and the role of senior executives in its processes in Saudi Arabian organisations.* Doctoral, University of East Anglia.

ALMAJED, A. & MAYHEW, P. 2013. Chief Information Officers' Perceptions Of IT Projects Success Factors In Saudi Arabian Public Organizations: An Exploratory Study. *IADIS International Journal on Computer Science and Information Systems,* 8**,** 66-78.

ALODADI, A. & BENHIN, J. 2015. Long Term Economic Growth in Oil-Rich Saudi Arabia: What is the role for non-oil sectors? *Economic Issues Journal Articles,* 20**,** 109-130.

ALSHITRI, K. I. 2008. *Quality management implementation in IS/IT departments in Saudi Arabian private organizations.* University of East Anglia.

ALTAMEEM, T. A. 2007. *The critical factors of e-government adoption: An empirical study in the Saudi Arabia public sectors.* Brunel University.

ALTAMONY, H., AL-SALTI, Z., GHARAIBEH, A. & ELYAS, T. 2016. The relationship between Change Management Strategy and Successful Enterprise Resource Planning (ERP) Implementations: A Theoretical Perspective. *International Journal of Business Management and Economic Research,* 7**,** 690-703.

ALTINKEMER, K., CHATURVEDI, A. & KONDAREDDY, S. 1998. Business process reengineering and organizational performance: an exploration of issues. *International Journal of Information Management,* 18**,** 381-392.

ALTUWAIJRI, M. M. & KHORSHEED, M. S. 2011. InnoDiff: A project-based model for successful IT innovation diffusion. *International Journal of Project Management*.

ALTUWAIJRI, M. M. & KHORSHEED, M. S. 2012. InnoDiff: A project-based model for successful IT innovation diffusion. *International Journal of Project Management,* 30**,** 37-47.

AMBERG, M., FISCHL, F. & WIENER, M. 2005. Background of critical success factor research. *Friedrich-Alexander-Universitat Erlangen-Nurnberg Working*.

ANDERSON, J. C. & RUNGTUSANATHAM, M. 1994. A theory of quality management underlying the Deming management method. *Academy of Management Review,* 19**,** 472-509.

ANNAMALAI, C. & RAMAYAH, T. 2013. Does the organizational culture act as a moderator in Indian enterprise resource planning (ERP) projects? An empirical study. *Journal of Manufacturing Technology Management,* 24**,** 555-587.

APM 2006. Project Management Body of Knowledge. 5th ed. UK: Association for Project Management.

ASEMI, A. & JAZI, M. D. 2010. A comparative study of critical success factors (CSFs) in implementation of ERP in developed and developing countries. *International Journal,* 2**,** 99-110.

ATKINSON, R. 1999. Project management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *International Journal of Project Management,* 17**,** 337-342.

AVISON, D. E. & PRIES-HEJE, J. 2005. *Research in information systems: A handbook for research supervisors and their students,* Butterworth-Heinemann.

BACCARINI, D. 1999. The logical framework method for defining project success. *Project Management Journal,* 30**,** 25-32.

BACCARINI, D. & COLLINS, A. 2003. Critical success factors for projects. *Faculty of The Built*.

BACCARINI, D., SALM, G. & LOVE, P. E. D. 2004. Management of risks in information technology projects. *Industrial Management & Data Systems,* 104**,** 286-295.

BAKER, B. N., MURPHY, D. C. & FISHER, D. 2008. Factors affecting project success. *Project Management Handbook, Second Edition***,** 902-919.

BANKER, R. D., HU, N., PAVLOU, P. A. & LUFTMAN, J. 2011. CIO reporting structure, strategic positioning, and firm performance. *MIS quarterly,* 35**,** 487-504.

BANSAL, V. & AGARWAL, A. 2015. Enterprise resource planning: identifying relationships among critical success factors. *Business Process Management Journal,* 21**,** 1337-1352.

BARBER, K. 1998. *The Canadian Oxford Dictionary,* Oxford University Press Canada.

BELASSI, W. & TUKEL, O. I. 1996. A new framework for determining critical success/failure factors in projects. *International Journal of Project Management,* 14**,** 141-151.

BELOUT, A. 1998. Effects of human resource management on project effectiveness and success: toward a new conceptual framework. *International Journal of Project Management,* 16**,** 21-26.

BELOUT, A. & GAUVREAU, C. 2004. Factors influencing project success: the impact of human resource management. *International Journal of Project Management,* 22**,** 1-11.

BENNER, M. J. & TUSHMAN, M. 2002. Process management and technological innovation: A longitudinal study of the photography and paint industries. *Administrative Science Quarterly,* 47**,** 676-707.

BERG, M. 2001. Implementing information systems in health care organizations: myths and challenges. *International journal of medical informatics,* 64**,** 143-156.

BEYNON-DAVIES, P., OWENS, I. & WILLIAMS, M. D. 2004. Information systems evaluation and the information systems development process. *Journal of Enterprise Information Management,* 17**,** 276-282.

BHATTI, T. Critical success factors for the implementation of enterprise resource planning (ERP): Empirical validation. The Second International Conference on Innovation in Information Technology (IIT'05), 2005. 1-10.

BINGI, P., SHARMA, M. K. & GODLA, J. K. 1999. Critical issues affecting an ERP implementation. *Information systems management,* 16**,** 7-14.

BOŠNJAK, S. 2001. The declaration of Helsinki: The cornerstone of research ethics. *Archive of Oncology,* 9**,** 179-184.

BOURKE, L., HUMPHREYS, J. S., WAKERMAN, J. & TAYLOR, J. 2010. Charting the future course of rural health and remote health in Australia: Why we need theory. *Australian Journal of Rural Health,* 18**,** 54-58.

BOURNE, L. & WALKER, D. H. T. 2008. Project relationship management and the Stakeholder Circle™. *International Journal of Managing Projects in Business,* 1**,** 125-130.

BOYNTON, A. C. & ZMUD, R. W. 1984. An assessment of critical success factors. *Sloan management review,* 25**,** 17-27.

BRADLEY, J. 2008. Management based critical success factors in the implementation of Enterprise Resource Planning systems. *International Journal of Accounting Information Systems,* 9**,** 175-200.

BREWER, J. L. Project managers: can we make them or just make them better? Proceedings of the 6th conference on Information technology education, 2005. ACM, 167-173.

BREWER, J. L. & DITTMAN, K. C. 2013. *Methods of IT project management*, Purdue University Press.

BROADBENT, M. & KITZIS, E. S. 2005. The new CIO leader. *Harvard Business School Press, Boston, Massachusetts*.

BROWN, D. H. & HE, S. 2007. Patterns of ERP adoption and implementation in China and some implications. *Electronic Markets,* 17**,** 132-141.

BROWN, K. A. & HYER, N. L. 2010. *Managing projects: a team-based approach*, McGraw-Hill Irwin.

BRYDE, D. 2008. Perceptions of the impact of project sponsorship practices on project success. *International Journal of Project Management,* 26**,** 800-809.

BRYMAN, A. 2012. *Social research methods*, OUP Oxford.

BRYMAN, A. & BELL, E. 2011. Business Research Methods. sl: Oxford University Press.

BUKAMAL, O. M. & WADI, R. M. A. 2016. Factors Influencing the Success of ERP System Implementation in the Public Sector in the Kingdom of Bahrain. *International Journal of Economics and Finance,* 8**,** 21.

CARLSSON, S. 2003. Advancing information systems evaluation (research): a critical realist approach. *Electronic Journal of Information Systems Evaluation,* 6**,** 11-20.

CARMINES, E. G. & ZELLER, R. A. 1979. *Reliability and validity assessment*, Sage.

CASH, J. & PEARLSON, K. 2004. The future CIO. *Information Week,* 1010**,** 28-29.

CASSIDY, A. 2005. *A practical guide to information systems strategic planning*, Auerbach Publications.

CAVANA, R. Y., DELAHAYE, B. L. & SEKARAN, U. 2001. *Applied business research: Qualitative and quantitative methods*, John Wiley & Sons Australia.

CHAN, A. P., SCOTT, D. & LAM, E. W. 2002. Framework of success criteria for design/build projects. *Journal of Management in Engineering,* 18**,** 120-128.

CHEN, W. & HIRSCHHEIM, R. 2004. A paradigmatic and methodological examination of information systems research from 1991 to 2001. *Information systems journal,* 14**,** 197-235.

CHIN, W. W. 1998. Commentary: Issues and opinion on structural equation modeling. JSTOR.

CHUN, M. & MOONEY, J. 2009. CIO roles and responsibilities: Twenty-five years of evolution and change. *Information & Management,* 46**,** 323-334.

CHUNG, B. Y., SKIBNIEWSKI, M. J., LUCAS JR, H. C. & KWAK, Y. H. 2008. Analyzing enterprise resource planning system implementation success factors in the engineering–construction industry. *Journal of Computing in Civil Engineering,* 22**,** 373-382.

CHURCHILL JR, G. A. 1979. A paradigm for developing better measures of marketing constructs. *Journal of marketing research***,** 64-73.

CLARK, T. D., JONES, M. C. & ARMSTRONG, C. P. 2007. The dynamic structure of management support systems: theory development, research focus, and direction. *Mis Quarterly,* 31**,** 579-615.

CLEGG, C., AXTELL, C., DAMODARAN, L., FARBEY, B., HULL, R., LLOYD-JONES, R., NICHOLLS, J., SELL, R. & TOMLINSON, C. 1997. Information technology: a study of performance and the role of human and organizational factors. *Ergonomics,* 40**,** 851-871.

COHEN, J. 2013. *Statistical power analysis for the behavioral sciences*, Routledge Academic.

COHEN, L. 2000. *Research methods in education*, RoutledgeFalmer.
COLLINS, A. & BACCARINI, D. 2004. Project success—a survey. *Journal of Construction Research,* 5**,** 211-231.
COMREY, A. L. & LEE, H. B. 1992. *A first course in factor analysis*, Routledge.
COOKE-DAVIES, T. 2002. The "real" success factors on projects. *International Journal of Project Management,* 20**,** 185-190.
COOKE-DAVIES, T. 2004. Consistently Doing the Right Projects and Doing Them Right–What Metrics Do You Need. *The measured,* 4**,** 44-52.
COOKE-DAVIES, T. J. 2001. *Towards improved project management practice: Uncovering the evidence for effective practices through empirical research*, Universal-Publishers.
COOKE-DAVIES, T. J. & ARZYMANOW, A. 2003. The maturity of project management in different industries: An investigation into variations between project management models. *International Journal of Project Management,* 21**,** 471-478.
COOPER, R., EDGETT, S. & KLEINSCHMIDT, E. 2002. Portfolio management for new product development: results of an industry practices study. *r&D Management,* 31**,** 361-380.
COSTLEY, K. C. 2006. Why Do We Have Theories? *Online Submission*.
CRAWFORD, L. 2005. Senior management perceptions of project management competence. *International Journal of Project Management,* 23**,** 7-16.
CRAWFORD, L. & POLLACK, J. 2008. Developing a basis for global reciprocity: negotiating between the many standards for project management. *International Journal of IT Standards and Standardization Research (IJITSR),* 6**,** 70-84.
CRESWELL, J. W. 2013. *Research design: Qualitative, quantitative, and mixed methods approaches*, Sage publications.
CRESWELL, J. W. & CLARK, V. L. P. 2011. *Designing and Conducting Mixed Methods Research*, SAGE.
CUELLAR, M. Assessing project success: Moving beyond the triple constraint. International Research Workshop on IT Project Management 2010, 2010.
CUELLAR, M. J. 2013. The nature of project success.
DADASHZADEH, M. 1989. Teaching MIS Concepts to MBA students: a critical success factor approach. *Journal of Information Systems Education,* 1 (4).
DAI, C. X. & WELLS, W. G. 2004. An exploration of project management office features and their relationship to project performance. *International Journal of Project Management,* 22**,** 523-532.
DANIEL, D. R. 1961. Management information crisis. *Harvard Business Review,* 39**,** 111-121.
DAVIS, K. 2014. Different stakeholder groups and their perceptions of project success. *International Journal of Project Management,* 32**,** 189-201.
DAVIS, K. 2016. A method to measure success dimensions relating to individual stakeholder groups. *International Journal of Project Management,* 34**,** 480-493.
DE BAKKER, K., BOONSTRA, A. & WORTMANN, H. 2010. Does risk management contribute to IT project success? A meta-analysis of empirical evidence. *International Journal of Project Management,* 28**,** 493-503.
DE SOUSA, J. M. E. 2004. *Definition and analysis of critical success factors for ERP implementation projects.* Universitat Politècnica de Catalunya, Barcelona, Spain.
DE VAUS, D. A. 2004. *Surveys in social research*, London, Routledge.
DELONE, W. H. & MCLEAN, E. R. 1992. Information systems success: The quest for the dependent variable. *Information systems research,* 3**,** 60-95.
DELONE, W. H. & MCLEAN, E. R. 2003. The DeLone and McLean model of information systems success: a ten-year update. *Journal of management information systems,* 19**,** 9-30.
DEMING, W. E. 2000. *Out of the Crisis*, MIT press.
DENSCOMBE, M. 2010. *The good research guide*, Open University Press.
DESOUZA, K. C. & EVARISTO, J. R. 2006. Project management offices: A case of knowledge-based archetypes. *International Journal of Information Management,* 26**,** 414-423.
DEZDAR, S. 2011. *CRITICAL FACTORS AFFECTING ENTERPRISE RESOURCE PLANNING IMPLEMENTATION SUCCESS.* UNIVERSITY OF MALAYA KUALALUMPUR, MALAYSIA.
DEZDAR, S. 2012. Strategic and tactical factors for successful ERP projects: insights from an Asian country. *Management Research Review,* 35**,** 1070-1087.
DEZDAR, S. & AININ, S. 2011a. ERP systems implementation success: A study on Iranian organizations. *International Journal of Current Research and Review,* 3**,** 78-100.
DEZDAR, S. & AININ, S. 2011b. Examining ERP implementation success from a project environment perspective. *Business process management journal,* 17**,** 919-939.
DEZDAR, S. & AININ, S. 2011c. The influence of organizational factors on successful ERP implementation. *Management Decision,* 49**,** 911-926.

DEZDAR, S. & AININ, S. 2012. Examining Successful ERP Projects in Middle-East and South-East Asia. *American Journal of Scientific Research***,** 13-25.

DIALLO, A. & THUILLIER, D. 2005. The success of international development projects, trust and communication: an African perspective. *International Journal of Project Management,* 23**,** 237-252.

DILLMAN, D. A. & SALANT, P. 1994. How to conduct your own survey. New York: John Wiley & Sons, Inc.

DIN, S., ABD-HAMID, Z. & BRYDE, D. J. 2011. ISO 9000 certification and construction project performance: The Malaysian experience. *International Journal of Project Management,* 29**,** 1044-1056.

DOHERTY, N. & KING, M. 2001. The treatment of organisational issues in systems development projects: The implications for the evaluation of information technology investments. *Electronic Journal of Information Systems Evaluation,* 4.

DOHERTY, N. F., KING, M. & AL-MUSHAYT, O. 2003. The impact of inadequacies in the treatment of organizational issues on information systems development projects. *Information & Management,* 41**,** 49-62.

DOHERTY, N. F., M. KING, ET AL. 2003. The Impact of Inadequacies in the treatment of Organizational Issues on Information Systems Development Projects. *Information & Management***,** 41(1): 49-62.

DOOM, C., MILIS, K., POELMANS, S. & BLOEMEN, E. 2010. Critical success factors for ERP implementations in Belgian SMEs. *Journal of Enterprise Information Management,* 23**,** 378-406.

DRUCKER, P. F. 2006. *The effective executive: The definitive guide to getting the right things done*, HarperBusiness.

DUNCAN, W. R. 1995. Developing a project-management body-of-knowledge document: the US Project Management Institute's approach, 1983-94. *International Journal of Project Management,* 13**,** 89-94.

E-GOVERNMENT, S. N. 2013. *The list of all the government agencies* [Online]. Available: http://www.saudi.gov.sa/wps/portal/yesserRoot/govAgenciesDirectory [Accessed].

EARL, M. & FEENY, D. 2000. Opinion: How to be a CEO for the information age. *MIT Sloan Management Review,* 41**,** 11.

EFQM-MULTIPROJECT 2010. EFQM Framework MutiProject Management. *In:* EUROPEAN FOUNDATION FOR QUALITY MANAGEMENT & BRUSSELS. (eds.).

EGBENIYOKO, S. 2014. *Exploring the critical success factors of business intelligence system implementation: an empirical study and proposed integrated model.* Kingston University.

EL-SOFANY, H. F., AL-TOURKI, T., AL-HOWIMEL, H. & AL-SADOON, A. 2012. E-Government in Saudi Arabia: Barriers, challenges and its role of development. *International Journal of Computer Applications,* 48.

EL SAWAH, S., ABD EL FATTAH THARWAT, A. & HASSAN RASMY, M. 2008. A quantitative model to predict the Egyptian ERP implementation success index. *Business Process Management Journal,* 14**,** 288-306.

ENNA 2015. Project and Program Management in Enterprise Innovation (P2M), available at https://www.enaa.or.jp/EN/activities/res_act.html. 5th ed.

ESKILDSEN, J. K. & DAHLGAARD, J. J. 2000. A causal model for employee satisfaction. *Total Quality Management,* 11**,** 1081-1094.

ESTEVES, J. & PASTOR, J. Towards the unification of critical success factors for ERP implementations. 10th Annual BIT Conference, Manchester, UK, 2000. 44.

ESTEVES, J. & PASTOR, J. Analysis of critical success factors relevance along SAP implementation phases. Proceedings of the Seventh Americas Conference on Information Systems, 2001. 1019-1025.

ESTEVES, J. & PASTOR, J. A. Towards a unified ERP implementation critical success factors model. Atas da Conferência da Associação Portuguesa de Sistemas de Informação, 2016.

EVELEENS, J. L. & VERHOEF, C. 2009. The rise and fall of the chaos report figures. *IEEE software***,** 30-36.

FAIRLEY, R. E. 2009. *Managing and Leading Software Projects*, Wiley-IEEE Computer Society Press.

FAKEEH, M. S. 2009. *Saudization as a solution for unemployment: The case of Jeddah western region.* University of Glasgow.

FALKOWSKI, G., PEDIGO, P., SMITH, B. & SWANSON, D. 1998. A recipe for ERP success. *Beyond Computing,* 6**,** 44-45.

FAN, D. Analysis of critical success factors in IT project management. Industrial and Information Systems (IIS), 2010 2nd International Conference on, 2010. IEEE, 487-490.

FEILZER, M. Y. 2010. Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of mixed methods research,* 4**,** 6-16.

FIELD, A. 2009. *Discovering statistics using SPSS*, Sage publications.

FINNEY, S. & CORBETT, M. 2007. ERP implementation: a compilation and analysis of critical success factors. *Business process management journal,* 13**,** 329-347.

FLICK, U. 2015. *Introducing research methodology: A beginner's guide to doing a research project*, Sage.

FLYNN, D. J. & ARCE, E. A. 1997. A CASE tool to support critical success factors analysis in IT planning and requirements determination. *Information and Software Technology,* 39**,** 311-321.

FORNELL, C. & LARCKER, D. F. 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research (JMR),* 18.

FORTUNE, J. & WHITE, D. 2006. Framing of project critical success factors by a systems model. *International Journal of Project Management,* 24**,** 53-65.

FOX, C. 2007. *PRINCE2: A No Nonsense Management Guide*, Van Haren Publishing.

FRANKFORT-NACHMIAS, C. & NACHMIAS, D. 2000. *Research Methods in the Social Sciences*, Worth Publishers.

GARG, P. & AGARWAL, D. 2014. Critical success factors for ERP implementation in a Fortis hospital: an empirical investigation. *Journal of Enterprise Information Management,* 27**,** 402-423.

GARSON, G. 2006. Statnotes: Topics in multivariate analysis, 2006.

GARSON, G. D. 2012. *Testing statistical assumptions*.

GAULD, R. 2007. Public sector information system project failures: Lessons from a New Zealand hospital organization. *Government Information Quarterly,* 24**,** 102-114.

GEFEN, D., STRAUB, D. W. & BOUDREAU, M. C. 2000. Structural equation modeling and regression: Guidelines for research practice.

GEISSER, S. 1974. A predictive approach to the random effect model. *Biometrika,* 61**,** 101-107.

GEMINO, A., SAUER, C. & REICH, B. Beyond chaos: Examining IT project performance. 2nd International Research Workshop for, 2007. Citeseer.

GERMOV, J. 2014. Theorising health: major theoretical perspectives in health sociology| NOVA. The University of Newcastle's Digital Repository.

GILBERT, N. 2008. *Researching social life*, Sage.

GLASS, R. L. 2006. The Standish report: does it really describe a software crisis? *Communications of the ACM,* 49**,** 15-16.

GODDARD, W. & MELVILLE, S. 2004. *Research methodology: An introduction*, Juta and Company Ltd.

GOTTSCHALK, P. 1999. Strategic management of IS/IT functions: the role of the CIO in Norwegian organisations. *International Journal of Information Management,* 19**,** 389-399.

GOTTSCHALK, P. 2000. Information systems executives: the changing role of new IS/IT leaders. *Informing Science,* 3**,** 31-40.

GROL, R. & GRIMSHAW, J. 2003. From best evidence to best practice: effective implementation of change in patients' care. *The lancet,* 362**,** 1225-1230.

GROVER, V., JEONG, S.-R., KETTINGER, W. J. & LEE, C. C. 1993. The chief information officer: A study of managerial roles. *Journal of Management Information Systems,* 10**,** 107-130.

GRUNERT, K. G. & ELLEGAARD, C. 1992. *The concept of key success factors: theory and method*, MAPP.

GUNASEKARAN, S. & GARETS, D. 2003. Business value of IT: the strategic planning process. *Journal of healthcare information management: JHIM,* 17**,** 31.

GUNASEKARAN, S. & GARETS, D. 2004. Managing the IT Strategic Planning Process. *Healthcare Information Management Systems: Cases, Strategies, and Solutions***,** 22-34.

GUNATHILAKA, S., TUULI, M. M. & DAINTY, A. R. Critical Analysis of Research on Project Success, Construction Management Journals. Procs 29th Annual ARCOM Conference, 2013.

GUPTA, A. 2000. Enterprise resource planning: the emerging organizational value systems. *Industrial Management & Data Systems,* 100**,** 114-118.

GUPTA, H., AYE, K., BALAKRISHNAN, R., RAJAGOPAL, S. & NGUWI, Y. 2014. A study of key critical success factors (CSFs) for Enterprise Resource Planning (ERP) systems. *International Journal of Computer and Information Technology,* 3**,** 813-818.

HAINES, M. N. & GOODHUE, D. L. ERP implementations: The role of implementation partners and knowledge transfer. Proceedings of the 2000 information resources management association international conference on Challenges of information technology management in the 21st century, 2000. IGI Publishing, 34-38.

HAIR, J. F. 2010. *Multivariate Data Analysis: A Global Perspective*.

HAIR, J. F., RINGLE, C. M. & SARSTEDT, M. 2011. PLS-SEM: Indeed a silver bullet. *The Journal of Marketing Theory and Practice,* 19**,** 139-152.

HAIR, J. F., SARSTEDT, M., RINGLE, C. M. & MENA, J. A. 2012. An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science,* 40**,** 414-433.

HAIR JR, J. F., HULT, G. T. M., RINGLE, C. & SARSTEDT, M. 2014. *A primer on partial least squares structural equation modeling (PLS-SEM)*, SAGE Publications, Incorporated.

HARTMAN, F. & ASHRAFI, R. 2002. Project management in the information systems and information technologies. *Management Journal,* 33**,** 5-15.

HARTONO, E., SANTHANAM, R. & HOLSAPPLE, C. W. 2007. Factors that contribute to management support system success: An analysis of field studies. *Decision Support Systems,* 43**,** 256-268.

HAWARI, A. A. & HEEKS, R. 2010. Explaining ERP failure in a developing country: a Jordanian case study. *Journal of Enterprise Information Management,* 23**,** 135-160.

HAZEBROUCK, J. 1993. Les facteurs clés de succès dans filemanagement de projets. *Revue Internationale en Gestion et Management de projets,* 1**,** 1-27.

HEEKS, R. 2002. Information systems and developing countries: Failure, success, and local improvisations. *The Information Society,* 18**,** 101-112.

HENSELER, J., RINGLE, C. M. & SINKOVICS, R. R. 2009. The use of partial least squares path modeling in international marketing. *Advances in international marketing,* 20**,** 277-319.

HOCHSTRASSER, B. & GRIFFITHS, C. 1991. *Controlling IT investment: strategy and management*, Chapman & Hall.

HOLLAND, C. & LIGHT, B. 1999. A critical success factors model for ERP implementation. *Software, IEEE,* 16**,** 30-36.

HONG, E. K. 2009. Information Technology Strategic Planning. *IT professional,* 11**,** 8-15.

HOOPER, V. & BUNKER, B. The CIO in the Public Sector: The Role and Requisite Knowledge and Competencies. Proceedings of The 4th International Conference on Information Systems Management and Evaluation ICIME 2013, 2013. 119.

HU, Q., YAYLA, A. A. & LEI, Y. Does inclusion of CIO in top management team impact firm performance? Evidence from a long-term event analysis. 2014 47th Hawaii International Conference on System Sciences, 2014. IEEE, 4346-4355.

HUANG, S.-M., CHANG, I.-C., LI, S.-H. & LIN, M.-T. 2004. Assessing risk in ERP projects: identify and prioritize the factors. *Industrial management & data systems,* 104**,** 681-688.

HUNG, S.-Y., CHEN, C. & WANG, K.-H. 2014. Critical Success Factors for the Implementation of Integrated Healthcare Information Systems Projects: An Organizational Fit Perspective. *Communications of the Association for Information Systems,* 34**,** 39.

HUSSEIN, R., ABDUL KARIM, N. S., MOHAMED, N. & AHLAN, A. R. 2007. The influence of organizational factors on information systems success in e-government agencies in Malaysia. *The Electronic Journal of Information Systems in Developing Countries,* 29.

HWANG, M. I. & XU, H. 2008. A structural model of data warehousing success. *Journal of Computer Information Systems,* 49**,** 48-56.

IFINEDO, P. 2008. Impacts of business vision, top management support, and external expertise on ERP success. *Business Process Management Journal,* 14**,** 551-568.

IFINEDO, P., RAPP, B., IFINEDO, A. & SUNDBERG, K. 2010. Relationships among ERP post-implementation success constructs: An analysis at the organizational level. *Computers in Human Behavior,* 26**,** 1136-1148.

IJAZ, A., MALIK, R., NAWAZ LODHI, R., HABIBA, U. & IRFAN, S. M. A Qualitative Study of the Critical Success Factors of ERP System-A Case Study Approach. International Conference on Industrial Engineering and Operations Management, Indonesia, 2014. 25562566.

IKA, L. A. 2009. Project success as a topic in project management journals. *Project Management Journal,* 40**,** 6-19.

ISO9000 2000. ISO 9000: Quality Management Systems - Fundamental and Vocabulary. *International Organization for Standardization.*

JABLOKOW, K. W., JABLOKOW, A. & SEASOCK, C. 2010. IT leadership from a problem solving perspective. *Information Technology and Management,* 11**,** 107-122.

JAIN, M. 2008. *Delivering Successful Projects with TSP (SM) and Six Sigma: A Practical Guide to Implementing Team Software Process (SM)*, Auerbach Publications.

JIANG, J., KLEIN, G. & BALLOUN, J. 1996. Ranking of system implementation success factors. *Project Management Journal,* 27**,** 49-53.

JINNO, H., ABE, H. & IIZUKA, K. 2017. Consideration of ERP Effectiveness: From the Perspective of ERP Implementation Policy and Operational Effectiveness. *Information,* 8**,** 14.

JOHNSON, J. 1999. Turning chaos into success. *Software Magazine,* 19**,** 30–34.

JOOSTEN, D., BASTEN, D. & MELLIS, W. 2011. Measurement of information system project success in organizations–What researchers can learn from practice. *MEASUREMENT,* 10**,** 6-2011.

JØRGENSEN, M. & MOLØKKEN-ØSTVOLD, K. 2006. How large are software cost overruns? A review of the 1994 CHAOS report. *Information and Software Technology,* 48**,** 297-301.

KAMHAWI, E. M. 2007. Critical factors for implementation success of ERP systems: an empirical investigation from Bahrain. *International Journal of Enterprise Information Systems (IJEIS),* 3**,** 34-49.

KANSAL, V. 2007. Systemic Analysis for Inter-Relation of Identified Critical Success Factors in Enterprise Systems Projects. *Contemporary management research,* 3.

KAPLAN, B. & SHAW, N. 2004. Future directions in evaluation research: people, organizational, and social issues. *Methods of Information in Medicine-Methodik der Information in der Medizin,* 43**,** 215-231.

KARLSEN, J. T., ANDERSEN, J., BIRKELY, L. S. & ØDEGÅRD, E. 2005. What characterizes successful IT projects. *International Journal of Information Technology & Decision Making,* 4**,** 525-540.

KEMPPAINEN, J., TEDRE, M., PARVIAINEN, P. & SUTINEN, E. 2012. Risk Identification Tool for ICT in International Development Co-operation Projects. *The Electronic Journal of Information Systems in Developing Countries,* 55.

KERZNER, H. 2009. *Project management: a systems approach to planning, scheduling, and controlling*, Wiley.

KHALIFA, G., IRANI, Z. & BALDWIN, L. Factors Impacting the Selection of IT/IS Evaluation Methods,'. Proceeding of 5th UKAIS Conference, University of Wales Institute, Cardiff, 2000. 26-28.

KHANDELWAL, V. K. & FERGUSON, J. R. Critical success factors (CSFs) and the growth of IT in selected geographic regions. Systems Sciences, 1999. HICSS-32. Proceedings of the 32nd Annual Hawaii International Conference on, 1999. IEEE, 13 pp.

KILLEN, C. P., HUNT, R. A. & KLEINSCHMIDT, E. J. 2008. Project portfolio management for product innovation. *International Journal of Quality & Reliability Management,* 25**,** 24-38.

KING, S. F. & BURGESS, T. F. 2006. Beyond critical success factors: A dynamic model of enterprise system innovation. *International Journal of Information Management,* 26**,** 59-69.

KOTHARI, C. R. 2004. *Research methodology: Methods and techniques*, New Age International.

KRATHWOHL, D. R. 2009. *Methods of Educational & Social Science Research: An Integrated Approach,* Long Grove, IL, US, Waveland Press.

KRONBICHLER, S. A., OSTERMANN, H. & STAUDINGER, R. 2010. A comparison of erp-success measurement approaches. *JISTEM-Journal of Information Systems and Technology Management,* 7**,** 281-310.

KUCUKYAZICI, B., KESHAVJEE, K., BOSOMWORTH, J., COPEN, J. & LAI, J. 2010. Best practices for implementing electronic health records and information systems. *Health Information Systems: Concepts, Methodologies, Tools, and Applications. New York: Medical Information Science Reference***,** 994-1007.

KUKAFKA, R., JOHNSON, S. B., LINFANTE, A. & ALLEGRANTE, J. P. 2003. Grounding a new information technology implementation framework in behavioral science: a systematic analysis of the literature on IT use. *Journal of biomedical informatics,* 36**,** 218-227.

KUMAR, V., MAHESHWARI, B. & KUMAR, U. 2002. ERP systems implementation: Best practices in Canadian government organizations. *Government Information Quarterly,* 19**,** 147-172.

KWON, T. H. & ZMUD, R. W. Unifying the fragmented models of information systems implementation. Critical issues in information systems research, 1987. John Wiley & Sons, Inc., 227-251.

LAND, F. 1992. The information systems domain. *Information systems research: issues, methods and practical guidelines***,** 6-13.

LAWLEY, M., SUMMERS, J., KORONIOS, A. & GARDINER, M. Critical success factors for regional community portals: a preliminary model. ANZMAC, Massey, New Zealand, Massey University, 2001.

LEE, A. S. 2004. Thinking about social theory and philosophy for information systems. *Social theory and philosophy for information systems***,** 1-26.

LEIDECKER, J. K. & BRUNO, A. V. 1984. Identifying and using critical success factors. *Long range planning,* 17**,** 23-32.

LEVY, Y. & ELLIS, T. J. 2006. A systems approach to conduct an effective literature review in support of information systems research. *Informing Science: International Journal of an Emerging Transdiscipline,* 9**,** 181-212.

LEYH, C. 2016. Critical success factors for ERP projects in small and medium-sized enterprises—the perspective of selected ERP system vendors. *Multidimensional Views on Enterprise Information Systems.* Springer.

LI, Y. & TAN, C.-H. 2013. Matching business strategy and CIO characteristics: The impact on organizational performance. *Journal of Business Research,* 66**,** 248-259.

LIM, C. & MOHAMED, M. Z. 1999. Criteria of project success: an exploratory re-examination. *International Journal of Project Management,* 17**,** 243-248.

LINDSTRÖM, Å., JOHNSON, P., JOHANSSON, E., EKSTEDT, M. & SIMONSSON, M. 2006. A survey on CIO concerns-do enterprise architecture frameworks support them? *Information Systems Frontiers,* 8**,** 81-90.

LIU, J., LOVE, P. E., SMITH, J., REGAN, M. & DAVIS, P. R. 2014. Life cycle critical success factors for public-private partnership infrastructure projects. *Journal of Management in Engineering,* 31**,** 04014073.

LOH, T. C. & KOH, S. 2004. Critical elements for a successful enterprise resource planning implementation in small-and medium-sized enterprises. *International Journal of Production Research,* 42**,** 3433-3455.

LOUCHART, E. S. 2012. *The changing role of the Chief Information Officer (CIO): an inquiry into the demands, constraints and choices of the CIO*. The University of Northampton.

LUND, R. L. 2016. *"Total population sampling"* [Online]. Laerd Dissertations Available: http://dissertation.laerd.com/total-population-sampling.php [Accessed 15/11/2016].

MANDAL, P. & GUNASEKARAN, A. 2003. Issues in implementing ERP: A case study. *European journal of operational research,* 146**,** 274-283.

MARCHEWKA, J. T. 2014. *Information Technology Project Management: Providing Measurable Organizational Value*, USA, John Wiley & Sons.

MARKUS, M. L. & TANIS, C. 2000. The enterprise systems experience-from adoption to success. *Framing the domains of IT research: Glimpsing the future through the past,* 173**,** 207-173.

MARSHALL, C. & ROSSMAN, G. B. 2010. *Designing qualitative research*, Sage.

MASA'DEH, R. E. 2013. The impact of information technology infrastructure flexibility on firm performance: An empirical study of Jordanian public shareholding firms. *Jordan Journal of Business Administration,* 9**,** 204-224.

MAY, T. 2011. *Social research*, McGraw-Hill Education (UK).

MCLEOD, L., DOOLIN, B. & MACDONELL, S. G. 2012. A perspective ‐based understanding of project success. *Project Management Journal,* 43**,** 68-86.

MCLEOD, L. & MACDONELL, S. G. 2011. Factors that affect software systems development project outcomes: A survey of research. *ACM Computing Surveys (CSUR),* 43**,** 24.

MCLEOD, R., JONES, J. W. & SAUNDERS, C. 1995. The difficulty in solving strategic problems: The experiences of three CIOs. *Business Horizons,* 38**,** 28-38.

MCMANUS, J. & WOOD-HARPER, T. 2007. Understanding the sources of information systems project failure. *Management services,* 51**,** 38-43.

MCPHERSON, M. & BAPTISTA NUNES, M. 2006. Organisational issues for e-learning: Critical success factors as identified by HE practitioners. *International Journal of Educational Management,* 20**,** 542-558.

MELANDER, A. 2016. On previous failure's effects and critical success factors in ERP implementation-A case study.

MIGHT, R. J. & FISCHER, W. A. 1985. The role of structural factors in determining project management success. *Engineering Management, IEEE Transactions on***,** 71-77.

MINISTRYOFECONOMYANDPLANNING. 2015. *The Long Term Strategy of the Saudi Economy. Retrieved 28 May2015, from http://www.mep.gov.sa/themes/Dashboard/index.jsp#1432769975146* [Online]. [Accessed].

MIR, F. A. & PINNINGTON, A. H. 2014. Exploring the value of project management: linking project management performance and project success. *International journal of project management,* 32**,** 202-217.

MORRIS, P. & HOUGH, G. 1987. *The anatomy of major projects*, New York, US, Wiley.

MORRIS, P. W. G., JAMIESON, A. & SHEPHERD, M. M. 2006. Research updating the APM Body of Knowledge 4th edition. *International Journal of Project Management,* 24**,** 461-473.

MUKTI, N. A. 2000. Barriers to putting businesses on the Internet in Malaysia. *The Electronic Journal of Information Systems in Developing Countries,* 2.

MÜLLER, R., MARTINSUO, M. & BLOMQUIST, T. 2008. Project portfolio control and portfolio management performance in different contexts. *Project Management Journal,* 39**,** 28-42.

MURRAY, M. & COFFIN, G. A case study analysis of factors for success in ERP system implementations. Proceedings of the seventh Americas conference on information systems, 2001. 1012-1018.

MUSCATELLO, J. R. & CHEN, I. J. 2008. Enterprise resource planning (ERP) implementations: theory and practice. *International Journal of Enterprise Information Systems (IJEIS),* 4**,** 63-83.

MYERS, M. 1999. Investigating information systems with ethnographic research. *Communications of the AIS,* 2**,** 1.

MYERS, M. D. 1997. Qualitative research in information systems. *Management Information Systems Quarterly,* 21**,** 241-242.

NAH, F. F. H. & DELGADO, S. 2006. Critical success factors for enterprise resource planning implementation and upgrade. *Journal of Computer Information Systems,* 46**,** 99.

NAH, F. F. H., ISLAM, Z. & TAN, M. 2007. Empirical assessment of factors influencing success of enterprise resource planning implementations. *Journal of Database Management (JDM),* 18**,** 26-50.

NAH, F. F. H., LAU, J. L. S. & KUANG, J. 2001. Critical factors for successful implementation of enterprise systems. *Business process management journal,* 7**,** 285-296.

NAH, F. F. H., ZUCKWEILER, K. M. & LAU, J. L. S. 2003. ERP implementation: chief information officers' perceptions of critical success factors. *International Journal of Human-Computer Interaction,* 16**,** 5-22.

NANDHAKUMAR, J., ROSSI, M. & TALVINEN, J. 2005. The dynamics of contextual forces of ERP implementation. *The Journal of Strategic Information Systems,* 14**,** 221-242.

NASIR, M. H. N. & SAHIBUDDIN, S. 2011. Critical success factors for software projects: A comparative study. *Scientific Research and Essays,* 6**,** 2174-2186.

NELSON, R. R. 2005. Project retrospectives: Evaluating project success, failure, and everything in between. *MIS Quarterly Executive,* 4**,** 361-372.

NEWMAN, W. L. 2006. *Social research methods: Qualitative and quantitative approaches*, Pearson.

NGAI, E. W. T., LAW, C. C. H. & WAT, F. K. T. 2008. Examining the critical success factors in the adoption of enterprise resource planning. *Computers in Industry,* 59**,** 548-564.

NIZAMANI, S., KHOUMBATI, K., ISMAILI, I. A. & NIZAMANI, S. 2014. A Conceptual Framework for ERP Evaluation in Universities of Pakistan. *arXiv preprint arXiv:1402.0116*.

NORTON INSTITUTE, N. 2001. Say goodbye to the CIO, welcome to the business prophet. *Information Management & Computer Security,* 9**,** 123-125.

NUNNALLY, J. & BERNSTEIN, I. 1994. *Psychometric Theory (3)* McGraw-Hill.

OGUNLANA, S. O. 2010. Beyond the 'iron triangle': Stakeholder perception of key performance indicators (KPIs) for large-scale public sector development projects. *International journal of project management,* 28**,** 228-236.

OHARA, S. 2005. A Guidebook of Project & Program Management for Enterprise Innovation, Rev 3. *Tokyo: PMAJ.*

OJO, A., SHAH, B. P. & JANOWSKI, T. 2009. Strategic IT Planning for Public Organizations: A Toolkit. *Project Deliverable D,* 1.

OLSEN, R. P. 1971. Can project management be defined? *Project Management Quarterly,* 2**,** 12-14.

OLUGBARA, O. O., KALEMA, B. M. & KEKWALETSWE, R. M. 2014. Identifying critical success factors: The case of ERP systems in higher education.

ONADEMUREN, B. Zachman Framework Enterprise Modelling of the Estonian National Health Information System. Information and Knowledge Management, 2014. 120-124.

ONAN, M. & GAMBILL, S. 2002. Small Company CIOs. *Journal of Computer Information Systems,* 42**,** 90-94.

ORLIKOWSKI, W. J. & BAROUDI, J. J. 1991. Studying information technology in organizations: Research approaches and assumptions. *Information systems research,* 2**,** 1-28.

OZORHON, B. & CINAR, E. 2015. Critical success factors of enterprise resource planning implementation in construction: Case of Turkey. *Journal of Management in Engineering,* 31**,** 04015014.

P GILBERT, G. 1983. The project environment. *International Journal of Project Management,* 1**,** 83-87.

PALVIA, P., MAO, E., SALAM, A. & SOLIMAN, K. S. 2003. Management information systems research: what's there in a methodology? *Communications of the Association for Information Systems,* 11**,** 16.

PARR, A., SHANKS, G. & DARKE, P. 2013. 8 IDENTIFICATION OF NECESSARY FACTORS FOR SUCCESSFUL IMPLEMENTATION OF ERP SYSTEMS. *New Information Technologies in Organizational Processes: Field Studies and Theoretical Reflections on the Future of Work,* 20**,** 99.

PARR, A. N., SHANKS, G. & DARKE, P. 1999. Identification of necessary factors for successful implementation of ERP systems. *New information technologies in organizational processes.* Springer.

PEFFERS, K., GENGLER, C. E. & TUUNANEN, T. 2003. Extending critical success factors methodology to facilitate broadly participative information systems planning. *Journal of Management Information Systems,* 20**,** 51-85.

PELIZZA, A. & HOPPE, R. 2015. Birth of a Failure Consequences of Framing ICT Projects for the Centralization of Inter-Departmental Relations. *Administration & society***,** 0095399715598343.

PELLOW, A. & WILSON, T. 1993. The management information requirements of heads of university departments: a critical success factors approach. *Journal of Information Science,* 19**,** 425-437.

PENG, F. & KURNIA, S. Understanding Hospital Information Systems Adoption in China. PACIS, 2010. Citeseer, 66.

PENG, G. C. & NUNES, M. B. 2010. Barriers to the successful exploitation of ERP systems in Chinese State-Owned Enterprises. *International Journal of Business and Systems Research,* 4**,** 596-620.

PENG, G. C. A. & NUNES, M. B. Identification and assessment of risks to successful exploitation of ERP systems in China. 5th European and Mediterranean Conference on Information Systems, Dubai, UAE, 2008.

PEPPARD, J. 2010. Unlocking the performance of the chief information officer (CIO). *California Management Review,* 52**,** 73-99.

PINTO, J. K. 1986. *Project implementation: a determination of its critical success factors, moderators and their relative importance across the project life cycle.* University of Pittsburgh.

PINTO, J. K. 2004. The elements of project success. *Field Guide to Project Management, Second Edition.*

PINTO, J. K. & MANTEL JR, S. J. 1990. The causes of project failure. *Engineering Management, IEEE Transactions on,* 37**,** 269-276.

PINTO, J. K. & PRESCOTT, J. E. 1988. Variations in critical success factors over the stages in the project life cycle. *Journal of management,* 14**,** 5-18.

PINTO, J. K. & ROUHIAINEN, P. 2001. *Building customer-based project organizations*, Wiley.

PINTO, J. K. & SLEVIN, D. P. 1987. Critical factors in successful project implementation. *IEEE Transactions on Engineering Management,* 34**,** 22-27.

PINTO, J. K. & SLEVIN, D. P. 1988. Project success: definitions and measurement techniques. *Project Management Journal,* 19**,** 67-72.

PLANES, P. & CASTILLO, C. 2002. An Interview with Forrest Moore CIO & VP Information Technology RF Micro Devices Inc. *Journal of Global Information Technology Management,* 5**,** 60-65.

PLANT, R. & WILLCOCKS, L. 2007. Critical success factors in international ERP implementations: a case research approach. *Journal of Computer Information Systems,* 47**,** 60-70.

PMI 2013. A Guide to the Project Management Body of Knowledge: PMBOK® Guide. 5th ed.: Project Management Institute, Newton Square, PA.

POLANSKY, M., INUGANTI, T. & WIGGINS, S. 2004. The 21st century CIO. *Business Strategy Review,* 15**,** 29-33.

PORANKI, K. R., PERWEJ, Y. & AKHTAR, N. 2015. Integration of SCM and ERP for Competitive Advantage. *Research Journal of Sciences & IT Management,* 4.

PRESTON, D. S., LEIDNER, D. & CHEN, D. 2008. CIO leadership profiles: implications of matching CIO authority and leadership capability on IT impact. *MIS Quarterly Executive,* 7**,** 57-69.

PRINCE2 2011. Project In Controlled Environment. 5th ed. UK: Office of Government Commerce.

PUNCH, K. F. 2005. *Introduction to social research: Quantitative and qualitative approaches*, Sage Publications Limited.

RAM, J. & CORKINDALE, D. 2014. How "critical" are the critical success factors (CSFs)? Examining the role of CSFs for ERP. *Business Process Management Journal,* 20**,** 151-174.

RAM, J., CORKINDALE, D. & WU, M.-L. 2013. Implementation critical success factors (CSFs) for ERP: Do they contribute to implementation success and post-implementation performance? *International Journal of Production Economics,* 144**,** 157-174.

RAMAPRASAD, A. & WILLIAMS, J. The utilization of critical success factors: a profile. 29th Annual Meeting of the Decision Sciences Institute; LasVegas, USA, 1998.

RAMAYAH, T., ROY, M. H., AROKIASAMY, S. & ZBIB, I. 2007. Critical success factors for successful implementation of enterprise resource planning systems in manufacturing organisations. *International Journal of Business Information Systems,* 2**,** 276-297.

REMENYI, D. 1998. *Doing research in business and management: an introduction to process and method*, Sage.

REMENYI, D. 2012. *Stop IT Project Failures*, Routledge.

RERUP SCHLICHTER, B. & KRAEMMERGAARD, P. 2010. A comprehensive literature review of the ERP research field over a decade. *Journal of Enterprise Information Management,* 23**,** 486-520.

RINGLE, C. M., WENDE, S. & BECKER, J. 2014. SmartPLS 3.0. Hamburg: SmartPLS. http://www.smartpls.com.

ROBEY, D., ROSS, J. W. & BOUDREAU, M. C. 2002. Learning to implement enterprise systems: An exploratory study of the dialectics of change. *Journal of Management Information Systems,* 19**,** 17-46.

ROCKART, J. F. 1979. Chief executives define their own data needs. *Harvard business review,* 57**,** 81-93.

ROCKART, J. F. 1986. A Primer on Critical Success Factors" published in The Rise of Managerial Computing: The Best of the Center for Information Systems Research, edited with Christine V. Bullen.(Homewood, IL: Dow Jones-Irwin), 1981, OR. McGraw-Hill School Education Group.

RODRIGUEZ-REPISO, L., SETCHI, R. & SALMERON, J. L. 2007. Modelling IT projects success: Emerging methodologies reviewed. *Technovation,* 27**,** 582-594.

ROSARIO, J. 2000. On the leading edge: critical success factors in ERP implementation projects. *Business World,* 17**,** 15-29.

ROSS, J. W. 1999. Surprising facts about implementing ERP. *IT professional,* 1**,** 65-68.

S AL-MUDIMIGH, A., ULLAH, Z. & SHAHZAD, B. 2010. Critical success factors in implementing portal: A comparative study. *Global Journal of Management and Business Research,* 10.

SALEH, M. F., ABBAD, M. & AL-SHEHRI, M. 2013. ERP implementation success factors in Saudi Arabia. *International Journal of Computer Science and Security (IJCSS),* 7**,** 15.

SARAPH, J. V., BENSON, P. G. & SCHROEDER, R. G. 1989. An instrument for measuring the critical factors of quality management. *Decision sciences,* 20**,** 810-829.

SAUDI ARABIAN GENERAL INVESTMENT AUTHORITY. 2015. *The Hard Facts. Retrieved 28 May2015, from http://www.sagia.gov.sa/en/Why-Saudi-Arabia/The-hard-facts/* [Online]. [Accessed].

SAUNDERS, M. & TOSEY, P. 2012. The layers of research design. *Rapport, Winter,* 2013**,** 58-59.

SAUNDERS, M. N., SAUNDERS, M., LEWIS, P. & THORNHILL, A. 2011. *Research methods for business students, 5/e*, Pearson Education India.

SEDDON, P. B., STAPLES, S., PATNAYAKUNI, R. & BOWTELL, M. 1999. Dimensions of information systems success. *Communications of the AIS,* 2**,** 5.

SEDDON, P. B., WALKER, D., REYNOLDS, P. & WILLCOCKS, L. 2008. A Case-Based Assessment of the Descriptiveness of Three CIO Typologies and Validity of Two CIO-Effectiveness Models. *ACIS 2008 Proceedings***,** 90.

SEKARAN, U. & BOUGIE, R. 2010. *Research methods for business: A skill building approach*, John Wiley & Sons.

SHAH, M. & SIDDIQUI, F. A survey of research methods used to investigate critical factors. Conference Proceedings European Conference on Research Methodology for Business and Management Studies, 2002.

SHANKS, G., PARR, A., HU, B., CORBITT, B., THANASANKIT, T. & SEDDON, P. 2000. Differences in critical success factors in ERP systems implementation in Australia and China: a cultural analysis. *Proceedings of the 8th European Conference on Information Systems.* Citeseer.

SHENHAR, A. J. & DVIR, D. 1996. Toward a typological theory of project management. *Research Policy,* 25**,** 607-632.

SHENHAR, A. J. & DVIR, D. 2004. *How projects differ and what to do about it,* New York, Wiley

SHENHAR, A. J., DVIR, D., GUTH, W., LECHLER, T., PATANAKUL, P., POLI, M. & STEFANOVIC, J. Project strategy: the missing link. annual Academy of Management meeting, 2005. 5-10.

SHENHAR, A. J., TISHLER, A., DVIR, D., LIPOVETSKY, S. & LECHLER, T. 2002. Refining the search for project success factors: a multivariate, typological approach. *r&D Management,* 32**,** 111-126.

SILVER, M. S., MARKUS, M. L. & BEATH, C. M. 1995. The information technology interaction model: A foundation for the MBA core course. *MIS quarterly***,** 361-390.

SLEVIN, D. P. & PINTO, J. K. 1987. Balancing strategy and tactics in project implementation. *Sloan management review,* 29**,** 33-41.

SMALTZ, D. H., SAMBAMURTHY, V. & AGARWAL, R. 2006. The antecedents of CIO role effectiveness in organizations: An empirical study in the healthcare sector. *IEEE Transactions on Engineering Management,* 53**,** 207-222.

SMITH, D., HAIR JR, J. F. & FERGUSON, K. 2014. An investigation of the effect of family influence on Commitment–Trust in retailer–vendor strategic partnerships. *Journal of Family Business Strategy*.

SOJER, M., SCHLÄGER, C. & LOCHER, C. The CIO-hype, science and reality. ECIS, 2006. 1232-1243.

SOMERS, T. M. & NELSON, K. G. 2004. A taxonomy of players and activities across the ERP project life cycle. *Information & Management,* 41**,** 257-278.

STANDISH-GROUP 2013. Chaos Summary.

STONE, M. 1974. Cross-validatory choice and assessment of statistical predictions. *Journal of the Royal Statistical Society. Series B (Methodological)***,** 111-147.

STRATMAN, J. K. & ROTH, A. V. 2007. Enterprise Resource Planning (ERP) Competence Constructs: Two‐Stage Multi‐Item Scale Development and Validation*. *Decision Sciences,* 33**,** 601-628.

STRAUB, D., BOUDREAU, M. C. & GEFEN, D. 2004. Validation guidelines for IS positivist research. *Communications of the Association for Information Systems,* 13**,** 380-427.

STRAUB, D. W. 1989. Validating instruments in MIS research. *MIS quarterly***,** 147-169.

SUMNER, M. Critical success factors in enterprise wide information management systems projects. Proceedings of the 1999 ACM SIGCPR conference on Computer personnel research, 1999. ACM, 297-303.

SYAL, R. 2013. Abandoned NHS IT system has cost£ 10bn so far. *The Guardian,* 21.

TABACHNICK, B. G. & FIDELL, L. S. 2013. *Using Multivariate Statistics*, Pearson.

TAFTI, M. H. 2005. Risks factors associated with offshore IT outsourcing. *Industrial Management & Data Systems,* 105**,** 549-560.

TAKANEN, T. 2008. The Changing Role of the CIO. Is CIO an IT Expert or a Business Executive?

TARAWNEH, H. 2011. A Suggested Theoretical Framework for Software Project Success. *Journal of Software Engineering and Applications,* 4**,** 646-651.

TARHINI, A., AMMAR, H. & TARHINI, T. 2015. Analysis of the critical success factors for enterprise resource planning implementation from stakeholders' perspective: A systematic review. *International Business Research,* 8**,** 25.

THIERAUF, R. J. 1982. *Decision support systems for effective planning and control: A case study approach*, Prentice Hall PTR.

THOMAS, G. & FERNANDEZ, W. 2008. Success in IT projects: A matter of definition? *International Journal of Project Management,* 26**,** 733-742.

THOMAS, G. & FERNÁNDEZ, W. The Elusive Target of IT Project Success. 2nd International Research Workshop for, 2007. Citeseer.

TOBIE, A. M., ETOUNDI, R. A. & ZOA, J. 2016. A literature review of ERP implementation within African countries. *The Electronic Journal of Information Systems in Developing Countries*.

TURNER, J. R. 1999. *The handbook of project-based management*, McGraw-Hill London.

TURNER, J. R. & COCHRANE, R. A. 1993. Goals-and-methods matrix: coping with projects with ill defined goals and/or methods of achieving them. *International Journal of Project Management,* 11**,** 93-102.

TURNER, R., ZOLIN, R. & REMINGTON, K. Monitoring the performance of complex projects from multiple perspectives over multiple time frames. Proceedings of the 9th International Research Network of Project Management Conference, 2009. IRNOP.

UMBLE, E. & UMBLE, M. Enterprise resource planning systems: a review of implementation issues and critical success factors. proceedings of the 32nd annual meeting of the decision sciences institute, 2001. 1109-11.

UMBLE, E. J., HAFT, R. R. & UMBLE, M. M. 2003. Enterprise resource planning: Implementation procedures and critical success factors. *European journal of operational research,* 146**,** 241-257.

UZOKA, F.-M. E., ABIOLA, R. O. & NYANGERESI, R. 2008. Influence of product and organizational constructs on ERP acquisition using an extended technology acceptance model. *International Journal of enterprise information systems,* 4**,** 67.

VAN BULLEN, C. & ROCKART, J. 1986. A primer on critical success factors. *Rockart and Van Bullen, The rise of Management Computing, Dow Jones Irwin, Homewood, Illinois*.

VAN DER WESTHUIZEN, D. & FITZGERALD, E. P. Defining and measuring project success. European Conference on IS Management, Leadership and Governance, University of Reading, UK, 7-8 July 2005, 2005. Academic Conferences Limited, 157.

VATANASOMBUT, B. & GRAY, P. 1999. Factors for success in data warehousing: What the literature tells us. *Journal of Data Warehousing,* 4**,** 25-33.

VIDYASAGAR, G. & REA, D. M. Saudi women doctors: gender and careers within Wahhabic Islam and a 'westernised'work culture. Women's Studies International Forum, 2004. Elsevier, 261-280.

WANG, E. T., CHIA-LIN LIN, C., JIANG, J. J. & KLEIN, G. 2007. Improving enterprise resource planning (ERP) fit to organizational process through knowledge transfer. *International Journal of Information Management,* 27**,** 200-212.

WARE, L. C. 2003. What Do You Think of Your CIO? *CIO Research Reports,* 15.

WATERIDGE, J. 1998. How can IS/IT projects be measured for success? *International Journal of Project Management,* 16**,** 59-63.

WEE, S. 2000. *Juggling toward ERP success: keep key success factors high* [Online]. [Accessed].

WESTERVELD, E. 2003. The Project Excellence Model®: linking success criteria and critical success factors. *International Journal of Project Management,* 21**,** 411-418.

WHITE, D. & FORTUNE, J. 2002. Current practice in project management—An empirical study. *International Journal of Project Management,* 20**,** 1-11.

WICKRAMASINGHE, V. & GUNAWARDENA, V. 2010. Critical elements that discriminate between successful and unsuccessful ERP implementations in Sri Lanka. *Journal of Enterprise Information Management,* 23**,** 466-485.

WILES, R., CROW, G. & PAIN, H. 2011. Innovation in qualitative research methods: a narrative review. *Qualitative Research,* 11**,** 587-604.

WILLCOCKS, L. 1992. Evaluating information technology investments: Research findings and reappraisal. *Information Systems Journal,* 2**,** 243-268.

WILLCOCKS, L. P., LACITY, M. & CRAIG, A. 2015. The IT function and robotic process automation.

WILLIAMS, J. & RAMAPRASAD, A. 1996. A taxonomy of critical success factors. *European Journal of Information Systems,* 5**,** 250-260.

WINTER, M., SMITH, C., MORRIS, P. & CICMIL, S. 2006. Directions for future research in project management: The main findings of a UK government-funded research network. *International Journal of Project Management,* 24**,** 638-649.

YEO, K. 2002. Critical failure factors in information system projects. *International Journal of Project Management,* 20**,** 241-246.

YEOH, W. & KORONIOS, A. 2010. Critical success factors for business intelligence systems. *Journal of computer information systems,* 50**,** 23-32.

YESSER. 2015. *Best Practices for Project Management* [Online]. Available: http://www.yesser.gov.sa/en/Methodologies/Pages/best_practices_government.aspx [Accessed 1/5/2015].

YIN, R. K. 2014. *Case study research: Design and methods*, Sage publications.

YINGJIE, J. 2005. Critical success factors in ERP implementation in Finland. *The Swedish School of Economics and Business Administration,* 71.

YOUNG, R. & JORDAN, E. 2008. Top management support: Mantra or necessity? *International Journal of Project Management,* 26**,** 713-725.

ZANDHUIS, A. & STELLINGWERF, R. 2013. ISO 21500. Guidance on project management-A Pocket Guide. *Zaltbommel: Van Haren Publishing.*

ZHANG, L., LEE, M. K., ZHANG, Z. & BANERJEE, P. 2003. Critical success factors of enterprise resource planning systems implementation success in China. *System Sciences, 2003. Proceedings of the 36th Annual Hawaii International Conference on.* IEEE.

ZHANG, Z., LEE, M. K., HUANG, P., ZHANG, L. & HUANG, X. 2005. A framework of ERP systems implementation success in China: An empirical study. *International Journal of Production Economics,* 98**,** 56-80.

ZHAO, X. & SINGHAPUTTANGKUL, N. 2016. Effects of firm characteristics on enterprise risk management: Case study of Chinese construction firms operating in Singapore. *Journal of Management in Engineering,* 32**,** 05016008.

ZIEMBA, E. & OBLAK, I. 2013. Critical Success Factors for ERP Systems Implementation in Public Administration. *Interdisciplinary Journal of Information, Knowledge and Management,* 8**,** 1.

ZIKMUND, W., BABIN, B., CARR, J. & GRIFFIN, M. 2012. *Business research methods*, Cengage Learning.

ZOUINE, A. & FENIES, P. 2014. The Critical Success Factors Of The ERP System Project: A Meta-Analysis Methodology. *Journal of Applied Business Research,* 30**,** 1407.

ZWIKAEL, O. & GLOBERSON, S. 2006. From critical success factors to critical success processes. *International Journal of Production Research,* 44**,** 3433-3449.

Appendices

Appendix A (Exploratory Study)

Questionnaire Survey

Factors Affecting the Success of Information Technology (IT) Projects in Saudi Arabian Public Organisations

Dear CIO,

This research aims to rank the success factors based on their importance in order to identify the critical ones that may affecting the Information Technology (IT) projects success in Saudi Arabian public organisations.

The information you provide will be strictly confidential and will be used solely for the purpose of the research, and there are no direct benefits to you as well as no risk to you. Definitely, you are totally free to discontinue or to withdraw at any time and also to decline to answer any questions.

The researcher would like to take this opportunity to thank you in advance for spending your valuable time to contribute to this questionnaire.

Abdulaziz Almajed
Mobile/Viber/Tango: 0044 755 2870 236
Skype: almajed1970
Email: a.almajed@uea.ac.uk

* Required

Respondent Background

1. Nationality *

2. Gender *

3. Age *

4. Last Educational Qualification *

5. Field of Study *

6. Experience *

7. Organisation Category *

IT Project Success Factors

8. To what extent do you agree that the following factors are critical to IT project success? *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Top Management Support and Stability	○	○	○	○	○
2. Strategic Planning	○	○	○	○	○
3. Project Management	○	○	○	○	○
4. Process Management	○	○	○	○	○
5. IT Readiness	○	○	○	○	○
6. Change Management	○	○	○	○	○
7. Risk Management	○	○	○	○	○
8. Communication Management	○	○	○	○	○
9. Training & Education	○	○	○	○	○
10. Partners & Suppliers Management	○	○	○	○	○
11. Project Team Competency	○	○	○	○	○
12. Stakeholder Management	○	○	○	○	○

9. Please add any factor that you believe it is critical for project success:

Thank You

Name

Email Address

Organization Name

Submit

Never submit passwords through Google Forms.

Appendix B (Main Study - Questionnaire Survey)

Information Technology Project Success in Saudi Arabian Public Organizations

Dear CIO/IT Director

I am carrying out a PhD study at the University of East Anglia, UK on Information Technology Project Success in Saudi Arabian Public Organizations, under the supervision of Dr. Pam Mayhew (P.Mayhew@uea.ac.uk). This research aims to evaluate the status of IT project success in public organizations in Saudi Arabia.

I would be grateful if you respond to the enclosed questions as frankly and thoughtfully as possible. The answers required will only take 15-20 minutes to complete, but will have a significant value in terms of the completion and execution of the research as well as the achievement of its objectives. So, please fill in the questionnaire as completely as possible. The information you provide will be strictly confidential and will be used solely for the purpose of the research. You are totally free to discontinue or to withdraw at any time and also to decline to answer any questions at any time. Also, there are no direct benefits to you as well as no risk to you.

The questionnaire is divided into the following sections:
Section One: Respondent Background
Section Two: Organizational and IT Characteristics
Section Three: IT Project Success Criteria/Dimensions
Section Four: IT Project Success Practices

I would like to take this opportunity to thank you in advance for spending your valuable time to answer the questions of this survey.

Abdulaziz I. AlMajed
Mobile: 0044 755 287 0236
Email: a.almajed@uea.ac.uk

Section One: Respondent Background

1. Nationality? *

- ○ Saudi
- ○ Non-Saudi

2. Gender? *

- Male
- Female

3. Age (years)? *

- under 26
- 26-30
- 31-35
- 36-40
- 40+

4. Educational level? *

- Below Bachelor
- Bachelor
- Higher Diploma
- Master
- PhD

5. Field of study? *

- Computing
- Management
- Accounting
- Engineering
- Other

6. Years of experience? *

- Under 6
- 6-10
- 11-15
- 16--20
- 20+

7. How many reporting levels exist between yourself and the head of the organization? *

- One
- Two
- Three
- Four
- More than four

8. Which of the following best describing you as CIO? *

- Strategic
- Transformational
- Operational

9. How many years have you been in CIO position? *

10. How many IT projects have you been responsible for that have had an effect at the organizational level? *

Section Two: Organisational and IT Characteristics

11. Organization's category? *

- Ministers
- Authorities
- Corporations
- Hospitals
- Higher Education
- Other

12. How many employees are there in your organization? *

- Under 100
- 100-249
- 250-499
- 500-999
- 1000+

13. How many IT employees are there in your organization? *

- Under 10
- 10-24
- 25-49
- 50-99
- 100+

14. IT projects' yearly budget? *

- < 1,000,000 SR
- 1,000,000 - 4,999,999 SR
- 5,000,000 - 10,000,000 SR
- > 10,000,000 SR

15. Existence of Formal Project Management Methodology/Standard? *

- PMI (Project Management Institute)
- PRINCE2 (Projects in a Controlled Environment)
- ISO 21500 (Guidance on project management)
- Other
- None

16. Existence of Project Management Office (PMO)? *

- Yes
- No

17. Who develops your information systems? *

- In-house developed
- Professional company
- Both

18. Does your organization receive external government support (e.g., Yesser Program)?

- Financial
- Consultations
- Both
- None

Section Three: IT Project Success Criteria/Dimensions

19. **Regarding the IT projects in your organization: How frequently each of the following IT project success criteria is achieved? ***

	Never	Rarely	Sometimes	Often	Always
IT projects are completed on-time.	○	○	○	○	○
IT projects are completed on-budget.	○	○	○	○	○
IT projects are completed with all features and functions as initially specified.	○	○	○	○	○
IT projects meet the needs of the project stakeholders.	○	○	○	○	○
IT project achieve its business goals and purpose.	○	○	○	○	○
End products of IT projects are used.	○	○	○	○	○

20. Do you have any additional criteria/dimensions concerning IT project success in your organization in addition to what has been seen above?

Section Four: IT Project Success Practices

Top Management Support and Commitment

21. **Regarding the IT projects in your organization: To what extent do you agree with each of the following statements?** *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Top management participates in IT projects.	○	○	○	○	○
Top management shares long term plans.	○	○	○	○	○
Top management allocate enough budget and resources.	○	○	○	○	○
Top management create the environment for IT projects to succeed.	○	○	○	○	○
Sufficient reward is provided by top management.	○	○	○	○	○

IT projects are viewed as a strategic decision by top management.	○	○	○	○	○
There is long term top management commitment.	○	○	○	○	○
Top management is actively supporting IT projects.	○	○	○	○	○
IT projects receive explicit identification from top management as a critical priority.	○	○	○	○	○

Section Four: IT Project Success Practices

Strategic Planning

22. **Regarding the IT projects in your organization: To what extent do you agree with each of the following statements?**

*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Our IT capabilities are constantly reviewed against strategic goals.	○	○	○	○	○
IT plans are redesigned as required to meet evolving conditions.	○	○	○	○	○
Strategic IT planning is a continuous process.	○	○	○	○	○
Written guidelines exist to structure strategic IT planning in our organization.	○	○	○	○	○
Top management involves in IT strategic planning.	○	○	○	○	○
IT strategic planning includes inputs from all functional areas.	○	○	○	○	○

Section Four: IT Project Success Practices

Communications Management

23. **Regarding the IT projects in your organization: To what extent do you agree with each of the following statements?**

*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
There are effective communications between project team members and users.	○	○	○	○	○
There are effective communications amongst functional departments.	○	○	○	○	○
There are effective communications to get the users' requirements and comments.	○	○	○	○	○
There are enough communication channels (presentations, newsletter, etc.) to inform users about the objectives of the IT projects.	○	○	○	○	○
IT projects progress are communicated amongst stakeholders.	○	○	○	○	○
All stakeholders and team members willingly keep each other informed.	○	○	○	○	○

Section Four: IT Project Success Practices

Project Management

24. **Regarding the IT projects in your organization: To what extent do you agree with each of the following statements?**

*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The scope of each IT project is clearly established.	○	○	○	○	○
A detailed project plan (i.e., what activities to cover at what stage) with measurable results is provided for each IT project.	○	○	○	○	○
The responsibility for all parts of each IT project is assigned.	○	○	○	○	○

The activities across all stakeholders parties are coordinated properly for each IT project.	○	○	○	○	○
There is a formal management process to monitor each IT project activities.	○	○	○	○	○
Each IT project's progress is reviewed on a periodic basis.	○	○	○	○	○

Section Four: IT Project Success Practices

Project Team Competency

25. **Regarding the IT projects in your organization: To what extent do you agree with each of the following statements?**

*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Each IT project has a highly experienced project manager who is dedicated to the project.	○	○	○	○	○
A variety of cross-functional team members are selected.	○	○	○	○	○
The people selected for each IT project team have the best business and technical knowledge.	○	○	○	○	○
Each IT project team is empowered to make decisions relating to the project.	○	○	○	○	○
Each IT project team is working on the project full-time as their only priority.	○	○	○	○	○

Section Four: IT Project Success Practices

Stakeholders Management

26. **Regarding the IT projects in your organization: To what extent do you agree with each of the following statements?**

*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Structured stakeholder analysis is conducted on a regular basis to understand their expectations, identify synergies and risks.	○	○	○	○	○
Stakeholders' relationships are managed along and across IT projects.	○	○	○	○	○
IT projects' requirements reflect stakeholder needs and the capability of the organization.	○	○	○	○	○
Stakeholders are recognized for their contribution to efficient IT projects.	○	○	○	○	○
The roles and responsibilities of all stakeholders are identified.	○	○	○	○	○

Section Four: IT Project Success Practices

Partners and Suppliers Management

27. **Regarding the IT projects in your organization: To what extent do you agree with each of the following statements?**

*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The partners and suppliers communicate well with our organization.	○	○	○	○	○
The partners and suppliers personnel have enough experience for implementing IT projects.	○	○	○	○	○
The partners and suppliers provide quality services.	○	○	○	○	○
The training offered by the partners and suppliers is adequate to increase the user's proficiency in each IT project usage.	○	○	○	○	○
The partners and suppliers provide					

suitable formal documents (user manual, operation guide, etc.) required for each IT project.	○	○	○	○	○
IT product/service quality is regarded as the most important factor in selecting suppliers.	○	○	○	○	○
Long-term cooperative relations with partners and suppliers are established.	○	○	○	○	○
Detailed information regarding partners and suppliers' performance is maintained.	○	○	○	○	○

Section Four: IT Project Success Practices

Training and Education

28. **Regarding the IT projects in your organization: To what extent do you agree with each of the following statements?**

*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Specific IT skills training is given to team members in each IT project.	○	○	○	○	○
Specific user training needs were identified early in the implementation of each IT project.	○	○	○	○	○
A formal training program has been developed to meet the requirements of each IT project user.	○	○	○	○	○
Training materials have been customized for each specific job.	○	○	○	○	○
Employees are tracked to ensure that they have received the appropriate training.	○	○	○	○	○
Our organization provides regular training sessions.	○	○	○	○	○
The resources for education and training have been put in place.	○	○	○	○	○
Education and training are encouraged and supported.	○	○	○	○	○

Section Four: IT Project Success Practices

Organizational Culture

29. **Regarding the IT projects in your organization: To what extent do you agree with each of the following statements?**

*

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Employees are encouraged to analyze mistakes and learn from them.	○	○	○	○	○
Every day brings new challenges.	○	○	○	○	○
Employees are encouraged or rewarded to express their opinions and ideas regarding work.	○	○	○	○	○
Management freely shares information.	○	○	○	○	○
Employees are supportive and helpful.	○	○	○	○	○
There is willingness to collaborate across organizational units.	○	○	○	○	○
Opportunities are provided for individual development, other than formal training (e.g., work assignments and job rotation).	○	○	○	○	○
Adequate organizational resources are available to the employees.	○	○	○	○	○

30. **Do you have any additional comments concerning IT project success practices in your organization in addition to what has been seen in section four?**

31. **In your opinion, please list the major obstacles for IT project's success:**

1.
2.
3.
4.
5.

Thank You!

Your response is very important for my PhD research. Thank you very much for your cooperation.

Appendix C (Ethical Approval Form)

School of Computing Sciences

UEA

Research Ethics Check

Name Abdulaziz Almajed ..... UG / PGT / PGR / (S)RA / Faculty / Other

Title of project (80 chars. max.) IT Project Success in Saudi Arabian Public Organizations

Name of Supervisor / ~~PI~~ / ~~Lab leader~~: Dr. Pam Mayhew

A. Does the research use an interview or questionnaire survey? **Yes** No

If so, does it:

1. Ask for any personal information? Yes **No**
2. Ask personal questions other than those from published surveys/questionnaires? Yes **No**
3. Use questions on age, gender or ethnicity other than those in widespread use? Yes **No**
4. Ask other personal or sensitive questions? Yes **No**

B. Does the research offer advice or guidance to people? Yes **No**

If so:

5. Are you using a validated knowledge base? **Yes No**
6. Are you (or you collaborators) formally qualified to give the advice or guidance? **Yes No**

C. Does the research involve children, vulnerable adults or their carers? Yes **No**

If so:

7. Have you obtained the relevant (e.g. Enhanced) CRB checks? **Yes No**

D. Does the research record or observe people's behaviour? Yes **No**

If so:

8. Does it replicate other published studies? **Yes No**
9. Are these recent and culturally compatible? **Yes No**

E. Experimental subjects and consent

10. Briefly describe how you will recruit subjects.
11. Briefly describe how you will obtain the informed consent of your subjects.
12. How will they be informed of their options to withdraw?
13. How will they be informed of any risks or benefits from participating?

F. Data

14. What observational or behavioural data will be collected? How?
15. How will confidentiality be ensured?
16. Who else may have access to the data?
17. Will the data be anonymised? How?
18. Will the data be made available to other studies? How?
19. How will experimental subjects be informed of these issues?
20. How will the data be stored in the short term? Long term?

Attachments

☑ Project synopsis (250 words max.) ☑ Research protocol ☑ Questionnaire

Approval – for office use only

Approved **Yes** / No Signature ..... Date 12 July 2013

Please return completed form to CMP Office S2.01

Appendix D (Yesser's Invitation)

From: Yesser PR
Sent: Thursday, 26 September, 2013 11:43
Subject: بحث بخصوص مشاريع تقنية المعلومات في المملكة العربية السعودية

University of East Anglia

برنامج التعاملات الإلكترونية الحكومية
e-Government Program

يسرنا في برنامج التعاملات الإلكترونية الحكومية (يسّر) أن نطلب منكم تعبئة الاستبيان المشمول في هذه الرسالة (أضغط هنا)، وهو بخصوص بحث حول مشاريع تقنية المعلومات في المملكة العربية السعودية. ويأتي هذا البحث ضمن متطلبات رسالة الدكتوراه الخاصة بأحد الباحثين السعوديين. وبما إننا نساعد بشكل دائم طلاب المملكة وباحثيها في كتابة أبحاثهم ورسائلهم للدراسات العليات (الماجستير والدكتوراه) والمتعلقة بمجال عملنا، فإننا نأمل منكم تقديم الدعم اللازم لهذا الباحث لإكمال بحثه، ونقدر لكم هذه المساهمة الفاعلة.

Yesser would like to request you to complete the research survey regarding IT Projects in Saudi Arabia (Please Press Here). This is a PhD research requirement for a Saudi student, who is completing his PhD. We try to help students whose thesis in Masters or PhD requires surveys like this.

Your time in completing the survey will contribute greatly and we thank you.

www.yesser.gov.sa

Appendix E (Normality Test)

	Case Statistics			Range		Normality Test			
	N	Mean	Std. Dev.	Min.	Max.	Skewness	Std. Err.	Kurtosis	Std. Err.
TMS1 - Top management participates	73	3.78	1.017	1	5	-1.252	.281	1.433	.555
TMS2 - Top management shares long-term plans	73	3.77	.936	1	5	-.558	.281	.030	.555
TMS3 - Top management allocates sufficient budget and resources	73	3.93	.822	2	5	-.488	.281	-.140	.555
TMS4 - Top management creates the environment for IT projects to succeed	73	3.70	.923	2	5	-.445	.281	-.544	.555
TMS5 - Sufficient reward is provided by top management	73	3.15	1.210	1	5	-.152	.281	-.957	.555
TMS6 - IT projects are viewed as a strategic decision	73	3.67	1.015	1	5	-.688	.281	-.010	.555
TMS7 - There is long-term top management commitment	73	3.63	1.074	1	5	-.452	.281	-.250	.555
TMS8 - Top management is actively supporting IT projects	73	3.78	.975	1	5	-.649	.281	-.075	.555
TMS9 - IT projects identification as a critical priority	73	3.59	.925	2	5	-.160	.281	-.767	.555
SP1 - Our IT capabilities are constantly reviewed against strategic goals	73	3.38	1.022	1	5	-.357	.281	-.656	.555
SP2 - IT plans are redesigned as required to meet evolving conditions	73	3.63	.921	1	5	-.945	.281	1.227	.555
SP3 - Strategic IT planning is a continuous process	73	3.95	1.066	1	5	-.738	.281	-.382	.555
SP4 - Written guidelines exist to structure strategic IT planning	73	3.40	1.051	1	5	-.275	.281	-.734	.555
SP5 - Top management involved in IT strategic planning	73	3.45	1.179	1	5	-.379	.281	-.818	.555
SP6 - IT strategic planning includes inputs from all functional areas	73	3.64	1.072	1	5	-.560	.281	-.442	.555
CM1 - Effective communications between project team members and users	73	4.10	.785	2	5	-.349	.281	-.776	.555
CM2 - Effective communications amongst functional departments	73	3.70	.953	1	5	-.741	.281	.490	.555
CM3 - Effective communications to obtain the users' requirements	73	4.10	.960	1	5	-1.262	.281	1.732	.555
CM4 - Enough channels to inform users about the objectives	73	3.62	1.049	1	5	-.280	.281	-.791	.555
CM5 - IT projects' progress is communicated amongst stakeholders	73	3.78	.768	2	5	-.356	.281	-.022	.555
CM6 - Stakeholders and team members keep each other informed	73	3.53	.944	1	5	-.458	.281	-.339	.555
PM1 - The scope of each IT project is clearly established	73	3.97	.816	2	5	-.737	.281	.436	.555
PM2 - A detailed project plan with measurable results is provided	73	3.82	.855	1	5	-1.014	.281	1.304	.555
PM3 - The responsibility for all parts of each IT project is assigned	73	3.90	.885	2	5	-.552	.281	-.277	.555
PM4 - The activities across all stakeholders parties are coordinated	73	3.63	.825	1	5	-.430	.281	.531	.555
PM5 - There is a formal management process to monitor project activities	73	3.52	.959	1	5	-.546	.281	-.431	.555
PM6 - Each IT project's progress is reviewed on a periodic basis	73	3.81	.908	1	5	-.752	.281	.488	.555
PTC1 - Each IT project has a highly experienced project manager	73	3.33	1.106	1	5	-.185	.281	-.821	.555
PTC2 - A variety of cross-functional team members are selected	73	3.78	.786	2	5	-.646	.281	.339	.555
PTC3 - Teams have the best business and technical knowledge	73	3.51	1.002	2	5	-.062	.281	-1.035	.555
PTC4 - Each IT project team is empowered to make decisions	73	3.56	.866	1	5	-.855	.281	.925	.555
PTC5 - Each IT project team is working on the project full-time	73	2.96	1.073	1	5	.014	.281	-1.234	.555
SHM1 - Structured stakeholder analysis is conducted	73	3.25	1.011	1	5	.228	.281	-.719	.555
SHM2 - Stakeholders' relationships are managed	73	3.48	.784	2	5	-.375	.281	-.391	.555
SHM3 - IT projects' requirements reflect stakeholder needs	73	3.75	.619	2	5	-.875	.281	1.337	.555
SHM4 - Stakeholders are recognised for their contribution	73	3.59	.879	1	5	-.468	.281	.124	.555
SHM5 - The roles and responsibilities of all stakeholders are identified	73	3.66	.961	1	5	-.416	.281	-.294	.555

	Case Statistics			Range		Normality Test			
	N	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Skewness**	**Std. Err.**	**Kurtosis**	**Std. Err.**
PSM1 - The partners and suppliers communicate well with our organisation	73	3.85	.660	2	5	-.128	.281	-.011	.555
PSM2 - The partners' and suppliers' personnel have enough experience	73	3.59	.910	2	5	-.102	.281	-.742	.555
PSM3 - The partners and suppliers provide quality services	73	3.59	.955	2	5	-.163	.281	-.861	.555
PSM4 - The training offered by the partners and suppliers is adequate	73	3.48	1.042	1	5	-.549	.281	-.280	.555
PSM5 - The partners and suppliers provide suitable formal documents	73	3.56	1.067	1	5	-.588	.281	-.252	.555
PSM6 - Quality is the most important factor in selecting suppliers	73	3.70	1.023	1	5	-.638	.281	-.062	.555
PSM7 - Long-term relations with partners and suppliers are established	73	3.73	.917	1	5	-.866	.281	.954	.555
PSM8 - Detailed information regarding suppliers' performance is maintained	73	3.52	.959	1	5	-.546	.281	-.003	.555
TE1 - Specific IT skills training is given to team members	73	3.48	1.094	1	5	-.469	.281	-.826	.555
TE2 - Specific user training needs were identified	73	3.49	1.056	1	5	-.600	.281	-.332	.555
TE3 - A formal training program has been developed	73	3.41	1.052	1	5	-.605	.281	-.242	.555
TE4 - Training materials have been customised for each specific job	73	3.26	1.118	1	5	-.353	.281	-.484	.555
TE5 - Employees receive the appropriate training	73	3.19	1.138	1	5	-.273	.281	-.748	.555
TE6 - Our organisation provides regular training sessions	73	3.18	1.273	1	5	-.469	.281	-.985	.555
TE7 - The resources for education and training have been put in place	73	3.14	1.316	1	5	-.184	.281	-1.154	.555
TE8 - Education and training are encouraged and supported	73	3.44	1.225	1	5	-.437	.281	-.731	.555

Appendix F (Publication)

(Papers Written in Course of Working towards this Thesis)

During the period of this thesis, and in an effort to relate this work to a wider number of researchers in this field, gain their feedback, increasing the researcher's knowledge and familiarity of the topic in hand, the researcher managed to:

- ✓ **Journals**

1. Almajed, Abdulaziz I., and Mayhew, P. "An Investigation of the Critical Success Factors of IT Projects in Saudi Arabian Public Organizations". *IBIMA Business Review*. Vol. 2013 (2013), Article ID 260919, 10 pages DOI: 10.5171/2013.260919.

2. Almajed, Abdulaziz I., and Mayhew, P. "Chief Information Officers' Perceptions of IT Projects Success Factors In Saudi Arabian Public Organizations: An Exploratory Study". *IADIS International Journal on Computer Science and Information Systems*, 2013. 8, 66-78.

3. Almajed, Abdulaziz I., and Mayhew, P. "Barriers to Information Technology Project Success in Saudi Arabian Public Organizations". *International Journal of Scientific Knowledge*. 2014. Vol. 5, No.6, ISSN 2305-1493.

4. Almajed, Abdulaziz I., and Mayhew, P. "Building a Conceptual Framework for IT Project Success: CIOs' Perspective". *International Journal of Information Technology and Business Management*. 2015. Vol.39, No.1, ISSN 2304-0777.

- ✓ **Conferences**

1. Almajed, Abdulaziz I., and Mayhew, P. "Chief Information Officers' Perceptions Of IT Projects Success Factors In Saudi Arabian Public Organizations: An Exploratory Study". *International Conference Information Systems* 2013. ISBN: 978-972-8939-83-0.

2. Almajed, Abdulaziz I., and Mayhew, P. "The Critical Success Factors of IT Projects in Saudi Arabian Public Organizations". *International Business Information Management Association (IBIMA) 20th IBIMA Conference* 2013.

3. Almajed, Abdulaziz I., and Mayhew, P. "An empirical investigation of IT project success in developing countries." Science and Information Conference (SAI), 2014. *IEEE, 2014.*