E-procurement Adoption and the Impact of Culture Mediator towards the Assessment of Accepting a New Technology in Organisations

By

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DECLARATION

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of PhD is entirely my own work, and that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

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DEDICATION

"O Allah! Bestow on souls of my parents Your Mercy as they cherished me in childhood"

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LIST OF ABBREVIATIONS

Abbreviation	Nomenclature
AEP	Adoption of E-procurement
AGFI	Adjusted Goodness of Fit Index
ATT	Attitude
B2B	Business-to-Business
B2C	Business-to-Customer
BNF	Benefits of E-procurement
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CHB	Challenges and Barriers
CLF	Common Latent Factor
CSCMP	Council of Supply Chain Management Professionals
CSF	Critical Success Factors
EDI	Electronic Data Interchange
EM	Expectation Maximisation
E-PAM	E-procurement Adoption Model
E-procurement	Electronic Procurement
e-RAS	Electronic Reverse Auctions
GFI	Goodness of Fit Index
GP	Green Procurement
ICT	Information and Communication Technology

IT	Information Technology
NAFTA	North American Free Trade Agreement
NFI	Normed Fit Index
OF	Organisation Facilitators
OL	Organisation Leadership
OPEC	Organisation of Petroleum Exporting Countries
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
RIS	Rules of Islamic Sharia
RMR	Root Mean Square Residual
RMSEA	Root Mean Square Error of Approximation
SCM	Supply Chain Management
SEM	Structural Equation Modeling
SMEs	Small and Medium Size Enterprises
SP	Sustainable Procurement
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
TLI	Tucker Lewis Index
TOE	Technology, Organisation and Environment
TPB	Theory of Planned Behaviour
VAN	Value-Added Network

LIST OF PUBLICATIONS

JOURNAL PUBLICATION

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Maddi, M., Lorza, R.L, Geraghty, J. and Davis, P. (2013) Using the finite element method (FEM) as an optimisation tool in the oil and gas EPC projects, *30th International Manufacturing Conference IMC, 2- 5-SEPT.-12, UCD, Dublin, Ireland*

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ABSTRACT

This research project is concerned with the development of a realistic model for e-procurement adoption by organisations and groups observing Rules of Islamic Sharia (RIS). This model is intended to be based on the behavioural control, subjective norms, and the recognition of the benefits and risks of e-procurement adoption. The developed model, "E-Procurement Adoption Model" (E-PAM), combined and extended two existing models previously used for information technology adoption. Central to the design of the E-PAM is the principle that a realistic model should take into account all relevant psychological, social, cultural, demographic and religious factors. The mediating components "mediators" that determine the final model are thus determined by the specific aforementioned factors pertaining to the development of an e-procurement approach in the context of the Rules of Islamic Sharia. Therefore, in the design of the research model, factors including perceived usefulness, perceived ease of use, organisational facilitators, organisational leadership, critical success factors, challenges, barriers and benefits were taken into account. These factors in turn gave rise to the two mediating components of 'Attitude' and 'Rules of Islamic Sharia'.

A number of hypotheses were made in order to establish links between the contributing factors, the mediators and the adoption of e-procurement as the final dependent variable output of the model. An online questionnaire survey was conducted to validate the hypotheses using a structural equation model. The descriptive analysis of the survey data provided demographic details of the questionnaire participants and their employers and statistical analysis methods were used to correlate the contributing factors and mediators. The analysis of the survey data confirmed the existence of positive relationships between Benefits and Rules of Islamic Sharia, Organisational Facilitators and the Adoption of e-procurement, Organisational Facilitators and Organisational Leadership, and Rules of Islamic Sharia and the Adoption of e-procurement. It was observed that Perceived Usefulness and Organisational Leadership do not influence the adoption of e-procurement. Furthermore, the analysis suggested that Rules of Islamic Sharia is not influenced by Critical Success Factors.

This model successfully validated most of the initial hypotheses made regarding e-procurement adoption. The results of this research strongly encourage organisations observing Rules of Islamic Sharia to adopt e-procurement practices.

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Chapter One: Introduction

1.1 Overview

The concept of economic development, as has existed in the world for centuries, pertains to the qualitative and quantitative changes in the economy of a society and deals with social, economic, and industrial mechanisms in both public and private sectors. Fundamental to this thesis is a conviction that a rapid and extensive improvement in the living standards of people in developing countries is essential. Developing countries contribute extensively to the world economy by providing expensive mineral resources and cheap labour; however, these same countries receive little and often no benefit from the technological advancements enjoyed by the populations of developed countries. This is particularly injurious to the potential and ambitions of these developing countries as over the past century, scientific and technological advancements have become the main driving forces for economic development. Therefore, the process of economic development should be regularised and stimulated by less-developed and developing countries via making increased use of modern economic management models and concepts. In context of this aim and of this research programme, it is important to note that the utilisation of electronic technologies has changed various concepts of economics management for industries and companies worldwide [1].

The particular electronic development with which this thesis is concerned is that of e-procurement. Procurement refers to the securing of services and/or goods from external sources. The importance of procurement method to the procurement process is equally important for all types of companies, irrespective of size. The influence of information and communication technology (ICT), especially the widespread use of internet, on procurement procedures has been significant, as ICT provides innovative ways of requesting and supplying information, quotations and specific proposal details. The use of electronic information systems for the securing of supplies, services and work is termed as e-procurement. The adoption of e-procurement technology can intensify economic development and growth on a large scale due to its ability to facilitate the exchange of business at all levels of an organisation. Therefore, e-procurement has been adopted by numerous industries and organisations throughout the world. Advancements in technology and the adoption of e-procurement models to these technological developments are

thus considered as being at the heart of a social and economic revolution that is beginning to be felt throughout most countries of the world [2].

The adoption of electronic procurement (AEP) procedures in developed countries has taken place in a context of economic growth and was in turn to engender significant positive effects in society and in business culture. The technological gap, varying demographic and sociological characteristics, and cultural differences between different regions of world has resulted, firstly, in a reluctance in some areas to accept and adopt new technological developments and, secondly, in complications in implementation. Where the economic or commercial actors in question belong to a specific religion and thus practice particular religious provisions in business, the religious factor has the potential to positively or negatively affect the acceptance and adoption of new or innovative technology. A number of models have been designed and developed to facilitate new and innovative technology acceptance processes; however, in order to predict the behaviour of a potential e-procurement user working in compliance with Rules of Islamic Sharia (RIS; i.e. religiously-based cultural and legal practices), it is necessary to develop a new model that can predict behaviour regarding e-procurement acceptance in this specific religious context.

In this research project, a conceptual model has been adopted and modified by introducing new factors related to RIS. The modified model was in turn used to design a unique questionnaire that was distributed to top management personnel such as chairman, director, mangers, superintendents and coordinators whose work frequently involved procurement and tendering procedures. The recipients of the questionnaire belong to a number of sectors, mainly those related to the oil and gas industry. The data gathered by the online questionnaire were collected and processed by commercially available software including Statistical Package for the Social Sciences (SPSS) and Analysis of Moment Structurers (AMOS) (a structural equation modelling (SEM) tool). This software was used to perform the analysis on the data gathered through the online questionnaire using numerous statistical procedures. The correlations between several factors influencing e-procurement adoption – such as usefulness, organisational facilitators, organisational leadership, and RIS, etc. were then calculated. As shall be seen in later chapters, the detailed statistical analysis and data processing revealed interesting observations and threw up new findings. These results, as discussed in more detail later, suggest that there is great potential involved in the adoption of e-procurement by organisations working in compliance with RIS.

1.2 Research Context

After the discovery of oil in Libya in 1959, it emerged as the holder of the ninth highest oil reserves in the world, transforming Libya from a poor country into a rich one [2]. Libya, a member of the Organisation of the Petroleum Exporting Countries (OPEC), is one of the largest oil exporters from Africa and the Arab world [3]. Most of the world's largest international oil companies have large-scale assets in Libya, including Esso, British Petroleum, Total, Wintershall and Eni. Of these, Eni is the largest single recent investor. However, due to the political turmoil following the events in 2011 that were to become known as the Arab Spring, development and economic growth in Libya has faced considerable challenges and difficulties, exacerbated by the fact that the country had, up to that point, depended almost exclusively on only one main revenue source: oil and gas exports [4]. The political and violent uprising of 2011 and after was to have a negative effect on the economic growth of Libya, as the exports of oil and gas decreased, thus impacting hugely on business operations in the country.

Following the political changes of the Arab Spring, both the Libyan people and the international community held high hopes for the future of Libya, especially after the democratic elections that brought political parties to power. However, this hope was quickly destroyed as the political situation, highly influenced by international interests in the region, deteriorated the political and economic situation, and the country became unstable. Rebuilding the Libyan economy will require drastic changes in the organisational structures of those companies that have a role to play in this recovery process. Therefore, this thesis highlights the fact that the innovative technologies that have formed the basis for latter-day international economic development, particularly advanced information technology tools, could be employed to the benefit of the currently-struggling Libyan economy. The adoption of such technological tools – including the specific tool of e-procurement, as considered in detail in this thesis – could be beneficial both for Libya and for those western countries that hold strong economic interests in the region.

Strategic procurement management plays an important role in the public sector, particularly in the development and realisation of engineering projects. Information Technology (IT) is already playing significant roles in most of the organisations operating in various services and industrial sectors in many Islamic countries (such as Malaysia, Indonesia and Pakistan) and Arab countries (such as Saudi Arabia, United Arab Emirates, and Egypt, etc.). IT provides many organisations

with the opportunity to develop beyond traditional market strategies and working styles. IT also enables these organisations to develop the capability to compete and communicate with large international organisations in order to create high-level engineering procurement systems [5].

As information and communications technology has developed, researchers in different world regions have shown an increased interest in the e-procurement process. The application of various information technology tools allows for automatic processes by which procurement activities can be executed in a growing number of organisations [6]. Information and communications technology processes, such as e-auction, e-catalogue, e-invoice and e-commerce, allow for the "searching for products, services and information, advertising, and the buying, selling and paying for products and/or services" [7]. The lack of ICT knowledge is the biggest single inhibitor in many implementation cases [8]. In addition, many organisations place a lot of trust in ICTs as the support basis for their information processes [9].

Many barriers to business development remain in Libya since the political upheaval of early 2011. The violent events of 2011 were to negatively affect economic processes within Libya; hence there is potential for recovery and improvement within oil and gas production in most companies.

The main rationale behind this research project is the issue raised in Section 1.5 and the need to provide an answer to the research question set out in Section 1.6. Other rationalisations include:

- That this research project provides a heretofore neglected international perspective on the pattern of e-procurement adoption in Islamic countries, thus addressing an important gap in the literature.

- That even though there exists a vast profusion of literature on e-procurement adoption in developed countries, reflecting the evolved economies of these countries, there is an obvious lack in the literature dealing with the same issue in developing countries.

- That there is a need for a new conceptual framework that is based upon previous well-established models and theories but that introduces "Rules of Islamic Sharia*"* as an important mediator necessary in Arab and Islamic countries like Libya, Saudi Arabia, Malaysia, Pakistan etc. which are included in this research.

- That there is as yet no Islamic-compliant model for information technology adoption and implementation; the development of such a model could help Islamic-compliance companies to benefit from advancements in information technology.
- That the research findings are of real practical importance and value for developing countries, particularly for the governments of Islamic countries, allowing them to manage their approaches to adopting such technology more effectively.
- That this study provides valuable knowledge and information that can be used in efforts to combat corruption and inefficiency and to increase transparency in the procurement process as carried out by organisations in developing countries in general.
- That the research outcomes contribute towards structuring an empirical basis for future research into e-procurement adoption in growing world economies.
- That the data collected from and the results of the analyses of this research survey provide new insights into how e-procurement can best be adopted in specific contexts and regions.

1.3 Research Motivation

The primary motivation of this research project can be summarised in the following points:

1. There is a need for the development of a model for information technology adoption and implementation by Islamic-compliance companies/workers.
2. Such a model would enable Islamic compliance companies to benefit from the international advancements in information technology.
3. Previous similar models have been based on human, cultural and economic conditions and theories.
4. A new conceptual framework must be based upon these previously existing, well-established models and theories but with the introduction of "Rules of Islamic Sharia*"* as an important mediator.

1.4 Significance of the Research

The procurement process influences the overall performance of the development and growth of the oil and gas industry. The majority of existing studies on the procurement process focus only on specific geopolitical regions such as North America, Central and Western Europe, and Asia. The lack of research relating to e-procurement in the regions of North Africa and the Middle East is evident from a survey of the existing literature. Furthermore, studies in this field have been historically performed by focusing on the buyer side of e-procurement, thus ignoring the supplier side. More recently, research studies aimed at encouraging and promoting the adoption of e-procurement have begun to focus on both buyers and suppliers. However, there remains a lack of empirical studies on how a recognition of the benefits of e-procurement (BNF), challenges and barriers (CHB), critical success factors (CSF) and influence of Rules of Islamic Sharia might help business and research communities obtain a deeper intellectual understanding of e-procurement implementation in various economic world regions by taking into account differences of culture, religion, politics and tradition.

The outcomes of this research project will provide senior management in purchasing and procurement departments with new insights into the importance of e-procurement from the management point of view and will also provide important details on the operation of this technology in many developed countries. The results of this research should encourage small and medium sized enterprises (SMEs) to adopt e-procurement as an innovative way of maintaining relationships with their suppliers and clients.

In summary, this study will contribute to the existing literature by providing valued assessments of the adoption of e-procurement in the North African region, an area that has not previously been analysed in this context. In addition, the study provides a detailed comparison of the organisational characteristics and activities of companies from a number of industrial sectors, including oil and gas, engineering, and textile.

1.5 Research Aims and Objectives

An evaluation of the adoption of e-procurement strategies from the perspective of both consumers as end users (or buyers) and suppliers has not been conducted for Arab countries, Libya included. The buyers in this study are the end users or customers who are affected by the

adoption of e-procurement strategies. Such customers belong to either the governmental or private sector and conform to one of several business operational types that have already been implemented as per relevant global standards. One important research study previously performed by Aboelmaged in the United Arab Emirates focused primarily on the importance of the technological aspects and the influence of these on the social behavior of users who adopt e-procurement systems [10]. Therefore, there is a need for a study that considers whether the factors focused on by Aboelmaged affect the attitude of an organisations' employees.

The research objectives dictate the format of the thesis according to the following schema:

1. An investigation of various relevant factors including organisational facilitators, organisational leadership, challenges and barriers, benefits and success factors of e-procurement in organisations according to the existing theory of technology acceptance model (TAM) factors.
2. The introduction of new factors that affect the adoption of new technology based on Rules of Islamic Sharia.
3. The formulation of research hypotheses on the basis of a model establishing links between different variables and mediators.

1.6 Research Question

The research question around which this research project is structured is as follow:

- ***How can e-procurement technology be accepted and adopted in a manner that takes into account the Rules of Islamic Sharia?***

1.7 Research Contributions

A more holistic model for the adoption of e-procurement systems e-procurement adoption model (E-PAM) is proposed and tested in this research project. E-PAM includes a social/cultural mediator, RIS, which allows for research in this field to be expanded in a direction proposed by Gunasekaran and Ngai [11]. The four contributions in this research are as follows:

1. This research project thus examines and explores in detailed and various levels, the e-procurement technology adoption process in the Islamic context.
2. This research project integrates three eminent models of technology adoption, namely;

A. TAM by Davis.
B. Kaliannan et al.
C. Gunasekaran and Ngai.

3. This project represents for the first time that the new mediator of Rules of Islamic Sharia (RIS) is elaborated into a conceptual model.
4. The research model E-PAM developed in this thesis could also be extended to other cultures/world regions, where RIS could be replaced by another social or cultural mediator.

This research project focuses on both sides of procurement process, that is, on both buyers and suppliers. This thesis investigates directly the relationship between organisational leadership and facilitators and, in turn, the relationship between these and the remaining relevant psychological, social, cultural, demographic and religious factors.

1.8 Thesis Outline

The thesis is organised in such a way as to lay out clearly the main objectives and aims of the research problem and to present this in a broader practical and intellectual context with the support of the literature review. The research work carried out during the project is presented in this dissertation in a progressive way through the introduction of the conceptual model used to design the research methodology. The results obtained through putting this conceptual model into operation are followed by separate discussion and conclusion sections. A summary is provided at the end of each chapter to emphasise the contributions of each section. The thesis chapters are graphically illustrated in Figure 1.1.

Briefly, the content of each chapter is described below:

Chapter 2 – This chapter presents a comprehensive literature review covering existing work on issues including supply chain management, procurement and e-procurement procedures and their impact on contract and tendering management. The factors influencing the adoption of e-procurement – including challenges, barriers, benefits and critical success factors – are also presented. The Islamic perspective on e-commerce is also introduced and described in this chapter.

Chapter 3 – The research methodology used to carry out the framework design of the conceptual model is presented in this section. This chapter provides details on the development

and distribution of the questionnaire. The research model and important contributing factors, along with variables used to develop the design of questionnaire, are presented in this chapter.

Chapter 4 – The processing of the data collected by the online questionnaire is presented in this chapter. This section of the thesis also provides detailed descriptions of the data collection process and a further descriptive analysis.

Chapter 5 – This chapter presents the important findings and discussions emerging from the analysis of the results obtained. The possible cultural and legislative impacts of the results obtained in the study are also explored.

Chapter 6 – The last chapter highlights the important contributions of this research project and presents a discussion of the overall findings as well as concluding remarks covering the issues raised and addressed in this study. The chapter also addresses some limitations which arises in this study, and provides recommendations for future research directions.

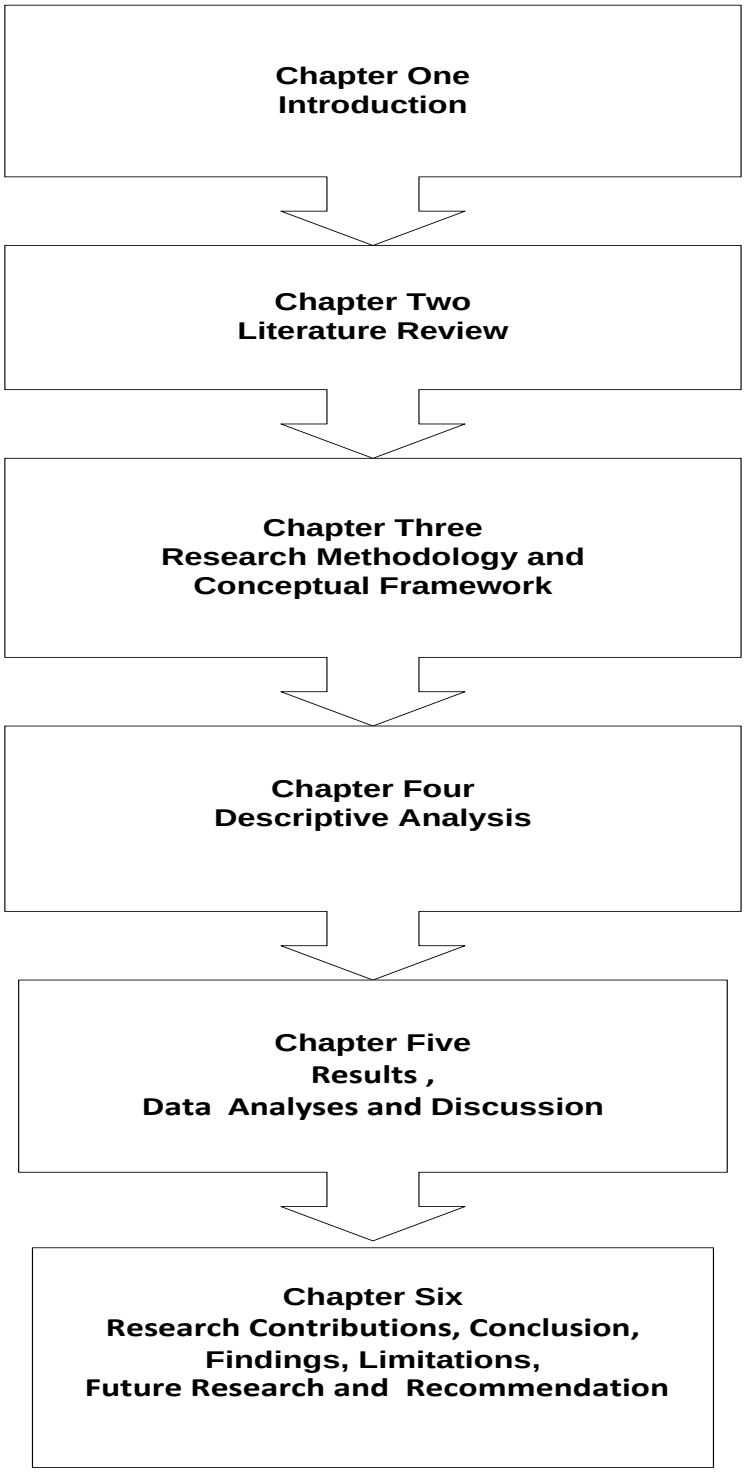

Figure 1.1: Outline of thesis

Chapter Two: Literature Review

2.1 Introduction

The adoption of a new technology, or the acceptance of a new innovative system for traditional business management processes, depends upon the demographic and psychological characteristics of the target audience. The adoption of this new technology can be achieved efficiently by developing and utilizing realistic models [12], which are commonly referred to as Technology Acceptance Models (TAM). The contributing factors of such models should include important psychological, social, cultural and demographic characteristics, which have a tremendous influence over the final output of a model. If the intended groups belong to a certain religion and engage in particular religious practices in business, it is important to include these religious provisions in the TAMs that influence the overall adoption process. In this research, a new model is developed and utilised to encourage the organisations working in compliance with Islamic provisions to accept and adopt e-procurement systems.

The selection of the relevant contributing factors for a TAM depends upon the traditional methods and routines which have been typically used within organisations where new technologies are required to be put in place. Before developing a new model for technology acceptance, it is important to understand the existing business models, the contributing factors which influence the overall process, additional factors (such as cultural or religious, etc.) that could influence the process, the new technology that is to be adopted, and the advantages and disadvantages of the new technology.

In this chapter the traditional procurement process and routines, important limitations of traditional procurement methods and the use of computer networks for trading (e-Commerce) are discussed briefly. Following this, e-procurement systems and the risks and benefits involved with the adoption of such systems are explored. The relevant models for technological acceptance currently present in the literature are discussed, along with contributing factors and hypotheses which are used in such models. The chapter finishes with an argument that highlights the necessity of a new model for e-procurement adoption by groups that work in compliance with Islamic provisions.

E-procurement has been used quite extensively by organisations in both the public and private sectors as it provides smart, effcient strategies and solutions for sustainable growth and competitive advantage for organisations globally [13]. To understand e-procurement systems, it is important to first understand the basic principles and processes that have been used in traditional procurement systems. In the following sections the basis of procurement, specifically in relation to supply chain management, and other important procurement processes are discussed.

2.2 Supply Chain (SC)

A supply chain is the network between two or more firms that produce a particular product, and the handling and distributing of the said product to the consumer. The supply chain has been typically defined in terms of the integrated process where materials are made into products and then delivered to a customer. The process flows through a number of stages from; supply, manufacturing, distribution, retail and finally, to the consumer [13]. Supply chain management (SCM), however, is the complex operation of producing and selling products as well as the optimisation of lower cost prices and reduced delivery time. Until recently, a lack of consensus existed over how best to define SCM, which has prevented academics and practitioners from advancing research in the field.

The next section shows in detail some samples of supply chain management overview and definitions from contemporary researchers in this field.

2.3 Supply Chain Management (SCM)

Supply chain management (SCM) corresponds to the management of the flow of goods and services. In the current global economy, companies produce and supply goods and services that are worth trillions of dollars annually. Such huge market size requires well defined protocols and processes for the smooth execution of SCM procedures. Therefore it has been discussed in depth by a large number of researchers in order to understand and explain the importance of each step involved in SCM, and their relationships with each other. It is important to note that SCM protocols may vary from industry to industry. For example, the SCM protocol for the healthcare industry might be different from that of the aerospace industry due to the type of goods and services involved. One example could be difference between the types of food services required

by both industries. The hospitals mainly require food services with strict dietary and nutritional control. However, in the airline industry, the taste and variety of food is important. Consequently, the SCM protocols for both industries in procuring food services would be different. Therefore researchers belonging to different industrial sectors provide different definitions and models for SCM according to the needs of that particular sector.

Over the last century, SCM has evolved from a process of intensive labour handling of materials to a complex network in managing the exchange of goods and services in the global market. Particularly, it can be observed from the literature that during the last three decades, the definition of SCM has been continuously evolving. Therefore in this study, eleven definitions from different researchers have been included to introduce the changing and evolving concept of SCM. For ease of referencing, the definitions are numbered from one to eleven.

2.3.1 Supply Chain Management Definitions

The first definition of SCM included in this research comes from an old study dating back to 1985. The study defines SCM as:

Definition 1: *"An integrative approach to dealing with the planning and control of the material flow from suppliers to end-users."* [14]

This is one of the simplest definitions of SCM, which includes the processes involved in the supply of products or materials from suppliers to customers. The next two definitions include the processes related to procurement of raw materials:

Definition 2: *"A network of firms interacting to deliver product or service to the end customer, linking flows from raw material supply to final delivery."* [15]

Definition 3: *"The global network used to deliver products and services from raw materials to end customers through an engineered flow of information and physical distribution."*[16]

These two definitions (2 & 3, above) consider SCM as a network, and extend this network from procurement of raw materials to supply of the product to the end customer. In the third definition however, SCM is defined as an engineered flow of information. This means that SCM includes a very well defined set of rules and regulations for the execution of various processes involved.

Definition 4: *"Networks of manufacturing and distribution sites that procure raw materials, transform them into intermediate and finished products, and distribute the finished products to customers."* [17]

Definition 5: *"External Chain is the total chain of exchange from the original source of raw material, through the various firms involved in extracting and processing raw materials, manufacturing, assembling, distributing and retailing to ultimate end customers."* [18]

In definition number 4 and 5, beside procurement of raw materials and supply of products to end users, the intermediate processes including manufacturing and assembling are also included as part of SCM. As companies often sell their products to distributors only, retailing processes are also included in 5th definition of SCM.

Definition 6: *"A network of organisations that are involved in upstream and downstream relations in the various processes and activities that produce value in the form of products and services that are delivered to the final consumer."* [19]

Definition 7: *"A set of three or more organisations directly involved in the flow of goods, services, finance and / or information both upstream and downstream from a source (supplier) to the consumer."* [20]

Upstream, downstream and midstream are common business terms defining particular production processes in several industries including oil and gas, metals, and biotechnology industries. In definitions 6 and 7, the authors make use of these terms and define SCM as a network that involves upstream and downstream processes and activities extended from suppliers to the end customers.

Definition 8: *"Supply chain management aims at building trust, exchanging information on market needs, developing new products, and reducing the supplier base to a particular OEM (original equipment manufacturer) so as to release management resources for developing meaningful, long term relationship. "* [21]

Definition 9: *"Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities."* [22]

The authors of definition 8 and 9 stressed the managerial point of view and management resources to establish strong well defined routines for management of different activities related to SCM.

Definition 10: *"Supply chain management encompasses materials/supply management from the supply of basic raw materials to final product (and possible recycling and re-use)."* [23]

The authors of this definition include processes and activities related to recycling and reuse of products as part of SCM.

Definition 11: *"Strategic approach to planning for and acquiring the organisation's current and future needs through effectively managing the supply base, utilizing a process orientation in conjunction with cross-functional teams (CFTs) to achieve the organisational mission."* [24]

This definition from a recently published book provides a comprehensive definition of SCM in terms of planning to attain the strategic objectives of a company by distributing the activities to cross-functional teams and and consequently will be the definition of SCM utilised in this thesis.

Considering the important activities mentioned in the above definitions, it can be concluded that the definition of the SCM has been, and will be, varied over extended periods of time as innovative strategies and processes are being continuously adopted by organisations worldwide. As a general idea, one can understand that SCM is an extended process that includes various processes and activities related to the procurement of raw materials, pre-processing, manufacturing and finishing of products, the distribution of products to distributors and further to retailers, from retailers to end customers and from customers back to manufacturers in the case of recyclable products. Also, this is the kind of definition for SCM which will be used in this thesis.

2.3.2 Supply Chain Management Schools of Thought

What follows are the five 'supply chain schools of thought', according to Bechtel & Jayaram [25]. "Supply chain management: A strategic perspective" provides a comprehensive review of SCM that has been introduced in the last few decades of the twentieth century. The important characteristics from these schools of thought are summarised in Table 2.1 as follows [26].

Table 2.1: SCM Schools of thought

SCHOOLS OF THOUGHT	CHARACTERISTICS
Functional Chain Awareness School	This school recognised that a chain of functional areas exists across an organisation.
Linkage/Logistics School	This school of thought recognised that there exists a chain from the suppliers to the consumers and starts to address material flows.
Information School	This school of thought highlights the movement of information between the members of the supply chain.
Process School/Integration	This school places an emphasis on the integration of the SCM into a system of value adding processes.
Demand driven	This school highlights a seamless pipeline, which emphasises relations as well as transactions

The supply chain management concept was introduced in the mid twentieth century by Forrester [27]. According to the supply chain literature, the description provided by Forrester was a significant innovation in business models due to a number of factors; it included the increased amount of information transfer, the required capital involvement, the amount of raw material used by industries, and manpower requirements [27]. Therefore the research activities in this thesis would be viewed as being relevant to the Information school of thought, primarily [26].

According to the literature, all these factors; the amount of information, the required capital involvement, the amount of raw material, and manpower requirements affected one other and influenced the formation of new business models and policies. These models and policies would then be able to provide attractive investment opportunities. However, this description did not consider various aspects like the need of a multi-enterprise analysis and the relationships inherent within this; it does however provide the basis for what is now known as SCM [28]. Some features of the SCM included the ability for companies to integrate the functionalities that are linked with physical distribution. The flow of various materials (including information, data, proposals, etc.) can be considered as the main character in a supply chain [28]. Gershon et al. [29] described a detailed set of entities that encapsulate the supply chain. The suppliers and

external services for logistic needs, the constructors, and the merchants are all important components of the supply chain and the information and goods flow through these.

SCM is an imperative part of strategic management which connects and integrates the raw material suppliers with the end users by using the supply chain. This includes the efficient flow of information and material through cooperation between the supply chain members to maximise consumer satisfaction while maintaining minimum operation costs. Many academics and researchers have identified necessary activities, barriers, and conditions to implement SCM. The SCM workflow system is presented in Figure 2.1

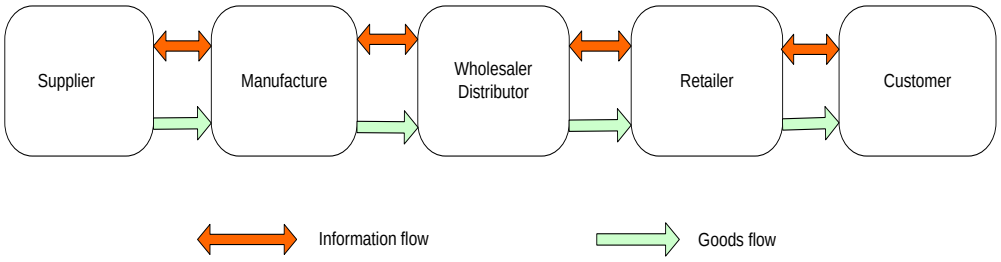

Figure 2.1: A conventional supply chain process adopted from [30].

2.3.3 Supply Chain Management Role

Many studies have used the phrase ‘supply chain management’ as a synonym or alternative to logistics [31]. However, given that various business operations are integrated in supply chains, the phrase and meaning goes further and is not identical or replaceable with logistics. According to the council of supply chain management professionals (CSCMP), “*the supply chain consists of planning and management of all functions related to sourcing and procurement, conversion, and all logistics management activities*” [22]. This idea can be seen in the development of a new product where logistics would not have any control or influence over either the development process or the customers in the same way that the supply chain does. According to another study [32], SCM is explained as a structure of events occurring in the flow of goods and this sequence provides additional value to the overall performance of a particular product. To explain, the supply chain provides a linkage between the buyer and the seller by means of a dedicated service [32].

As shown in the Figure 2.2, the successful Supply Chain Manager should have the following skills:

1. Ability to design a detailed work plan and strategy by identifying the scope required for success, assigning different tasks to employees, mark key milestones and updating the work plan throughout the tenure of a project as per project requirements
2. Managing directly all day-to-day operational aspects.
3. Classifying required resources.
4. Arranging meetings with project team regularly.
5. Co-ordination of cross-functional teams.

These requirements imply that the key to success for SCM is innovation, scalability, integration and customisation of an unlimited number of vendors, multi-channel networks, increased flexibility and security [33].

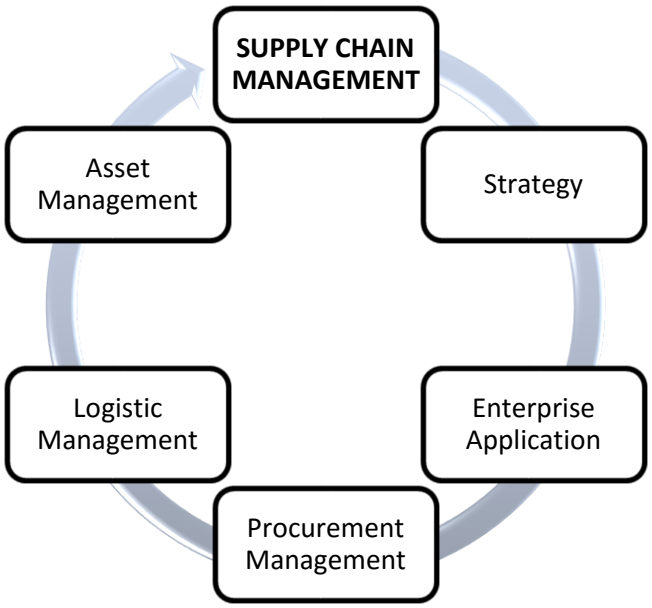

Figure 2.2: Supply chain manager duty.

In addition, the use of an e-procurement strategy is significant. This strategy allows both sides to establish a base of qualified and registered users, which is useful when searching for buyers or sellers and to select the bidding price or new tender [34]. This linkage between ICT and

procurement has become more important in new product development as it enables faster communication and closer connectivity between the parties involved in the supply chain.

2.4 Traditional Procurement

The terms "procurement" and "purchasing" are often incorrectly used interchangeably. Though SCM is often applied as a substitute for both procurement and purchasing, it has nevertheless assumed a larger process at organisational level. Procurement specifically has a large and complex function and has a different meaning from purchasing, as it is a whole process in and of itself [29]. In large scale organisations, the information technology resources are well developed and available to use for the adoption of new technologies. These firms are therefore expected to implement and adopt e-procurement due to their large size, possessing a high level of information technology already in operation [34]. The word procurement has various different definitions and the application or use of these definitions is dependent upon the specific procurement process it is used upon.

Many scholars in literature have contributed to define the term procurement. In this section, few definitions have been discussed followed by the definition found most appropriate during literature review for this study. It has been explained in previous studies that procurement encompass the processes involved in buying a product from a seller right up until the product reaches the end user, and that all of these processes have to be included in the procurement procedure. These processes include managing all the internal processes, and part of the external processes that might be involved with the strategic management of e-procurement [31].

The National Public Procurement Policy in Ireland defines public procurement as *"the acquisition, whether under formal contract or otherwise, of works, supplies and services by public bodies"* [31]. Although this definition includes acquisition of works, supplies and services making it usable for wide areas, however, it is limited to public procurement.

The North American Free Trade Agreement (NAFTA) does not give a descriptive meaning of the word procurement and it is therefore difficult to know the context in which the NAFTA describe the process. For example, it may refer to purchases or the obtaining of goods or services. The exchanges that occur during the purchases can be done by trading the goods/services with something other than currency or money [35].

According to policy given by the European Commission regarding environmental control, the definition of the public procurement process is given as:

"*The process used by governments, regional and local public authorities or bodies governed by public law (financed, supervised or managed for more than 50% by public authorities) to obtain goods and services (including construction) with taxpayer money."*[36].

Although this policy refers to environmental control, it can be taken as good example of procurement proceedings executed by public offices and organisations.

In this research, procurement has been defined as an act of acquisition of goods and/or services by following several step including but not limited to requirement determination, source selection, request for quotation, selection of vendor, price and terms of business negotiation, issuance of purchase order, receipt of goods or services, invoice verification, vendor payment, and feedback.

2.5 Tendering and Contracts

This section reviews the literature related to the tendering and contracting procedures of the procurement process, which must be performed before reaching the supply stage. This review aims to provide a clear understanding of the factors affecting contracts and tendering in different organisations. The competitiveness of the global market has compelled organisations worldwide to adopt rapidly advancing technologies which can help in minimising expenses so as to maximise the profit in the long run. The oil and gas industry offers a classic model for implementing supply-chain management techniques. In a supply-chain, a company is linked to its upstream suppliers and downstream distributors as materials, information, and capital flow through the supply chain, [37]. One of the major challenges being faced by organisations in the oil and gas industries is the selection and management of contracts which include details about practices regarding tendering issues. In the absence of clear contract strategies and policies, companies are not able to assess the economic risks involved in any tendering and contracting processes, no matter how low the technicalities will be in terms of the risks that are involved. The importance of strong contract management is highlighted as follows:

"*Strong contract management is an important mechanism to balance the interests of the government with those of the private contractor and to realise the financial added value of*

Design, Build, Finance, Maintain and Operate contracts if changes are made during the contract term'[38].

Contract management is the name given to the process of contract creation and execution and provides a measure of control over the various factors which influence the relationship between the supplier and the organisation. By using contract management both parties understand the terms and conditions of the agreement and could fulfil the obligations allocated to them. In this way, a sustainable process can be enacted, beneficial for both parties economically. Contract management aims to ensure the delivery of a reliable service which can be cost effective at standard price. It should be consistent with financial propriety and legal requirements. Contracts may be verbal or written, however, it is obviously advantageous to all concerned parties that contract may be put in writing as much as possible. There are two main reasons for adopting e-procurement to avoid unnecessary steps throughout the supply chain process. Firstly, relating to how the majority of items are bought on requisition and secondly, relating to how the tendering process is managed [39]. This will be further discussed in Section 2.5.3.

2.5.1 Contracts Objective and Elements

The objective of contracting externally is to gain access to the best commercially available services and expertise that could not be arranged by the company on its own. The contractors very often can supply the works, services or goods with staff, labour and expertise that cannot sufficiently be made available from the company's own resources. The contractor, for example, can supply the materials and goods at a lower cost and at a reduced risk than the parent company may be able to provide. The work or services often required by the companies frequently does not necessarily reflect the core part of a company's businesses. The type, quality, enhancements and fluctuation of required works, services or goods are inherent to the contractor specialty and not to the company. For long term commercial contracting, it is essential for the company to keep good control over the contractor through relationship management, however, they must provide stable and consistent working conditions to the contractor for the smooth execution of services. The principal elements of contracting policy which allow contracting objectives to be achieved are mostly dependant on the internal organisation circumstances [40].

2.5.2 Procurement Contracts

A procurement contract is a written document regarding the terms on which the buyer and supplier (seller) agree to exchange goods or services. The contracts specify the obligations and rights of both parties (buyer and seller). The contract is a legal document that provides details of the activities served by the vendors according to the requirement of the clients. In addition to that, the contract includes the terms and conditions on which both parties agree, such as the scope of work, working provisions, direct and in-direct costs, payment procedures and legal bindings in case of dispute. There are various purchasing models that are accepted and adopted by companies worldwide that serve as basis for procurement contracts. A simulation of advanced methods for real options strategies in the management of strategic commodity-type parts and the proposed model has been described in a study which could be utilised effectively for developing procurement contracts [41]. The real options are often used by the management to secure price and readiness in continuously changing world economy. Such contracts could provide an effective analysis according to seller and buyer point of view [41].

A contract is defined as a business agreement for the supply of goods or for conducting services at defined costs. Such jobs are usually documented in a number of items and conditions. The contracts have to be made either on paper forms, or it could be made orally, however it is clearly beneficial to all parties that contracts should be in written form where possible. People create numerous contracts as part of daily life and very often do not give much pause over the legitimacy of said contracts. Making contracts is essentially a way of providing evidence and justification for the procedures put into place related to the exchanges of goods and services [39].

The contract is, at its core, a document relating to work which houses different monitoring and control mechanisms built into it and it becomes hugely important especially in terms of a dispute. The main value, however, lies in the process of its creation, during which the concerned parties clarify issues relating to the scope of the work, some basic ground rules, guidelines and the costs which are then agreed upon and understood by all of the parties. This contract, then, is an agreement that generate the rights and the obligations which may at a later stage be enforced by judges. A formal, legal contract thus assumes that the equal parties have negotiated the terms of the bargain together [42].

If the parties involved in such a contract reach a dispute, they might go to a court of law to settle whatever the issue is. The involvement of a court, however, should seek to be avoided for a number of reasons including time, money and the hazardous impact it can have upon the reputation of the parties involved. In commercial practices, some breaches of contracts are seen less as a legal problem and more as a commercial one. A legal action with its formal style, the approach it takes towards conflict and its demands on both time and money, can be damaging to ongoing relationships within the business world [39].

2.5.3 Contract Types

There are a number of contract types such as Firm Fixed Price Contracts, Cost Reimbursement Contracts and Labour-Hour/Time and Materials. Contract types can differ based on types and factors like economic price adjustment involved in the services provided by vendors. The variation in the contract types are based on two main factors. These factors are affected by the amount of incentives and the total profit provided by the buyer. These incentives could depend upon the consistent high standard of the product supply including the short delivery time periods and higher responsibilities. There are a lot of factors that a contracting company should observe while offering different types of contract including the competition in prices, cost analysis, types and difficulty of requirements, the contractor's technical and financial capabilities as well as the necessity of the requirements and duration of task achievement.

A few examples of contract types are presented below:

- Contracts of Engineering: Intended for engineering activities such as on site, survey, data checking, definition and preparation of technical specifications.
- Contracts of Civil work: These contracts are intended for the preparation of detailed engineering, procurement, construction and the installation of civil works.
- Contracts of drilling: Such contracts are intended for drilling and services (mostly in the oil, gas and mining industry). Oil, gas and the petrochemical industry, generally, require certain policies and procedures concerning the contracting process, so that high standard procedures, ethics and fairness are maintained.

- Contracts of Mechanical and Electrical/Instrument works: These contracts relate to the preparation of detailed engineering, construction, installation, pre-commissioning, commissioning and start-up of mechanical and/or electrical based large modalities [43].

As explained above, the contract types are dependent upon the relevant industrial sector. The above break down of contracts into different industries and areas make it easy for the persons involved. Specific policies and terms of business are often related to a particular type of industry. For example, for civil works, the fluctuations in prices of cement are always a big issue during price and terms of business negotiation. For oil and gas industry, the global oil market prices and exchange rates play very important role. Therefore tender packages related to particular industries are available.

In this research, the pilot survey and the main study questionnaire were distributed to professionals belonging to different industrial sectors including those sectors mentioned above.

2.6 Electronic Procurement (E-Procurement)

In the following section the importance of e-procurement is reviewed. The literature regarding electronic procurement since the late 1990's has grown gradually [44, 45]. E-procurement is a type of buying and selling between producers and consumers or businesses, by using information technology and advanced communication tools. It also allows the parties involved to select the bidding price or to make new contracts. There are two main types of e-Commerce systems depending upon the type of buyer and supplier. In the first case, if both buyer and supplier are business companies; Business-to-Business (B2B) e-Commerce systems will be used. In the second case, if the buyer is an individual, the Business-to-Customer (B2C) e-Commerce system will be preferred [46]. In developed countries, the system of e-procurement is used to help mostly in purchasing goods and services by means of electronic channels [47].

E-procurement systems use information technology to process all of the data communication that is necessarily required in the traditional procurement process which includes the processing of information related to procurement of a particular product or for services required by a company or individual [48]. There is a growing interest in public sectors to adopt e-procurement systems to enhance existing e-government strategies and policies for economy growth and transparency

[49]. The e-procurement process is an emerging phenomenon in strategic supply chain management.

It has been demonstrated that a large number of private companies are utilizing IT tools for the purchasing process. These tools are designed in the form of electronic data interchange (EDI) platforms. Using such platforms, transactions can be performed by integrating a database between two business partners [50, 51]. E-procurement uses secure value-added network (VAN) for information sharing and communication. The VAN is a proprietary technology, not freely available. Although this raise the cost of e-procurement technology implementation in a company, however, secure networks are essential for procurement processes. There is also a caveat at the development stage of the e-procurement implementation process; if an organisation does not have a strong background in multifunctional cooperation and effective supplier participation, then the cooperative elements of the e-procurement system could fail to perform. In addition to this, there is another limitation relating to requisition approval process redundancies. These redundancies should be eliminated before the adoption of e-procurement is considered.

A design of a hybrid mechanism for e-procurement which aims to develop the decision conditions for the buyer in formulating a procurement strategy has been discussed in literature previously [52]. Also considered is the likelihood involved that using such a mixed mechanism will be able to provide sustainable business value, so long as there is reasonable symmetry in bargaining power between the buyer and the supplier [52].

In another study, a model for developing countries has been described which assesses the important factors that would influence e-procurement implementation, including the challenges and obstacles inherent to new technology adoption overall and e-procurement technology adoption in developing countries in particular [53]. The model was able to identify various aspects of e-procurement, including the leadership behaviour of a government, the legislative system of a country, the regulatory bodies working in public and private sectors and the overall information technology infrastructure. The model also provides information on organisational aspects such as available resources, the attitude of high level management towards e-procurement adoption, and the characteristics of the internal policies of an individual company.

In this research, factors not discussed in this previous study such as Benefit and critical success factors have been included. These factors are essential for RIS as mediator.

2.6.1 E-Procurement Definitions

Like the definition of SCM, the e-procurement definition has also substantially evolved and been explained by various authors and regulatory organisations. As global markets expand their SCM networks, the definitions of e-procurement are also being discussed and improved in research studies. One example of a new SCM network is the growing interest in the utilisation of waste materials produced by one industry by another industry. For instance, biowaste produced by agriculture and the food industry is used by energy sectors for producing biodiesel. Thus it is reasonable to state that the growing network of SCM influences the definition, understanding and explanation of e-procurement. Therefore, a number of e-procurement definitions have been provided by various individuals and regulatory organisations due to their diverse adoption by various industries. The variety of definitions highlights the significance of the words or phrases used with regards to what it means for the specifics of e-procurement. In a research study, four definitions of e-procurement have been compared, according to common words or phrases used [54]. In this research, ten definitions from different researchers have been included to examine and discuss the common terms used, followed by the definition used in this doctoral work. For ease of referencing, the definitions are numbered from one to ten.

Definition 1: *"Internet solutions that facilitate corporate purchasing*." [55].

This is one of the simplest definitions of e-procurement, which describes e-procurement as the use of internet solutions in order to facilitate corporate purchasing. In this definition, public and small-to-medium size enterprises are not included.

Definition 2: *"A series of steps – from the formulation of the purchasing corporate strategy to the actual implementation of an Internet-based purchasing system."*[56]

Definition 3: *"Using Internet Technology in the purchasing process – excluding old applications like ordering by telephone or by fax"* [6].

These two definitions regard e-procurement as the use of information-technology-based systems for the execution of purchasing processes. Definition 2 describes e-procurement as series of steps emphasizing the multistep process of procurement by electronic means. Definition 3 particularly

describes that the traditional communication means like telephone and fax are being replaced by internet technology.

Definition 4: *"The creation of private, web-based procurement markets that automate communications, transactions and collaboration between supply chain partners. It is about enhancing collaborations, streamlining processes, controlling costs, and enhancing information exchange within and across organisation boundaries."* [57].

Definition 5: *"Automating the whole purchasing process and making order and requisition information available along the entire supply chain"* [58].

Definition 4 and 5 describe e-procurement through the automatisation factor of traditional procurement processes by use of internet and information technology tools. Definition 5 expands the definition by including the transformation of procurement related processes in the entire supply chain to electronic means. This definition signifies the importance of e-procurement in SCM.

Definition 6: *"Various internet-based business-to-business (B2B) commerce (trading or buying-and-selling) systems, which are located at the buyer, the supplier or the third party."* [59]

Definition 7: *"The use of information technologies to facilitate B2B purchase transactions for materials and services."* [60].

Definition 6 and 7 used business-to-business (B2B) terminology which refers to commercial practices and transactions between two businesses. In B2B transactions, materials and services sourcing, and reselling, are typical form of trades. Combining the two definitions could provide a general definition of e-procurement that includes each type of transaction that may occur in B2B practices.

Definition 8: *"The integration, management, automation, optimisation and enablement of an organisation's procurement process, using electronic tools and technologies, and web-based applications."* [54].

Definition 9: *"E-procurement is the streamlining of corporate purchasing processes by eliminating traditional paper-based documents such as purchase orders and requisitions forms."* [61].

Definition 8 and 9 describe the integration and automatisation of procurement related processes by eliminating traditional paper-based documents. Definition 9 makes use of a specialised

terminology “streamlining”. Business streamlining means the improvement in efficiency of business by the simplification of the involved processes and the elimination of unnecessary steps. Business streamlining could be best attained by the use of IT tools. This definition suggests that e-procurement is a way of streamlining corporate procurement using IT techniques.

Considering the important concepts introduced by the definitions above, in this study, a simple and generalised definition of e-procurement has been used that does not limit the type of business mode, and is not restricted to a particular industrial sector. This definition states:

Definition 10: *“E-procurement is a type of buying and selling between producers and consumers, through the use of information technology (IT) and communications tools.”* [62].

This simple definition describes the execution of general processes involved in traditional procurement cycles using information and communication technology.

2.6.2 Benefits of E-Procurement

Several authors have presented the benefits and advantages of e-procurement implementations in great detail. It has been shown that companies could save billions of dollars annually by adopting and implementing e-procurement [51],[57].

The successful and beneficial integration of supply chain in any organisation cannot be talented without adoption and implementation of e-procurement system [63]. Applying an e-procurement system makes the business abilities and operation rather efficient [64]. These advantages have been widely assessed in the literature and are also detailed in the following section.

2.6.3 Summary of E-Procurement Benefits:

1) Better management and control of suppliers

Adoption of e-procurement potentially benefits both buyers and suppliers. The benefit for buyers come in the form of measurable operational savings more advantageous economic outcomes and improved corporate governance. It also helps buyers to increase the number of potential suppliers, both domestic and international. Buyers can locate the suppliers with best prices and quality, and also in enhanced transparency and communication for the negotiation and contracting process. For suppliers, e-procurement benefits primarily in lowering the cost and reducing the time and effort of submitting a bid or tender. It also

widens the number of contracting opportunities that came within the purview of the firm [11, 65].

2) *Better utilisation of staff*

Many companies have found that implementation of e-procurement and online catalogues does reduce the transactional burden and thereby freeing up procurement staff hours. It helps to build a strong multi-disciplined project team with clearly defined roles and responsibilities. This will lead to allocate sufficient high quality resource, and consider using temporary staff to relieve key project members of conflicting workload pressures [66].

3) *Compliance with laws and regulations*

E-procurement ensures compliance with laws and regulations in general. It seems to be less of a challenge in the public sector compared to the private sector. This is particularly because laws and regulations govern public procurement, and consequently influence the increased activities of public e-procurement [67].

4) *Cost savings in overall purchasing process*

The Process of e-procurement is certainly very cost efficient. It increases the speed and efficiency in procurement process and communication and eliminates the need to have paper works which instantly results in less costs. There is also less wastage of paper, which in turn leads to increased value and general efficiency. E-procurement increases the level of inventory-cycle, reduces the need of operational personnel and leads to savings and operating costs [68],[69].

5) *Decentralise of power/procurement management*

E-procurement helps in the decentralisation of power/procurement management a decision for purchasing to more users within the origination. Such decentralisation in beneficial reducing clerical works for the purchasing department and improves overall effectiveness of purchasing process [67].

6) Decreased bureaucracy and redundancy

Within an organisation, the adoption of e-procurement facilitates and speeds up internal control process which leads to decreased bureaucracy. This helps in eliminating inefficient approval procedure. Through e-procurement, it is also possible to detect and eliminate any services which are needless duplications. So it helps avoiding the redundancy of the services within organisations [65, 70, 71].

7) Easier access to market data and enhanced intelligence

In general, market allows buyers to know the latest price as well as to see the historical trends. E-procurement enables to monitor scan and external sources of data and intelligence easily. It helps facilitate not only to use market data to make decision but the historical market data can be used to project pricing trends and to calculate market risks [65, 66, 70].

8) Enhanced decision making

In e-procurement, all relevant information are neatly organised and time-stamped which helps in enhanced decision making. The decision making process is vital to a correct bid and many organisations benchmark themselves against their competitions. This bookmark process is easier through e-procurement and results in increased quality of the bid [66, 70] .

9) Enhanced inventory management

Inventory management primarily deals with specifying the shape and placement of stocked goods. There are many competing requirements such as carrying costs of inventory, asset management, inventory forecasting, inventory valuation, inventory visibility, future inventory price forecasting, quality management, demand forecasting, etc. which will lead to optimal inventory level.

Through the adoption of e-procurement, automated inventory control and standardised producers can be followed which will make inventory operations easier to be managed, adjusted and upgraded [11, 66].

10) Improved communication and collaboration in supply chain

Three separate and essential communication factors were examined; 1) improving visibility in supply chain management 2) improving visibility in customer demand and 3) increased compliance. It has also been suggested that improved communication also improves the quality of the end product [72].

E-procurement allows sections of electronic document to flow through the supply chain. As it improves the speed of returns and makes it easy to communicate requirements in an accessible manner, it results in better understanding of requirements and due compliance [65, 66].

11) Improved supply chain transparency

Supply chain transparency is critical for managing rising levels of risks in an environment where corporate supply chain practices are attracting increasing legal, regulatory and consumer scrutiny. Through e-procurement, transparency of product specifications, prices, contract details such as the contractual conditions, time, terms of order etc. can be made visible to relevant parties [70, 71].

12) Increased customer service level

Customer services plays an important role in the organisation's success. It is the provision of service to customers before, during and after a purchase. Adopting e-procurement system in the organisation will increase customer service level. The sales people will have access to the procurement system, therefore they can answer customer questions immediately using available information. An increased level of customer service will create competitive advantage, and fast response to customer questions looks good from the customer's point of view [70, 71].

13) Increased process quality and efficiency

E-procurement system in organisation will increase its efficiency as the same number of people can process a high number of orders. Despite increase in sales, there will be no need to employ many additional staff members in the purchasing department.

The transparency available in an e-procurement system together with increased completion among suppliers will lead to improvements in procurement process quality [73, 74].

14) Integrated information sharing

Through e-procurement, access to any relevant information is easier and faster. This accelerates the flow of any vital information needed between internal and external business partners and leads to deliver a well-integrated information sharing platform [66, 70].

15) Minimisation of process errors

Bidding, negotiation and supplier selection constitutes a crucial stage in the procurement process. Any error made during this part of the purchasing cycle can be very damaging and long-lasting. Adopting e-procurement system eliminates manual process and paperwork which minimises the opportunity for human errors, inaccuracies and reworks [65, 70].

16) Online and real-time reporting

There is an increased reporting capability for organisation through an e-procurement system. The access of information is easier and faster, as well as provides additional capability to generate customised reports. A real time reporting system will enable the management to have a fast and reliable way to compare various expenditures with budget [66, 70].

17) Quicker response to problems through real-time information

As the e-procurement system facilitates generation of real-time reporting, tracking of transactions of situations leading to problems are faster. Such real-time information helps in understanding the problem sources and to yield optimal solutions for the problem or to make reactive decisions [70, 71].

18) Reduced administration cost

In traditional procurement, the administrative cost associated with preforming general administrative and coordination function related with procurement and purchasing, oversight and monitoring responsibilities related to administrative function, travel costs incurred for official business in carrying out overall management and technical/professional assistance are high. Through e-procurement system, such administration cost can be reduced [66, 71].

19) Reduced paperwork

E-procurement eliminates the need of paperwork which will turn out beneficial to the organisation in terms of minimising errors. By eliminating paperwork handling, purchasing personal will get more time to spend on strategic value-added purchasing activities [75].

20) Reduction in processing time

The automation process involved with e-procurement resulted in the elimination of paper documents which yields faster order approval and document processing. All information related to the order, and its current status is available in the system. Therefore, time to access necessary information for processing was reduced [11, 74].

21) Simplified and streamlined process

The purchasing process in the e-procurement system is simplified by bringing together all suppliers under a single e-platform. This helps in providing simplified and stream0lined procedures to expedite orders to the payment processing [73, 74] .

22) Time saving in overall purchasing process

Several of the beneficial factors discussed about e-procurement such as decreased bureaucracy, enhanced decision making, improved communication and collaboration, transparency, real-time information and stream-lined processing enables shorter time for the overall purchasing process [11, 74, 76].

In this doctoral thesis, only 13 benefits out of 22 have been selected to be elaborated further. The main reasons of selecting these items is that they affect the work progression, reduce the operation cost, operation time, and can result in improvements in the organisation, innovation and/or productivity in the procurement process. Table 2-2 below details the benefits of e-procurement measured in this research and relates them to those identified in the literature.

Table 2-2: Benefit of e-Procurement

No.	E-procurement benefits	Literature support	Related to
1	Reduce order cycle times	[77-79]	20
2	Generating original solutions for problems	[78-80]	17
3	Expand supplier bases	[81, 82]	8 & 9
4	Reduce paperwork	[78, 79]	19
5	Acquiring approval for innovative ideas	[80, 83]	1 & 3
6	Allowed the purchasing department to concentrate on more strategic tasks	[80, 83]	1, 9 & 14
7	Improve productivity and/or service improvement	[82, 84]	14 & 15
8	Saving time	[82, 83]	16 & 20
9	Reducing cost	[78, 82, 83]	4 & 18
10	Decentralise procurement management	[78, 82]	1, 2, 5 & 21
11	Improved communication and collaboration with suppliers	[77, 83, 84]	14, 16 & 17
12	Improved effectiveness of purchasing process	[77-79]	6, 11 & 15
13	Reduce of purchasing department size and number of functional areas	[78, 79]	12 & 13

2.6.4 Challenges and Barriers of E-Procurement

There is a large volume of research focused on the barriers and challenges of e-procurement which describes the pitfalls of e-commerce in areas relating to security of information exchange, inadequate technological infrastructure of business partners. In these studies, the authors were concerned about the following areas; the privacy of information exchange, concerns about data confidentiality, a lack of corporate strategy with respect to e-procurement processes, the impact

of changing the way people work, a lack of top management support, inadequate in-house technological infrastructure, inadequate in-house IT personnel, and the high cost of technological implementation [72, 85-87].

2.6.5 Summary of Challenges and Barriers

By adopting e-procurement system, there is a great potential for organisations to achieve significant improvement in operations and efficiency, but on the other hand, they also face some challenges and barriers while switching to an e-procurement system. A variety of challenges and barriers studied by the researchers in the context of e-procurement development process are detailed below:

1) Bureaucratic dysfunctionalities in practice

To adopt e-procurement system, there will be a specific regulations and standards in place regarding the legal institutions involved in order to ensure supply competitions and transparency in procurement process. This will require that a bureaucratic procedure be followed as these institutions will embrace audit, accountability and compliance standard to ensure supply competition and transparency [11, 66].

2) Cost/benefit concern

Although e-procurement system reduces the cost and translates into improved effectiveness and efficiency of organisation on a long run, there emerges a concern when the expenses outweigh the benefits of moving to e-procurement in short term [66, 70, 71].

3) High investment cost of IT infrastructure/software

Many companies do not already have the technology to carry out e-procurement, and cannot afford high investments on developing new IT infrastructures and software which are necessary for e-procurement adoption [11, 66, 71].

4) Inadequate IT infrastructure of suppliers/business partners

An important barrier and challenge when implementing e-procurement is with insufficient IT infrastructure of the actors in the supply chain. The inadequacy of the IT infrastructure mainly lies with the compatibility issues between the external parties of the supply chain and the organisation implementing e-procurement system [66, 70].

5) Incompliance with company culture and lack of top management support

Many companies do not have a clear corporate policies and procedures to follow when it adopts e-procurement. When a problem occurs, there is a lack of a widely accepted solution to be applied by the company. To cope up with any cultural changes needed within the organisation, it is essential that experts be appointed with the full senior management support. But, due to the pressure of competition, often these senior managements will need to focus on other aspects which leads to a lack of leadership and flexible central control [66, 70].

6) Interoperability concerns with other systems used

When organisations decide to adopt e-procurement system, they will be contacting software companies to implement necessary IT infrastructures. But, software companies tend to make their product unique. In doing so, they have endeavoured to stop migration of data between systems. So, there is a technical issue related with the lack of compatibility and interface with other internal systems [11, 66].

7) Lack of e-procurement knowledge/skilled personnel

Adopting e-procurement system into the organisation will necessitate the use of internet technologies. This give rise to personnel issue within the company such as an older generation that has not kept up to the advances in IT related fields and heavily relies on the traditional forms and means of procurement [11, 66, 70, 71] .

8) Lack of flexibility in process and documentation

E-procurement systems will be designed to work in a specific way. When there arises some situation when traditional procurement method is preferred (for example, dealing with a new supplier, or when purchasing is done rarely), e-procurement system will impose a hurdle. So, insufficient flexibility of the e-procurement system might harm the organisation under such circumstances [70, 71].

9) Security, confidentiality and authentication concerns

When working on the internet, security plays a major concern. The e-procurement system transmits several confidential data such as authentication details and procurement data which are exposed to security threats. Other electronic communication errors also pose

major threats such as the data transmitted can be garbled or can reassemble wrongly at the other end. So, security concern is an important barrier to e-procurement uptake [11, 66, 70].

10) Unsure as to the legal position of e-procurement

Upon adopting to e-procurement, there is no clarity regarding what could be accepted as a written notice which are made over the electronic media. This lack of clarity arises questions about the legal validity of the electronic information exchange. This uncertainty to the legal position of e-procurement is considered as a barrier to the implementation of an e-procurement system [66, 71].

11) External (supply chain/business partners) incompatibility

It is not enough that suppliers are willing to adopt to new technology such as e-procurement after analysing the benefits for such a move. It is also necessary that the supply chain or business partners will understand the benefits of adopting e-procurement and integrate into the system. But, there is a lack of readiness by external parties to engage in electronic interactions [70, 71].

12) Resistance to change of internal/external customers in supply chain

An inevitable aspect of human nature is to exhibit resistance to change. It is one of the biggest barrier to the introduction of e-procurement system especially in the public sector. The system users are generally unwilling to change their way of working to which they are accustomed [70, 71].

Considering the barriers and challenges described in the literature studied above, in this doctoral thesis, a list of barriers has been prepared and these factors have been considered in survey performed in this research. Some of the following items may have a different name but will have a similar meaning in practice. For example No.1 is related to category No.5 and No.7 related to No.7 and No.4 related to No.9 in the following list. Selected items are the challenges and barriers toward an advanced e-procurement adoption. These challenges and barriers are as listed in table 2-3 below:

Table 2-3: Challenges and Barriers of e-Procurement

No.	Challenges and Barriers	Literature Support	Related to
1	Lack of management support	[66, 70]	5, 7 & 8
2	High costs of implementation	[11, 66, 70, 71]	2 & 3
3	Lack of the technical expertise	[11, 66, 70, 71]	7
4	Security of transactions.	[11, 66, 70]	9
5	Lack of common technology standards	[70, 71]	4 & 6
6	Time needed for the implementation	[11, 66].	3 & 4
7	Lack of skilled personnel	[11, 66, 70, 71]	7
8	Process resistance to be changed	[70, 71]	12
9	The complicated procedures and extended relationships	[70, 71]	1, 10 & 11
10	Internal and external compatibility	[11, 66]	11 & 12
11	Suppliers to update and control the e-catalogues as well as monitoring.	[70, 71]	10 & 11

2.6.6 E-Procurement Adoption and Success Factors

The term critical success factor refers to the elements of an organisation or task that are necessary for the success of a project.

Concerns relating to the successful use of e-procurement are related to the essential procurement aspects rather than the electronic aspects such as end-user behaviour, supplier and contract management, e-procurement business processes and information, and e-procurement infrastructure [11, 88]. The significant factors related to organisational e-procurement adoption particularly depends on company size, top management, business partner influence and perceived indirect benefits [49].

A number of critical success factors have been identified in the literature regarding e-procurement adoption and implementation. In this study the important critical success factors are discussed that influence the adoption of e-procurement.

1) Training and Skill Learning

Training is one of the most important aspects for any organisation to be successful. Most large organisations have divided their training department into two sections, one for local training and the other for training abroad or overseas training. The majority of well qualified employees attempt to encourage companies to derive the benefits such as: 1) enhancing vendor relations and the ability to participate in preferred vendor fees and legitimate rebate programs as a result of purchase history, 2) site membership, 3) allowed from advanced technological systems. It is assured that employees are able to get the benefits derived from the implementation of e-procurement [74]. It has been suggested that training of employees for relevant technologies is compulsory and should be provided to employees which would reduce the problems that occur from lack of knowledge on how to efficiently use e-procurement systems [66].

2) Integration and compliance

The solutions of integration between companies and suppliers are not as relevant to the suppliers in which most companies consider that the position of the suppliers is considered insufficient [89]. Large organisations can increase the procurement processes of streamlining and integration by using advanced e-procurement systems. According to a study, some companies accept technology without understanding how the inter-organisational collaboration networks affect the technology model benefits, the effect on the communication required between employees and suppliers, and the difficulties of integrating these technologies with existing enterprise resource planning systems [68]. These companies should attempt to re-organise their processes to e-procurement, but should not merely replicate paper-based systems. A research study has been carried out from a buying organisation's perspective [76]. They endorsed the view that the participation of suppliers is important for a successful implementation of e-procurement. However, scarcity of decision support systems was a major barrier facing suppliers. The researchers illustrated a framework for a generic e-procurement system which had the following properties: allows customers to tender on multiple attributes, submit volume discount bids, and offers mobility for allowing business rules and buying logic in bid evaluations using multiple criteria.

Another study described that the logical basis for implementing e-business strategies is to expand and improve the efficiency and success of e-procuring and e-ordering, and the strengthening of customer relationship management [69]. The results from their study conclude that e-business

strategic initiatives and information systems integration are the most common critical success factors (CSFs) in each e-business process. Managers must be fully convinced of the strategic relevance to the future of the organisation and be committed to the implementation of the necessary aspects of e-business in their enterprise. Those who perceived e-business as adding strategic value to the firm have a positive attitude towards its adoption. Organisations with a high level of information systems integration should be able to transmit, combine and process data from business partners such as customers and suppliers. Results also revealed that there are key differences among the success factors in terms of the e-business capabilities. Strategic initiative should focus on the deployment of integrating information systems which is the base for providing the information sharing capabilities. Therefore, information sharing capabilities in e-procurement are less important than collaborative process capabilities.

3) Top management

The top management must be responsible for supporting the implementation process of e-procurement technology in any organisation for it to be successful [90]. Once the top level executive management of a company advocates for e-commerce, an organisation can increase the use of e-procurement significantly [91]. In another study regarding the adoption of e-procurement processes in Hong Kong, it has been highlighted that the top management mind-set regarding the acceptance of new technologies is a critical success factor [11]. There is a multifaceted relationship between the supply chain members which usually indicates a requirement involving different levels of managing and accessing the information. Organisations should consistently support the procurement department throughout the implementation process of e-procurement. It has been suggested that a successful e-procurement software development should encourage the participation of supplier as well, and incorporate their opinion and suggestions [92]. The main suppliers have to be considered as an integral part of the procurement procedures, provided with clear and achievable milestones for any changes in management plan [93].

4) Human behavior towards innovation technology

The human aspect is one of the most critical factors in the acceptance of e-procurement within an organisation. The employers/employees willingness to adopt e-procurement tools is widely acknowledged as a critical determinant of e-procurement implementation success [94]. In this

literature, together with reviewing the barriers of e-procurement, some of the success factors for the adoption of e-procurement have been presented as well. However, in this study, like any research, which looks at some cross-parameters or factor subject, a number of limitations do exist. The main limitation is that the research model was only developed for identifying a few important aspects of the adoption of e-procurement and their work does not cover the whole spectrum of problems that may face a large scale change process. Therefore, there may be other aspects which are hugely important [11].

5) Participation of public sectors

It has been explained that the greatest level of support for the implementation of e-procurement initiatives exists within the public sector. It was found that e-procurement projects have a greater reach and scope than traditional IT development projects. Security and controls as well as standards and interfaces emerged as more important requirements than those in other IT projects [49]. The legal and legislative issues did not emerge as CSFs, although factors such as top management support and performance measurement of the e-procurement process are found to be critical factors. The study concludes that public sector e-procurement initiatives like transparency and accountability issues are very significant.

6) Miscellaneous Critical Success Factors

A number of critical success factors in the literature which influenced the spread of e-procurement adoption from one sector to another, includes communication (peer communication and persuasion), demonstration (seeing the tool work), enforcement (the exertion of hierarchical power), training (training and education about the tool), involvement (involving people in the change process), risk reduction (expectation of reduced risk by taking on e-procurement tool), reward (incentives presented), and disposition (individuals inclination to adopt an innovation) [94].

It has been suggested in a study that three critical success factors should be ensured in e-procurement implementations which are: 1) monitoring and assessment system which allows for continuous process improvement, 2) efficient processes are deprived of excessive inactive times, 3) acceptable staff training is undertaken for the benefit of applying the new technology [65].

Therefore the important CSFs are not limited to supplier and contract management but also includes the end-user behaviour, e-procurement business processes, and the information and infrastructure [88].

Considering these factors and the overall CSFs presented in the literature, a list of 11 CSFs has been complied and these CSFs are used in this doctoral research in related to adoption and implementation of e-procurement. These 11 CSFs are listed in table 2-4 below.

Table 2-4: Critical Success Factors of e-Procurement

No.	Critical Success Factors	Literature Support	Related to
1	End-user uptake and training	[11, 66, 74, 94]	1
2	Supplier adoption	[89]	4
3	System integration	[68, 69, 76, 89]	2
4	Business case/project management	[11, 88]	3
5	Re-engineering of the process	[11,89]	2
6	Security and authentication	[68, 69, 76, 89]	6
7	Top management support	[11, 90, 91, 95, 96]	3
8	Change management	[11, 88]	3
9	Performance measurement	[49]	6
10	E-procurement implementation strategy	[68, 69, 76, 89]	5
11	Technical standards	[68, 69, 76, 89]	2

In conclusion, the development of an e-procurement management scheme is beneficial to organisations in various ways, although implementing such a system can be expensive for organisations. A large body of research exists over the success factors for implementing and operating e-procurement.

2.6.7 E-Procurement Types

The adoption of e-procurement technology is also to decrease corruption and increase transparency in the procurement process [95]. The following tools of e-procurement are the most common forms of using the web-based process for buying orders and gaining goods or services

1) E-informing: is the process of gathering and distributing purchasing of information in both external and internal parties using the internet [6, 96].

   The use of e-information in e-procurement has many advantages, with the main advantages being that it processes a high quantity and quality information very rapidly and allows for the combination of the search and credence information. Search qualities are inspected throughout the purchasing decision; e-procurement allows the buyers to increase aspects such as the quality, quantity and speed of information processing.

2) E-sourcing: is the process of identifying new suppliers for specific types of procuring requirements using internet technology [6, 97].
3) Web-based ERP (Enterprise Resource Planning): is the process of dealing with product-related items involving the creation of and approving purchasing requisitions, placing purchase orders and gaining the goods or services ordered through a software system based on internet technology [98, 99].
4) E-MRO (Electronic Maintenance, Repair and Operations): is the process that deals with indirect items of creating and approving purchasing requisitions, placing purchase orders. These items including consumables like office supplies and laboratory, plan upkeep supplies like repair tools and lubricants, and industrial equipment like valves and pumps [6, 11, 100].
5) E-markets: E-markets are virtual meeting locations for component suppliers and buyers, who use the tools to electronically support the procurement process [101, 102].
6) E-reverse auctions: The use of information technology of reverse auction technology which focus on the price of the auctioned goods and services [98, 99, 103].
7) E-ordering: The use of internet to facilitate operational acquiring process, including ordering (demanding), order approval, order receipt and payment process [94, 101].
8) E-intelligence: is the process of managing information system with spending analysis tools using internet technology [101, 104].

9) E-contract Management: the use of internet technology to improve the efficiency and effectiveness of contracts processes of firms [105].
10) E-tendering: is the use of the information technology process of distributing requests for information and prices to suppliers or vendors and receiving their replies [6, 106].

2.7 Technology Adoption

The pace at which a new technology is accepted and implemented determines its success and impact on a society. Organisations currently live in a global village or marketplace where it is important to determine the success and impact factors of a new technology across the world. Adopting a new technology is a complex process that involves not only different customers but also the innovators who adopt a new technology within an organisation. The innovators within an organisation are the group of people who are willing to take risks and that possess business acumen. The customers of a new technology could be divided into different parts with respect to the time duration it takes for them to adopt a new technology. The pace of technology adoption is dependent upon a number of economic/financial, religious, cultural and social factors. The relationship between technology and acceptance can also be affected by contemporary methods of communication and new media such as Google and Twitter [107]. The advent of the industrial revolution and rapid development of new technologies and innovations in existing systems poses a continual requirement for useable models and frameworks, based upon the aforementioned factors, to convince the customers to adopt and implement such new systems. Such models are designed on the basis of important factors contributing towards the decision to adopt and implement a new technology. The factors in a model are often mediated by dependent variables and the link between factors and mediators could be established by making certain hypotheses. The successful execution of (and receiving expected results from) the model validates the hypotheses. The validation of such hypotheses provides guidelines to innovators and technology developers to convince the customers about adopting new technology. In addition to this, research studies on the basis of such models encourage customers, who belong to certain social, cultural and religious background, to adopt a particular technology [107]. The model developed in this thesis, E-PAM, is designed around contributing factors such as usefulness, organisation facilitators and organisation leadership and the mediators of attitude and RIS. Attitude was used in a model presented previously, TAM, regarding technology adoption [108]. A new mediator

was used in E-PAM to describe the involvement rules of RIS in adoption of e-procurement. RIS is a cultural factor which was not studied previously and, one of the main concepts belonging to RIS relates to the morality of dealing with trade and business. In this section, a number of models from literature related to adoption, acceptance of new and innovative technologies were discussed. The contributing factors and mediators used in E-PAM in accordance to their use in models present in literature [108, 109], were highlighted.

2.7.1 Technology Acceptance Model (TAM)

The technology acceptance model (TAM) is a theoretical model designed and tested by Fred D. Davis, Jr. [110]. The TAM is one of the earliest models built to demonstrate the effect of system characteristics on the acceptance of (computer based) information technology. The model was successfully able to demonstrate various processes involved in the acceptance of new technology by users. In addition, the TAM was able to provide a platform for testing and evaluation of a new technology implementation processes before the actual adoption of any new technology. The objective of the study was to systematically select from an array of new support systems which had the highest probability of meeting the needs, and being accepted by its intended audience. The procedure had four phases to it consisting of opportunity scanning, functional screening, interface screening and prototype testing. The testing was performed from a managerial point of view. The TAM is basically a theoretical model that used perceived usefulness and perceived ease of use as contributing factors that were mediated by the attitude toward technology usage. The mediator (attitude) finally drives behavioural response, which is the actual system use. The TAM was empirically tested by conducting a survey to validate the hypotheses regarding the causal structure of the model. As shown in Figure 2.3, the TAM was able to provide an efficient method for developing a user motivational model (the characteristics of the system effect how motivated users are to use the system) regarding information technology acceptance [110-112].

The theory of planned behavior (TPB), TAM and technology, organisation and environment theory (TOE) are among the models that have gained attention in a variety of technology adoption contexts which aid in understanding the end-user’s intention to use new technology [10] , [113], [114].

Moreover, Stern et al., [115] proposed a revised TAM version by measuring variables such as affinity with the computer, risk and impulsiveness to investigate the adoption of online auctions. Moon and Kin [116] extended TAM to explain the adoption in a World-Wide-Web context. Muller-Seitz et al. [117] used TAM to understand customer acceptance of Radio Frequency Identification (RFID). Lin et al. [118] extended TAM by considering individual differences and to take them into account, so the study integrates the construct of technology readiness to examine e-service user's behavioural intention, for instance, investors can choose between online or conventional systems. Thus, if they decide to online trading system, they co-create an e-service with the system. Serenko et al. [119] modified TAM to assess user acceptance of interface agents in daily work applications. Chen et al.[120] proposed TAM to explain the users' adoption of self-service technologies. Additionally, Chen and Chen, [121] applied TAM to investigate the automotive telematics users' usage intention

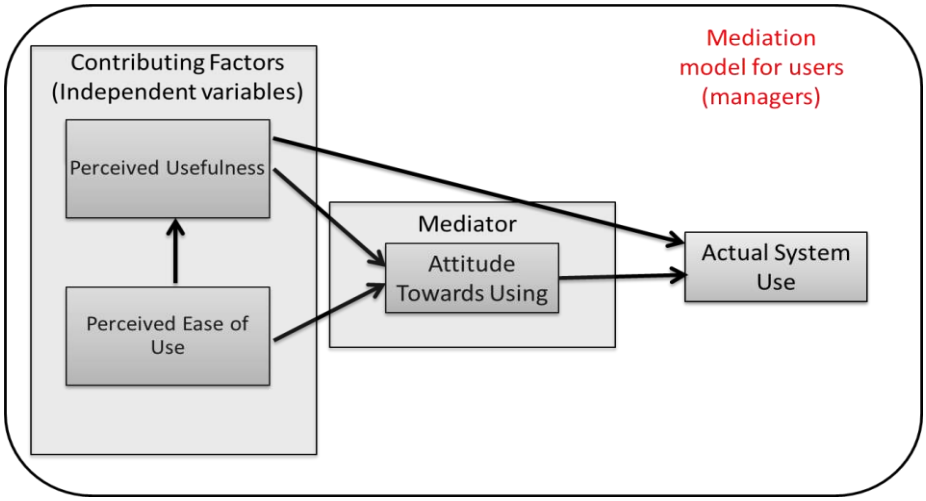

Figure 2.3: Technology Acceptance Model (TAM) developed by [110].

2.7.2 Technology, Organisation and Environment (TOE)

The technology, organisation and environment theory (TOE) is a framework developed by Tornatzky and Fleischer [122]. The TOE framework combined three important aspects of a company which are technology, organisation and environment that influence the adoption of an innovative technology. The technological aspect of the framework describes the available technologies that might be useful for an organisation and these technologies could already be in

use in a company and/or could be in use externally, outside the company by direct competitors or those available in the market place but not currently in use. This technology could be in the form of equipment or could be a certain process. The organisational context refers to the characteristics and resources of a firm (including number of employees, units, working groups and branches, etc.) and includes the managerial structure of a company. The third context of the TOE framework is the environmental conditions in which a company is practicing business, which includes the structure of the industry, ownership status (public, private or semi-private), the presence or absence of technology providers and the competitors in the market. The TOE framework has been widely used in the adoption of IT based innovative solutions and systems [123]. It is important to note that TAM was built for individual users (with managers in mind) while TOE was built considering organisations.

TOE framework assumes that the adoption process within firms is effectively established through the right match between a firm's internal and external factors [124]. Kuan & Chau, [125] confirmed the utility of the TOE framework in investigating the adoption of complex innovations. Shirish and Teo [126] also showed the role of the TOE framework when investigating information and communication technology. Researches which employed the TOE framework to study e-business/e-commerce adoption include Hong & Zhu [127], Lin & Lin [128], Sila [129], Teo et al. [130], Zhu & Kraemer,[131, 132]. Moreover, researchers have demonstrated the utility of the TOE framework in examining the adoption of other enterprise systems and technologies such as CRM and e-procurement (Ramdani et al. [133] ; enterprise resource planning (ERP) (Haddara & Elragal,[134] , Pan & Jang, [135]); mobile supply chain management (Chong et al.,[136]); knowledge management systems (KMS) (Lee et al., [137]); cloud computing (Chang et al., [138]); electronic data interchange (EDI) (Kuan & Chau,[125]); open systems (Chau & Tam, [139]).

2.8 Theory of Planned Behaviour (TPB)

The theory of planned behaviour presented by Ajzen describes reasoned action [140]. The theory of reasoned action suggested that actions are dependent upon intention, although not all intentions end up to actions as humans could judge the consequences of an action and could choose to avoid these intentions. The theory of planned behaviour (TPB) reflects this aspect that humans are able to plan an action based upon their intention and their judgement. The prediction

of intention that drives behaviour could be performed by using three variables including the attitude towards the behaviour, the subjective norm and the perceived behavioural control (Figure 2.4). The first variable describes the ability of a person to evaluate the consequences of a particular behaviour. This determines the attitude towards developing intentions about certain behaviour. The second variable is related to societal standards and practices, how other people think and what they believe about certain intentions or behaviour. A person could change his/her intentions on the basis of social pressure or social norms. The third variable is related to the confidence level of a person when executing certain intentions to reach certain behaviour. This includes how a person perceives his/her own ability to perform certain tasks and whether a person would be able to control their intentions if they perceived the negative consequences of a specific behaviour. The TPB theory effectively provides a psychological guide for understanding the intentions and behaviour of a person or group of people towards a certain action. On the basis of TPB, a survey questionnaire could be built to understand how to drive the aims of users towards the adoption of a certain technology [141-144].

Troung [145] used TPB to study consumer acceptance of online video and television services, and Hsu et al.[146] applied an extended version of TBP to examine online shopping behaviour. Morris and Venkatesh [147] used TPB to explore employees' decisions about technology usage and their attitudes toward adoption of technology, and Fortin [148] used the model to examine the behaviour of "clipping online coupons" in the educational setting. Lee et al.[149] applied TPB to investigate teachers' intentions to use computers to create and deliver lessons, while Renzi and Klobas [150] integrated TPB into a qualitative study to explore factors influencing the adoption of online teaching by university teachers.

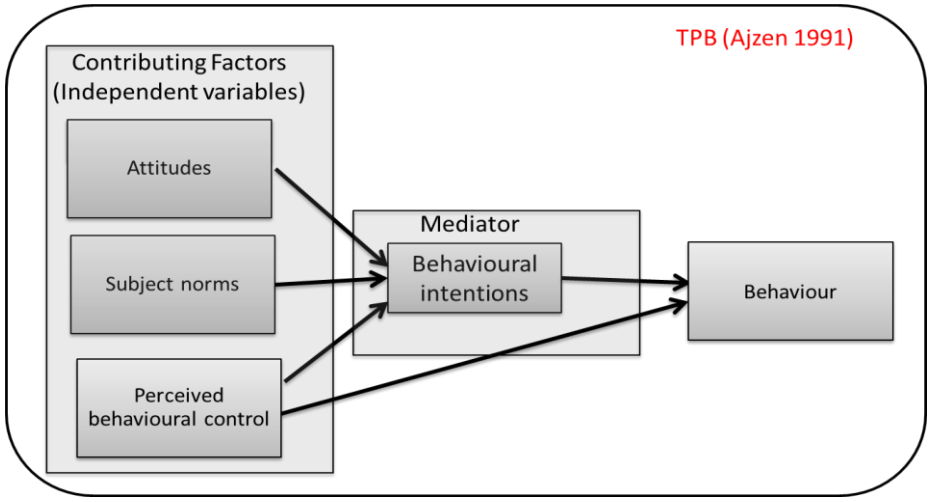

Figure 2.4: Theory of planned behaviour [151]

2.8.1 Theoretical Framework for the Adoption of E-Procurement

A. Gunasekaran and E. Ngai [11] presented a theoretical framework for the adoption of e-procurement in Hong Kong. Although this framework was built for regional use, the extension of this framework could be used in other contexts such as China or India. The framework is composed of four main building blocks that include the perceived benefits of e-procurement, the perceived barriers in the implementation of e-procurement, organisational performance with e-procurement and the critical success factors for e-procurement (Figure 2.5). A research questionnaire on the adoption of e-procurement in Hong Kong was built on the basis of the aforementioned four variables (benefits, barriers, challenges and critical success factors). The survey results validate the building block of the framework used for e-procurement adoption in Hong Kong. It was suggested by the authors of the framework that it should be extended by including more building blocks (variables) to be used in other regions of the world. The model designed in this research is an extended form of the framework developed by Gunasekaran and Ngai [11].

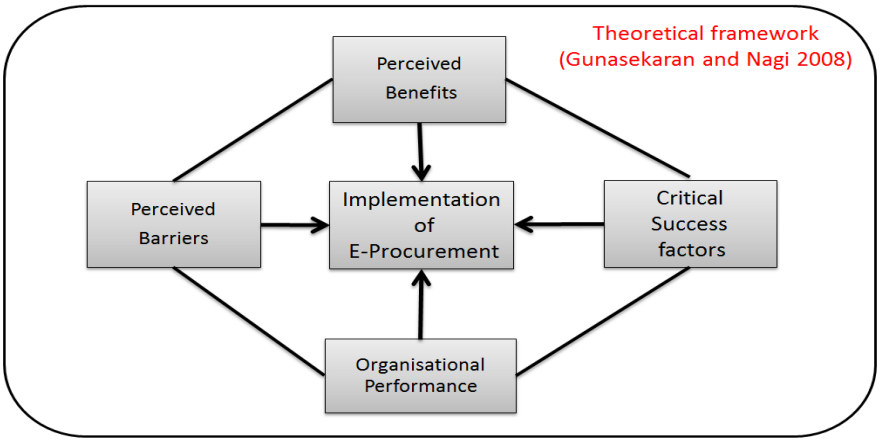

Figure 2.5: Theoretical Framework for the Adoption of E-procurement [11]

2.8.2 Integration of Technology Acceptance Model and Theory of Planned Behaviour

Aboelmaged [10], integrated the TAM and TPB frameworks to predict e-procurement adoption in a developing country (United Arab Emirates). In his work, Aboelmaged proposed a new model on the basis of ease of use and usefulness mediated by attitudes in predicting the adoption of e-procurement. In addition to that, Aboelmaged also considered the subjective norm (social pressure, society standards, etc.) and behavioural control (ability to control behaviour and plan about the consequences of intentions) as independent variables that take part in the prediction of e-procurement technology adoption. Aboelmaged proposed seven research hypotheses relating independent variables with mediators and the dependent variable which aimed to adopt e-procurement. In his work, Aboelmaged used structural equation modelling by conducting a questionnaire based survey. The framework used by Aboelmaged was distinct from others as it not only used the social aspects, but also the technical aspects of e-procurement technology. The survey results validated the hypothetical structure of the framework confirming that the attitude of target users mainly determines the adoption of e-procurement. In addition to that, the perceived usefulness and subjective norm also influence the e-procurement adoption process. Aboelmaged suggested that the framework could be extended by adding further independent variables (contributing factors) and mediators for further research studies. The model developed in this research is influenced by Aboelmaged's framework, considering additional independent variables and a mediator. Even though Aboelmaged conducted this research to predict e-

procurement adoption in an Islamic country, the specific influence of RIS as a factor was not studied, whereas the current thesis highlighted the influence of RIS.

2.9 Contributing Factors

For the development of a model for new technology adoption, it is important to understand the factors that contribute to the paradigm of reluctance towards certain technology, as these factors contribute either positively or negatively towards the final output of a model. The characteristics of a model could be established by selecting the appropriate contributing factors. The models described above are mainly distinct due to the selection of particular contributing factors while discounting certain others. The selection of contributing factors is mainly based on the degree of influence that they could provide over a certain technology and socio-economic conditions. The contributing factors selected in the design and development of E-PAM model in this research, is discussed below with relevant use in previous models.

2.9.1 Perceived Usefulness (PU)

Perceived usefulness has an important effect on the adoption of a new technology. It is a system of behavioural control measurement for the groups or employees working in public or private companies. Usefulness is also one of main elements of the technology acceptance model (TAM).

2.9.2 Perceived Ease of Use (PEOU)

Perceived ease of use, the second main factor of TAM refers to how groups can easily use a new technology in their organisations. It is very important to know by measuring this factor the effect of such a behavioural control element.

2.9.3 Adoption of E-Procurement (AEP)

The main factor of the model developed in this research is the AEP, and it is dependent variable of the TAM and also of the whole component research model. It also reflects the major target of this study in which the e-procurement technology can be adopted and implemented in the organisations correctly.

2.9.4 Organisational Facilitators (OF)

Technical facilitators have an important task in controlling and maintaining different IT problems during the working and out-work time e.g. these facilitators are responsible to fix any internet or intranet issues caused by misusing technical equipment. This factor has not been considered in many previous studies; however it is believed that the adoption of a new technology can have a positive effect on the supply chain and procurement process [152].

2.9.5 Organisation Leadership (OL)

OL has not been measured in previous studies [12, 116, 153-155], however, it is a significant factor in this study because key positions of the organisation are the decision makers that can be supportive to the adoption of e-procurement [156, 157]. Leadership can also organise and approve any financial decisions relating to the adoption of e-procurement or any other technology.

2.9.6 Critical Success Factors (CSF)

There are a number of critical factors that establish the success of e-procurement system in any organisation, such as adequate training and education, adequate monitoring and evaluation, organisation infrastructure, the integrity of IT systems, supplier participation and interest, etc. [65, 68, 74, 89, 93]. The critical success factors of e-procurement are rated according to the number of citations present in the literature. These CSFs tested in this research are listed in Table 2.5.

Table 2.5: Critical success factors in this research described by other researchers

Critical Success Factors	[47]	[158]	[159]	[160]	[161]	[89]	This Research (2015)
End-user uptake and training	x	x	x	x	x	x	x
Supplier adoption	x	x	x	x		x	x
System integration	x	x			x	x	x
Business case project management				x	x	x	x
Re-engineering of the process	x	x			x	x	x
Security and authentication	x	x		x		x	x
Top management support	x	x			x	x	x
Change management	x	x		x	x	x	x
Performance measurement				x	x	x	x
E-procurement implementation strategy	x		x	x		x	x
Technical standards	x	x		x		x	x

2.9.7 Challenges and Barriers (CHB)

There are a number of challenges and barriers to the adoption of e-procurement technology. In section 2.6.4, a detailed discussion about the challenges and barriers in e-procurement adoption is presented in accordance with prevalence in the literature. The challenges and barriers considered in developing E-PAM in this research are supported by studies present in previous literature, these challenges and barriers are summarised in Table 2.56

Table 2.6: Challenges and barriers considered in E-PAM

CHALLENGES AND BARRIERS	[66]	[11]	[71]	[162]	[163]	[67]	[70]	This Research
Bureaucratic dysfunctionalities in practice	x	x	x	x			x	x
Cost/benefit concern	x		x	x	x		x	x
High investment cost of IT infrastructure/software	x	x	x	x	x	x	x	x
Inadequate IT infrastructure of suppliers/business partners	x					x	x	x
Incompliance with company culture	x					x	x	x
Inter-operability concerns with other systems used	x	x			x	x	x	x
Lack of adequate technical/IT infrastructure	x	x	x	x	x	x	x	x
Lack of e-procurement knowledge/skilled personnel	x	x	x	x	x	x	x	x
Lack of flexibility in process and documentation				x	x	x	x	x
Lack of system integration with suppliers/business partners	x	x				x	x	x
Lack of top management support		x	x	x	x			x
Religious objections to internet			x	x				x
Security, confidentiality and authentication concerns	x	x	x	x	x	x	x	-
Time needed for the implementation process		x						x
Unsure as to the legal position of e-procurement	x		x	x				x
External (supply chain/business partners) incompatibility			x	x	x	x	x	-
Inadequate business processes to support e-procurement		x					x	-
Resistance to change of internal/external customers in supply chain			x	x	x	x	x	-
Rules of Islamic Sharia (RIS)								x

It is important to note that RIS is considered as an important factor in this study, which has never been considered in any prior research study on e-procurement adoption. Participants were asked whether they considered RIS to be a barrier, or if it caused any challenges for the adoption of a new technology. In addition to this, there are certain challenges considered by the researchers included in Table 2.6 that are not considered in this current research. These challenges include external (supply chain/business partners) incompatibility, inadequate business processes to

support e-procurement, and resistance to change of internal/external customers in the supply chain. The main aim of this study project is to encourage organisations and the public who practice RIS. Since these challenges are not directly related to RIS compliance and already well described and discussed by previous models, they will not be included in this research.

2.9.8 Benefits (BNF)

The benefits are an important contributing factor in E-PAM as they would greatly encourage the customers to implement this system. The benefits of e-procurement are already described in detail in section 2.6.2 and summarised in Table 2.7 on the next page.

2.10 Mediators

The models proposed for technology adoption are principally mediation models that use statistical tools to describe the relevant mechanisms between independent variables (contributing factors) and dependent variable(s) (final output) using an explanatory variable. This explanatory variable is commonly known as a "Mediator". A single mediator is commonly used in the models described previously. However, in E-PAM which is developed in this study, two mediators are used which are described below:

2.10.1 Attitude (ATT)

This is the first mediator in the research model and also the lone factor that mediates the usefulness and ease of use to the adoption of new technology in TAM. It is significant to measure and understand the effect of attitude to adopt new technology in any organisation.

Table 2.7: Various benefits considered by researchers

Benefit of e-procurement	[65]	[80]	[66]	[71]	[162]	[163]	[67]	[70]	This research
Better management and control of suppliers	x	x		x		x	x	x	x
Better utilisation of staff			x	x	x	x			-
Compliance with laws and regulations							x		-
Cost savings in overall purchasing process	x	x	x	x	x	x	x	x	x
Decentralise of power/procurement management							x		x
Decreased bureaucracy and redundancy	x				x		x	x	-
Easier access to market data and enhanced intelligence	x		x		x	x	x	x	-
Enhanced decision making			x					x	-
Enhanced inventory management			x	x	x	x		x	-
Improved communication and collaboration in supply chain	x		x	x	x	x		x	x
Improved supply chain transparency	x		x		x	x	x	x	-
Increased customer service levels		x		x					x
Increased process quality and efficiency		x			x	x		x	-
Integrated information sharing			x					x	-
Minimisation of process errors	x						x	x	-
On-line and real-time reporting			x				x	x	-
Quicker response to problems through real- time information					x			x	x
Reduced administration cost			x		x	x			x
Reduced paperwork							x		x
Reduction in processing time		x		x	x	x			x
Simplified and streamlined purchasing process	x	x			x	x	x	x	x
Standardisation of process							x		-
Time savings in overall purchasing process	x	x	x	x	x	x	x	x	x
Wider range of suppliers							x		-
Acquiring approval for innovative ideas									x
Allowed the purchasing department to concentrate on more strategic tasks									x

2.10.2 Rules of Islamic Sharia (RIS)

The Rules of Islamic Sharia could be an important factor for the adoption of a new technology as it reflects the cultural and religious factors related to the acceptance of a new technology that has not yet been explored. The primary and original rules of Islamic legislations can only be supportive of the adoption and use of new technologies. These rules and provisions are standing on the side of the humanitarian needs and could not go against this. Therefore it is believed that this factor must play a significant role in this research model and in paving the way for any technology which might benefit all the people of the world. The RIS factor is mediated by the three factors which are the CHB, CSFs and BNF.

2.11 Hypotheses

A total of thirteen hypotheses (H1 – H13) were formulated to correlate the various factors forming a model and to establish their true dependencies and effects on each other. The hypotheses H1, H2, H5, H6, H7, H11, H12 and H13 were adopted from existing works in literature regarding technology acceptance and adoption [110]. The hypotheses H3, H4, H8, H9, and H10 are developed for the first time in this study.

According to TAM, perceived usefulness can lead to behavioural intention. Davis [111] defined perceived usefulness as the degree to which "a person believes that using the system will enhance his or her performance". This proposition is justified from the perspective that people's intentions to use the technology will be greater in spite of their attitude toward the technology alone, if they expect a technology to increase their performance on the job. Many existing studies have shown that perceived usefulness directly and significantly influences behavioural intention to use a particular online system [109, 164-170]. In the context of mobile business service, researchers found that perceived usefulness is a vital factor determining the adoption of mobile service [171-173].

2.11.1 Research Hypotheses

According to TAM, perceived usefulness affects a person's attitude towards using a system. Lai and Yang argued that employees in a performance-oriented e-business context are generally reinforced for good performance and benefits [174]. This implies that realizing the usefulness of

e-business applications, such as mobile banking in improving performance or efficiency, will positively impact attitude towards that application. The effect of perceived usefulness on attitude has been validated in many studies including [109, 166, 168, 169, 173, 175].

Consequently, the following hypotheses **H1**and **H5** are suggested:

H1: Perceived usefulness (PU) has a direct, positive effect on an organisation's desire to adopt e-procurement (AEP).

The first determinant in TAM and TBP, which is attitude, reflects a person's belief that his/her behaviour leads to certain outcomes and the person's evaluation of those outcomes – favourable or unfavourable. The more positive the attitude, the stronger the behavioural intention will be and, ultimately, the higher the probability of a corresponding behaviour being demonstrated. Attitude towards using a particular system is a major determinant of the intention to use that system, which in turn generates the actual usage behaviour. The underlying premise is that individuals make decisions rationally and systematically on the basis of the information available to them [176].

Many existing studies in the context of e-business have shown that an individual's attitude directly and significantly influences behavioural intention to use a particular e-business application [116, 177, 178]. For example, George [178] found a strong positive relationship between an individual's attitude toward purchasing online and the user's behavioural intention. Gribbins et al. [177] studied the acceptance of wireless technologies by users. Also, Puschel et al. [179] found that attitude significantly affects intention to adopt mobile banking. They demonstrated support for the relationship between attitudes toward using mobile commerce/ banking and behavioural intention. Thus, the following hypotheses are proposed:

H2: Attitude positively influences the e-procurement adoption.

H5: Perceived usefulness positively influences attitudes towards e-procurement adoption.

PEOU can be defined as the degree to which the prospective user expects the potential system to be free of effort [111]. Previous studies on PEOU provide empirical evidence supporting its impact on attitude and usefulness. Examples include mobile banking in Malaysia, internet banking acceptance, wireless finance, and mobile commerce [164, 171-173, 180, 181]. Users would be concerned with the effort required to use that application and the complexity of the

process involved. Such perceived ease of browsing, identifying information and performing transactions should enable favourable and compelling individual experience [175, 182]). TAM suggests that ease of use is thought to influence the perceived usefulness of a technology. The easier it is to use a technology, the greater the expected benefits from the technology with regard to performance enhancement. This relationship has also been validated in online technology context [116, 183-187]. Thus, this research examines the following hypotheses:

H6: Perceived ease of use positively influences attitudes towards e-procurement adoption.

H7: Perceived ease of use positively influences the perceived usefulness of e-procurement adoption.

The above hypotheses provide an interesting relationship between perceived usefulness and ease of usage of a new technology and their link to the adoption of the technology itself. Davis [111] demonstrated that the perception of ease of use and usefulness of technology are significant influences affecting the attitude of people and it in turn defines the acceptance or adoption of e-procurement. This has been proved by further studies conducted using Davis's TAM [170],[109], [169, 188, 189]

Kaliannan, et al., [190] demonstrates that the two factors PU and EOU, as well as the organisation leadership and organisation facilitators, are also important factors for e-procurement adoption in organisations. Hence, the first five hypotheses propose that irrespective of culture and other factors, people will develop an attitude to adopt e-procurement only when they see that it is useful. However, the social conditions and cultural factors of a society contribute significantly towards the acceptance of a new technology [122, 140]. Therefore, hypotheses H3, H4, H8 and H9 focus on the organisations cultural beliefs and value systems, and they are represented in this research as follows:

H3: Organisation facilitators will have a positive effect on e-procurement adoption.

H4: Organisation Leadership will have an immediate positive effect on e-procurement adoption.

H8: Organisation facilitators will have a positive effect on the perceived ease of use.

H9: Organisation facilitators will have a positive effect on the organisation's leadership.

Kaliannan, et al. [190] stressed that there are several pre-conditions in an organisation, such as the leadership and the existing system being used, that determine whether the organisation is

ready to accept the e-procurement technology or not. Therefore, to predict e-procurement adoption by organisations following the RIS, it is crucial to analyse the religious and cultural beliefs of the facilitators and leaders of these organisations. This can be achieved by interviewing key personnel from leading organisations around the world that follow or not follow RIS. Such a survey could help formulate techniques that would lead to the adoption and implementation of e-procurement systems by RIS compliant organisations. It's not only the general religious belief that matter but also the beliefs and concerns of the facilitators and senior management of organisations that ultimately make a decision. The RIS mediator was placed in the model to moderate the effect of benefits, critical success factors, and barriers and challenges of e-procurement adoption. The mediator variable in any model is responsible for explaining and establishing a link between dependent and independent variables. In E-PAM, the independent variables provide input to the model and influence the final output (AEP). This relationship between input and output in E-PAM were mediated by two variables, namely "Attitude" and "Rules of Islamic Sharia (RIS)". The attitude has been widely discussed and used by researchers for technology adoption and implementation (TAM, TPB, etc.). As noted from literature, RIS has never been used as a mediator to establish link between independent and dependent variables for e-procurement technology adoption and acceptance. A number of independent factors or variables influence the e-procurement adoption, and in order to keep consistency with previous research works, three variables (CSF, CHB and BNF) have been selected to be mediated by RIS in E-PAM. These three variables have been used before in e-procurement technology acceptance model [11]. For mediation models (models with at least one mediator), the relationship between independent variables and mediator and the relationship between mediator and dependent variable should be examined. Such examination could provide mediation information about the intervention caused by the mediator. In this way, the role of a mediator (positive or negative) could be established in a model. The mediation caused by the mediator could be investigated by finding the correlation between the independent variables and the mediator. The correlation between the independent and mediator (termed as collinearity) describe the nature of mediation caused by the mediator. The nature of the mediation could be supporting (encouraging) or not supporting (discouraging) between the independent and dependent variables.

In order to investigate the above mentioned relationships between mediator and independent and dependent variables, three hypotheses were formulated. These hypotheses were made to provide

a complete picture of the intervention caused by the mediator (RIS) by establishing the links between CSF, CHB and BNF and AEP through RIS. The three hypotheses are as follows:

H10: Rules of Islamic sharia will have a positive effect on the employees to adopt e-procurement technology.

H11: Critical success factors will have a positive effect on the employees toward e-procurement technology.

H12: Challenges and barriers will have a positive effect on the employees toward e-procurement technology.

H13: Benefits will have a positive effect on the employees toward e-procurement technology [12].

The thirteen hypotheses presented above establish links between the various factors of the model and they were used to design an online questionnaire to perform a comprehensive analysis of the contributing factors and the important cultural aspects of the Islamic commercial laws. The successful proof of these hypotheses could therefore predict the e-procurement technology adoption guidelines for RIS observing users and organisations. The contributing factors that are correlated by the hypotheses made to develop the E-PAM are present in Figure 2.6Figure 2.6:

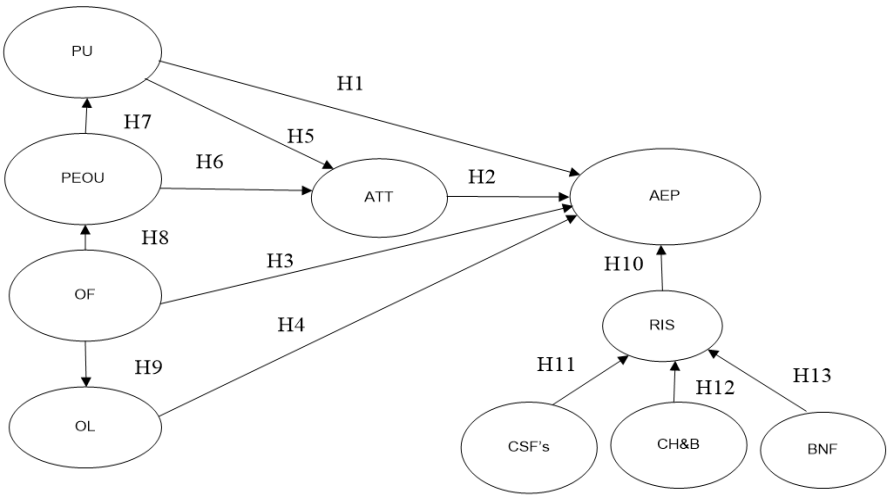

Figure 2.6: E-PAM factors correlated by hypotheses

2.12 Islamic Provisions Influencing Technology Adoption

Research on the Rules of Islamic Sharia in technology adoption is very rare. However, Hameed [191] defines Islamic ethical values as "a set of moral principles and guidance that recognises what is right or what one should do or not". He further explained that Islamic ethical values are significant to facilitate the adoption of websites in Islamic contexts. Al-Qahtani [192] provided a detailed and intensive juxtaposition of TAM and its underlying theoretical principles with the Islamic system of knowledge. The research found that there is a neat similarity and congruency between the two. Al-Qahtani, also established that the Islamic perspective has already exhibited interest in later developments and changes whose importance have been felt and accommodated by the most recent versions of TAM. This stands as evidence for the richness of the Islamic heritage and thought and its adaptability to the requirements of technological changes. Other studies which involve the importance of Rules of Islamic Sharia are in Islamic banking [193] and Islamic financial system [194].

The extensive development in information technology has directly and indirectly influenced the social and cultural life of the whole world, transforming it into a global village. Since the advancements in IT mainly occurred in developed countries, with keeping in mind the nature of combined social and cultural values, the inherent reluctance to IT advancement in under developed and less developed countries would be expected. The result of this reluctance made the technological gap wider between countries of different social, economic and socio-political backgrounds. A number of studies suggest that not only do such technological gaps slow down the adoption process of new technologies but also increase the risk of rejection and failure of new technology implementation in such countries, It has been suggested in a number of studies that by taking into account the social, cultural and religious backgrounds the acceptance of IT based new technologies could be increased and the risk of failure could be reduced [195-201].

An example is the general reluctance to adopt e-procurement systems in the Muslim world. According to Islam, the buying and selling of goods should be performed in a particular way, by avoiding "interest". Here interest means any amount of money that is paid by a person or company (borrower) to a person or company (lender) for credit or similar liability. While the world's banking system has shifted to using IT systems, people in the Muslim world remain

reluctant to use IT tools for any sort of trading where a doubt is present about the involvement of "interest" [202, 203].

E-procurement systems have replaced traditional procurement routines by introducing electronic (internet and other networking) systems for buying and selling of goods and services. As e-procurement mainly deals with the transaction of money in exchange for goods or services, the societies observing Rules of Islamic Sharia (RIS) are reluctant to adopt this technology. If it could be demonstrated that e-procurement is compliant to RIS, there could be greater success in encouraging people, groups and companies to adopt and implement e-procurement systems. In this study, a technology acceptance model for e-procurement (E-PAM) is created in which RIS is particularly taken into account. It is expected that the results from this study based on such a model would advocate the adoption of e-procurement systems by employees and employers observing Rules of Islamic Sharia.

Chapter Three: Research Methodology and Conceptual Framework

3.1 Introduction

Research studies available in the literature regarding acceptance of a new technology by a user or industries based are usually on qualitative or quantitative methods, or a combination of both [204]. The qualitative methods primarily describe particular situations based on research tools such as surveys, interviews and direct observations [205, 206]. The sets of data generated from such tools provide good understanding of situation under investigation. The quantitative research methods require quantifiable data on which various numerical and statistical techniques could be applied to draw conclusions regarding a particular situation [206]. Quantitative research methods acquire data by performing physical experiments [204]. For research in management sciences, qualitative research tools, including surveys and interviews, have been used to collect data for performing quantitative analysis such as numerical and statistical analysis. The combination of the two research methods strengthens the research studies by gathering information from the general public and/or people from a particular field and performing statistical and numerical analysis on the collected data [207].

Research into technology adoption can be classified into three main categories, namely positivist, interpretative and critical perspectives [208]. The positivist perspective assumes that the world is objectively and externally given and can be described by measurable properties that are independent of the researcher and his instruments. Positivist studies generally attempt to test theory, in an attempt to increase the predictive understanding of phenomena [209]. Similarly, positivist research deals with formal propositions, hypothesis testing, quantifiable measures of variables, and the drawing of deductions about a phenomenon from a representative sample to a stated population [208]. The interpretative perspective assumes that the world is socially constructed through language, consciousness and shared meanings. The philosophical base of interpretative research is hermeneutics and phenomenology [205]. This perspective aims at understanding how social group members enact their particular realities and endow them with meaning, and how these meanings, beliefs and intentions constitute their social action [208]. According to Alvesson and Deetz [210], critical researchers assume that people can change their world, and that organisational actors have the capability to transform organisational situations.

The acceptance and adoption of a new technology primarily depend upon the human psychology. A number of models have been developed to articulate the process of new technology acceptance and adoption on the basis of human behaviour [110]. These models were developed to understand the general relationships between various human, cultural, and economic factors and new technology acceptance and adoption. These models have been expanded by a number of researchers to demonstrate the acceptance and adoption of a particular new technology by specific organisations [110]. As explained in Chapter two, the acceptance and adoption of a new technology depend upon the economic conditions and culture of the target users [109].

In this study, quantitative research methods have been used to investigate the possibilities of e-procurement acceptance and adoption by users and organisations observing Rules of Islamic Sharia (RIS). For this purpose, previously developed technology acceptance models were used to construct a new model based on a cultural mediator, i.e., RIS, which has never been studied before for e-procurement acceptance and adoption. The current chapter provides a detailed methodology setup that has been used to develop the new model named as "E-procurement Adoption Model" (E-PAM). The research hypothesis that established the link between the factors and mediators of the model are explained. The details regarding the online survey questionnaire development and distribution, and the collection of data are presented, followed by the statistical methods used to analyse the survey data.

3.2 Selection of Quantitative Methods

A quantitative method is deemed suitable for this research because of the nature of the research questions and propositions. This type of method is more concerned with numbers than with words or sentences. Questions like how much, what, where and who are related to this method and can be used to measure the incidence and occurrence of phenomena [211]. A research study could fit into three categories, namely mono-method, mixed method and multi-method studies. The research strategy assumed should be appropriate to the research tasks and questions.

Johnson and Onwuegbuzie [212] show some weakness in the mixed method, such as the difficulty in carrying out both the qualitative and quantitative research for individual studies. They state that a researcher would need to learn multiple methods and approaches in order to understand how to mix them effectively. Some of the details of the mixed research method, in

terms of the cost and the time required, remain to be worked out fully by research methodologists. The strengths of the mixed method approaches highlighted in literature include assertions that the researcher can generate and test a grounded theory and provide stronger evidence for a conclusion through convergence and corroboration of findings. As such, the research can be used to increase the generalisation of the results and can also answer a broader and more complete range of research questions because the researcher is not confined to a single method or approach [212]. The advantage of implementing multiple-method research is to avoid any weaknesses of a specific method [206, 213].

The reason for choosing quantitative methods in this study is according to the three points below.

1) To examine the systematic empirical investigation of quantitative data and the relationship of phenomena and properties.
2) To assist the combination of two different culture researches and if there are any additional problems deriving from it.
3) To show that the quantitative research methods vary from other researches methods.

The 'Research Process Onion' as proposed by [214] outlines a visual representation of the logical process for conducting research, as shown in Figure3.1. This outline focuses on the six key stages of research, namely philosophies, research approaches, research strategies, choices, time horizon and technique and procedure [214] (see Figure 3.1).

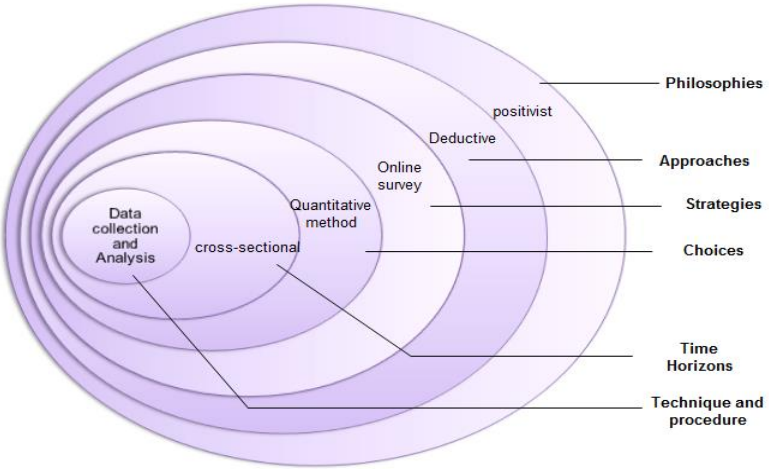

Figure 3.1: Research Process Onion

3.2.1 Research Philosophy

Guba and Lincoln [215] proposed that the research philosophy provides a foundation for the research, and a guide for researchers, to ensure that the most appropriate strategies and methods of research are employed for a given research situation. Saunders et al. [214] suggest that epistemology is concerned with the nature of knowledge that is derived from hard or real data or, on the other hand, from soft or subjective data gleaned from individual experience.

According to Filstead [216], a paradigm is a set of linked assumptions, which provides a conceptual and philosophical framework. Paradigms provide a structure for an epistemological study, and they can be classified under the positivism and interpretivism schools of thought. The positivist approach is suited to quantitative methods based for example on statistical data. Auguste Compte (1798-1857) was the father of positivist thinking in social science, and this philosophy started to gain popularity towards the end of the nineteenth century [217]. Positivism is based on an objective ontology, one which treats reality as objective and totally external to the researcher's insight.

The interpretivist approach acknowledges that the researcher and the topic of research are inseparable. This subjective ontology supports the view that the social world is constructed by an individual's cognition [206]. The concept of inducing information (soft data) from the data as a way of supporting this philosophy rather than using scientific methods to improve understanding and derive a sense from socio psychological rudiments. Saunders et al. [214] suggests that no one research paradigm is better than the other and that the most appropriate paradigm should be selected as a means of conducting research in a given circumstance. Some of the guidelines on the suitability of the two approaches are as follows:

Positivism

- Main goal is not only description but also prediction and explanation.
- It deals with observable phenomena and positive facts.
- Arrangement of substances and events, and observation of these, provide the basis for descriptive laws based on consistencies in patterns and properties
- Characterised by absolute or varying degree of generalisability
- Quantitative, as it draws on measurable evidence

Interpretivism

- Considers that each phenomenon is unique and is controlled by variables such as time, location and culture.
- No two situations are identical.
- No reliance on postulates of natural kinds, constancy or determinism.
- Essentially subjective, where the content of research and the way it is pursued is indicative of researcher's intention.

3.2.2 Research Approaches

The two broad methods of reasoning are usually discussed in the literature as the deductive and inductive approaches. Deductive reasoning starts from the more general to the more specific. This type of reasoning is informally called the top-down approach. Its starting point is the consideration of existing theories about the topic of interest then narrowing it down to more specific hypotheses. These hypotheses are then tested by collecting data to discourse the research hypotheses.

The inductive reasoning mechanism is different, as it starts from certain observations, examines patterns in the observations, followed by postulating tentative hypothesis to proposal of theories and models that account for the observations. In this research, a top-down approach was applied as illustrated in Figure 3.2 below.

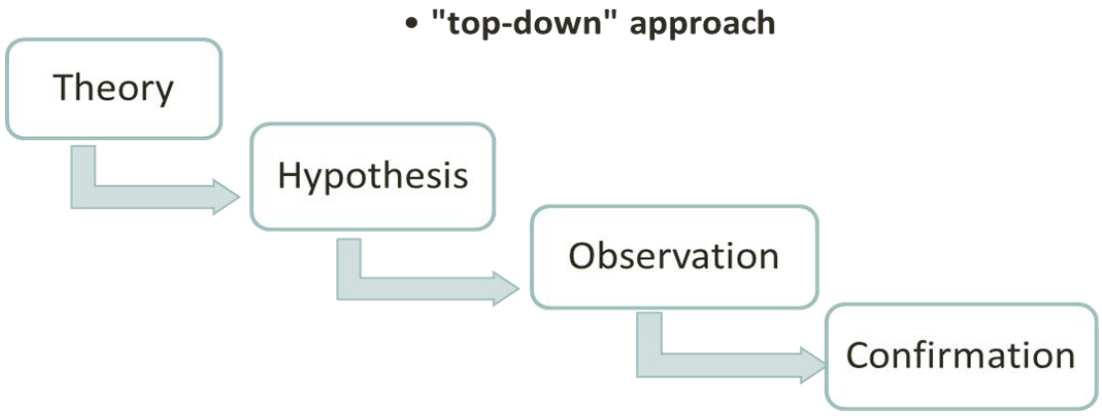

Figure 3.2: Top-Down Approach

According to Saunders et al. [214], deduction involves the development of theories and the scientific testing of hypothesis facilitating the deduction of information from the data. A survey strategy is usually linked to the deductive approach [218]. It eases the transfer from theory to data, thus preserving the independence of the researcher from the field of study. This deductive approach is linked with the quantitative methodologies and represents the positivist approach. On the contrary, the inductive approach is allied with qualitative research methodologies. It provides a more flexible structure to allow changes to the research and less anxiety with the need to generalise.

3.2.3 Research Strategy

The research strategy for this study is to use a quantitative method which is carried out in one phase. This phase is the online survey conducted to collect primary data from sources including 186 organisations in Ireland, UK and USA, as well as from organisations in the North Africa and Middle-East regions.

3.3 The Originality of the Study

This study aims to contribute to knowledge in numerous ways. Firstly, it examines and explores in a detailed and comprehensive manner the e-procurement technology adoption process in an Islamic context. Such examination could be helpful to investigate the influence of managerial practices within a specific cultural context on organisations' ability and strategy to accept and adopt e-procurement. The research studies previously performed on e-procurement were focused on specific areas such as adoption, implementation, drivers and barriers of e-procurement [11, 58, 219]. However, a strong need exists to perform research about e-procurement acceptance and adoption in the context of a particular culture or religion. Secondly, since existing literature focuses mainly on the buyer side of e-procurement, this research will focus on both buyers and suppliers. A third contribution of this research is to provide understanding of the challenges that organisations working with Islamic Sharia provisions might face in e-procurement adoption. Existing literature has not considered the effect of factors such as culture, religion, political and traditional perspectives can have on the success of e-procurement adoption [220].

Finally, the fourth contribution is that it further investigates the relationship between organisation leadership and facilitators. This will give procurement departments in organisations

the opportunity to understand the importance of e-procurement from a change management point of view and also provide insight into how this strategy works.

A study based on geopolitical conditions influencing the e-procurement system in Malaysia reported that top management support, organisation facilitators and organisational leadership are pivotal factors for a successful use of e-procurement [190]. In this research, these factors have been considered for the development of E-PAM, but in the context of organisations and users observing RIS. Table 3.1, summaries and presents the theories developed, empirical evidence, research method, research context and knowledge of practice that involve the contributions made by this research thesis.

Table 3.1: Summaries of the original contributions made in this research

	Supported	**Developed**	**New**
Theory	The Technology Acceptance Model (TAM) explains the adoption of IT that has been developed by Davis [190]	Organisational facilitators and Organisational leadership factors [190]. Top management support	Developing a new theoretical model (E-PAM) in an emerging research area. Addressing the relationship between CSFs, challenges, benefits &Rules of Islamic Sharia
Empirical Evidence	Supporting empirical studies and research related to relationships between the nine factors in the research model	Application of e-procurement organisations to different research contexts	The first application of the mediating of Rules of Islamic Sharia in E-PAM
Method	Quantitative Methodologies	Online Survey	Application to new cultural condition (RIS)
Context	Supports the previous studies which have examined the adoption of e-procurement within organisations	Organisations observing RIS	Managers and key positions in organisations work with RIS
Knowledge of Practice	Confirms the value of the growing body of work examining the application of CSFs and challenges the method in organisations	Study based on practice of e-procurement in organisations following Islamic Sharia's provisions	New contributions to research by examining the new factor RIS

3.4 Conceptual Model (E-PAM)

Considering all the models presented in Chapter two, there is a need for the development of a new model that could help to adopt and implement e-procurement in compliance with RIS. In this study, a new model is proposed that is based on all the important factors contributing to/or affecting the successful adoption of e-procurement in organisations which are compliant in Islamic law. The proposed new model, which is presented in Figure 3.3, is composed of seven independent factors that drive two mediators, and one dependent factor driven by the two

mediators. The seven independent factors selected for the model include perceived usefulness, perceived ease of use, organisation facilitators, organisation leadership, critical success factors, barriers, and challenges, and benefits. The two mediators driven by the independent factors are attitude and Rules of Islamic Sharia. These mediators moderate the acceptance and adoption of e-procurement by users and organisations observing RIS.

As shown in the research model (E-PAM) in Figure 3.3, it is important for people to demonstrate an objective towards the adoption of e-procurement technology (E-PT), and the objectives vary from country to country and in different industrial sectors.

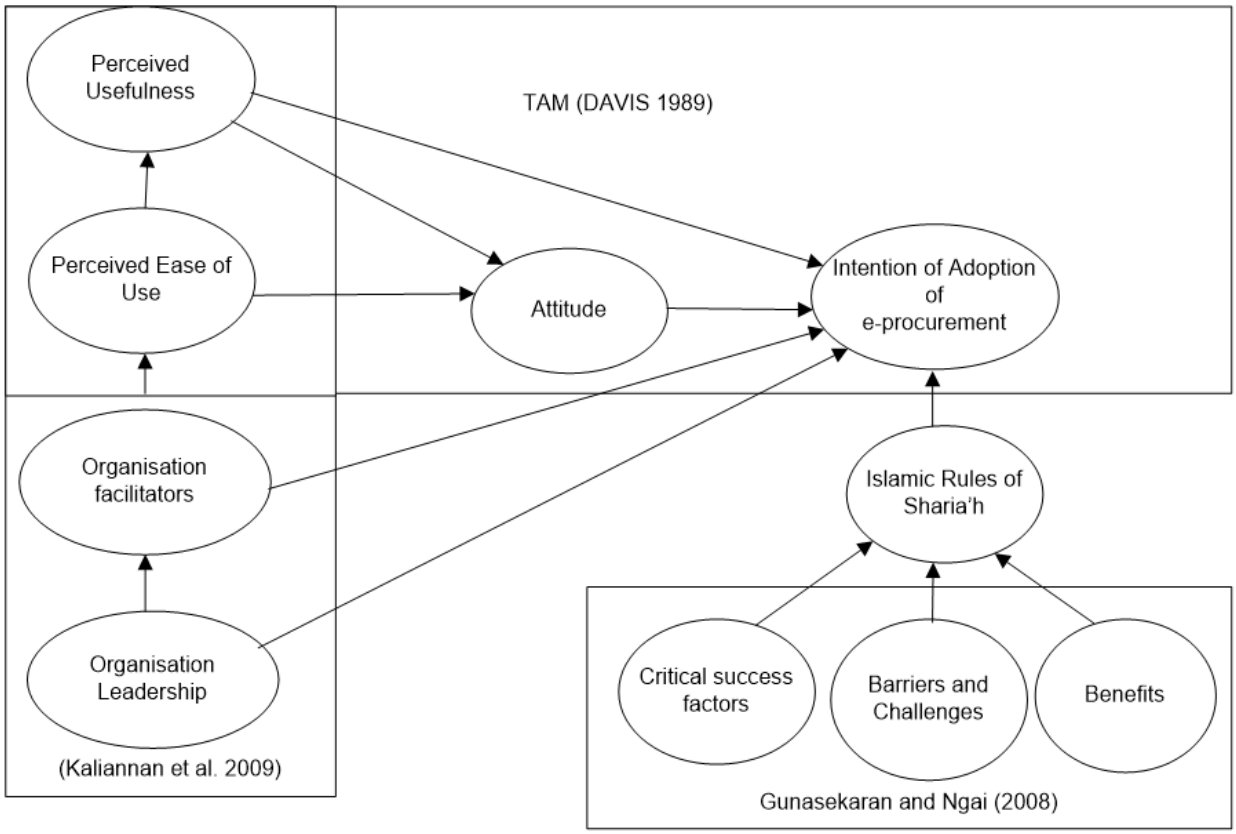

Figure 3.3: Electronic Procurement Adoption Model (E-PAM)

There are a number of cultural and personal factors that affect the attitude towards e-procurement adoption. The Islamic religion provides RIS that govern the financial transactions in the Islamic world. The Islamic laws prohibit the acceptance of a specific interest and fees on money lending

and, as such, any excess monetary consideration must be done in compliance with RIS. Figure 3.4 shows the part of the research model that is influenced by RIS.

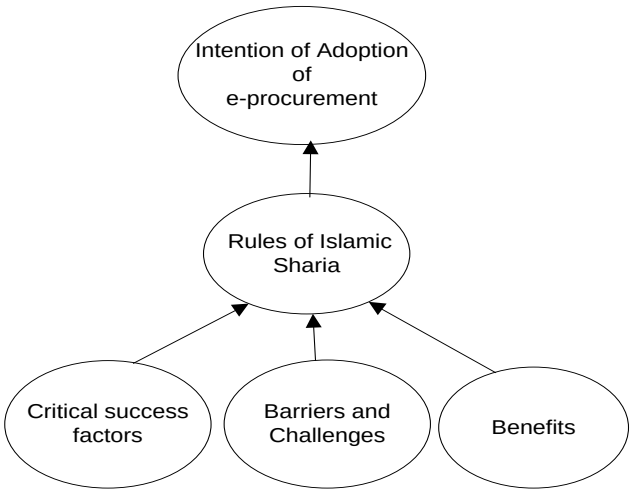

Figure 3.4: RIS mediator in newly developed model (E-PAM)

3.4.1 E-PAM Factors

The newly designed E-PAM model correlates different factors specifically affecting e-procurement adoption by a business that follows Islamic provisions on banking and trade. The contributing factors selected to be included in this model are described in the following sub-sections.

3.4.1.1 Perceived Usefulness

The perceived usefulness factor refers to the perceived behavioural control. It is well known that perceived usefulness significantly affect the overall adoption of e-procurement by a company. A study has shown that the factors of perceived behavioural control predict the acceptance of such technologies by a person or a company [111]. In a case study of an Australian city council, the importance of perceived usefulness for the council staff was highlighted [221]. The study showed that in addition to other factors, such as system usefulness and involvement of employees, the staff members' perception of ease of use and usefulness of the e-procurement system is extremely crucial and important for them to both accept and adopt the system.

3.4.1.2 Perceived Ease of Use

The perceived ease of use can be measured with the reduction in time observed for carrying out certain activities via the e-procurement system. The time taken by an organisation to procure items traditionally can be compared to the respective industry benchmark or standard for the same activity using an e-procurement system within another organisation. This comparison can then be used to determine if an e-procurement system is quicker than traditional procurement practices and makes it easier for the users to conduct contracting and tendering processes. Additionally, the reduction in time can also be measured to focus on the employees' perception of usefulness within the organisation.

Therefore, consideration of ease of use and perceived usefulness in E-PAM could form the basis for developing a strong questionnaire that consists of a comprehensive scale to measure if the e-procurement system is easy to use and useful for an organisation in terms of time and reduction of effort. The scales can provide the levels of perceived usefulness as ranked by the employees questioned. In this way, the impact and the perception of ease of use and usefulness on the adoption of e-procurement system can be quantitatively measured by E-PAM.

3.4.1.3 Organisation Facilitators

Organisation facilitators are the people, other than the top management, who help in the execution of the policies and systems adopted by the people who are in the positions in the organisation. Singh and Punia [222] demonstrated various factors affecting the adoption of e-procurement by the employees of an organisation. The authors make use of the technology acceptance model (TAM) to demonstrate how the behaviour and attitudes of the employees affect their overall adoption of an e-procurement system. Rahim [221] highlighted the role of organisational culture and demonstrated that the organisational culture emanates from the culture of its employees. Considering organisations following the Islamic Sharia's provisions, the culture of the facilitators should also be accounted for. Therefore, organisational facilitator factor would be a factor that could affect the adoption of e-procurement and included in the E-PAM.

3.4.1.4 Organisation Leadership

The executive management team decides on setting the goals and vision for the company and they play a crucial role in making decisions. These people are responsible for developing policies, rules and regulations related to e-procurement adoption in the system. Organisation

leadership are people in key positions to determine the requirement and strategy for adoption of e-procurement systems. Pires and Stanton, [223], have taken the examples of Australian companies in order to understand the impact of a company's leadership on e-procurement adoption. The study concluded that the adoption rate of e-procurement in Australia is low because of a lack of organisational leadership strategies for e-procurement adoption and an unavailability of predictive model of e-procurement adoption. Leenders, et al. [224] demonstrates that procurement is a set of different activities that go hand in hand and are usually governed by the top management leaders of the firm. Hence, the attitude and the beliefs of the firm's leaders also significantly affect e-procurement adoption. Lancioni, et al. [225] showed that support from the top management of an organisation is essential in order to make changes in the system of work and to ensure that the company is adopting the system.

3.4.1.5 Critical Success Factors

In consistency with the above literature review and the discussed factors, researchers have identified certain critical success factors (CSF) that facilitate e-procurement adoption. Mayer, et al. [226] identified trust as a CSF, as the employees need to have trust and faith in the technology in order to be able to adopt it in a more efficient and accessible manner. The trust of employees was considered in that study as characteristics of the trustor (employer), the trustee (employee) and the risk involved in the adoption procedure. In addition, other factors such as information quality and user acceptance have also been identified as important in another study [227]. These studies showed that a new technology for a system will be readily accepted only when the users are ready to accept the changes in the system and when they gain significant amount of information about the changes. To make the users open to new technologies, the employees should be educated about the CSF of the e-procurement. System integration, risks involved and staff training are also crucial for facilitating the adoption of e-procurement by the employees [228].

As explained previously in Section 2.2, the most important success factors for the implementation of e-procurement are supplier and contract management, end-user behaviour and e-procurement business processes, and Information and e-procurement infrastructure [88].

3.4.1.6 Challenges and Barriers

There are various technical and strategic challenges that will make it difficult to use e-procurement technology within any organisation. The common technical challenge is that most suppliers do not practice e-procurement system. This non-compliance by suppliers is one of the challenges leading to a negative effect from using the e-procurement technology. The procurement agreement procedures between RIS observing and non-observing organisations are considered important technical and strategic challenges in acceptance and adoption of e-procurement by RIS observing users.

3.4.1.7 Benefits

A number of research studies investigated the e-procurement benefits [51], [57, 80]. Some researchers have included benefits (BNF) as a factor in their e-procurement adoption model. This research is focused on the measurement of thirteen significant benefits. These benefits were discussed in particulars in Chapter two Section 2.6.3 with the literature support.

3.4.2 Mediators

The newly designed E-PAM model correlates the above mentioned factors affecting the e-procurement acceptance and adoption directly. Attitude and Rules of Islamic Sharia (RIS) are the two mediators newly introduced in this research to build the E-PAM. These mediators control the effect of contributing factors to demonstrate the adoption of e-procurement. The attitude is mediating four organisational factors consisting of usefulness, ease of use, organisation facilitators and organisation leadership. The RIS mediates three important contributing factors, including CSF, CHB, and BNF. The research model E-PAM is designed and executed in a way to mediate variables selectively as per requirements.

3.4.2.1 Attitude

Attitude is the key mediator considered by most of the existing models for new technology acceptance as described in Chapter two. In the model designed in this research, attitude mediates the contributing factors related to general behaviour of employees of the procurement department and the attitude of top level management who possess the power to make decisions. The attitudes of both procurement and management departments demonstrate the ultimate intention of the adoption of e-procurement.

3.4.2.2 Rules of Islamic Sharia

Rules of Islamic Sharia offer special provisions, rules and regulations defining concepts and the operation processes of organisations. These provisions, rules and regulations of Islamic Sharia prohibit any kind of transactions involving betting a sum of money. Furthermore, the Sharia rules prohibit any transactions leading to earning interests on loaned money. Interest in Islamic terms is referred to as *Riba* (usury). *Riba* signifies the stipulated excess over and above the principal that a loanee is required to pay to the lender [229]. Any charge for the privilege of borrowing money is essentially forbidden in Islamic Sharia [230].

Hence, the main question that arises concern the way entities make money under this particular law. The banks following RIS can earn profit mainly by sharing the risks with their consumers and then dividing the profit. The main items or investment options permitted or defined under the Islamic laws are *Ijara* (rental), *Ijara-wa-iqtina* (rental and possession), *Mudaraba* (speculation), *Murabaha* (sharing in profits) and *Musharaka* (partnership). While in *Ijara* the bank makes a purchase and then leases it back, under *Mudaraba* financial experts are hired to help in generating profits that are then shared [231].

All these laws are based on one basic factor which is the lack of importance given to money. Money is simply considered to be a medium of exchange that has no intrinsic value. Hence, there are some specific ways in which the companies can share their risks with the Islamic banks and earn profits. They can enter into an agreement called *Musharaka*, wherein the banks and the owners invest equally into a venture and the returns and profits are then shared among them [232].

The Islamic provisions define and require the people to be extremely productive but also lawful and hence not only do the businesses to earn money but they also do it in a way that is extremely fair to society. The Islamic laws promote trading and business activities as highly important, and also allow for the concept of e-commerce to be developed and implemented while observing RIS [233]. The importance and significance of the e-commerce is self-evident because it facilitates accuracy, flexibility, convenience and speed. The RIS provide guidance to traders and businessmen on how to perform business ethically and avoid deception [188]. Therefore, by including RIS as a mediator in an acceptance and adoption model for e-procurement could help individuals and organisations observing RIS to use state of the art e-procurement systems.

3.4.3 Adoption of E-Procurement (AEP)

The output variable of the newly developed E-PAM is the Adoption of E-Procurement (AEP). When the organisations are surveyed, the collected data in form of percentage of respondents demonstrating a willingness to adopt the e-procurement process can be processed statistically as explained in Section 3.7. The AEP variable depends upon the two mediators. These mediators drive the final output of the model and they are driven by the factors explained above.

3.4.4 Research Hypotheses

In this research, thirteen hypotheses have been made to correlate the E-PAM variables to describe the adoption of e-procurement. As discussed in section 3.4.1 and 3.4.2, the E-PAM consists of nine contributing factors and two mediators. The hypotheses were made to establish and verify the link between these variables. The hypotheses were tested using online questionnaire that has been described in section 3.5 of this chapter. The online questionnaire consists of 23 questions and questions from number 10 up to 19 are linked to variables. Table 3.2 provides a map of the links established between each hypothesis (see section 2.11), related variables and related questions asked from questionnaire participants.

Table 3.2: Research hypotheses and Influenced Factors

Hypothesis	**Influencing factor**	**Related question in questionnaire**	**Influenced factor**	**Related question in questionnaire**
Hypothesis 1	PU	11	AEP	19
Hypothesis 2	ATT	10	AEP	19
Hypothesis 3	OF	12,13	AEP	19
Hypothesis 4	OL	14	AEP	19
Hypothesis 5	PU	11	ATT	10
Hypothesis 6	PEOU	15	ATT	10
Hypothesis 7	PEOU	15	PU	11
Hypothesis 8	OF	12,13	PEOU	15
Hypothesis 9	OF	12,13	OL	14
Hypothesis 10	RIS	16	AEP	19
Hypothesis 11	CSF	18	RIS	16
Hypothesis 12	CHB	17	RIS	16
Hypothesis 13	BNF	22	RIS	16

3.5 Questionnaire Development

An online questionnaire survey is the main method used in this research. The questionnaire was distributed randomly to 550 organisations based in Ireland, the UK and USA – as the western respondents. Additionally, Arab and Islamic organisations from Libya, Saudi Arabia, United Arab Emirates and Malaysia participated in the study. A total of 186 organisations provided responses to the questionnaire between April 2014 and November 2015.

3.5.1 Pilot Survey

A pilot survey was conducted which concentrated on four main sections of the study, and this was distributed to assess public procurement in the Libyan oil and gas sector. The pilot survey was sent to 50 employees via Survey Monkey in different organisations in Libya. The four sections of the survey were on:

1. Demographic profile, such as number of employees, average annual revenue and general activities.
2. Respondent profiles (job position).
3. Current status of e-procurement in the organisation (availability of relevant tools and employer's influence, etc.).
4. Salient factors (critical success factors, benefits, and barriers).

The period of conducting it was one month and 21 employees responded to the questions asked in the survey. Out of the 21 responses, 16 were complete responses while the remaining five were incomplete.

3.5.2 Pilot Survey Results

Although the survey was based on a small sample size, it was sufficient to obtain some interesting insights which would be useful to further develop the framework of the main survey. Only ten questions were asked in this small sample survey as a free trial of the Survey Monkey website. These questions were divided into two sections; first sections from question 1 to question 4 were asked about the personal status of the employee, while the second section asked about the organisation status.

- Question 1 in this pilot survey led us to the design of question 2 of the main survey which was asked about the number of employees in the organisation,
- Question 2 related to question 4 and question 7 of the main survey about the industry type
- Question 3 connected to the same question 3 in the main online survey and asked about the organisation's turnover,
- Question 4 linked to question 1 of the main survey about job position
- Question 5 associated to question 20 of the main survey that questioned about the tools of e-procurement,
- Question 6 correlated to question 19 of the main survey about the influence of the acceptance of adoption a new technology,
- Question 7 interrelated to question 21 in the main survey which examined about the current status of e-procurement
- Question 8 allied to question 18 of the main survey asked about critical success factors
- Question 9 linked to question 17 of the main survey about barriers and challenges faced the adoption of e-procurement, and
- Question 10 linked to question 22 of the main survey which examined the benefits of e-procurement.

The results of the pilot survey were used as a platform for designing the main survey of the study. It illustrates very important numbers related to the adoption of e-procurement in organisations. For example, question 1 show that 33.33% of the participants were working in big size organisation which had 3000 employees or more, and 23.81% working in organisations with 500 employees or less. Answers to question 2 show that 50% of respondents were working in oil and gas industries. Question 7 shows that 80% of the workers were in leadership positions. An interesting observation from the survey was that 70% of the respondents have little or no consideration of adopting e-procurement. This might be responsible for the lack of acceptance of such new technology in the North Africa region. These results also matched the result of question 21 in the main survey which indicates that 40% of the participants started using e-procurement after 2010.

The full information of the pilot survey is presented in Appendix A.

3.5.3 Questionnaire Structure

One of the main ways in which quantitative research can help prepare the ground for the research questions is through the selection of companies to be surveyed. Occasionally, researchers need to collect two types of data. The description of the organisations and the employees are considered to be important as it provides information regarding the industrial sector, company size and its financial status along with the qualification and expertise of the employees. The description of the employees allows researchers to gain access to the perspectives of the people they are studying. In addition to that, the data collected by the survey could be processed statistically to prove the hypotheses. The quantitative data allow researchers to explore specific issues in which they are interested.

In this research, the questions have been designed in a manner that highlights the behavioural aspects of the employees and organisations towards the adoption of e-procurement. The questions reveal the attitudes of the employees towards the system and assess their level of happiness about the change. Also, the readiness of the employees with respect to their skill sets and training can be assessed. The willingness of people to adopt or implement e-procurement has been measured on a Likert scale. Respondents were asked about their opinions from a cultural perspective on an e-procurement system, as this can also give an overview of the impacts and role of these different factors in the adoption of such technology.

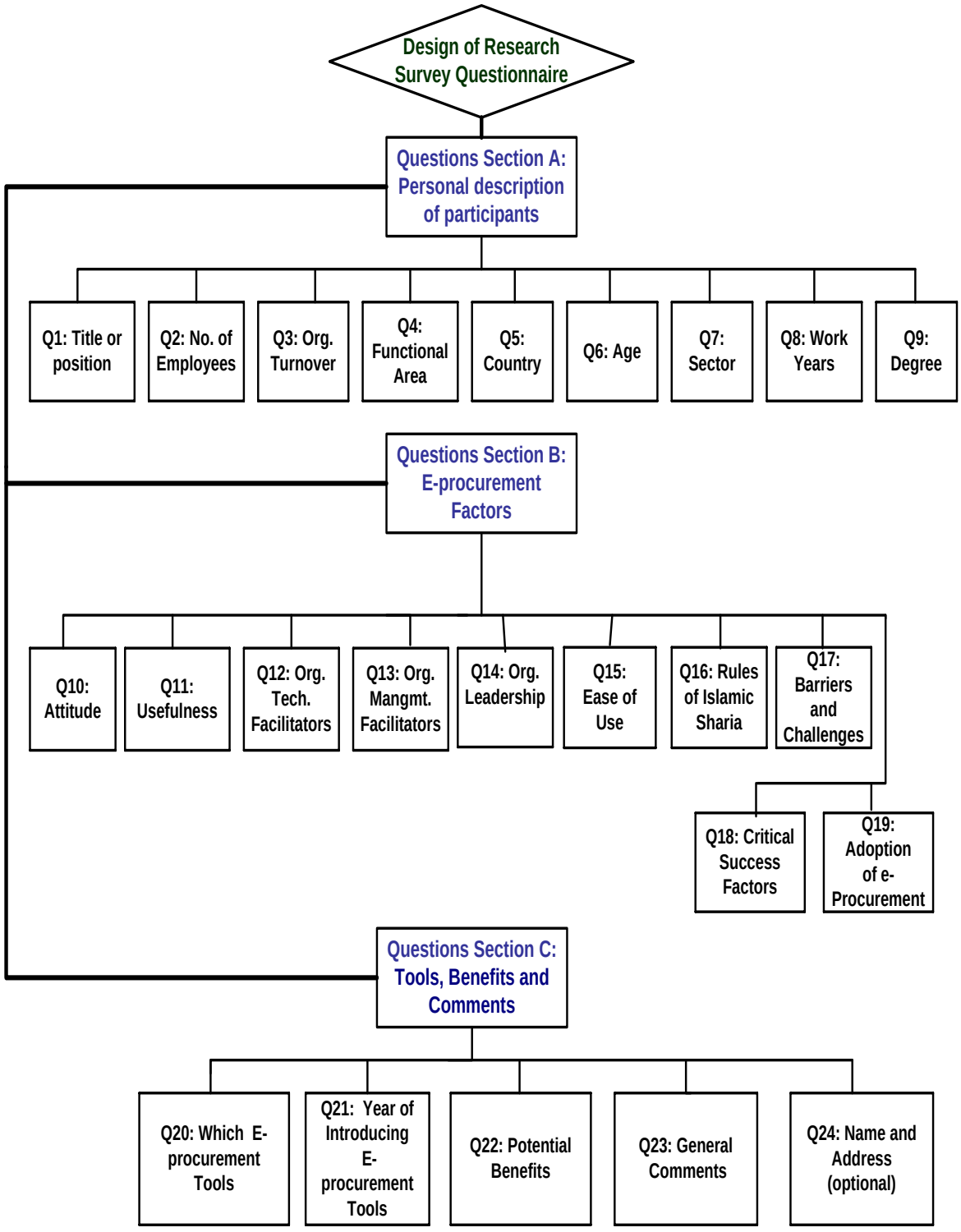

Figure 3.5: Online questionnaire structure based on E-PAM sent to survey participants

3.5.4 Survey Questions

The structure of the survey is presented in Appendix B. The online survey contained 23 questions which were grouped into three sections. The first section contained nine questions (Q1-Q9) that were designed to collect information to develop a profile of the respondents and their organisations. The second section consisted of ten questions (Q10-Q19) that were designed to elicit information to test the research hypotheses and the validity of the proposed E-PAM model. The third section, which consisted of five (Q20-Q24), asks about the e-procurement tools and the length of time for which they have been in use at the organisation, in order to estimate their experience and expertise. It asks for the e-procurement tools to be ranked based on their levels of benefits in achieving company objectives. Respondents were also asked to provide optional comments on the survey and themselves. The complete questionnaire is presented in detailed in Appendix B.

3.6 Questionnaire Distribution

The impact of the factors listed in the research framework was measured via a cross-sectional survey of top level management and the facilitators of 186 different organisations. The descriptive mode of analysis used here would help in studying the elements as they are and their true nature without any manipulation. Statistical Package for the Social Sciences (SPSS) and (AMOS) have been used by a number of researchers to analyse the data collected through online surveys [234]. In this study, SPSS and AMOS have been used for processing and analysing the responses obtained from the respondents. The factors that are measured and compared are the change in different culture and their effects on the procurement process before and after the adoption of e-procurement technology.

3.6.1 Online Questionnaire Distribution

The questionnaire developed in this study was distributed using Survey Monkey®. Survey Monkey® is an online survey platform which can be used to send surveys via web and social media. This platform provides real-time results and text analysis, as well as an SPSS integration facility. SPSS is statistical analysis software which is widely used for conducting market research and surveys.

3.6.2 Ethical Consideration

Bryman, et al., [207] demonstrated that it is important to consider the following potential ethical issues that could arise during the data collection process:

- Privacy: the rights of the people to refuse participation in the research study must be guaranteed.
- Confidentiality: the process of guaranteeing that no information sharing will occur without permission from the participant.
- Anonymity: participants should be allowed to choose whether they wish to participate anonymously.
- Management of the findings or results: guaranteeing that the research is based on ethical standards and that the information obtained from a participant will not be misused in a way that could affect them.

The above mentioned ethical issues were considered during the distribution of the questionnaire and the collection of survey data by keeping the data private and confidential. The data collected by the online survey has not been accessible to anyone beside the doctoral candidate and supervisors.

3.7 Data Collection

The data from completed questionnaires were collected using Survey Monkey®. The data were exported to Microsoft Excel sheets from Survey Monkey®.

3.8 Data Processing and Analyses

The data collected from the survey was processed and analysed systematically using the quantitative methods which are appropriate for such research studies [235]. The collected data was stored in two different groups. The first group of data was related to the information about the employees (survey participants) and brief description about their company background.

These descriptive data were processed for descriptive analysis. The statistical data collected from the respondents was statistically analysed using appropriate commercially available statistical SPSS software. Detailed descriptions of the methodologies used for data processing and analyses are presented below.

3.8.1 Descriptive Analyses

As explained earlier, the first nine questions of the online survey were related to descriptions of the respondents and their organisations. The respondents were categorised on the basis of their demographic details. These details provided insights on the respondents' age group, education, experience, industrial sector and the company size. The data collected by the online survey was exported to Microsoft EXCEL sheets in tabular form, such that graphs could be generated from them for better visualisation.

There are two tests performed on the descriptive data acquired from online survey.

3.8.1.1 Non-Response Bias

In any survey sample, some respondents are unwilling or unable to participate in the survey due to lack of knowledge in the specific area, lack of interest or lack of time. The non-response bias occurs when the response of the participants of the survey differ in meaningful ways from non-respondents [236]. There are various ways to test for non-response bias. In this doctoral study, respondents were categorised as belonging to one of two groups; early respondents were those who completed the survey in the first half of the study period and the remainder were categorised as late respondents. A chi-square test was used to confirm if non-response bias occurred in this study.

3.8.1.2 Reliability and Uni-Dimensionality Test

The quality of a study from any online survey depends upon the reliability and consistency of the data received. In order to measure the internal consistency of a study performed, Cronbach alpha estimate could be used that expressed as a number between 0 and 1. Cronbach alpha is a widely used index of test reliability. The value of alpha mainly depends upon the length and dimensionality of the test. Since this doctoral study depends upon the response of people that belong to different cultural, economic and social conditions, Cronbach alpha was calculated to establish the reliability of the study.

Three statistical methods were applied on the online survey data using tools described below.

3.8.2 Structural Equation Modelling (SEM)

Structural Equation Modelling is an analytical approach in which one can perform factor analysis and combine it with the linear regression models for validating the hypotheses of a theory. SEM is one of the most popular data analytic techniques for testing and validating survey data [237]. Many researchers in management and information technology fields use SEM and they have demonstrated that it is an appropriate tool for testing theories and combing the analysing of factors with linear regression [234]. SEM is a multivariate method that was used to assess the reliability and validity of the model measures. It was designed to test the theoretical framework or conceptual model of the study. Common SEM methods include discriminant validity, confirmatory factor analysis and latent growth modelling [10, 94, 238, 239]. Discriminant validity method is used to validate the independency of concepts that are supposed to be dependent upon each other. Confirmatory factor analysis procedure provides information about the accuracy of measured variables representing the number of constructs, while latent growth modelling is another statistical method commonly used to estimate growth trajectory.

There are a number of advantages of using SEM in analysing data collected from the survey. These are as follows:

1. SEM allows hidden variable models and isolated approximation of relationship between hidden factors and corresponding indicators, as well as between the factors themselves.
2. Using SEM, the measurement of global fit to collected data can be provided for complex models that are based upon huge number of equations.
3. SEM is a good alternative to straw-man testing of model that either reject or fail to reject the null hypotheses.

Partial Least Squares (PLS) and Linear Structural Relations (LISREL) are two prominent software packages often used with SEM modelling.

3.8.3 SPSS and AMOS

SPSS is a software application commonly used for analysing data collected by online surveys. The data can be transferred to SPSS from an excel sheet. SPSS provides various data statistics

such as descriptive statistics, t-test, frequencies and linear regression. AMOS is a software package used for conducting the structural equation modelling SEM analysis. It is an add-in of SPSS software made by IBM.

The graphical diagram of Structure Equation Model (SEM) representing the E-PAM could be drawn using AMOS. AMOS is a special software package for SPSS to perform structural equation modelling. The following steps were performed to draw the SEM on AMOS and upload the survey data obtained by online survey model.

1. SEM graphical designing using AMOS: the AMOS graphical user interface was used to draw the graphical diagram of SEM.
2. Reading data into AMOS: external data could be uploaded to the SEM using AMOS. The online survey data was exported to EXCEL sheets by Survey Monkey. The data from EXCEL sheets were read by AMOS and delivered to SEM graphical diagram.
3. Selecting analysis properties: the appropriate analysis properties were selected including a standardised solution, squared multiple correlations, the sample covariance matrix, and the covariance matrix of the residuals.
4. Model running and analysis: once the data was fed to SEM model, the model was run through AMOS.

3.8.3.1 Correlation Coefficient and Multicollinearity

The correlation coefficient is used to measure the strength of relationship between two constructs (variables). Therefore in models, the existence of a relationship among variables can be found by correlation coefficient. By measuring the correlation between two variables, it can be estimated that how much two variables could explain and affect each other. Multicollinearity is a statistical situation in which two or more variables have perfect or exact relationship. Such situation could expand the variances of the parameter estimates and could lead to lack of statistical significance of individual constructs although the model could be significant. The multicollinearity could be estimated by examining the correlation matrix.

3.8.3.2 Convergent Validity

Convergent validity parameter is mostly used in studies related to behaviour of a group which indicate that if two measures of constructs are related, then they should be theoretically related. Convergent validity used to measure the similarity between the individual items that are used to

measure the same construct. This measure gives an indication that individual items are well related and they together measure the underlying construct. Convergent validity was assessed using standardised parameter loading of the measurement items on their respective construct.

3.8.3.3 Discriminant Validity

Discriminant validity parameter is mostly used in studies related to behaviour of a group which indicate that if two measures of constructs are unrelated, then they should be theoretically unrelated. The evaluation of the discriminant validity upon success indicates that the assessment of a notion is not highly correlated with other assessment tests that are built to identify theoretically different notions. As Fornell and Larcker [252] describe discriminant validity exist if the items share more common variance with their respective construct than any variance the construct shares with other construct.

3.9 Summary

The research approach and execution of research procedure adopted for this study are explained in this chapter. The approach to be used in the development of a new model (E-PAM) for e-procurement acceptance and adoption by RIS observing users and companies was presented in relation to existing technology acceptance models. Thirteen hypotheses were outlined on the basis of E-PAM and an online survey questionnaire was constructed on the basis of these hypotheses. The approach to the distribution of the questionnaire to procurement experts in many countries through commercially available online survey platform Survey Monkey was discussed. The use of IBM SPSS and AMOS statistical software for graphical drawing of the structural equation model representing E-PAM was also described. Throughout this chapter, the methodology that has been utilised in the study which includes the newly designed research model (E-PAM), the contributing factors, research hypotheses, and the statistical analysis description has been demonstrated. All dependent and independent variables coupled with its role in managing variables in the current study are explained. The following chapter provides enough details regarding the descriptive analyses. Last but not least, the next chapter encompasses themes related to the in depth analyses of the research survey participants and provide many statistical details in number of tables.

Chapter Four: Descriptive Analysis

4.1 Introduction

This chapter explains in detail about the questionnaire which was designed in two parts. The first part involved nominal scale questions that were used to collect relevant information about respondents' demographics including age, educational level, number of employees, area of operations, work experience, industry, etc. The second part is comprised of questions related to Likert scales that were specifically designed to operationalise the constructs used in this research including attitude, usefulness, facilitators, leadership, ease-of-use, Rules of Islamic Sharia, barriers and challenges to e-procurement, critical success factors, adoption of e-procurement, and benefits. The Likert scale was based on five-point scaling method, ranging from strongly disagree to strongly agree. The questions pertaining to this survey were mostly adopted from pertinent literature and were modified specifically as per the research requirements.

This chapter summarises and analyses the nature of the data collected from the respondents. The chapter presents four important aspects of the data collected. The chapter first starts by presenting the characteristics of the respondents and their company. In the second part, it was examined if there was a significant difference between respondents' demography and their operations. Respondents' sector and adoption of e-procurement was also analysed to recognise if the adoption of e-procurement significantly differed among the different industrial sectors participated in the online survey. Afterwards in order to investigate if the likelihood of nonresponse occurred in the data due to early and late respondents, the analyses regarding non-response bias is presented. In the fourth part, the chapter presents the reliability and the uni-dimensionality analysis for the items and the constructs used in this research.

4.2 Demographic Details of the Respondents

Table 4.1: Demographic detail of individual respondents and their firm

Category	Respondent	Percentage (%)	Frequency
Designation	Sales/Marketing Manager	4.8	9
	Administrator	5.4	10
	Engineer	16.1	30
	Consultant	6.5	12
	Director/CEO	27.4	51
	Manager	17.7	33
	Proc. Manager	5.4	10
	Chief Executive Officer	1.1	2
	Chief Operating Officer	1.6	3
	Others	14	26
Respondents' age	Under 25	4.3	8
	25-35 years	16.7	31
	35-45 years	30.6	57
	45-55 years	27.4	51
	55-65 years	15.6	29
	Above 65	4.8	9
Education level	HND	3.2	6
	Diploma	7.0	13
	Secondary school	5.4	10
	Bachelor's Degree	34.9	65
	Masters	35.5	66
	PhD	8.1	15
	None	2	5
	Others	5.4	10
Work area	Engineering	14.5	27
	Operations	7.0	13
	General Services	5.9	11
	Financing	3.8	7
	Supplier	16.7	31
	Buyer	7.0	14
	Projects department	5.4	10
	General management	11.8	22
	Contracting & Tendering	13.4	25
	Business Advisory	8.6	16
	Others	10	19
Work experience	5 years or less	25.3	47
	5-10 years	23.1	43
	10-15 years	21.5	40
	15-20 years	12.4	23
	20-25 years	8.1	15
	25-30 years or More	8.6	16
	Others	0	0

Table 4.2: Demographic of respondents' firm

Respondent	Category	Percent %	Frequency
Firm size (in terms of number of employees)	500 or less	28.5	53
	1000	7.0	13
	1500	9.1	17
	2000	7.5	14
	2500	10.8	20
	3000 or more	17.7	33
Operating Country	Ireland	32.3	60
	UK	11.3	21
	USA	8.1	15
	Kuwait	2.7	5
	Egypt	0.5	2
	Libya	19.4	36
	UAE	4.3	8
	Saudi	4.8	9
	Malaysia	5.4	10
	Others	12.7	26
Turnover (in Euro)	1 million or less	4.3	8
	1-5 million	7.5	14
	5-10 million	7.5	14
	10-15 million	7.5	15
	More than 15 million	13.4	25
	Others		4
Industry	Oil & Gas	18.3	34
	Plastics & Rubber	1.1	2
	Metal & Mech. Eng.	1.6	3
	Chemical & Allied Products	2.7	5
	Food, Tobacco & Beverages	3.8	7
	Electrical and Electronic	12.9	24
	Wood and Furniture	1.6	3
	Stationery, Paper & printing	4.3	8
	Industrial equipment	6.5	12
	Automotive & Transportation	3.2	6
	Textile, Clothing & Footwear	2.7	5
	Clay & Building Ind. Products	3.2	6
	Water& agriculture	3.8	7
	Finance & Banks	4.3	8
	Management & Admin	10.5	19
	Others	25	56

Table 4.1 and Table 4.2 present demographic detail of individual respondents and their organisations' detail. In subsequent section, all these demographic details are discussed in detail.

4.2.1 Designation of the Respondents

Considering the significance of the source of the data or information received, respondent was emphasised to provide their designation/role within the organisation. Specifically, question asked was, "what is your title or position in the organisation?" Answer provided to this question is presented in Table 4.3, which shows that 27.4% of the respondents are director/CEO, 17.7 percent of them are manager, 16.1% are engineer, and around 10% of them are sales and marketing manager. Table 4.2 shows that the respondents are from both technical expertise groups and strategic position groups who can provide valid and reliable information. As we were interested in implementation of this e-procurement module, so that around 60 percent of the respondents were from top management of the firms who are chairman, Sales/Marketing Manager, Director/CEO and department Managers.

Table 4.3: Respondents' designation

Designation	Frequency	Percent
Sales/ Marketing Manager	9	4.8%
Administrator	10	5.4%
Engineer	30	16.1%
Consultant	12	6.5%
Director/CEO	51	27.4%
Manager	33	17.7%
Proc. Manager	10	5.4%
Chief Executive Officer	2	1.1%
Chief Operating Officer	3	1.6%
Other	26	14%

4.2.2 Respondent's Work Area

The questionnaire contained a question asking respondents to identify their work areas which was important to establish the credibility and authorisation of the information they provided. The question stated, "In what functional area do you work?" for which the answers from the respondents are presented in Table 4.4: Respondents' functional area. The answers showed that

the respondents work in various areas including engineering, operations, general services, financing, supplier, buyer, projects department, general management, contracting and tendering, and business advisory, reflecting a mixed opinion and the perspective on business related questions asked to the participants. There was hardly any dominant area sweeping the results of the survey towards one side. The lowest number of respondents from a functional work area was from finance that was 3.8% of the responses.

Table 4.4: Respondents' functional area

Area	Frequency	Percent
Engineering	27	14.5%
Operations	13	7.0%
General Services	11	5.9%
Financing	7	3.8%
Supplier	31	16.7%
Buyer	13	7.0%
Projects department	10	5.4%
General management	22	11.8%
Contracting & Tendering	25	13.4%
Business Advisory	16	8.6%

4.2.3 Age of Respondents

To know the maturity and experience of respondents a question was included asking “what age are you in?” Answers of respondents are shown in Table 4.5 Notably, 78.4 percent of the respondents were older than 35 years; 47.8% of respondents were older than 45 years of age while only 4.3% of respondents were under 25 years of age. It shows the respondents were having good experience, and their response and opinion should be credible and valid.

Table 4.5: Respondents' age

Age	Frequency	Percent
Under 25	8	4.3%
25-35 years	31	16.7%
35-45 years	57	30.6%
45-55 years	51	27.4%
55-65 years	29	15.6%
Above 65	9	4.8%

4.2.4 Work Experience of Respondents in Present Organisation

To estimate the depth of knowledge and understanding of the subject, a question was asked stating "how many years have you worked in your present organisation?" Their answers to this question are shown in Table 4.6: Approximately 74% of respondents had worked more than 5 years in present organisation while around 29% of them had worked more than 15 years in present organisation. From this information, it can be comfortably estimated that the respondents must be having a good knowledge and understanding in their area of work.

Table 4.6: Respondents' work experience in present organisation

Years	Frequency	Percent
5 years or less	47	25.3%
5-10 years	43	23.1%
10-15 years	40	21.5%
15-20 years	23	12.4%
20-25 years	15	8.1%
25-30 years or More	16	8.6%

4.2.5 Education Level of Respondents

To complement the estimate of depth of knowledge and understanding of respondents along with their age and year of work in present organisation, as discussed in previous sections, a question was inserted in questionnaire asking "what is the highest degree you have obtained?" Answers on education level of respondents are presented in Table 4.7. Responses constituted 35.5% respondents with Master's degree, 34.9% of them with Bachelor's degree, and 8.1% of total

respondents had Ph.D. degree. Therefore, it can be concluded that the respondents had very good education levels, and their opinion and understanding are valuable for the analysis.

Table 4.7: Respondents' education level

Education level	Frequency	Percent
HND	6	3.2%
Diploma	13	7.0%
Secondary school	10	5.4%
Bachelor's Degree	65	34.9%
Masters	66	35.5%
PhD	15	8.1%
None	5	2.7%

4.2.6 Firm Size

Firm size was considered based on the two parameters: number of employees and annual turnover. Both are presented below.

4.2.7 Number of Employees

For number of employees, the question was asked: "please provide information about your organisation's number of employees". The data is presented in Table 4.8. Most of the respondents were from companies with more than 500 employees, which constituted around 70% of the respondents. A considerable percentage of organisations, 17.7%, with employees more than 3000 responded to the questionnaire. This information conveys that the respondents in terms of number of employees were balanced. However, most of the respondents were from big organisations having more than 500 employees.

Table 4.8: Number of employees

Number of employees	Frequency	Percent
500 or less	53	28.5%
1000	17	7.0%
1500	14	9.1%
2000	20	7.5%
2500	33	10.8%
3000 or more	17	17.7%

4.2.8 Organisations' Turnover

To further profile the size of the organisations, respondents were asked to report the annual turnover of their organisation "what is your organisation's turnover?". The answers to this question are summarised in Table 4.9. Answers to this question contained excessive missing values as shown in Table 4.9. From the results, most of the respondents were from large turnover groups. Around 29% of the respondent organisations were from above five million turnovers. More than 13% of respondent organisations had turnovers more than 15 million. This observation combined with the number of employees discussed in previous section, it is worth noting that most respondents were from larger organisations in terms of number of employees as well as their turnovers.

Table 4.9: Turnover of respondents' firm

Organisations' turnover	Frequency	Percent
1 million or less	8	4.3%
1-5 millions	14	7.5%
5-10 millions	14	7.5%
10-15 millions	14	7.5%
more than 15 millions	25	13.4%
Total	186	100.0

4.2.9 Organisations' Country

E-procurement is largely dependent on extent of the technology use, and this use of technology and its perceived usefulness vary across different countries. Hence, it is important to know the country where the data is coming from. In questionnaire, a question was asked "In what country is your organisation based?" Answer to this question is presented in Table 4.10. From the responses, it was clear that the 60 respondents (32.3%) were from Ireland, 36 respondents (19.4%) were from Libya, 21 respondents (11.3%) were from the U.K., 15 respondents (8.1%) were from the U.S., 10 respondents (5.4%) were from Malaysia, 9 respondents (4.8%) were from Saudi Arabia, and 8 respondents (4.3%) were from the UAE. The 51.7% of responses were from Ireland and the U.K. It is also worth noting that 31.2% of the respondents were from Libya, UAE, Saudi Arabia, and Kuwait and 12.7% were also from other different Arab countries.

Therefore, the total of the responses from Islamic and Arab countries was almost 40% and the majority of the responses were from non-Arab countries.

Table 4.10: Organisations' country of operations

Country	Frequency	Percent
Kuwait	5	2.7%
Egypt	1	0.5%
Ireland	60	32.3%
UK	21	11.3%
USA	15	8.1%
Libya	36	19.4%
UAE	8	4.3%
Saudi	9	4.8%
Malaysia	10	5.4%
Others	23	12.7%

4.2.10 Organisations' Area of Operations

Priority to implement e-procurement may vary across industries, their practice, preference, necessity may also vary. So, respondents were asked, "In which sector does your organisation operate?" Table 4.11 shows responses of the question. Around 31% of the respondents were from oil & gas and electrical & electronic industry. Remaining responses came from wider range of industries, and the responses from each industry were below 7% of the total responses.

Table 4.11: Organisations' area of operations

Area of operations	Frequency	Percent
Oil & Gas	34	18.3%
Plastics & Rubber	2	1.1%
Metal & Mech. Eng.	3	1.6%
Chemical & Allied Products	5	2.7%
Food, Tobacco & Beverages	7	3.8%
Electrical and Electronic	24	12.9%
Wood and Furniture	3	1.6%
Stationery, Paper & printing	8	4.3%
Industrial equipment	12	6.5%
Automotive & Transportation	6	3.2%
Textile, Clothing & Footwear	5	2.7%
Clay & Building Ind. Products	6	3.2%
Water& agriculture	7	3.8%
Finance & Banks	8	4.3%
Management & Administration	19	10.2%

4.3 Demographic Details and Operations

The use of e-procurement is main dependent variable for this study. In this section, it will be investigated if there is significant difference in operations or opinion of respondents across the various types of respondents.

4.3.1 Firm Size and the Adoption of E-Procurement

As discussed above, this study considers firm size in terms of number of employees and turnover of the respondents' firm. Both are analysed in the section below.

4.3.2 Number of Employees

As described above, there were six categories of respondents in terms of number of employees. These categories are (1) 500 or less, (2) 1000, (3) 1500, (4) 2000, (5) 2500, and (6) 3000 or more.

To capture the information pertaining to adopt e-procurement, three questions were asked: (1) I am using/would use e-procurement technology for my procurement needs (AEP1), (2) using e-procurement technology for handling my procurement tasks is something I am doing/would do

(AEP2), and (3) I am seeing/would see myself using e-procurement technology for handling my procurement tasks (AEP3). The average responses from the survey participants regarding attitude towards e-procurement are present in Figure 4.1 (rated on a Likert scale from 1 - strongly disagree to 5 – strongly agree).

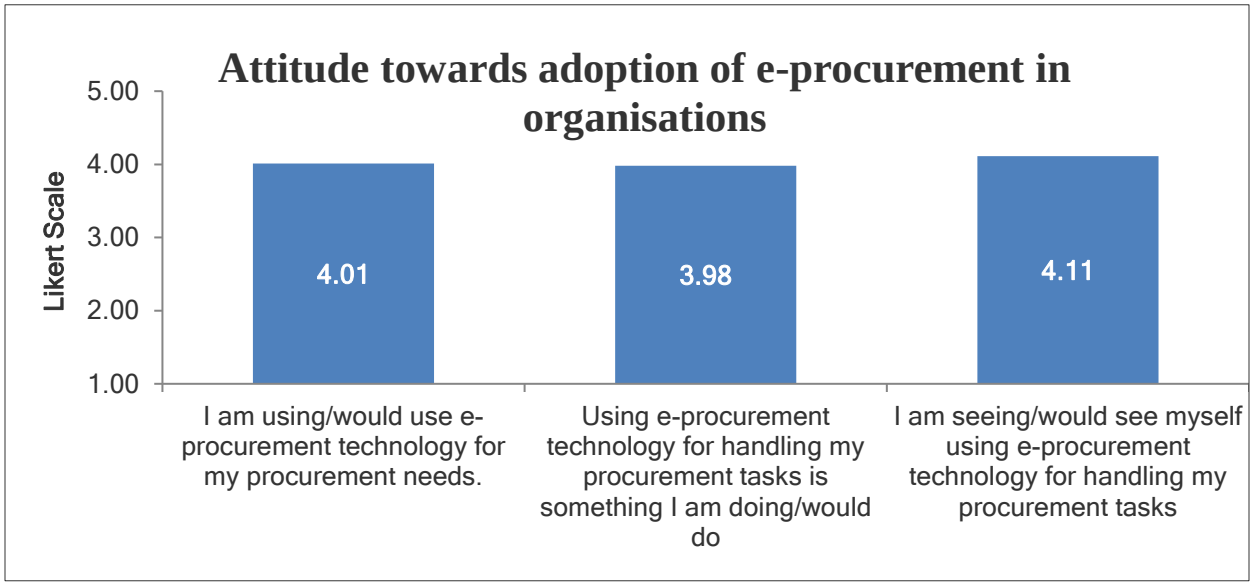

Figure 4.1: Survey participant response regarding attitude towards e-procurement

For all the three questions, chi-square test was conducted to verify the hypothesis. The chi-square test determines whether there is a significant difference between two categorical variables. If the X^2 value> critical value for significant level (normally set to p=0.1 for 90%, p=0.05 for 95%, p=0.025 for 97% and p=0.01 for 99% confidence). In this research, (p=0.05 for 95 %) has been used for the chi square test, for example AEP variable has p-value 0.189, 0.575 and 0.146 as shown in Table 4.12 below and Table 3 in Appendix (B). This test examines null hypothesis that there is no significant difference between the variables. Results of chi-square test are presented in Table 4.12 and Table 4.13. The chi-square value is called test statistic.

Table 4.12: Chi square test for number of employees to adopt e-procurement

	Chi square (χ^2)	Degree of freedom	p-value
AEP1	42.14	35	0.189
AEP2	27.92	30	0.575
AEP3	43.80	35	0.146

Table 4.13: Respondents and their opinion

	AEP1		AEP2		AEP3	
	4	5	4	5	4	5
500 or less	52.8%	22.6%	52.8%	20.8%	47.2%	30.2%
1000	84.6%	7.7%	69.2%	23.1%	46.2%	46.2%
1500	47.1%	35.3%	52.9%	23.5%	58.8%	29.4%
2000	50%	35.7%	64.3%	28.6%	57.1%	35.7%
2500	55%	40%	55%	35%	35.0%	60.0%
3000 or more	72.7%	24.2%	63.6%	30.3%	60.6%	36.4%

The p-value (For all the three questions, chi-square test was conducted to verify the hypothesis.

The chi-square test determines whether there is a significant difference between two categorical variables. The test examines null hypothesis that there is no significant difference between the variables. Results of chi-square test are presented in Table 4.12 and Table 4.13 the chi-square value is called test statistic.

Table 4.12 for all variables (AEP1, AEP2, and AEP3) are greater than 0.05. Therefore, the null hypothesis, H1, is accepted. This result conveys that there is no difference in the opinion of respondents to use e-procurement across organisations with different number of employees ranging from less than 500 to more than 3000. It means all size of companies have a consensus to use e-procurement.

Table 4.13 presents the opinion of each category of the respondent. The results show that most of the companies either agree or strongly agree on the use of e-procurement. Around 53% of the companies with employees 500 or less agree while 22.6% of them strongly agree to use e-

procurement. 72.7% of the respondents with employees 3000 or more agree while 24.2% of the respondents strongly agree on using e-procurement. Most of respondents from big companies agree on the adaptation to use e-procurement while some of them strongly agree on the same.

4.3.3 The Turnover

The turnover is another parameter to assess the size of respondents' firm. Five levels of turnover are used to assess the company's size: (1) 1 million euro or less, (2) 1-5 million euro, (3) 5-10 million euro, (4) 10-15 million euro, and (5) more than 15 million euro. To test the hypothesis, chi square test was conducted. The results of the chi square test are presented in Table 4.14 and Table 4.15.

Table 4.14: Chi square test for respondents' turnover to adopt e-procurement

	Chi square (χ^2)	Degree of freedom	p-value
AEP1	5.27	8	0.728
AEP2	16.67	12	0.162
AEP3	11.44	8	0.178

Table 4.15: Respondents and their opinion

	AEP1		AEP2		AEP3	
	4	5	4	5	4	5
1 million or less	62.5%	25%	62.5%	25%	62.5%	37.5%
1-5 million	71.4%	21.4%	50%	42.9%	71.4%	21.4%
5-10 million	57.1%	42.9%	57.1%	42.9%	50%	50%
10-15 million	64.3%	35.7%	92.9%	0%	28.6%	71.4%
more than 15 million	52%	44%	52%	44%	44%	56%

The results presented in the turnover is another parameter to assess the size of respondents' firm. Five levels of turnover are used to assess the company's size: (1) 1 million or less, (2) 1-5 million, (3) 5-10 million euro, (4) 10-15 million euro, and (5) more than 15 million euro. To test the hypothesis, chi square test was conducted. The results of the chi square test are presented in

Table 4.15 shows that the p-value of chi square test for all variables (AEP1, AEP2, and AEP3) are greater than 0.05. Therefore, the hypothesis, H2, is accepted. This result conveys that companies with different turnover ranging from 1 million or less to more than 15 million do not differ on the question of adopt e-procurement. It shows that companies with different turnover have a consensus over using e-procurement.

Table 4.15 shows that 62.5% of companies with turnover 1 million or less agree on using e-procurement while 25% of them strongly agree on using e-procurement. This finding is similar to the finding of firm size in terms of employees in which it was found that most companies (more than 70%) either agree or strongly agree on using e-procurement to procure goods/parts/material from outside.

The survey participant responses for question 10 to 18 and 20 to 22 are present in Figure 4.2 to Figure 4.13 (rated on a Likert scale from 1 - strongly disagree to 5 – strongly agree with the exception of Figure 4.12 where values are percentages).

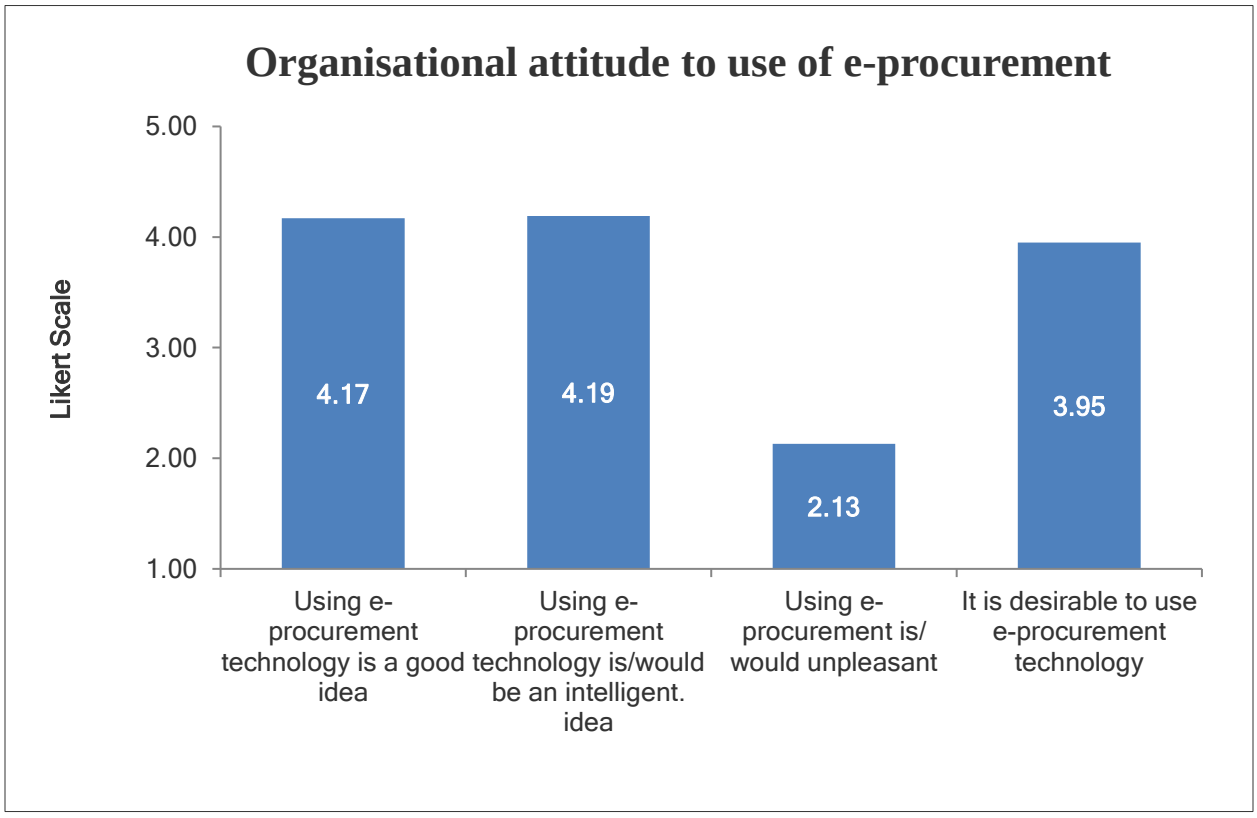

Figure 4.2: Survey participant response regarding e-procurement

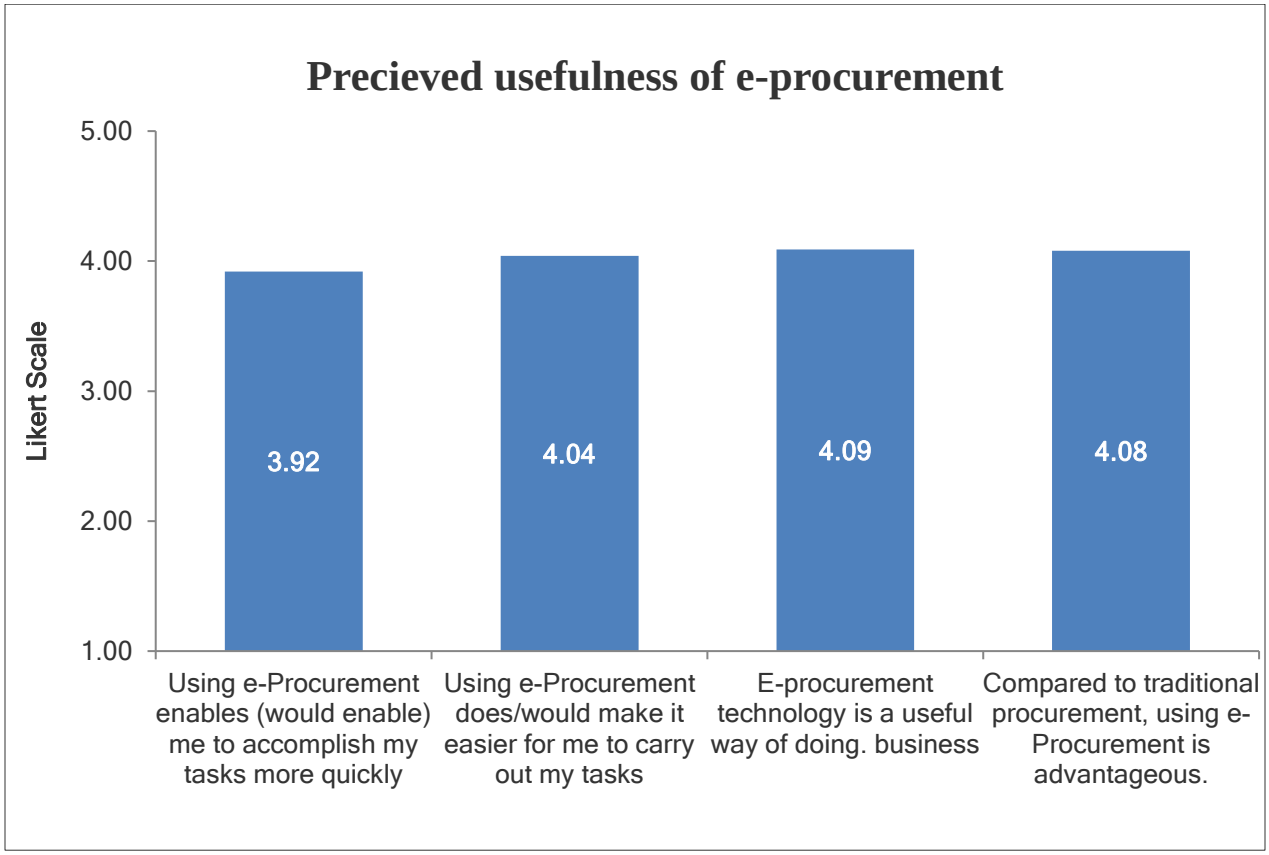

Figure 4.3: Survey participant response regarding adopt towards e-procurement

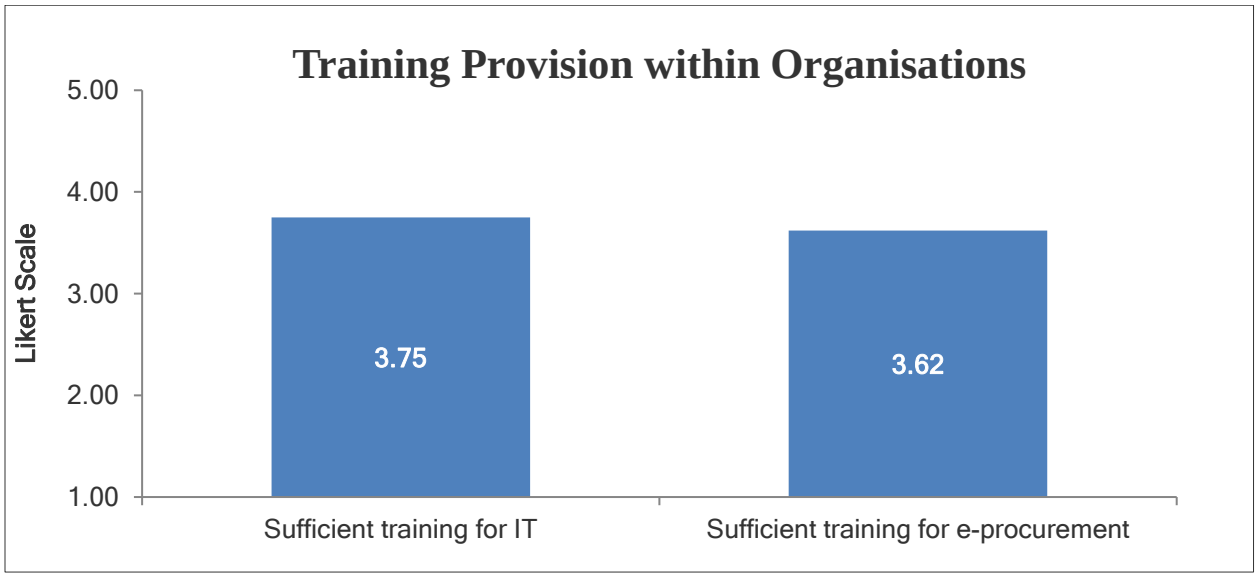

Figure 4.4: Survey participant response regarding training

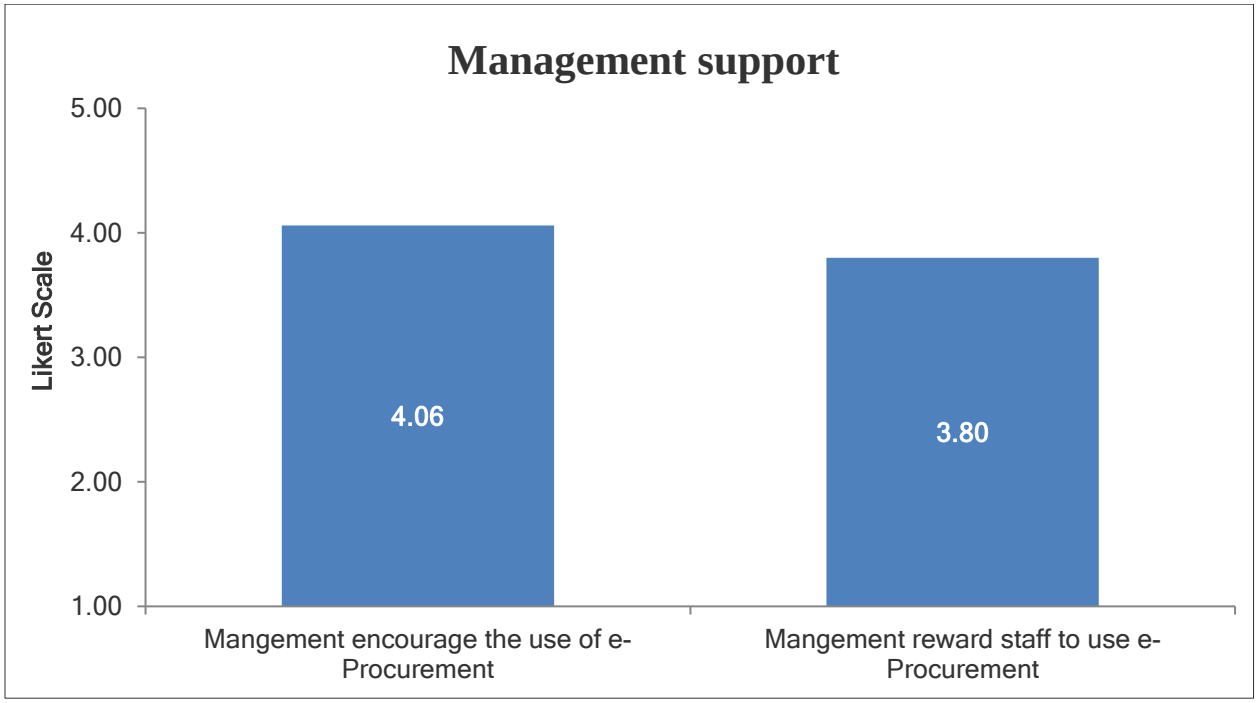

Figure 4.5: Survey participant response regarding e-procurement management

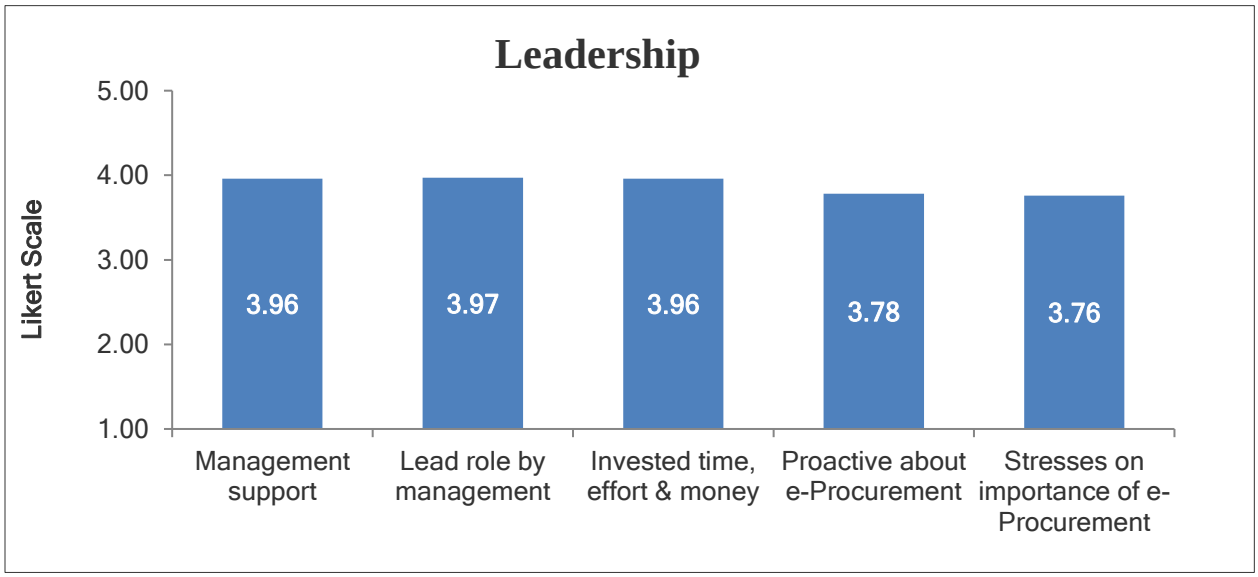

Figure 4.6: Survey participant response regarding leadership

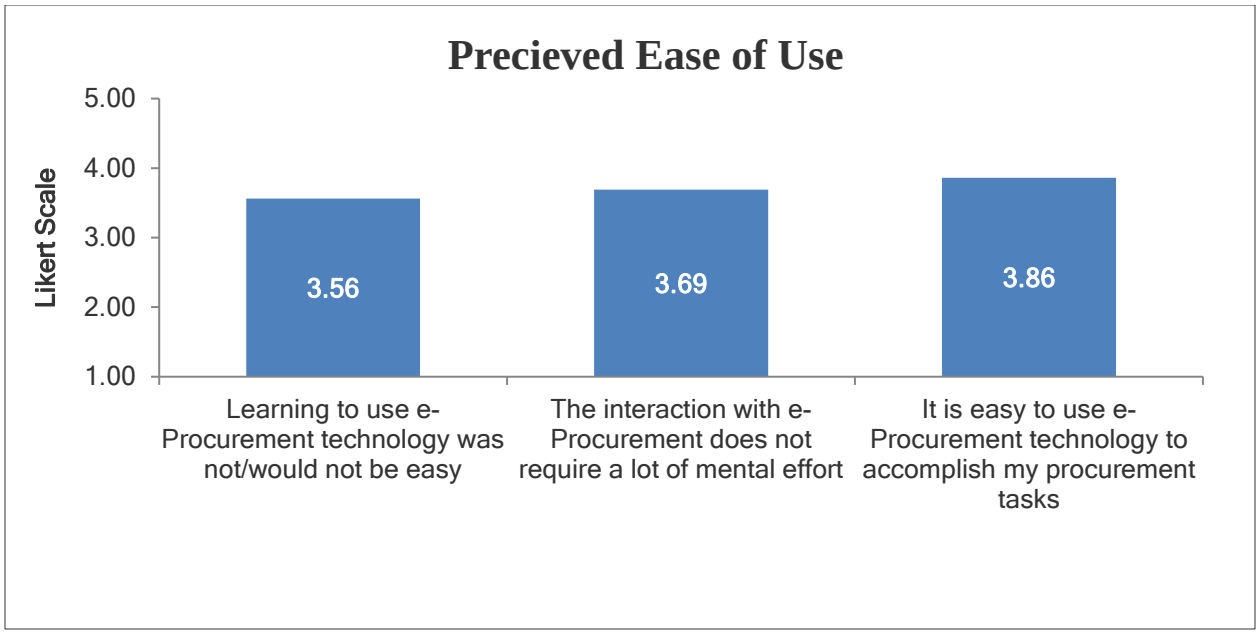

Figure 4.7: Survey participant response regarding e-procurement

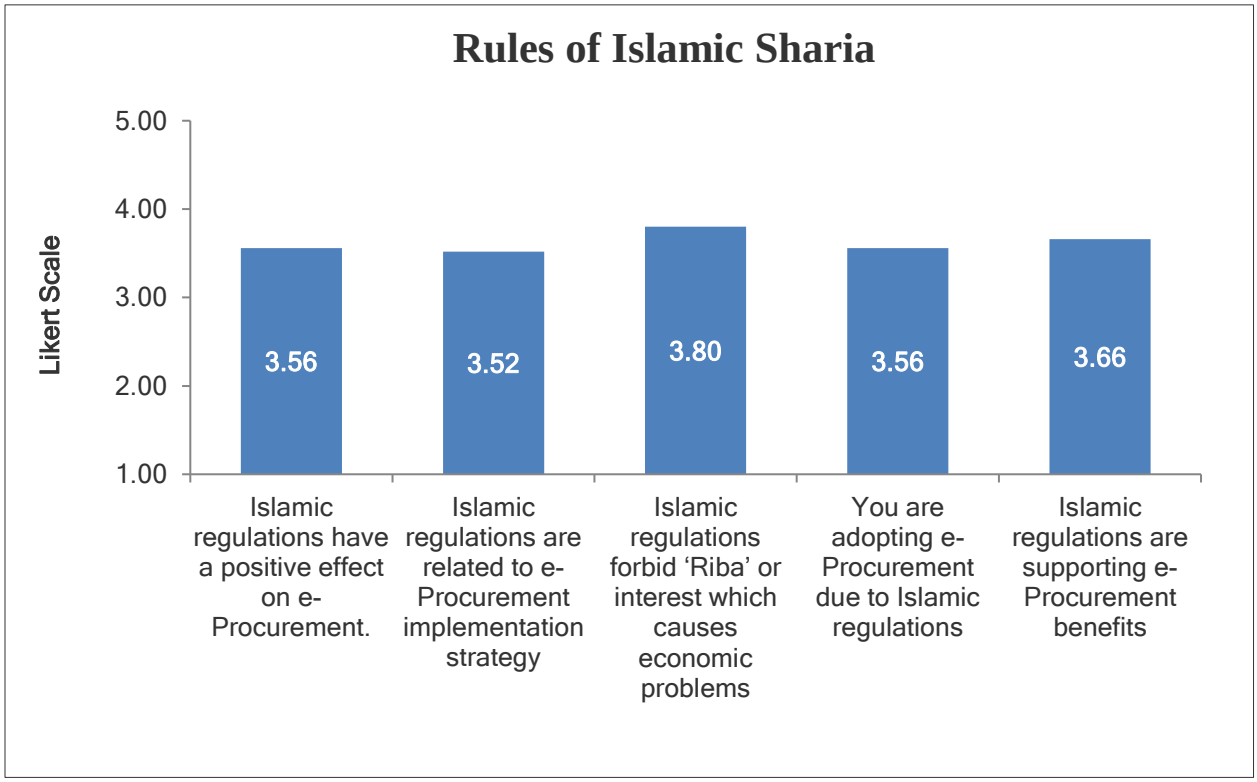

Figure 4.8: Survey participant response regarding RIS compliance

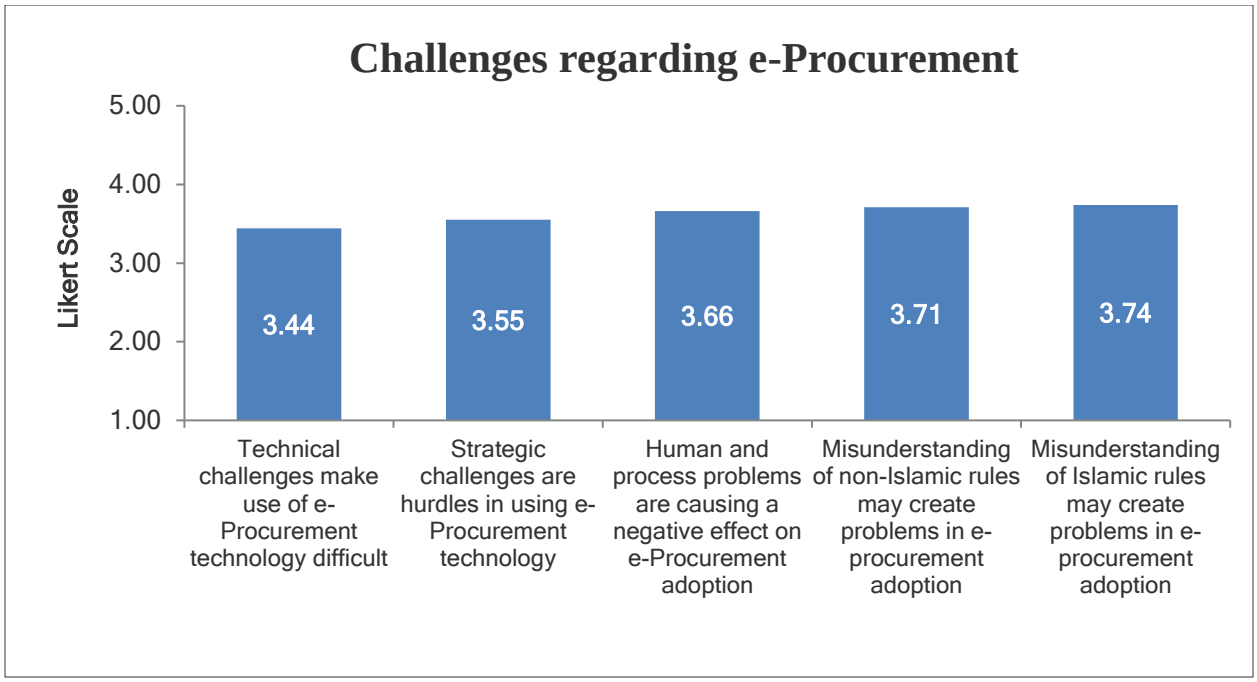

Figure 4.9: Survey participant response regarding e-procurement challenges

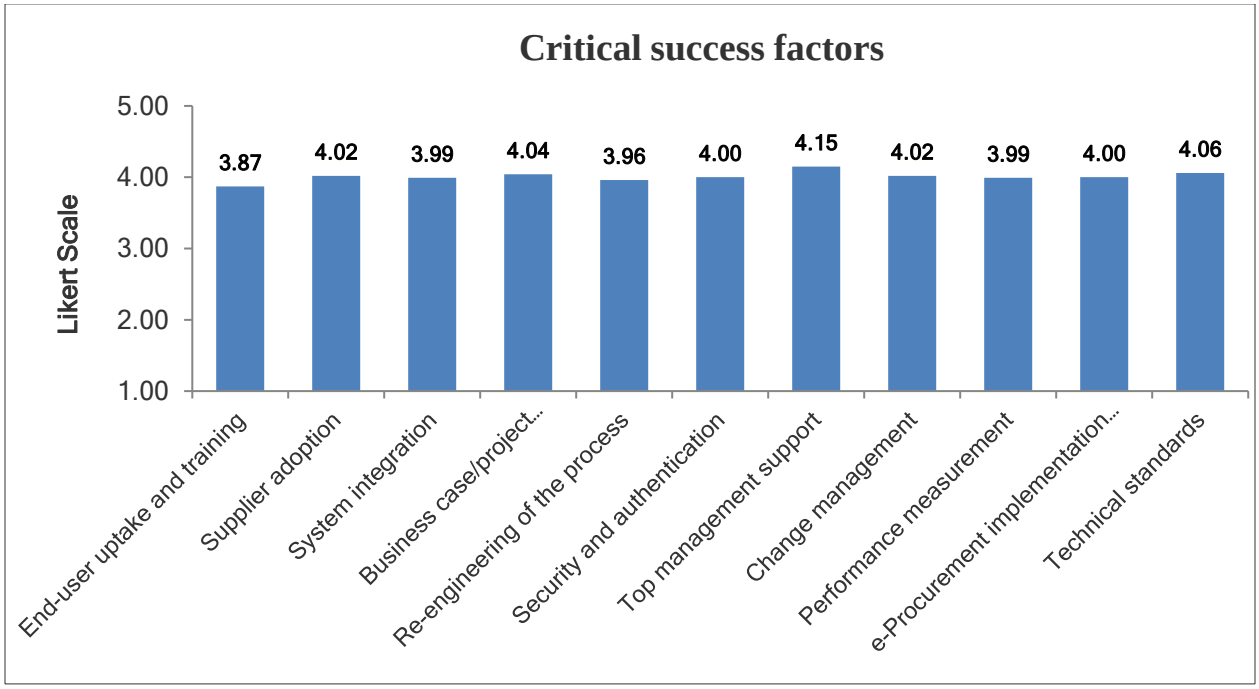

Figure 4.10: Survey participant response regarding CSF of e-procurement

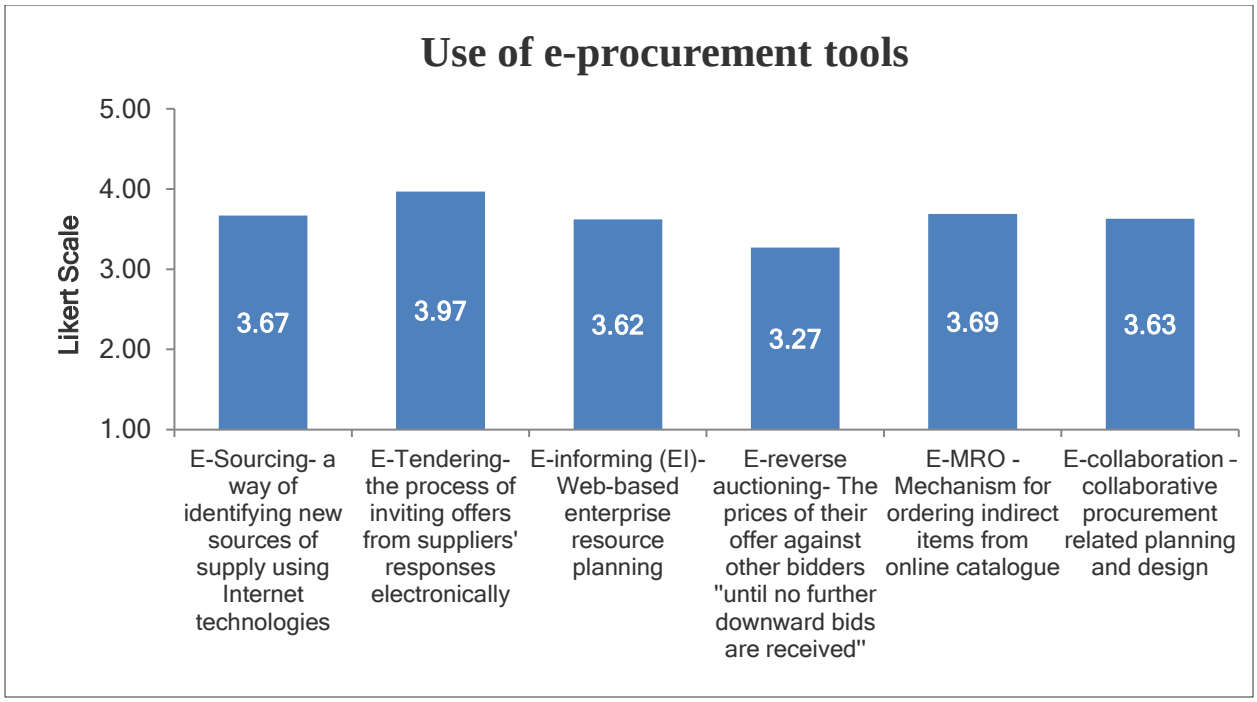

Figure 4.11: Survey participant response regarding e-procurement tools (part 1)

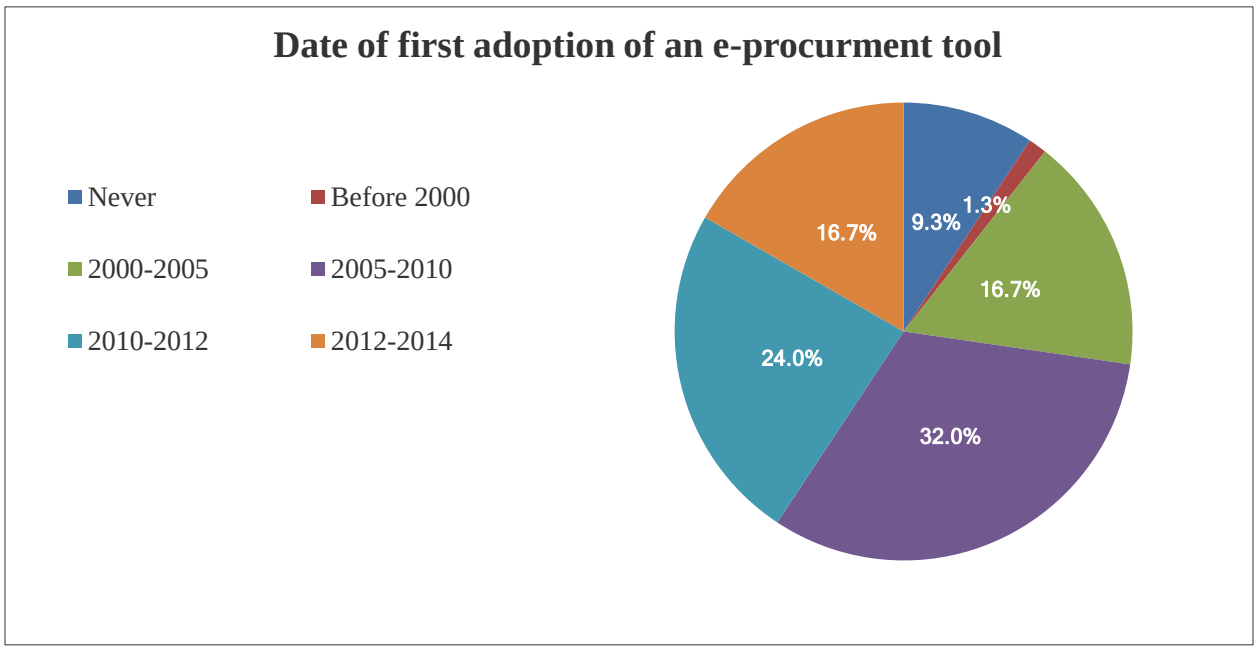

Figure 4.12: Survey participant response regarding e-procurement tools (part 2)

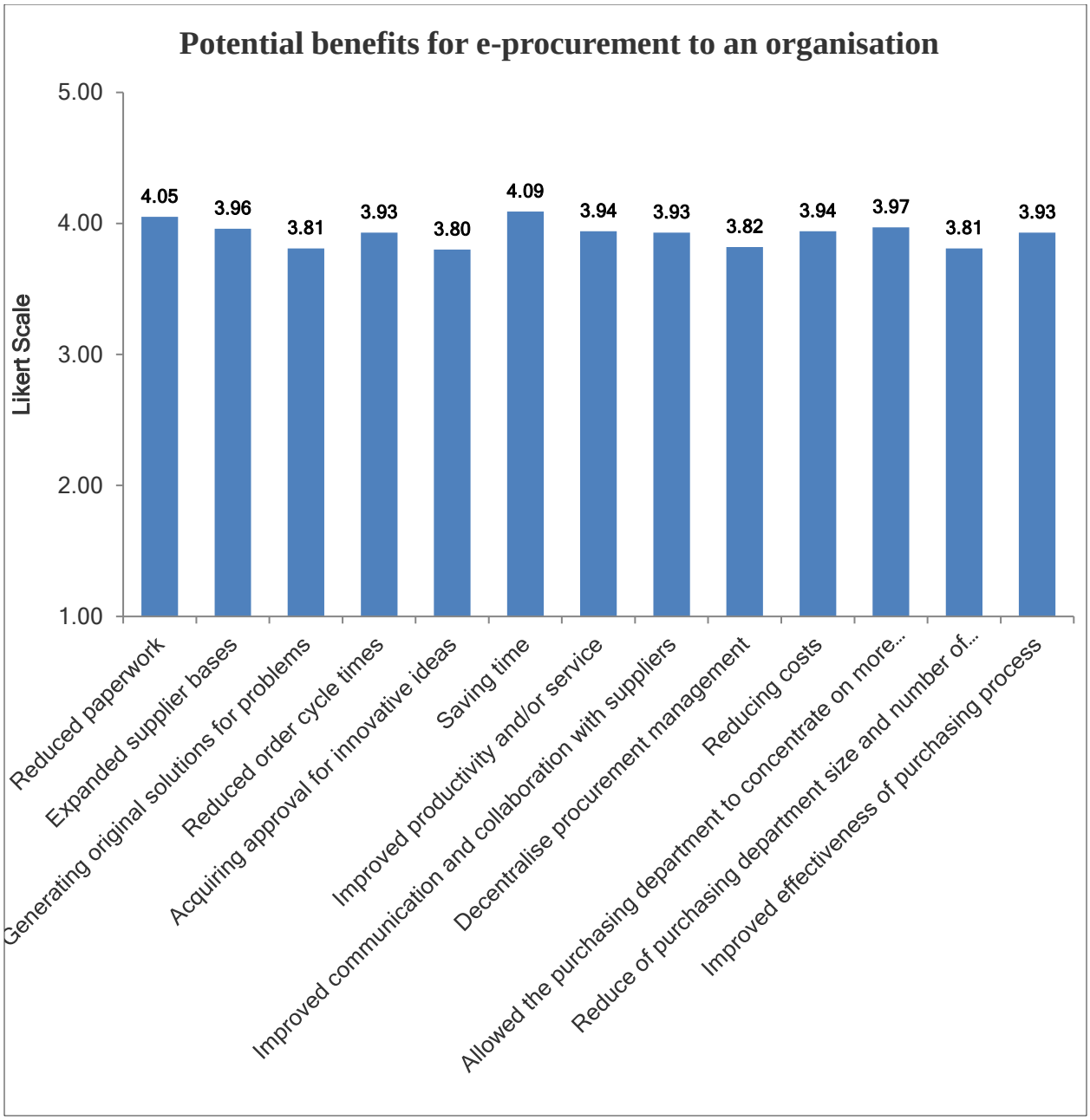

Figure 4.13: Survey participant response regarding e-procurement benefits

4.4 Non-Response Bias

It is important to know if there were significant differences between the respondents who responded soon after the online survey was distributed and those who responded after some time. As responses were collected online during a period of three months (13 weeks) respondents in the first 7 weeks of the study period were classified as early respondents and those from the final

6 weeks of the study were classified as late respondents (see Figure 4.14). In total 100 participants were classified as early respondents and the majority of the responses in this category occurred in week 1 (30 responses) and week 4 (47 responses). A further 86 participants were classified as late respondents (week 8 to 13 inclusive) and a relatively smooth response pattern was observed during this period with the exception of the final week in which the number of participants was approximately double the number in any of the previous five weeks. The early and late responses were compared using chi-square test to confirm if the nonresponse bias occurred in this study and the result of the chi square test is shown in Table 4-B in Appendix B.

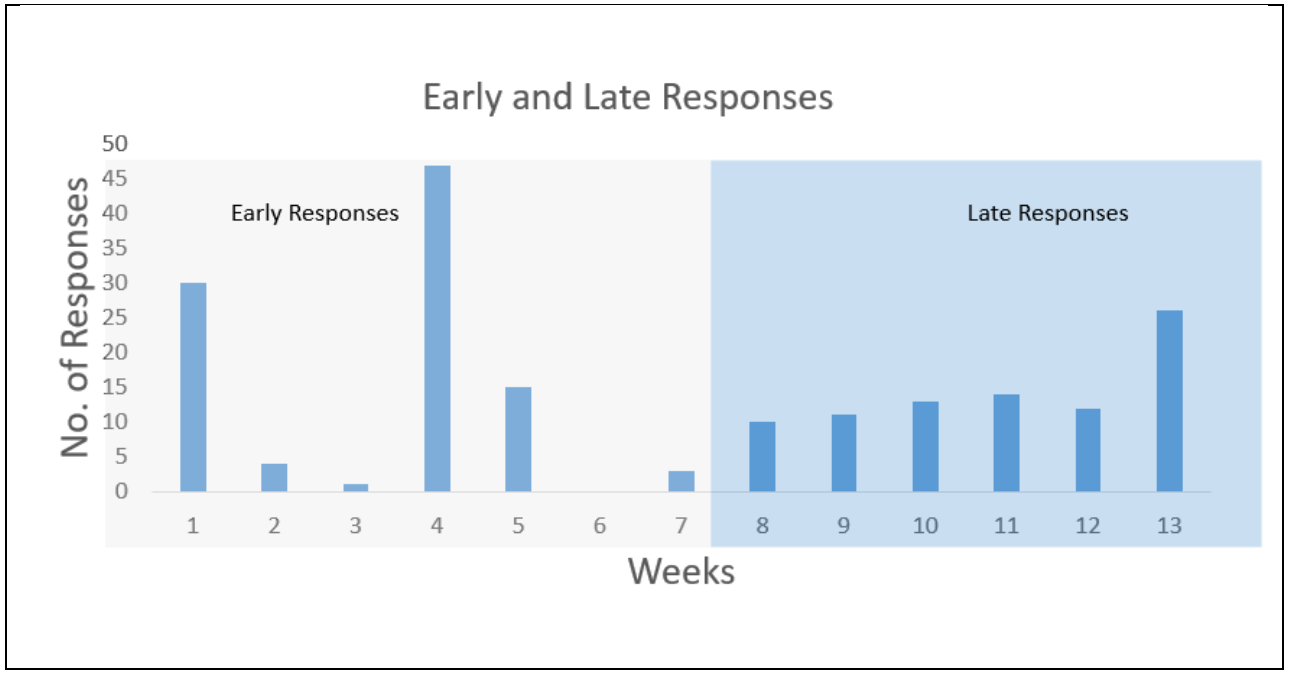

Figure 4.14: Early and late responses of participants

It was clear from the nonresponse bias results that only 13 of the 58 variables were significant as summarised in Table 4.16, when investigated for early and late response. This indicated that non-response bias was not likely to occur in this study and, therefore, it is reasonable to conclude that the responses of the sample can safely be concluded to be representative of the larger population (respondents and non-respondents). This enables generalisation of the conclusions that will be generated from the statistical analysis of the sample responses to the survey.

Table 4.16: significant variables in Chi-square test for non-response bias

Significant Variable	Value	p-value (p<0.05)
OF3	186.0	0.045
OF4	186.0	0.045
OF5	186.0	0.045
CHB1	24.397	0.018
CSF2	21.054	0.050
CSF3	23.941	0.047
BNF 2	18.919	0.008
BNF 4	17.890	0.036
BNF 5	24.233	0.029
BNF 6	19.457	0.022
BNF 9	15.237	0.055
BNF 12	16.784	0.019
BNF 13	18.661	0.017

4.5 Reliability and Unidimensionality Test

The test for reliability was conducted by Chronbach's alpha estimation. The results of this test are presented in Table 4.17. Chronbach alpha estimation is a common test to measure the internal consistency or reliability that indicates how well a set of variables measure a single or one-dimensional construct. The cut-off value for Chronbach alpha was considered as 0.7 in this study, above which concerned variables reliably measure the underlying construct. Chronbach alpha of most constructs were above 0.7, and the same measure of the construct, ATT, was 0.5. This observation indicated that the underlying items reliably measured the corresponding construct. Table 4.17 also presents the first Eigenvalue and the percentage variance explained by each construct. The results showed that all constructs except ATT and AEP received Eigenvalue greater than one. This indicated uni-dimensionality of the construct. Therefore, the variables measured a single dimension of the construct as it was modelled theoretically. It was also observed that all constructs explained variance well above 50% that further established the notion of uni-dimensionality.

Table 4.17: Chronbach's alpha, eigenvalue, and variance explained by constructs

Construct	Chronbach's alpha	Eigenvalue	Variance explained
ATT	0.500	0.530	63.304%
PU	0.909	3.145	78.620%
OF	0.830	3.074	61.470%
OL	0.903	3.690	72.575%
EOU	0.715	1.918	63.940%
RIS	0.887	3.963	66.046%
CHB	0.910	3.675	73.499%
CSF	0.955	7.602	69.105%
AEP	0.921	0.592	86.395%
BNF	0.970	9.610	73.921%

4.6 Summary

The 55% respondents of the online questionnaire survey hold important positions such as director, CEO, manager, or engineer. The rest of the respondents hold positions of procurement manager, sales/marketing manager, consultant, or administrator, etc. Most of these respondents were working in the areas of engineering, suppliers, contracting/tendering, or general management, etc. Around 73% of respondents had more than 5 years of experience, 29.1% of them had more than 15 years of experience while 25.3% of respondents had 5 or fewer years of experience. The description of the respondents indicated that the survey response came from well experienced professionals. Around 78% of respondents had bachelors or higher degree indicating their high academic qualifications.

The 28.5% respondents belong to firms having 500 or fewer employees. Similar percentage of respondents belongs to firms having more than 2500 employees. The firm sizes of remaining respondents were between 500 and 2500 employees. Around 22.5% of respondents' firm had turnover 1-15 million euro and 13.4% of organisations had turnover more than 15 million euro. 32% of the respondent organisations are operating in Ireland. Around 35% of respondent organisations are operating in Libya, the UAE, Saudi Arabia, and Malaysia. 11.3% of them are operating in the UK. The survey responses were received from the professionals belonging to various fields such as oil & gas, electrical and electronics, industrial equipment, finance and banking, automobile, textile, and chemical industries, etc.

The use of e-procurement was analysed across different sizes of firms from where survey responses were received. It was observed that the use of e-procurement did not differ across the

firms with different employees ranging from below 500 to 3000 or above. Most of the respondents (around 70%) agreed to adopt e-procurement. The statistical test for the non-response bias found that there were no significant differences between the respondents who responded early and those who responded late. Finally, the test for the reliability and the uni-dimensionality demonstrated that the items used in this study reliably measured their underlying construct and all constructs were unidimensional.

Chapter Five: Results and Data Analysis

5.1 Data Collection

Email carrying online questionnaire link has been sent to 550 randomly selected organisations from eleven countries around the world four of them categorised as developed countries, and the rest are developing countries. The most of responses were from Ireland, Libya, UK, and USA. The online questionnaire has more advantage than offline survey. The reason for that it makes data collection and analysis, to let the organisations key positions to answer them in a limited period and to use the online survey technique to the analysis the results faster and easier. More details about the data collections were presented in chapter three at section 3.8 of the research methodology.

5.2 Data Analyses and Results

Prior to the analysis, the data was examined to ensure that there are no outliers present. The dataset was observed for missing values, which averaged 4.7% of the cases, and replaced with values obtained by expectation-maximisation (EM) iterative algorithm implemented in SPSS version 21.0. The algorithm estimates parameters for missing value by maximum likelihood method. The EM method is seen to be more accurate algorithm than other substitution and elimination techniques [240].

5.2.1 Correlation Coefficient and Multicollinearity

Appendix (B) shows inter item Pearson correlation coefficients. These coefficients are low to moderate in magnitude. If these coefficients exceed 0.9 then the possibility of multicollinearity being present in the data is high [241]. Problem of multicollinearity arises when correlations among predictors are high which makes results unstable and difficult to interpret. Since no correlation coefficient exceeds 0.9, the problem of multicollinearity did not appear to be present.

Confirmatory factor analysis (CFA) based structural equation modelling is used to measure and test the conceptual model using survey data. The statistical program AMOS version 21.0 was used to test the measurement and structural model and SPSS version 21.0 was used for descriptive analysis. As per Gerbing and Anderson's [242], suggestions, two-step approach-measurement model and structural model has been used to analyse the model with collected data.

Table 5.1 presents all constructs and the respective measurement items and loadings. The loadings describe how much a variable contributes in explaining its underlying factor.

Reliability and validity were tested using various methods which are described in table of correlations among items in Appendix B.

5.2.2 Convergent Validity

Convergent validity used to measure the similarity between the individual items used to measure the same construct. This measure gives a clue that individual items are well related and they together measure the underlying construct. Convergent validity was assessed using standardised parameter loading of the measurement items on their respective construct. Items that did not load significantly, i.e., if loading is less than 0.50, those construct were removed from the model. Convergent validity was assessed using standardised parameter loading of the measurement items on their respective construct. All the loadings ranged from 0.67 and 0.90 are significant (p-value<0.01) providing support for convergent validity. Average variance extracted (AVE) and composite reliability (CR) are also computed as suggested by Fornell and Larcker [243]. The AVE and CR are presented in Table 5.1. The CR ranged from 0.71 to 0.97, and exceeded the suggested cut-off of 0.7, AVE ranged from 0.74 to 0.88, exceeding the cut-off of 0.5. This conveys that variance captured by a factor is more than the variance of error component.

Table 5.1: Constructs and their item loading

Constructs	Average variance extracted (AVE)	Composite reliability (CR)	Items	Item loading
Perceived usefulness (PU)	0.84	0.90	PU1	.859
			PU2	.844
			PU3	.828
			PU4	.848
Attitude (A)	0.78	0.87	ATT1	.854
			ATT2	.913
			ATT3	-0.314
			ATT4	.738
Perceived ease of use (PEOU)	0.74	0.71	PEOU1	.498
			PEOU2	.674
			PEOU3	.816
Organisational facilitators (OF)	0.75	0.84	OF1	.713
			OF2	.861
			OF3	.750
			OF4	.683
			OF5	.045
Organisational leadership (OL)	0.80	0.90	OL1	.792
			OL2	.795
			OL3	.781
			OL4	.813
			OL5	.842
Rules of Islamic Sharia (RIS)	0.86	0.93	RIS1	.890
			RIS2	.895
			RIS3	.767
			RIS4	.851
			RIS5	.897
Benefits (BNF)	0.85	0.97	BNF1	.842
			BNF2	.868
			BNF3	.844
			BNF4	.891
			BNF5	.859
			BNF6	.877
			BNF7	0.205
			BNF8	0.081
			BNF9	0.055
			BNF10	0.278
			BNF11	0.070
			BNF12	0.019
			BNF13	0.017

Table 5.1: Constructs and their item loading (continued)

Challenges and Barriers (CHB)	0.85	0.90	CHB1	.823
			CHB2	.809
			CHB3	.809
			CHB4	.832
			CHB5	.816
Critical success factors (CSF)	0.81	0.95	CSF1	.772
			CSF2	.823
			CSF3	.859
			CSF4	.836
			CSF5	.821
Adoption of e-procurement (AEP)	0.88	0.91	AEP1	.895
			AEP2	.851
			AEP3	.906

5.2.3 Discriminant Validity

Discriminant validity tests if constructs that theoretically are not related are indeed not observed to be related. As Fornell and Larcker [243] describe discriminant validity exist if the items share more common variance with their respective construct than any variance the construct shares with other construct. To test this Table 5.2 shows correlation between constructs and Average variance extracted (AVE) of each construct. It is clear from Table 5.2 that AVE of each construct is greater than or equal to the square of the correlation of that construct and each of the other constructs. This provides proof of discriminant validity.

Table 5.2: Correlation and average variance extracted

	PU	**ATT**	**PEOU**	**OF**	**OL**	**RIS**	**BNF**	**BC**	**CSF**	**AEP**
PU	1									
ATT	0.84	1								
PEOU	0.50	0.33	1							
OF	0.48	0.33	0.48	1						
OL	0.49	0.42	0.49	0.69	1					
RIS	0.43	0.43	0.43	0.27	0.29	1				
BNF	0.69	0.64	0.64	0.36	0.49	0.57	1			
CHB	0.29	0.19	0.29	0.36	0.49	0.46	0.50	1		
CSF	0.54	0.48	0.54	0.42	0.51	0.52	0.70	0.65	1	
AEP	0.63	0.62	0.63	0.47	0.55	0.44	0.68	0.44	0.67	1
AVE	**0.84**	**0.78**	**0.74**	**0.75**	**0.80**	**0.86**	**0.85**	**0.85**	**0.81**	**0.88**

5.2.4 Common Method Bias

All data for predictor and criterion variables were collected from respondents using a Likert scale response format. Given this, the presence of common method bias (CMB) could represent an issue in the data. The study used multiple approaches to keep this problem in check. First, respondents with mid- to senior-level managers with relevant knowledge were considered for participation in the survey. Second, it was clearly assured that the participants' responses will be kept anonymous.

To assess and confirm the bias in data, the study conducted Harmon's one factor method using confirmatory approach. This involves allowing all items present in the study to load onto a single "common-factor" construct. The result is presented in Table 5.3.

The goodness-of-fit indices of this test is $\chi^2 = 3642.86$, DF = 665, p-value < 0.001, normed $\chi^2 = 5.48$; GFI = 0.396; AGFI = 0.327; TLI = 0.510; CFI = 0.536; RMR = 0.120; and RMSEA = 0.156. The ratio, χ^2/DF is 5.48 and all indices are well below the generally accepted cut-off, 0.90. These indices of this test clearly indicate that CMB is an unlikely problem in the study.

Table 5.3: Goodness-of-fit indices for Harmon's one factor test

Chi-square (χ^2)	**Degree of freedom (DF)**	**P-Value**	**GFI**	**AGFI**	**CFI**	**TLI**	**RMR**	**RMSEA**
3642.86	665	<0.001	0.396	0.327	0.536	0.510	0.120	0.156

A test conducted using common latent factor (CLF) to capture the variance among all observed variables. In this method, a latent factor, CLF, is added to the model, and all observable variables were loaded onto the factor, CLF. All regression weights were observed with and without the CLF. It was found that there is no significant difference between the two results confirming the result would free from CMB.

The results of SEM are reported in two steps: measurement model and structural model. The measurement model assesses reliability and validity measurement items and its underlying constructs while structural model analyses hypothesised relationships among constructs.

5.2.5 Measurement Model

All SEM related parameters were estimated by employing maximum likelihood method in AMOS. The measurement model was tested by allowing all constructs' variance to vary freely. This is employed in Figure 5.1 by connecting two-way arrow between all constructs. The measurement model is shown in Figure 5.1. As shown in the figure, each construct is connected through bidirectional arrow. The overall measurement model fit is shown in Figure 5.1 below. The ratio of chi-square to degree of freedom is 2.17 (1365.22/629) which is slightly more than 2 and therefore acceptable [244] . As presented in the Table 5.4, all fit indices, NFI, TLI, and CFI are close to 0.90 and RMSEA just greater than 0.06 are indication that the study has acceptable level of fit [245].

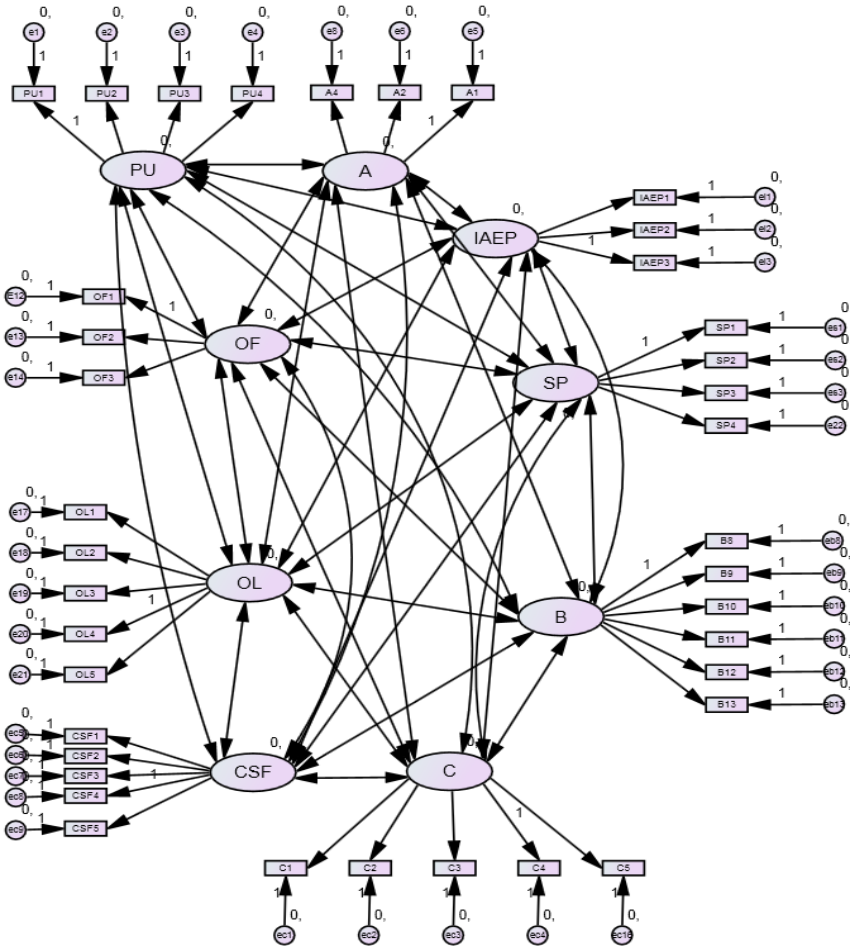

Figure 5.1 Measurement model

Table 5.4: Measurement model fit

Chi-square	Degree of freedom (DF)	p	NFI	CFI	TLI	RMSEA
1365.21	629	<0.001	0.808	0.885	0.872	0.08

5.2.6 Structural Model

The final structural model with standardised regression weights is shown in the Figure 5.2. The fit indices are presented in Table 5.5. Following the guideline of Hair et al. [241], iterative modifications were made by examining model fit statistics, error, and loadings. As shown in Figure 5.2, some correlations are assumed for improving key model fit indices. For example, variable, CHB1, CHB2 and CHB3 are connected through two-way arrow in Figure 5.2. Experts like Bollen and Long [246], and others have proposed a graduated list of terms which describe various level of model-data fit. The idea is to emphasise the importance of the level of model-data fit rather than having binary choice of accepting or rejecting model-data fit. These levels include “perfect”, “strong”, “acceptable”, “adequate”, “weak”, “moderate”, “poor”, and “no-fit”. The p-value is required to be higher than 0.05 for good fit.

The final model fit indices are as: chi-square = 1159.425, DF = 607, NFI = 0.803, CFI=0.88, TLI= 0.868 and RMSEA = 0.082. These indices NFI, CFI, TLI, and RMSEA are generally reported by most researchers in operations management and psychology disciplines and are accepted. The value of CFI and NFI between 0.80 and 0.89 represent a reasonable fit [244] , and value above 0.90 represents good fit [245]. The normed chi-square (chi-square divided by degree of freedom) = 1.88 (< 2) indicates relative efficiency of competing models or alternative models. Value of normed chi-square less than 3 represents a reasonable fit while value less than 2 represents a good fit [244]. Values of RMSEA less than 0.08 is acceptable [241], [247], [248].

Table 5.5: Structural model fit indices

Chi-square	Degree of freedom (DF)	p	GFI	NFI	CFI	TLI	RMR	RMSEA
1159.425	607	<0.001	0.764	0.803	0.880	0.868	0.110	0.08

It is evident from these criteria that the values of NFI, CFI and RMSEA as 0.80, 0.88 and 0.08 respectively are acceptable. Overall it would be reasonable to say that data exhibit acceptable level of model fit.

By applying criteria for model-data fit indices proposed by Hu and Bentler [249] RMSEA < 0.06, it appears that the model-data fit is generally poor. However, Hu and Bentler's criteria are considered excessively stringent [250], [251]. Hair et al. [241], applying criteria which are less stringent, as discussed in the above paragraph, it is believed that "acceptable" descriptor reasonably accurately capture the fit that has been obtained here.

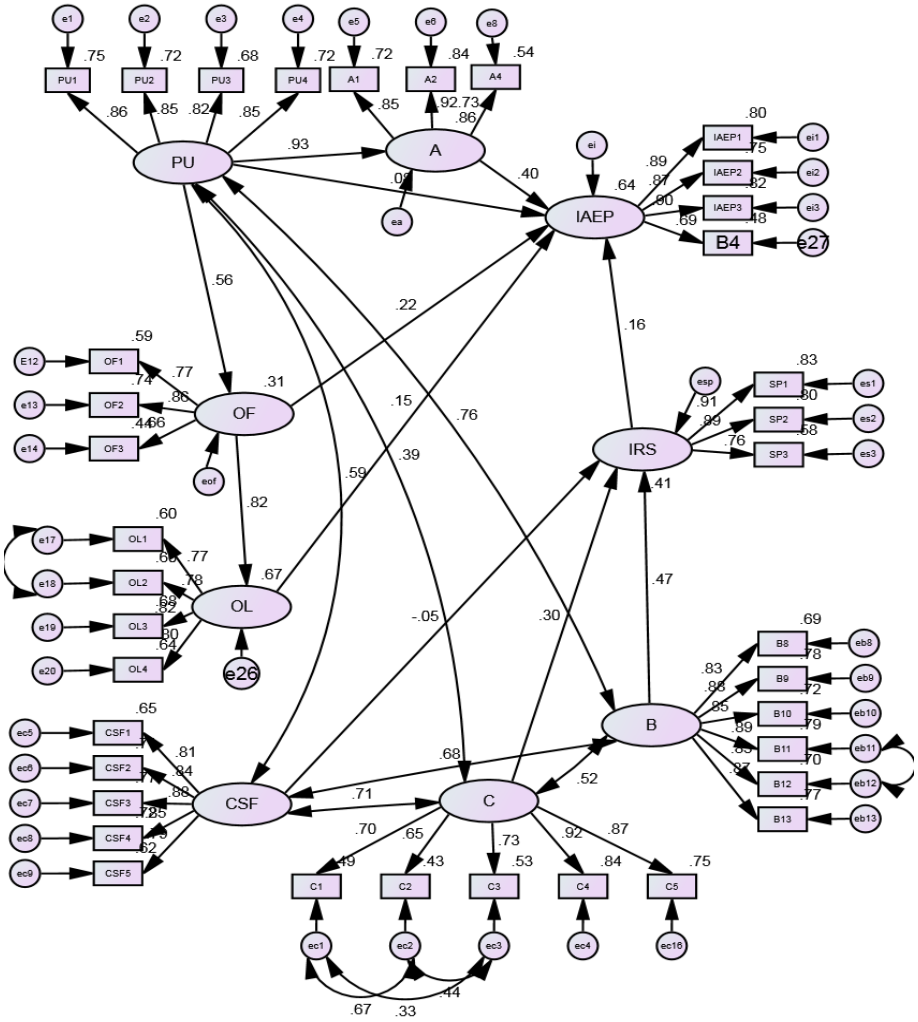

Figure 5-2: Structural Model

Finally, the assessment of predictive validity which is the extent to which a measure predicts the criterion scores was performed. It can be assessed by examining the theory driven relationship between various constructs which are hypothesised in previous chapter. The structural model tests the relationships between hypothesised constructs. The relationship between constructs is assessed by examining sign (positive or negative), value of path coefficient and its significance level. The regression (or path) coefficient of every path and its significance level are presented in Table 5.6. The path coefficient describes relationship between predictor and criterion construct. For example, if ATT increases by one standard deviation from its mean, AEP is expected to increase by 0.398 (see Table 5.6) its own standard deviation from its own mean while holding other regional relationships constant. As presented in the table, eight hypotheses are supported while there is a lack of evidence to supporting the other hypotheses. Four hypotheses are supported at $p<0.001$; two hypotheses are supported at $p<0.01$; one hypothesis was supported at $p<0.06$ and one hypothesis was supported at $p<0.10$.

Table 5.6: Path coefficients

Hypothesis	**Path coefficient (β)**	**Decision**
H1: PU→AEP	0.083	Not supported
H2: ATT→AEP	0.398*	Supported
H5: PU→A	0.927***	Supported
H6: OF→AEP	0.222[a]	Supported
H7: PU→OF	0.556***	Supported
H8: OL→AEP	0.151	Not supported
H9: OF→OL	0.816***	Supported
H10: RIS→AEP	0.16**	Supported
H11: CSF→RIS	-0.049	Not supported
H12: CHB→RIS	0.299**	Supported
H13: BNF→RIS	0.472***	Supported

*** $p<0.001$, ** $p<0.01$, * $p<0.06$, [a] $p<0.10$

5.2.7 Developed Research Model

As shown in Figure 5.2, the part of contribution in this research model is that the three factors which are critical success factors (CSFs), barriers and challenges (CHB) and Benefits (BNF) are mediated by Rules of Islamic Sharia (RIS). This component is significant for developing the research model according to the previous studies in literature. Attitude as a mediator was also an important component for the adoption of a new technology e-procurement in the organisations in

this research. Research hypothesis explain the relationship between all factors in details in the next section.

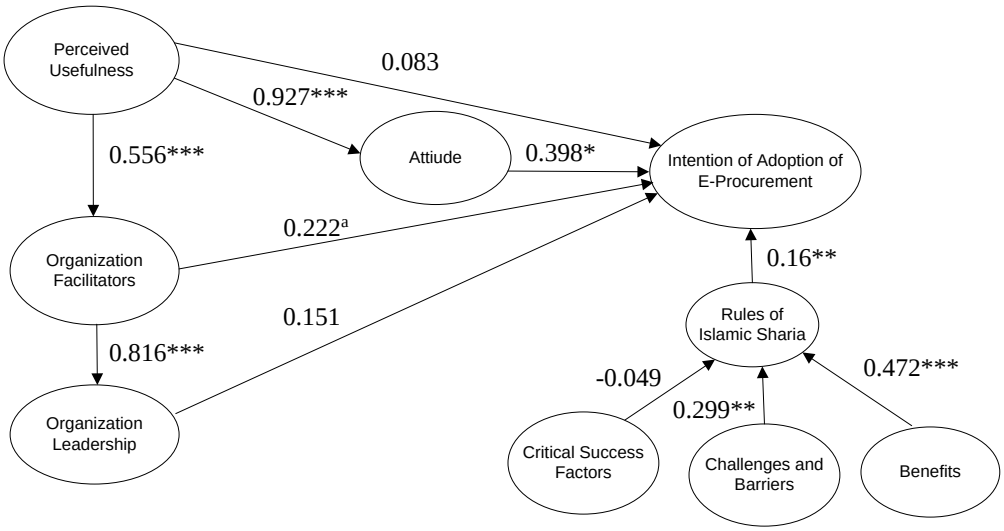

Figure 5-3: E-PAM with p-values of the supporting/non-supporting links

5.3 Discussion

This study applies TAM theory in the context to adopt e-procurement and tries to integrate RIS with it [110]. A comprehensive model has been developed with the help of previous studies. To validate the model, the data collected from industries was analysed using confirmatory SEM technique. Results are presented in the previous section.

The newly designed E-PAM model is based on nine variables. The multiple regression analysis (MRA) using SPSS was performed to predict the value of final output (AEP) dependent upon the model variables (RIS, ATT, etc.). MRA is a standard technique to present the explanatory power and prediction of variable values [252].

Explanatory power of this study has R^2 value of 64% to adopt e-procurement. These results are comparable to previous behavioural research studies [110, 253] . For example, in a similar study related to adoption of e-procurement using TAM, the observed variance for intention to use e-procurement was 62% [10]. By extending the TAM, another study was conducted in context of world-wide-web WWW usage [116]. The observed variance for actual usage of WWW context using that model was found to be 37.8% [10, 116] . Therefore, the overall explanatory power of

the newly designed research model E-PAM was relatively higher for the adoption of e-procurement.

The variance for the variable attitude by using E-PAM was found to be 86%. This result for attitude variable is better than the previous model results for e-procurement (68%) and WWW context (33.2%) [10, 116]. The observed variance for the organisation facilitators and organisational leadership were found to be 31% and 66% respectively. The R^2 value for Rule of Islamic Sharia variable was 41%. The values of R^2 range from 31% to 86% representing a high level of explanatory power. This suggests that the newly designed model E-PAM, an extension of TAM, is capable of explaining a relatively high proportion of variance.

The result of the hypotheses H1, H2, H3, H4 and H10, which predicted positive relationship of PU, ATT, OF, OL, and RIS to AEP respectively is presented in Table 5.6. The path coefficient (β) calculated by MRA for Hypothesis H2 (Attitude→AEP) was found to be 0.398 ($p < 0.06$). This result is comparable to previous study related to predicting e-procurement adoption in a developing country where TAM was used and the path coefficient for link between attitude and intention of e-procurement was 0.35 (with $p<0.001$)[10].

For H3 (OF→AEP, $\beta = 0.222$, $p < 0.10$), and H10 (RIS→AEP, $\beta = 0.16$, $p < 0.01$) are found significant and are supported by the data. However, hypothesis H1 ($\beta = 0.083$, $p > 0.10$) and H4 ($\beta = 0.151$, $p > 0.10$) could not find support from the data. Precisely, attitude, organisational facilitators, and Rules of Islamic Sharia are emerged as variables influencing positively the adoption of e-procurement. These hypotheses together explain a total of 64% (>50%) variance of AEP which is comparable to previous studies [10, 116]. Going by B-coefficient, attitude ($\beta = 0.39$) appears to be the most important enabler for organisations to adopt e-procurement followed by organisational facilities ($\beta = 0.22$) and Rules of Islamic Sharia ($\beta = 0.16$). Attitude is predicted by perceived usefulness which explains 83% of the variance of the response variable. This relationship is found significant ($\beta = 0.93$, $p < 0.001$) and supported by the study. This result is comparable to previous study demonstrating path coefficient of 0.41 ($p<0.001$) between Usefulness and Attitude [10].

Regarding the direct link between perceived usefulness and adoption of e-procurement, it was observed in this study that the path coefficient between PU and AEP was 0.083. On the contrary, a previous study demonstrated a positive link between PU and intention to adopt internet banking

with path coefficient 0.21 [12]. This finding was not expected from the data. One possible explanation for this finding is that due to tremendous use of online systems, social media, and other related applications, it has now become a common knowledge that information systems used for business processes helps in enhancing the effectiveness and is almost unavoidable. In this regard, it makes sense if organisations do not care much on perceived usefulness for implementing e-procurement.

The next hypotheses are related to perceived usefulness, organisational facilitators and leadership. Hypothesis predicting positive effect of perceived usefulness on organisational facilities is found significant ($\beta = 0.55$, $p < 0.001$) and supported by the study. The organisation facilitators has been considered important variable in models for adoption of information technology tools in previous studies, however investigation of direct linkage between OF and PU has never been performed using MRA as noted in the literature [152, 253]. The results from this doctoral study demonstrated that the perceived usefulness and organisational facilitators are positively linked with each other supporting in the adoption of e-procurement. When people recognise that there are ways which can increase working efficiency, ease in doing work with lesser skill sets, naturally they seem to acknowledge that there is a good number of organisation facilitators which reflects training for IT, training for e-procurement, and encouraging adoption of e-procurement. According to E-PAM, the Organisational Facilitators and Organisational leadership directly influence the e-procurement adoption as well as support each other. Both of these effects found significant and positive. Therefore, the results of this study supports the positive relationship of organisation facilitators to adopt e-procurement ($\beta = 0.22$, $p < 0.10$). In addition to that, OF also support OL positively ($\beta = 0.82$, $p < 0.001$). A large portion of variance of organisational leadership, 67%, is explained by organisational facilitators. This indicates organisation facilitators plays an important role in enhancing organisational leadership and is a positive predictor. Organisational leadership in this study reflects management support, lead role by management, invested time, effort & money, and be proactive in using e-procurement. All these measures of organisational leadership represent operational aspect of organisations. The better organisational facilitators could provide good leadership. This is also supported by the fact that a firm equipped with technologies, online systems, and machines will have a greater potential and incentive to go further in this direction and implement e-procurement. Further, the organisation facilitators impact adoption of e-procurement significantly and positively. This

finding is in line with Ellinger et al. and Veit et al. [254, 255]. Veit et al. emphasised that IT sophistication (a deeper and wider penetration of IT) has positive impact on adoption of e-procurement [255]. A moderate level of support was found for organisational determinants; however, the conceptual model was not tests using quantitative methods [255]. Ellinger et al. studied managers as facilitators of learning influences behaviours [152]. The managers perform the role of facilitators of learning, coach the workers by demonstrating various duties and teach them new techniques. Therefore, the learning of an organisation (and employees) as a whole depend upon the behaviour of the managers (organisation leadership). However, organisational leadership which was postulated as impacting to adopt e-procurement positively, found insignificant in this doctoral study ($\beta = 0.15$, $p > 0.10$), and therefore was not supported by the results. The actual cause of this unexpected result depicted by data needs to be investigated. However, one possible explanation of this result could be similar to the possible explanation of insignificant relationship of perceived usefulness to adoption of e-procurement. Adoption of e-procurement might be strongly driven by market which is increasingly automated and web-based across all spheres of business. Another cause could be the employees' increasing inclination towards accomplishing their jobs through automated processes and workflow. The natural inclination towards implementing e-procurement could have been a reason which neutralises organisation leadership playing a role in adopting e-procurement.

Another important set of hypotheses predicted a positive relationship of critical success factors, barriers & challenges, and benefits to Rules of Islamic Sharia. The critical success factors influencing Rules of Islamic Sharia is observed insignificant ($\beta = -0.05$, $p > 0.10$). Barriers & challenges influencing Rules of Islamic Sharia is observed significant ($\beta = 0.30$, $p < 0.01$). Benefits influencing Rules of Islamic Sharia is observed significant ($\beta = 0.47$, $p < 0.001$). The average variance calculated for RIS by correlation of CHB, CSF, BNF, and AEP was 0.80. The direct observed variance of RIS influencing AEP was 0.44. These results are satisfactory in the sense of positive influence of RIS on AEP as postulated in the beginning of this study.

Critical success factors may influence Rules of Islamic Sharia was postulated in the light of the study Vaidya et al. [49] highlighted influence of critical success factors in implementation perspectives and on the success of e-procurement. The implementation perspectives include organisation & management, practices & process, and systems & technology. However, this study finds a lack of support for confirming the positive influence of critical success factors on

Rules of Islamic Sharia. Further, the data supported that barriers & challenges influence Rules of Islamic Sharia positively. This means that RIS positively mediates the barriers & challenges and adoption of e-procurement. The barriers & challenges reflect technological challenge, strategic challenge, human & process problems, misunderstanding of Islamic rules, and misunderstanding of non-Islamic rules. These barriers and challenges reflect the description of question 16 and 17 of online questionnaire.

When organisations go to implement any new practices and processes, it becomes apparent to them to evaluate barriers & challenges to implement the new practices. The findings from this doctoral study establishing positive relationship between RIS and CHB and could encourage the RIS observing companies and groups to adopt e-procurement. It was found that the benefits impacts Rules of Islamic Sharia positively. The benefits include improved communication and collaboration with suppliers, decentralise procurement management, reducing costs, allowed the purchasing department to concentrate on more strategic tasks, reduction of purchasing department size and number of functional areas, and improved effectiveness of purchasing process. This positive relationship between BNF and RIS conveys that more the benefits derived from adopting e-procurement, organisations would go for Rules of Islamic Sharia. This notion has been approved from the results especially for those organisations operating under Rules of Islamic Sharia or bound to operate under Sharia rules because when organisations get enough benefits from e-procurement, there would be an incentive to experiment what-if by falling in the line of Sharia rules. In case of compulsion for firms to operate under Rules of Islamic Sharia, organisations may feel more comfortable to follow Sharia rules when benefits would be more [256].

The hypothesis which postulated a positive relationship between Rules of Islamic Sharia and to adopt e-procurement is found significant ($\beta = 0.16$, $p < 0.01$) and thus supported. These findings imply that organisations operating under RIS may find it beneficial to adopt e-procurement. Therefore, this study suggests managers of organisations operating under Rules of Islamic Sharia to go for e-procurement rather than functioning with paper-based procurement. This switching to e-procurement would be promising.

5.4 Summary

To test the conceptual model, a questionnaire was developed and an online survey has been conducted. The conceptual model is analysed using data collected by confirmatory SEM techniques. Overall it was found out that attitude, organisation facilities, and Rules of Islamic Sharia are important in influencing the adoption of e-procurement. These factors together explain a whopping acceptable percentage of variance of adoption of e-procurement. Barriers & challenges and benefits are found impacting Rules of Islamic Sharia positively. Contrary to the many existing studies, there was not enough evidence found to support perceived usefulness impacting adoption of e-procurement positively. The possible reason for this has been explained in the previous section. So it is good form organisations to focus on attitude, organisational facilities and Rules of Islamic Sharia. The support for perceived usefulness influencing organisational facilities, organisation facilities influencing organisational leadership was found positively. Although perceived usefulness was not observed influencing adoption of e-procurement directly, but it has been seen impacting adoption of e-procurement through attitude and organisational facilities. Therefore, the role of perceived usefulness to adopt e-procurement cannot be ignored rather it needs to be strengthen actively.

Chapter Six: Conclusion

6.1 Research Contributions

Further to the above analyses and discussion, it is believed that some essential contributions have been made to the existing knowledge in the field of supply chain management as listed below:

1. A holistic model incorporating many realistic factors to the adoption of e-procurement systems (E-PAM) has been proposed and tested.
2. E-PAM includes a social/cultural mediator, RIS, which expands research in this field in a direction proposed by Gunasekaran and Ngai [11].
    a. This research examines and explores in a detailed and comprehensive manner the e-procurement technology adoption process in an Islamic context.
    b. The research provides an understanding of the scenarios that organisations working in compliance with RIS might face in e-procurement adoption.
    c. This research explored the factors namely, critical success factors (CSFs), barriers and challenges (CHB) and Benefits (BNF), and tested if they influence organisations working in compliance with RIS.
    d. The mediation of these three factors by Rules of Islamic Sharia (RIS) is one of the main contributions in this research.
3. The research investigates the roles of organisation leadership and facilitators in influencing the adoption of e-procurement. It emphasises the important roles played by organisation leadership and facilitators in the adoption of e-procurement.
4. The model developed in this research brings important insights which could be used in other cultures/world regions, where RIS could be replaced by other similar social or cultural mediators.
5. Because this research surveyed both buyers and suppliers, conveys some broad and generalised findings which would be valid and applicable for most parts of the supply chain.

6.2 Conclusion

In this research, a number of studies pertaining to the adoption of e-procurement have been reviewed, and based on this knowledge a conceptual model has been built. To test the conceptual

model, a questionnaire was developed and an online survey has been conducted. The conceptual model was analysed by using confirmatory SEM techniques on the data collected. Overall, it was found that attitude, organisation facilities, and Rules of Islamic Sharia are important in influencing the adoption of e-procurement strategy. These factors together explain a highly significant 64% of the variance of adoption of e-procurement. Barriers & challenges and benefits are found to positively impact upon the Rules of Islamic Sharia mediator. Contrary to the many existing studies, not enough evidence was found to support the hypothesis that perceived usefulness positively impacts the adoption of e-procurement. The possible reason for this has been explained in section 6.1. Therefore, it is good for organisations to focus on attitude, organisational facilitators and Rules of Islamic Sharia. Support was also found for perceived usefulness influencing organisational facilitators and organisation facilitators influencing organisational leadership positively. Although, perceived usefulness was not observed to influence the adoption of e-procurement directly, it has been identified as impacting the adoption of e-procurement through attitude and organisational facilitators. Therefore, the role of perceived usefulness to adopt e-procurement cannot be ignored; rather it needs to be strengthened actively.

The hypothesis which assumed a positive relationship between the Rules of Islamic Sharia and an aim to adopt e-procurement is proved significant and therefore sustained and supported. These findings imply that organisations which operate under Sharia law should find it beneficial to adopt e-procurement technology. Therefore, this study recommends that managers of organisations operating under Rules of Islamic Sharia adopt e-procurement rather functioning with paper-based procurement.

6.3 Research Findings

This study yielded new findings that in some cases differed from those existing studies. For example, the TAM model identifies that ease-of-use and perceived usefulness influence a person’s attitude toward using an information system; that ease-of-use influences usefulness; and that attitude and usefulness both influence the willingness to adopt information technology or e-procurement. However, this research establishes from a different model with good data fit that the influence of ease-of-use is not as important. It also finds that attitude is influenced by perceived usefulness and that perceived usefulness has positive influence on organisation

facilitators. On the other hand, the adoption of e-procurement is positively influenced by attitude, organisation facilitators and the Rules of Islamic Sharia. Benefits and barriers & challenges were observed to influence Rules of Islamic Sharia, while critical success factors were not found to significantly influence the Rules of Islamic Sharia. The study also found that organisation facilitators affect organisation leadership positively which in turn influences perceived usefulness.

As it is evident from the conceptual model, the model is complex in terms of the number of measured items and the relationships being tested. As such, a larger sample size might be needed to fully capture other relationships and more interesting results. Also, in order to gain an in-depth understanding and the real reasons for all the significant and insignificant relationships, future research might consider applying a qualitative methodology such as case studies. Although, this study used samples from North Africa, Middle-East, Ireland, USA and UK which gives a generalised picture of the model under investigation, a separate survey with a large sample size in these areas might help to gain a more in-depth understanding. Since users perceive things based upon the level of technology used around them, it is possible that as the use of information technology increases, their perceived view/usefulness/ease-of-use would change significantly over time. Using a longitudinal study to understand if the model and its underlying theories vary over different time periods of low to widely used information technology would provide more comparative insights into e-procurement adoption.

Although, the research model in this study provides more insights into adopting e-procurement, there would be other important factors which may moderate many of the relationships under investigation. For example, technological readiness and innovation attitude of a firm may moderate many relationships which should be understood and explained in particular contexts.

Based on the outcomes of this research, and in reference to the findings of existing studies, the following conclusions can be made:

(1) Apart from the TAM model, the adoption of e-procurement may depend on critical success factors, organisational leaderships, organisational facilities, Rules of Islamic Sharia, etc. It is therefore necessary to view the adoption of e-procurement with due consideration of these factors. It is necessary to use a comprehensive model constituting these factors in various settings. Hence, this study deconstructs various issues of the adoption of e-procurement, and it

enables an in-depth understanding of e-procurement by integrating the above factors into the model.

(2) The finding of this research that ease-of-use may not always allow essential components to explain the adoption of e-procurement or information technology as a new way of conducting business affairs was in accord with the results of [257],[108].

According to the TAM model, ease-of-use and perceived usefulness influence a person's attitude toward using information system; ease-of-use influences usefulness; finally, attitude and usefulness both influence to use information technology or to adopt e-procurement. However, this research finds support for a different model with good data fit where ease-of-use is not observed as important construct.

(3) The attitude to adopting e-procurement is influenced by perceived usefulness. Hence, it is important to take perceived usefulness and the Rules of Islamic Sharia into consideration when seeking to understand the attitude towards the adoption of e-procurement.

TAM theory states that attitude is generally influenced by ease-of-use and perceived usefulness. As [258] finds, attitude to e-auction is influenced by commodity and strategic services. In a similar vein, this study complements existing studies by establishing that implementing e-procurement is also influenced by the rules of Islamic Sharia. Hence, e-procurement formulation and its implementation have to be considered in the light of perceived usefulness as well as the rules of Islamic Sharia.

(4) Organisation facilitators are positively influenced by perceived usefulness. Hence, organisation facilitators have to be examined carefully in order to understand perceived usefulness.

According to the TAM model, perceived usefulness is driven by ease-of-use. However, the analysed data of this research did not support this assertion. Instead, it showed that perceived usefulness is significantly influenced by expected benefits and critical success factors. Therefore, in the process of understanding the adoption of e-procurement through perceived usefulness, potential benefits as well as organisation facilitators need to be well understood. Organisation facilitators constitute technology, skilled manpower, infrastructure and training etc.

(5) The adoption of e-procurement is positively influenced by attitude and the Rules of Islamic Sharia. Hence, the Rules of Islamic Sharia need to be investigated and uncovered in order to understand the adoption e-procurement.

The TAM model argues that the willingness to use new technology is positively influenced by attitude. This study also supports this notion and goes further to argue that organisation facilitators are also important in influencing the adoption of e-procurement. As a result, it is important to consider organisation facilitators and the Rules of Islamic Sharia when attempting to understand the adoption of e-procurement.

(6) Benefits and barriers & challenges were observed to influence the Rules of Islamic Sharia, while organisation leadership and critical success factors were not found to significantly influence the Sharia laws. This finding highlights that the Rules of Islamic Sharia is not an independent construct to influence other constructs; there exist potential benefits and barriers & challenges which act as antecedents and influence the Rules of Islamic Sharia.

This finding sheds a new light on the level and nature of influence of the Rules of Islamic Sharia. Generally, it is understood that the Rules of Islamic Sharia is independent and enforced for implementation. However, this finding highlights that enforcing the Rules of Islamic Sharia is also dependent on potential benefits from e-procurement and various barriers & challenges in implementing e-procurement. In other words, the more the potential benefits and barriers & challenges to implement and adopt e-procurement, the greater would be the extent of implementation of the Rules of Islamic Sharia. These factors – benefits and barriers & challenges to the adoption of e-procurement – act as incentives for the Rules of Islamic Sharia. This study also finds that organisation leaderships and critical success factors are not significant in deciding the implementation of the Rules of Islamic Sharia. However, the real reasons behind these observations have to be investigated further.

(7) This study also finds that organisation facilitators affect organisation leadership positively which in turn influences perceived usefulness. Hence, this study finds organisation leadership as having important impact on the adoption of e-procurement.

This study brings an in-depth understanding to the complex dynamics of e-procurement by highlighting the importance of organisation leaderships and organisation facilitators. Organisation facilitators significantly influence organisation leadership which in turn influences

perceived usefulness. Perceived usefulness then positively impacts the adoption of e-procurement. Here, organisation leadership signifies a change agent which is determined and strong to go beyond the traditional way of conducting business. Though, there would be various impediments or hurdles in the path of bringing the changes into the organisation, strong and determined facilitators would create leadership as opportunities which would further help in enhancing perceived usefulness. Hence, creating and giving an able leadership and facilitators are very important in order to adopt e-procurement.

The implication of this study is that it brings some important points into consideration. Factors such as organisational leadership, organisational facilitators, the Rules of Islamic Sharia, critical success factors, challenges and benefits play important roles in the adoption of e-procurement. These factors have been largely ignored in previous studies on the adoption of e-procurement.

Although, this research has attempted to investigate a broad research model, it has many future opportunities for widening its scope to make it applicable in various conditions. Organisations intending to adopt e-procurement differ in their ability to integrate today's wide, deep, and complex supply chain [259], it therefore requires that the model formulated should be examined for possible explanatory variables such as firm size, innovation capability, technological readiness, preparedness and training. This will further widen the scope of the model and make it adoptable in different conditions.

6.4 Limitations

This study was conducted in the context of two different regions – the European countries and the Islamic countries. The rational for choosing them was to compare between the developing and developed countries that have attempted to adopt e-procurement. However, there are certain factors that researchers should take into account when the methods and technique appropriate for a study are being selected. As for example and not limited, the study has developed face to face interviews as a qualitative method for developing countries, but because of some circumstances like time limitations only online survey has been used for the data collection and therefore a quantitative method has been conducted.

The current research was not a very large-scale assessment study, in which was undertaken for a limited period of time, hence it was deficient to indicate the real effects of e-procurement strategy.

A considerable number of organisations did not respond back to the survey process, which means only 186 out of 550 organisations and this limited the number of data available for the analysis. Moreover, some companies were not willing to participate in the survey whereas some were not interested to answering question related to the rules of other cultures.

The generalisation of the research conceptual model (E-PAM) was developed but not implemented yet in any of the developing countries organisation. The reason is because it is still in the theory stage. Therefore, this model needs to be implemented and validated in some organisation in the Islamic context.

6.5 Future Research and Recommendations

E-procurement in developing countries is still in its infancy stage; therefore future studies of this subject may encounter different factors resulting from the rapid change in technology and other issues that may not have been observed in this research.

The conceptual model that has been developed in this research is to help the developing countries in the Islamic region to adopt and implement e-procurement strategy. Therefore, a study collecting data only from Islamic region and evaluating the research model would be beneficial.

Future studies could explore and examine new factors that this research has not investigated in details. The future researches could also focus on certain sectors in the Islamic context and separate them to research areas to be able to understand in depth the challenges and barriers facing such adoption of technology and also the benefits and success factors from such adoption.

To improve in-depth understanding and reasons for all significant and insignificant relationships, future research might consider qualitative approach such as grounding theory or case studies.

The longitudinal study can be used to understand if the model and its underlying theories vary over different time periods.

The following recommendations are made to the organisations and decision makers in the developing countries in particular and the governments in these countries who are seeking to adopt e-procurement.

1. The topic of procurement should be introduced as a subject in institutions and the departments of purchasing and procurement in organisations should give their employees enough incentives for training and acquisition of knowledge.
2. Conducting research to make people understand that cultures and religions do not conflict with the adoption of new technology would be another important task for researchers in these countries.
3. The governments in the developing countries must encourage the development of today's world economy by supporting the adoption of e-commerce.

References

[1] Schulz, W. (2004), "Reconstructing mediatisation as an analytical concept", *European journal of communication,* Vol.19 (1), pp. 87-101.

[2] Hamed, A., (2009), “E-commerce and Economic Development in Libya", PhD. Thesis, University of Wales, Cardiff, UK.

[3] Squalli, J. (2007), "Electricity consumption and economic growth: bounds and causality analyses of OPEC members", *Energy Econ,* Vol.29 (6), pp. 1192-1205.

[4] Watts, M. (2006). "Empire of oil: capitalist dispossession and the scramble for Africa". *Monthly Review*, 58(4), pp. 1-17.

[5] Stockdale, R. and Standing, C., (2004), "Benefits and barriers of electronic marketplace participation: an SME perspective", *Journal of Enterprise Information Management,* Vol.17 (4), pp. 301-311.

[6] De Boer, L., Harink, J. and Heijboer, G., (2002), "A conceptual model for assessing the impact of electronic procurement", *European Journal of Purchasing & Supply Management,* Vol.8 (1), pp. 25-33.

[7] Van Akkeren, J. and Cavaye, A.L.M., (19999), "Factors Affecting Entry-Level Internet Technology Adoption by Small Business in Australia: An Empirical Study". In *Proceedings 10th Australasian Conference on Information Systems,* 1-3 December 1999, Victoria University of Wellington, New Zealand.

[8] Evangelista, P. and Sweeney, E., (2006), "Technology usage in the supply chain: the case of small 3PLs", *International Journal of Logistics Management, The,* Vol.17 (1), pp. 55-74.

[9] Davis, P. (2010), "Development of a Framework for the Assessment of the Role and Impact of Technology on the Public Procurement Process: an Irish Health Sector Study", Ph.D. Thesis, DIT, Dublin, Vol.2010 pp. 01-01.

[10] Aboelmaged, M.G. (2010), "Predicting e-procurement adoption in a developing country: an empirical integration of technology acceptance model and theory of planned behaviour", *Industrial Management & Data Systems,* Vol.110 (3), pp. 392-414.

[11] Gunasekaran, A. and Ngai, E.W.T., (2008), "Adoption of e-procurement in Hong Kong: an empirical research", *International Journal for Production Economics,* Vol.113 (1), pp. 159-175.

[12] Lee, M. (2009), "Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit", *Electronic Commerce Research and Applications,* Vol.8 (3), pp. 130-141.

[13] Sharifi, H., Kehoe, D. and Hopkins, J., (2006), "A classification and selection model of e-marketplaces for better alignment of supply chains*", Journal of Enterprise Information Management,* Vol.19 (5), pp. 483-503.

[14] Jones, T. and Riley, D., (1985) "Using Inventory for Competitive Advantage through", *Supply Chain Management*, pp. 16-26.

[15] Ellram, L.M., et al. (2002), "The impact of purchasing and supply management activities on corporate success", *Journal of Supply Chain Management,* Vol.38 (1), pp. 4-17.

[16] Alber, K. L. and William T. Walker 1997, "Supply chain management: A practitioner's approach", "Supply chain management: A practitioner's approach", *International Conference proceedings-American production and inventory control society*, American production and inventory control society 203-210.

[17] Lee, H.L .and Billington, C., (1992), "Managing supply chain inventory: pitfalls and opportunities", *Sloan Manage. Rev.,* Vol.33 (3), pp. 65.

[18] Saunders, M. 1995, "Chains, pipelines, networks and value stream: the role, nature and value of such metaphors in forming perceptions of the task of purchasing and supply management", *First Worldwide Research Symposium on Purchasing and Supply Chain Management, Tempe, Arizona,* 476-485.

[19] Christopher, M., (1992), *"Logistics and Supply Chain Management"* (1st ed.), Pitman Publishing, London, UK.

[20] Mentzer, J.T., et al. (2001), "Defining supply chain management", Journal of Business logistics, Vol.22 (2), pp. 1-25.

[21] Berry, D., Towill, D.R. and Wadsley, N., (1994), "Supply chain management in the electronics products industry", *International Journal of Physical Distribution & Logistics Management,* Vol.24 (10), pp. 20-32.

[22] Vitasek, K. (2010), "Supply chain management terms and glossary", *Council of Supply Chain Management Professionals (CSCMP).*

[23] Tan, K.C., Kannan, V.R. and Handfield, R.B., (1998), "Supply chain management: supplier performance and firm performance", *Journal of Supply Chain Management,* Vol.34 (3), pp. 2.

[24] Monczka, R., et al., (2015), Purchasing and supply chain management, *Cengage Learning.*

[25] Bechtel, C. and Jayaram, J., (1997), "Supply chain management: a strategic perspective", *The international journal of logistics management,* Vol.8 (1), pp. 15-34.

[26] Sweeney, E. (2011), "Supply Chain Management: SCM Key to Competitiveness", *Irish packaging Yearbook and Directory.*

[27] Power, D. (2005), "Supply chain management integration and implementation: a literature review", *Supply chain management: an International journal,* Vol.10 (4), pp. 252-263.

[28] Kopczak, L.R. (1997), "Logistics partnerships and supply chain restructuring: survey results from the US computer industry", *Production and Operations Management,* Vol.6 (3), pp. 226-247.

[29] Gershon, P., (1999), *Review of civil procurement in central government,* (1st ed.)Hm Treasury, London.

[30] Lu, X., Huang, L. and Heng, M.S., (2006), "Critical success factors of inter-organizational information systems-A case study of Cisco and Xiao Tong in China", *Information & Management,* Vol.43 (3), pp. 395-408.

[31] Van Weele, A.J., (2009), *Purchasing and supply chain management: Analysis, strategy, planning and practice,* (5th ed.), Cengage Learning EMEA,U.K.

[32] Croom, S. and Brandon-Jones, A., (2007), "Impact of e-procurement: experiences from implementation in the UK public sector", *Journal of Purchasing and Supply Management,* Vol.13 (4), pp. 294-303.

[33] MacManus, S. (2002), "Understanding the incremental nature of e-procurement implementation at the state and local levels", *Journal of Public Procurement,* Vol.2 (1), pp. 5-28.

[34] Soares-Aguiar, A. and Palma-dos-Reis, A., (2008), "Why do firms adopt e-procurement systems? Using logistic regression to empirically test a conceptual model", *Engineering Management, IEEE Transactions on,* Vol.55 (1), pp. 120-133.

[35] Wise, C. (2009), "The North American Free Trade Agreement", *New Political Economy,* Vol.14 (1), pp. 133-148.

[36] Georghiou, L., et al. (2010), *"Public procurement for innovation in small European countries",* A Report from the ERA-PRISM: (Policies for Research and Innovation in Small Member States to Advance the European Research Area) OMC-Net Project, Brussels.

[37] Chima, C.M. (2011), "Supply-chain management issues in the oil and gas industry", *Journal of Business & Economics Research (JBER),* Vol.5 (6).

[38] Rekenkamer, A. (2013), "Contract management of DBFMO projects", *Tweede Kamer, vergaderjaar 2012-2013,* 33 639, nrs. 1-2 Netherlands.

[39] Koffman, L. and Macdonald, E., (2010), *the law of contract,* Oxford University Press, U.K.

[40] Shi, C. and Chen, B., (2007), "Pareto-optimal contracts for a supply chain with satisficing objectives", *J.Oper.Res.Soc.* Vol.58 (6), pp. 751-759.

[41] Marquez, A.C. and Blanchar, C., (2004), "The procurement of strategic parts. Analysis of a portfolio of contracts with suppliers using a system dynamics simulation model", *Int J Prod Econ*, Vol.88 (1), pp. 29-49.

[42] Burton, S.J. (2012), "Principles of contract law", (4th ed.) *St. Paul, MN: West Publishing Co., St. Paul, MN: Thomson/West*, 664 pages.

[43] Jin, Y. and Jorion, P., (2006), "Firm value and hedging: Evidence from US oil and gas producers", *The Journal of Finance*, Vol.61 (2), pp. 893-919.

[44] Choi, H., et al. (2016), "Rethinking the assessment of e-government implementation in developing countries from the perspective of the design–reality gap: Applications in the Indonesian e-procurement system", *Telecommunications Policy*.

[45] Rita, P. and Krapfel, R. (2015), "Collaboration and Competition in Buyer-Supplier Relations: The Role of Information in Supply Chain and e-Procurement Impacted Relationships", Assessing the Different Roles of Marketing Theory and Practice in the Jaws of Economic Uncertainty, *Springer, pp. 98-105*.

[46] Ramayah, T., et al. (2007), "Type of procurement and operational performance: comparing e-procurement and offline purchasing", *International Journal of Services and Operations Management*, Vol.3 (3), pp. 279-296.

[47] Parida, U. and Parida, V., (2005), "E-procurement: An Indian and Swedish perspective", Retrieved May 6, 2013 from http://www.epubl.ltu.se/1404-5508/.

[48] Assar, S. and Boughzala, I., (2007), "Empirical evaluation of public e-procurement platforms in France", *International Journal of Value Chain Management*, Vol.2 (1), pp. 90-108.

[49] Vaidya, K., Sajeev, A. and Callender, G., (2006), "Critical factors that influence e-procurement implementation success in the public sector", *Journal of public procurement*, Vol.6 (1/2), pp. 70.

[50] Smart, A. (2010), "Exploring the business case for e-procurement", *International Journal of Physical Distribution & Logistics Management*, Vol.40 (3), pp. 181-201.

[51] Presutti, W.D. (2003), "Supply management and e-procurement: creating value added in the supply chain", *Industrial Marketing Management*, Vol.32 (3), pp. 219-226.

[52] Huang, H., et al. (2013), "A hybrid mechanism for heterogeneous e-procurement involving a combinatorial auction and bargaining", *Electronic Commerce Research and Applications*, Vol.12 (3), pp. 181-194.

[53] Tran, Q., et al. (2011), "A construction enterprise's readiness level in implementing e-procurement: A system engineering assessment model", *Systems Engineering Procedia*, Vol.2 pp. 131-141.

[54] Tatsis, V., et al. (2006), "E-procurement in the Greek food and drink industry: drivers and impediments", *Journal of Purchasing and Supply Management,* Vol.12 (2), pp. 63-74.

[55] Alaniz, S. and Roberts, R., (1999), "E-Procurement: A guide to buy-side applications", *Stephens Inc, December,* Vol.27.

[56] Morris, A., Stahl, A. and Herbert, R., (2000), "E-procurement: streamlining processes to maximize effectiveness", *Luminant Worldwide Corporation,* USA.

[57] Aberdeen, G. (2001), "E-procurement: Don't Believe the Anti-Hype: Aberdeen Group", *Boston, MA.*

[58] Roche, J., (2001), "Are you ready for e-procurement?" *Strategic Finance,* pp. Vol. 83 No. 1-pp. 56-9.

[59] Kim, J. and Shunk, D.L., (2004), "Matching indirect procurement process with different B2B e-procurement systems", *Comput. Ind.,* Vol.53 (2), pp. 153-164.

[60] Wu, F., Zsidisin, G. and Ross, A., (2007), "Antecedents and outcomes of e-procurement adoption: an integrative model", *Engineering Management, IEEE Transactions on,* Vol.54 (3), pp. 576-587.

[61] Teo, T.S., Lin, S. and Lai, K., (2009), "Adopters and non-adopters of e-procurement in Singapore: an empirical study", *Omega,* Vol.37 (5), pp. 972-987.

[62] Maddi, M.S., Lorza, R.L., and et al. (2013), "Project Based Learning in Engineering Schools: The roles of Supply Management, Procurement, Designers and Builders of a New Product", *International Journal for Cross-disciplinary Subjects in Education,* Vol.3, 2.

[63] Csáki, C. and Gelléri, P., (2005), "Conditions and benefits of applying decision technological solutions as a tool to curb corruption within the procurement process: The case of Hungary", *Journal of Purchasing and Supply Management,* Vol.11 (5), pp. 252-259.

[64] Bakar, N.A., et al. (2016), "Abridgment of Traditional Procurement and E-Procurement: Definitions, Tools and Benefits.", *Journal of Emerging Economies & Islamic Research,* Vol.4 (1),.

[65] Panayiotou, N.A., Gayialis, S.P. and Tatsiopoulos, I.P., (2004), "An e-procurement system for governmental purchasing", *Int J Prod Econ,* Vol.90 (1), pp. 79-102.

[66] Eadie, R., et al. (2007), "Drivers and barriers to public sector e-procurement within Northern Ireland's construction industry", *Journal of Information Technology in Construction,* Vol.12 pp. 103-120.

[67] Eei, K.S., Husain, W. and Mustafa, N., (2012), "Survey on benefits and barriers of e-procurement: Malaysian SMEs perspective", *International Journal on Advanced Science, Engineering and Information Technology*, Vol.2 (6), pp. 424-429.

[68] Gilbert, A. (2000), "E-Procurement: Problems behind The Promise--companies find the applications limited, integration troublesome, and managing catalogs difficult. Is it worth it?", *InformationWeek*, Vol.48 (2),.

[69] Zhao, e. a. (2008), "An empirical investigation of critical success factors for e-business strategy implementation", "An empirical investigation of critical success factors for e-business strategy implementation", *Engineering Management Conference, 2008. IEMC Europe 2008. IEEE International,*: IEEE 1-4.

[70] Toktaş-Palut, P., et al. (2014), "The impact of barriers and benefits of e-procurement on its adoption decision: An empirical analysis", *Int J Prod Econ*, Vol.158 pp. 77-90.

[71] Eadie, R., Perera, S. and Heaney, G., (2010), "Identification of e-procurement drivers and barriers for UK construction organisations and ranking of these from the perspective of quantity surveyors", *Journal of Information Technology in Construction*, Vol.15 pp. 23-43.

[72] Hawking, D. 2004, "Challenges in enterprise search", *Proceedings of the 15th Australasian database conference-Volume 27*, Australian Computer Society, Inc. 15-24.

[73] Tanner, C., et al. (2008), "Current trends and challenges in electronic procurement: an empirical study", *Electronic Markets*, Vol.18 (1), pp. 6-18.

[74] Kothari, T., Hu, C. and Roehl, W.S., (2005), "e-Procurement: an emerging tool for the hotel supply chain management", *International Journal of Hospitality Management*, Vol.24 (3), pp. 369-389.

[75] Eadie, R., McLernon, T. and Patton, A., (2015), "An investigation into the legal issues relating to Building Information Modelling (BIM)", *Proceedings of RICS COBRA AUBEA 201*.

[76] Kameshwaran, S., et al. (2007), "Multiattribute electronic procurement using goal programming", *Eur.J.Oper.Res.*, Vol.179 (2), pp. 518-536.

[77] Liu, Q., et al. (2011), "A multi-agent based system for e-procurement exception management", *Knowledge-Based Syst.*, Vol.24 (1), pp. 49-57.

[78] Ronchi, S., et al. (2010), "What is the value of an IT e-procurement system?", *Journal of Purchasing and Supply Management*, Vol.16 (2), pp. 131-140.

[79] Davila, A., Gupta, M. and Palmer, R., (2003), "Moving Procurement Systems to the Internet:: the Adoption and Use of E-Procurement Technology Models", *European Management Journal*, Vol.21 (1), pp. 11-23.

[80] Wong, C. and B. Sloan 2004, "Use of ICT for e-procurement in the UK construction industry: a survey of SMES readiness", *Proceedings of ARCOM Twentieth Annual Conference 2004*, 1-3.

[81] Min, H. and Galle, W.P., (2003), "E-purchasing: profiles of adopters and nonadopters", *Industrial Marketing Management*, Vol.32 (3), pp. 227-233.

[82] Moon, M.J. (2005), "E-procurement management in state governments: diffusion of e-procurement practices and its determinants", Journal of Public Procurement, Vol.5 (1), pp. 54-72.

[83] Gebauer, J. and Arie S. (2001), "Changing Shapes of Supply Chains-How the Internet Could Lead to a More Integrated Procurement Function", *Supply Chain Forum: an International Journal*, Vol.2: BEM-Bordeaux Management School 2-9.

[84] Ageshin, E.A. (2001), "E-procurement at work: A case study", *Production and Inventory Management Journal*, Vol.42 (1), pp. 48-53.

[85] Rajkumar, T. (2001), "E-procurement: business and technical issues", *Information System Management*, Vol.18 (4), pp. 1-9.

[86] Kheng, C.B. and Al-Hawamdeh, S., (2002), "The adoption of electronic procurement in Singapore", *Electronic Commerce Research*, Vol.2 (1), pp. 61-73.

[87] Bingi, P., Mir, A. and Khamalah, J., (2000), "The challenges facing global e-commerce", *Information System Management*, Vol.17 (4), pp. 1-9.

[88] Angeles, R. and Nath, R., (2007), "Business-to-business e-procurement: success factors and challenges to implementation", *Supply Chain Management: An International Journal*, Vol.12 (2), pp. 104-115.

[89] Tanner, C., et al. (2008), "Current trends and challenges in electronic procurement: an empirical study", *Electronic Markets*, Vol.18 (1), pp. 6-18.

[90] Teo, T.S. and Ranganathan, C., (2004), "Adopters and non-adopters of business-to-business electronic commerce in Singapore", *Information & Management*, Vol.42 (1), pp. 89-102.

[91] Pani, A.K. and Agrahari, A., (2007), E-procurement in Emerging Economies, , *Igi Global,*.

[92] Corini, J. (2000), "Integrating e-procurement and strategic sourcing", *Supply Chain Management Review*, V.2, NO.3 (FALL 1998), P. 70-75: ILL.

[93] Neef, D., (2001), *E-procurement: from strategy to implementation*, FT press, Prentice-Hall, Upper Saddle River, NJ.

[94] Reunis, M.R., van Raaij, E.M. and Santema, S.C., (2004), "Actor-to-actor dissemination of electronic procurement (EP) adoption: an exploration of influencing factors", *Journal of Purchasing and Supply Management*, Vol.10 (4), pp. 201-210.

[95] Neupane, A., Soar, J. and Vaidya, K., (2015), "Anti-corruption capabilities of public e-procurement technologies: principal-agent theory", *Business Law and Ethics:* Concepts, Methodologies, Tools, and Applications: Concepts, Methodologies, Tools, and Applications, pp. 355.

[96] Bezos, J.P., et al. (2008), "Methods and systems for distributing information within a dynamically defined community". *Amazon. Com, Inc.* United States patent US 7,433,832. 2008 Oct 7.

[97] Fuks, K. and Kawa, A. (2010), "e-Sourcing cluster strategies: empathy vs. egoism", Agent and Multi-Agent Systems: Technologies and Applications, *Springer*, pp. 312-320.

[98] Tarantilis, C.D., Kiranoudis, C.T. and Theodorakopoulos, N., (2008), "A Web-based ERP system for business services and supply chain management: Application to real-world process scheduling", *Eur.J.Oper.Res.*, Vol.187 (3), pp. 1310-1326.

[99] Choi, D.H., Kim, J. and Kim, S.H., (2007), "ERP training with a web-based electronic learning system: The flow theory perspective", *International Journal of Human-Computer Studies*, Vol.65 (3), pp. 223-243.

[100] Bruno, G., Esposito, E., & Mastroianni, (2005), Evaluation of Public E-Procurement Services Accessibility: A Multicriteria Approach: *(First Ed. ed.), International Handbook of Public Procurement.*

[101] Neupane, A., et al., 2012, "Role of public e-procurement technology to reduce corruption in government procurement", *Proceedings of the 5th International Public Procurement Conference (IPPC5):* Public Procurement Research Centre 304-334.

[102] Block, C. and Neumann, D.(2008), "A decision support system for choosing market mechanisms in e-procurement", Negotiation, Auctions, and Market Engineering, *Springer*, pp. 44-57.

[103] Carter, C.R., et al. (2004), "Reverse auctions—grounded theory from the buyer and supplier perspective", *Transportation Research Part E: Logistics and Transportation Review*, Vol.40 (3), pp. 229-254.

[104] Eakin, D. (2003), "Measuring e-procurement benefits", Summit: *Canada's magazine on public sector purchasing*, United Kingdom.

[105] Angelov, S. and Grefen, P., (2008), "Supporting the diversity of B2B e-contracting processes", *International Journal of Electronic Commerce*, Vol.12 (4), pp. 39-70.

[106] Betts, M., et al. (2006), "Towards secure and legal e-tendering", *Journal of Information Technology in Construction*, Vol.11.

[107] Hennig T., et al. (2010), "The impact of new media on customer relationships", *Journal of service research*, Vol.13 (3), pp. 311-330.

[108] Koufaris, M. (2002), "Applying the technology acceptance model and flow theory to online consumer behavior", *Information systems research*, Vol.13 (2), pp. 205-223.

[109] Lee, M.K., Cheung, C.M. and Chen, Z., (2005), "Acceptance of Internet-based learning medium: the role of extrinsic and intrinsic motivation", *Information & management*, Vol.42 (8), pp. 1095-1104.

[110] Davis Jr, F.D. (1986), "A technology acceptance model for empirically testing new end-user information systems": Theory and results. *PhD thesis, Massachusetts Institute of Technology*.

[111] Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS quarterly*, pp. 319-340.

[112] Davis, F.D. (1993), "User acceptance of information technology: system characteristics, user perceptions and behavioral impacts", *International journal of man-machine studies*, Vol.38 (3), pp. 475-487.

[113] Armitage, C.J. and Conner, M., (2001), "Efficacy of the theory of planned behaviour: A meta-analytic review", *British journal of social psychology*, Vol.40 (4), pp. 471-499.

[114] Venkatesh, V. and Davis, F.D., (2000), "A theoretical extension of the technology acceptance model: four longitudinal field studies", *Management science*, Vol.46 (2), pp. 186-204.

[115] Stern, B.B., et al. (2008), "Consumer acceptance of online auctions: An extension and revision of the TAM", *Psychology & Marketing*, Vol.25 (7), pp. 619-636.

[116] Moon, J. and Kim, Y., (2001), "Extending the TAM for a World-Wide-Web context", *Information & Management*, Vol.38 (4), pp. 217-230.

[117] Müller-Seitz, G., et al. (2009), "Customer acceptance of RFID technology: Evidence from the German electronic retail sector", *Journal of Retailing and Consumer Services*, Vol.16 (1), pp. 31-39.

[118] Lin, C., Shih, H. and Sher, P.J., (2007), "Integrating technology readiness into technology acceptance: The TRAM model", *Psychology & Marketing*, Vol.24 (7), pp. 641-657.

[119] Serenko, A., Bontis, N. and Detlor, B., (2007), "End-user adoption of animated interface agents in everyday work applications", *Behaviour & Information Technology,* Vol.26 (2), pp. 119-132.

[120] Chen, S., Chen, H. and Chen, M., (2009), "Determinants of satisfaction and continuance intention towards self-service technologies", *Industrial Management & Data Systems,* Vol.109 (9), pp. 1248-1263.

[121] Chen, H. and Chen, S., (2008), "The empirical study of automotive telematics acceptance in Taiwan: comparing three Technology Acceptance Models", *International Journal of Mobile Communications,* Vol.7 (1), pp. 50-65.

[122] Tornatzky, L.G., Fleischer, M. and Chakrabarti, A.K., (1990), *The processes of technological innovation*, Lexington Books Lexington, MA, USA.

[123] Oliveira, T. and Martins, M.F., (2011), "Literature review of information technology adoption models at firm level", *The Electronic Journal Information Systems Evaluation*, Vol.14 (1), pp. 110-121.

[124] Arpaci, I., et al. (2012), "Organizational adoption of information technologies: A literature review", *International Journal of e-Business and e-Government Studies,* Vol.4 (2), pp. 37-50.

[125] Kuan, K.K. and Chau, P.Y., (2001), "A perception-based model for EDI adoption in small businesses using a technology–organization–environment framework", *Information & management,* Vol.38 (8), pp. 507-521.

[126] Srivastava, S.C. and Teo, T.S., (2010), "E-government, e-business, and national economic performance", *Communications of the Association for Information Systems,* Vol.26 (1), pp. 14.

[127] Hong, W. and Zhu, K., (2006), "Migrating to internet-based e-commerce: Factors affecting e-commerce adoption and migration at the firm level", *Information & Management,* Vol.43 (2), pp. 204-221.

[128] Lin, C.H., et al. (2008), "Osteoplastic thumb ray restoration with or without secondary toe transfer for reconstruction of opposable basic hand function", *Plast. Reconstr. Surg.,* Vol.121 (4), pp. 1288-1297.

[129] Sila, I. (2013), "Factors affecting the adoption of B2B e-commerce technologies", *Electronic commerce research,* Vol.13 (2), pp. 199-236.

[130] Srivastava, S.C. and Teo, T.S., (2007), "What facilitates e-government development? A cross-country analysis", *Electronic Government, An International Journal,* Vol.4 (4), pp. 365-378.

[131] Zhu, K., Kraemer, K.L. and Xu, S., (2006), "The process of innovation assimilation by firms in different countries: a technology diffusion perspective on e-business", *Management science,* Vol.52 (10), pp. 1557-1576.

[132] Zhu, K., et al. (2006), "Innovation diffusion in global contexts: determinants of post-adoption digital transformation of European companies", *European journal of information systems,* Vol.15 (6), pp. 601-616.

[133] Jones P., et al. (2013), "SMEs' adoption of enterprise applications: A technology-organisation-environment model", *Journal of Small Business and Enterprise Development,* Vol.20 (4), pp. 735-753.

[134] Haddara, M. and Elragal, A., (2013), "ERP Lifecycle: A retirement case study", *Information Resources Management Journal (IRMJ),* Vol.26 (1), pp. 1-11.

[135] Pan, M. and Jang, W., (2008), "Determinants of the adoption of enterprise resource planning within the technology-organization-environment framework: Taiwan's communications", *Journal of Computer information systems,* Vol.48 (3), pp. 94.

[136] Lee, V., et al. (2014), "Creating technological innovation via green supply chain management: An empirical analysis", *Expert Syst. Appl.,* Vol.41 (16), pp. 6983-6994.

[137] Lee, O.D., et al. (2009), "Knowledge management systems diffusion in Chinese enterprises: A multistage approach using the technology-organization-environment framework", *Journal of Global Information Management,* Vol.17 (1), pp. 70.

[138] Chang, V., Walters, R.J. and Wills, G., (2013), "The development that leads to the Cloud Computing Business Framework", *Int.J.Inf.Manage.,* Vol.33 (3), pp. 524-538.

[139] Chau, P.Y. and Tam, K.Y., (1997), "Factors affecting the adoption of open systems: an exploratory study", *Mis Quarterly,* pp. 1-24.

[140] Ajzen, I., (1985), *From intentions to actions: A theory of planned behavior*, Springer, (pp. 11-39). Springer Berlin Heidelberg.

[141] Cheon, J., et al. (2012), "An investigation of mobile learning readiness in higher education based on the theory of planned behavior", *Comput. Educ.,* Vol.59 (3), pp. 1054-1064.

[142] Shah A.S. and Sayuti M. N., (2011), "Applying the Theory of Planned Behavior (TPB) in halal food purchasing", *International Journal for Commerce Management,* Vol.21 (1), pp. 8-20.

[143] Norman, P. (2011), "The theory of planned behavior and binge drinking among undergraduate students: Assessing the impact of habit strength", *Addict.Behav.,* Vol.36 (5), pp. 502-507.

[144] Han, H. (2015), "Travelers' pro-environmental behavior in a green lodging context: Converging value-belief-norm theory and the theory of planned behavior", *Tourism Management*, Vol.47 pp. 164-177.

[145] Truong, Y. (2008), "An evaluation of the theory of planned behaviour in consumer acceptance of online video and television services", *The Electronic Journal Information Systems Evaluation*, Vol.12 (2), pp. 177-186.

[146] Hsu, M., et al. (2006), "A longitudinal investigation of continued online shopping behavior: An extension of the theory of planned behavior", *International Journal of Human-Computer Studies*, Vol.64 (9), pp. 889-904.

[147] Venkatesh, V., Morris, M.G. and Ackerman, P.L., (2000), "A longitudinal field investigation of gender differences in individual technology adoption decision-making processes", *Organ.Behav.Hum.Decis.Process.*, Vol.83 (1), pp. 33-60.

[148] Fortin, D.R. (2000), "Clipping coupons in cyberspace: a proposed model of behavior for deal-prone consumers", *Psychology & Marketing*, Vol.17 (6), pp. 515-534.

[149] Lee, J., Cerreto, F.A. and Lee, J., (2010), "Theory of planned behavior and teachers' decisions regarding use of educational technology", *Journal of Educational Technology & Society*, Vol.13 (1), pp. 152-164.

[150] Renzi, S. and Klobas, J., (2008), "Using the theory of planned behavior with qualitative research", Carlo F. *Dondena Centre for Research on Social Dynamics. Working Paper* No. 12. .

[151] Ajzen, I. (1991), "The theory of planned behavior", *Organ.Behav.Hum.Decis.Process.* Vol.50 (2), pp. 179-211.

[152] Ellinger, A.D., Watkins, K.E. and Bostrom, R.P., (1999), "Managers as facilitators of learning in learning organizations", *Human Resource Development Quarterly*, Vol.10 (2), pp. 105-125.

[153] Wu, I. and Chen, J., (2005), "An extension of trust and TAM model with TPB in the initial adoption of on-line tax: an empirical study", *International Journal of Human-Computer Studies*, Vol.62 (6), pp. 784-808.

[154] Hu, P.J., et al. (1999), "Examining the technology acceptance model using physician acceptance of telemedicine technology", *J.Manage.Inf.Syst.*, pp. 91-112.

[155] Teo, T. (2009), "Is there an attitude problem? Reconsidering the role of attitude in the TAM", *British Journal of Educational Technology*, Vol.40 (6), pp. 1139-1141.

[156] Yukl, G.A. (2002), "Leadership in organizations", (5th ed.) *Prentice-Hall*, Upper Saddle Creek, N.J.

[157] Williams, L.R., Esper, T.L. and Ozment, J., (2002), "The electronic supply chain: Its impact on the current and future structure of strategic alliances, partnerships and logistics leadership", *International Journal of Physical Distribution & Logistics Management,* Vol.32 (8), pp. 703-719.

[158] World Bank. (2003), "Electronic government procurement (e-GP)" world bank draft strategy", pp. 01.08.2014

[159] ECOM Group. (2002), "e-Procurement in the UK Public Sector: A Guide to Developments and Best Practices (A CIPFA e-Government Forum Report)", *London, UK: Author,* .

[160] Mohammadi, M.R. (2013), "Ranking of Critical Success Factors of e-procurement in Iranian Automotive Industry".

[161] KPMG. (2001), "University of California office of the president system wide e-procurement assessment and strategy recommendation".

[162] Farzin, S. and Nezhad, H.T., (2010), "E-Procurement, the golden key to optimizing the supply chains system", *World Academy of Science, Engineering and Technology,* Vol.66 pp. 518-524.

[163] Pop, C.S. (2011), "THE BARRIERS OF IMPLEMENTING E-PROCUREMENT", *Studia Universitatis Vasile Goldiş, Arad-Seria Ştiinţe Economice,* (1-2), pp. 120-124.

[164] Lin, H. and Yi-Shun Wang 2005, "*Predicting consumer intention to use mobile commerce in Taiwan"*, Mobile Business, 2005. ICMB 2005. International Conference on: IEEE 406-412.

[165] Fisk, R.P., et al. (2011), "The role of technology readiness in self-service technology acceptance", *Managing Service Quality: An International Journal,* Vol.21 (4), pp. 424-444.

[166] Liao, Z. and Cheung, M.T., (2008), "Measuring consumer satisfaction in internet banking: a core framework", *Commun. ACM,* Vol.51 (4), pp. 47-51.

[167] Khalifa, M. and Shen, K.N., (2008), "Explaining the adoption of transactional B2C mobile commerce", *Journal of enterprise information management,* Vol.21 (2), pp. 110-124.

[168] Guriting, P. and Ndubisi, N.O., (2006), "Borneo online banking: evaluating customer perceptions and behavioural intention", *Management research news,* Vol.29 (1/2), pp. 6-15.

[169] Van der Heijden, H., Verhagen, T. and Creemers, M., (2003), "Understanding online purchase intentions: contributions from technology and trust perspectives", *European journal of information systems,* Vol.12 (1), pp. 41-48.

[170] Chen, L., Gillenson, M.L. and Sherrell, D.L., (2002), "Enticing online consumers: an extended technology acceptance perspective", *Information & management,* Vol.39 (8), pp. 705-719.

[171] Wang, Y., et al. (2003), "Determinants of user acceptance of Internet banking: an empirical study", *International Journal of service industry management,* Vol.14 (5), pp. 501-519.

[172] Luarn, P. and Lin, H., (2005), "Toward an understanding of the behavioral intention to use mobile banking", *Comput.Hum.Behav,* Vol.21 (6), pp. 873-891.

[173] Kleijnen, M., Wetzels, M. and de Ruyter, K., (2004), "Consumer acceptance of wireless finance", *Journal of Financial Services Marketing,* Vol.8 (3), pp. 206-217.

[174] Lai, J. and Yang, C., (2009), "Effects of employees' perceived dependability on success of enterprise applications in e-business", *Industrial Marketing Management,* Vol.38 (3), pp. 263-274.

[175] Robinson, L., Marshall, G.W. and Stamps, M.B., (2005), "Sales force use of technology: antecedents to technology acceptance", *Journal of Business Research,* Vol.58 (12), pp. 1623-1631.

[176] Ajzen, I. (1991), "The theory of planned behavior", *Organ.Behav.Hum.Decis.Process.* Vol.50 (2), pp. 179-211.

[177] Gribbins, M., Shaw, M. and Gebauer, J., (2003), "An investigation into employees' acceptance of integrating mobile commerce into organizational processes", *AMCIS 2003 Proceedings,* pp. 11.

[178] George, J.F. (2002), "Influences on the intent to make Internet purchases", *Internet Research,* Vol.12 (2), pp. 165-180.

[179] Karjaluoto, H., et al. (2010), "Mobile banking: proposition of an integrated adoption intention framework", *International Journal of Bank Marketing,* Vol.28 (5), pp. 389-409.

[180] Amin, H., Baba, R. and Muhammad, M.Z., (2007), "An analysis of mobile banking acceptance by Malaysian customers", *Sunway academic journal,* Vol.4 pp. 1-12.

[181] Ramayah, T. and Suki, N.M., (2006), "Intention to use mobile PC among MBA students: implications for technology integration in the learning curriculum", *UNITAR e-Journal,* Vol.1 (2), pp. 1-10.

[182] Porter, C.E. and Donthu, N., (2006), "Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics", *Journal of business research,* Vol.59 (9), pp. 999-1007.

[183] Morosan, C. and Jeong, M., (2008), "Users' perceptions of two types of hotel reservation Web sites", *International Journal of Hospitality Management,* Vol.27 (2), pp. 284-292.

[184] McKechnie, A.E., Freckleton, R.P. and Jetz, W., (2006), "Phenotypic plasticity in the scaling of avian basal metabolic rate", *Proc.Biol.Sci.,* Vol.273 (1589), pp. 931-937.

[185] McCloskey, D.W. (2006), "The importance of ease of use, usefulness, and trust to online consumers: An examination of the technology acceptance model with older consumers", *Journal of Organizational and End User Computing*, Vol.18 (3), pp. 47.

[186] Gefen, D., Karahanna, E. and Straub, D.W., (2003), "Trust and TAM in online shopping: an integrated model", *MIS quarterly*, Vol.27 (1), pp. 51-90.

[187] Gefen, D. and Straub, D.W., (2003), "Managing user trust in B2C e-services", *E-service Journal*, Vol.2 (2), pp. 7-24.

[188] Venardos, A.M., (2012), *Islamic banking and finance in South-east Asia: its development and future*, (Vol. 6), World Scientific.

[189] Ngai, E.W., Poon, J. and Chan, Y., (2007), "Empirical examination of the adoption of WebCT using TAM", *Comput. Educ.*, Vol.48 (2), pp. 250-267.

[190] Kaliannan, M., Awang, H. and Raman, M., (2009), "Government purchasing: A review of E-procurement system in Malaysia", *The Journal of Knowledge Economy & Knowledge Management*, Vol.4 (1), pp. 27-41.

[191] Hameed, S.A. (2009), "Software Engineering Ethical Principles based on Islamic Values", *Journal of Software*, Vol.4 (6), pp. 563-570.

[192] Al-Qahtani, S. (2010), "Technology Acceptance Model: Toward a Theoretical Indigenized Study from an Islamic Perspective", *Dirasat: Administrative Sciences*, Vol.37 (1).

[193] Sundararajan, V. and Errico, L., (2002), *Islamic financial institutions and products in the global financial system: Key issues in risk management and challenges ahead*, International Monetary Fund,.

[194] Iqbal, Z. (1997), "Islamic financial systems", *Finance and Development*, Vol.34 pp. 42-45.

[195] Al-Gahtani, S.S. (2004), "Computer technology acceptance success factors in Saudi Arabia: an exploratory study", *Journal of Global Information Technology Management*, Vol.7 (1), pp. 5-29.

[196] Al-Gahtani, S.S. (2003), "Computer technology adoption in Saudi Arabia: Correlates of perceived innovation attributes", *Information Technology for Development*, Vol.10 (1), pp. 57-69.

[197] Al-Gahtani, S. (2001), "The applicability of TAM outside North America: an empirical test in the United Kingdom", *Information Resources Management Journal*, Vol.14 (3), pp. 37.

[198] Al-Abdul-Gader, A.H., (1999), *Managing computer based information systems in developing countries: A cultural perspective*, IGI Global.

[199] Anandarajan, M., Igbaria, M. and Anakwe, U.P., (2002), "IT acceptance in a less-developed country: a motivational factor perspective", *Int.J.Inf.Manage.* Vol.22 (1), pp. 47-65.

[200] Azmat, S., Skully, M. and Brown, K., (2015), "Can Islamic banking ever become Islamic?", *Pacific-Basin Finance Journal*, .

[201] Ibrahim, M.H. (2015), "Issues in Islamic banking and finance: Islamic banks, Shari'ah-compliant investment and sukuk", *Pacific-Basin Finance Journal,* Vol.34 pp. 185-191.

[202] Kabir, M.N., Worthington, A. and Gupta, R., (2015), "Comparative credit risk in Islamic and conventional bank", *Pacific-Basin Finance Journal,* Vol.34 pp. 327-353.

[203] Gaither, T.K. and Al-Kandari, A.J., (2014), "The cultural-economic model and public relations in the Middle East: An examination of the Islamic banking system in Kuwait", *Public Relations Review,* Vol.40 (1), pp. 33-41.

[204] Bryman, A. and Cramer, D., (2012), *Quantitative data analysis with IBM SPSS 17, 18 & 19: A guide for social scientists,* Routledge.

[205] Myers, M.D. (1997), "Qualitative research in information systems", *Management Information Systems Quarterly,* Vol.21 pp. 241-242.

[206] Mangan, J., Lalwani, C. and Gardner, B., (2004), "Combining quantitative and qualitative methodologies in logistics research", *International Journal of Physical Distribution & Logistics Management,* Vol.34 (7), pp. 565-578.

[207] Bryman, A. and Bell, E., (2007), *Business research methods,* Oxford University Press, USA.

[208] Orlikowski, W.J. and Baroudi, J.J., (1991), "Studying information technology in organizations: Research approaches and assumptions", *Information systems research,* Vol.2 (1), pp. 1-28.

[209] Easterby-Smith, M.T. (1991), "R. and Lowe, A. (1991)", *Management research: An introduction,* Vol.1.

[210] Alvesson, M. and Deetz, S., (2000), *Doing critical management research,* Sage.

[211] Bradley, E.H., Curry, L.A. and Devers, K.J., (2007), "Qualitative data analysis for health services research: developing taxonomy, themes, and theory", *Health Serv.Res.,* Vol.42 (4), pp. 1758-1772.

[212] Johnson, R.B. and Onwuegbuzie, A.J., (2004), "Mixed methods research: A research paradigm whose time has come", *Educational researcher,* Vol.33 (7), pp. 14-26.

[213] Näslund, D. (2002), "Logistics needs qualitative research–especially action research", *International Journal of Physical Distribution & Logistics Management*, Vol.32 (5), pp. 321-338.

[214] Saunders, M., Lewis, P. and Thornhill, A. eds. (2003), *Research Methods for Business Students*, 3rd ed. ed., Harlow: FT/Prentice Hall.

[215] Guba, E.G. and Lincoln, Y.S., (1994), "Competing paradigms in qualitative research", *Handbook of qualitative research*, Vol.2 pp. 163-194.

[216] Filstead, W.J. (1979), "Qualitative methods: A needed perspective in evaluation research", *Qualitative and quantitative methods in evaluation research*, pp. 33-48.

[217] Kitchin, R. editor. (2006), *Positivistic geographies and spatial science*, pp. 20 ed., Sage Publications Limited.

[218] Lancaster, G., (2012), *Research methods in management*, Routledge.

[219] Abu-ELSamen, A., Chakraborty, G. and Warren, D., (2010), "A Process-Based Analysis of e-Procurement Adoption", *Journal of Internet Commerce*, Vol.9 (3-4), pp. 243-259.

[220] Al-Shihi H. (2006). "Critical Factors in the Adoption and Diffusion of E-government Initiatives in Oman" (pdf). pp. 13, 14. *http://wallaby.vu.edu.au/adt-VVUT/uploads/approved/adt-VVUT20060904.154748/public/01front.pdf. Retrieved 2010-01-19.*

[221] Rahim, M.M. (2008), "Identifying factors affecting acceptance of e-procurement systems: An initial qualitative study at an Australian City Council", *Communications of the IBIMA*, Vol.3 pp. 7-17.

[222] Singh, I. and Punia, D., (2011), " Employees Adoption of E-Procurement System: An Empirical Study", Vol.1112/1112.2699.pdf (http://arxiv.org/ftp/arxiv/papers/1112/1112.2699.pdf.), pp. 19/08/2013.

[223] Pires, G.D. and Stanton, J., (2005), "A research framework for the electronic procurement adoption process: drawing from Australian evidence", *Journal of Global Business and Technology*, Vol.1 (2), pp. 12-20.

[224] Leenders, M.R., et al., (2002), *Purchasing and supply management*, McGraw-Hill Boston.

[225] Lancioni, R.A., Smith, M.F. and Oliva, T.A., (2000), "The role of the internet in supply chain management", *Industrial Marketing Management*, Vol.29 (1), pp. 45-56.

[226] Mayer, R.C., Davis, J.H. and Schoorman, F.D., (1995), "An integrative model of organizational trust", *Academy of management review*, Vol.20 (3), pp. 709-734.

[227] Succi, M. J. and Zhiping D. Walter 1999, "Theory of user acceptance of information technologies: an examination of health care professionals", *System Sciences, 1999. HICSS-32. Proceedings of the 32nd Annual Hawaii International Conference on,*: IEEE 7 pp.

[228] Ring, P.S. and Van de Ven, Andrew H., (1994), "Developmental processes of cooperative interorganisational relationships", *Academy of management review*, Vol.19 (1), pp. 90-118.

[229] Khan, W.M., (2002), *Transition to a Riba free economy*, IIIT, *International Islamic University, Islamabad. 34*, Pakistan.

[230] Fasih, F. (2012), "Inclusive growth in India through Islamic banking", *Procedia-Social and Behavioral Sciences*, Vol.37 pp. 97-110.

[231] Zainul, N., Osman, F. and Mazlan, S.H., (2004), "E-commerce from an Islamic perspective", *Electronic Commerce Research and Applications*, Vol.3 (3), pp. 280-293.

[232] Abdul-Rahman, Y., (2009), The Art of Islamic Banking and Finance: Tools and Techniques for Community-Based Banking, John Wiley & Sons,.

[233] Uusmani, M.T. and Taqi ' Uusmani, M., (2002), *"*An introduction to Islamic finance, Idratul Ma arif: Pakistan". *Valpy, Scott. Paper Presented at the Fourth Islamic Finance Program at Harvard University*, Boston, Massachusetts.

[234] Byrne, B.M., (2013), *Structural equation modeling with AMOS: Basic concepts, applications, and programming*, Routledge, UK.

[235] Bryman, A. and Cramer, D., (1994), *Quantitative data analysis for social scientists* (rev,Taylor & Frances/Routledge, UK.

[236] Anderson, D.R., et al., (2016), *Statistics for business & economics*, , Nelson Education,.

[237] Williams, L.J., Vandenberg, R.J. and Edwards, J.R., (2009), "12 structural equation modeling in management research: a guide for improved analysis", *The Academy of Management Annals*, Vol.3 (1), pp. 543-604.

[238] Batt, R. (2002), "Managing customer services: Human resource practices, quit rates, and sales growth." *Academy of management Journal*, Vol.45 (3), pp. 587-597.

[239] Gormly, J. (2014), "What are the challenges to sustainable procurement in commercial semi-state bodies in Ireland?" *Journal of Public Procurement*, Vol.14 (3).

[240] Jamshidian, M. and Bentler, P.M., (1999), "ML estimation of mean and covariance structures with missing data using complete data routines", *Journal of Educational and Behavioral Statistics*, Vol.24 (1), pp. 21-24.

[241] Hair, J.F., et al., (2006), *Multivariate data analysis*, Pearson Prentice Hall Upper Saddle River, NJ, USA.

[242] Anderson, J.C. and Gerbing, D.W., (1988), "Structural equation modeling in practice: A review and recommended two-step approach." *Psychol.Bull.*, Vol.103 (3), pp. 411.

[243] Fornell, C. and Larcker, D.F., (1981), "Structural equation models with unobservable variables and measurement error: Algebra and statistics", *J. Market. Res.*, pp. 382-388.

[244] Segars, A.H. and Grover, V., (1998), "Strategic information systems planning success: an investigation of the construct and its measurement", *MIS quarterly*, pp. 139-163.

[245] Byrne, B.M., (1989), "*A primer of LISREL: Basic applications and programming for confirmatory factor analytic models"*, Springer-Verlag Publishing.

[246] Kenneth A. Bollen and J. Scott Long., (1993), *Testing structural equation models*, Vol. 154. , Sage.

[247] Jöreskog, K.G. and Sörbom, D., (1989), *LISREL 7: A guide to the program and applications*, SPSS, Chicago, USA.

[248] Sörbom, D. (1989), "Model modification", *Psychometrika*, Vol.54 (3), pp. 371-384.

[249] Hu, L. and Bentler, P.M., (1999), "Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives", *Structural equation modeling: a multidisciplinary journal*, Vol.6 (1), pp. 1-55.

[250] Marsh, H.W., Wen, Z. and Hau, K., (2004), "Structural equation models of latent interactions: evaluation of alternative estimation strategies and indicator construction." *Psychol. Methods*, Vol.9 (3), pp. 275.

[251] Sharma, S. and Kumar, A., (2006), "Cluster analysis and factor analysis", *The Handbook of Marketing Research: Uses, Misuses, and Future Advances*, pp. 365.

[252] Pedhazur, E.J. (1997), "Multiple regression in behavioral research: Explanation and prediction", (2nd ed.). New York: Holt, Rinehart &Winston.

[253] Aman, A.and Kasimin, H., (2011), "E-procurement implementation: a case of Malaysia government", *Transforming Government: People, Process and Policy*, Vol.5 (4), pp. 330-344.

[254] Ellinger, A.D. and Bostrom, R.P., (1999), "Managerial coaching behaviors in learning organizations", *Journal of Management Development*, Vol.18 (9), pp. 752-771.

[255] Veit, D. J., Nils P. Parasie and Huntgeburth, J. C. (2011), "E-Procurement Adoption at the Municipal Level: Influence of Organizational, Technological and Environmental Factors", *System Sciences (HICSS), 2011 44th Hawaii International Conference on,*: IEEE 1-10.

[256] Madalina, L. (2015), "Islamic Economics: Contemporary Approach in the Arab World", *Academic Journal of Interdisciplinary Studies*, Vol.4 (3 S1), pp. 278.

[257] Wu, J. and Wang, S., (2005), "What drives mobile commerce?: An empirical evaluation of the revised technology acceptance model", *Information & management*, Vol.42 (5), pp. 719-729.

[258] Tassabehji, R. (2010), "Understanding e-auction use by procurement professionals: motivation, attitudes and perceptions", *Supply Chain Management: An International Journal*, Vol.15 (6), pp. 425-437.

[259] Pearcy, D.H. and Giunipero, L.C., (2008), "Using e-procurement applications to achieve integration: what role does firm size play?", *Supply Chain Management: An International Journal*, Vol.13 (1), pp. 26-34.

Appendix (A) – Pilot Survey Results

The results of this study show/indicate that the demographic information from 19 responses from a different types industry (figure A-1). The employees' number is shown in table2. Table 3 shows the annual income in total; each of them shows a different percentage of result. It is obvious that oil and gas industry has 47% which is considering the highest number of participates.

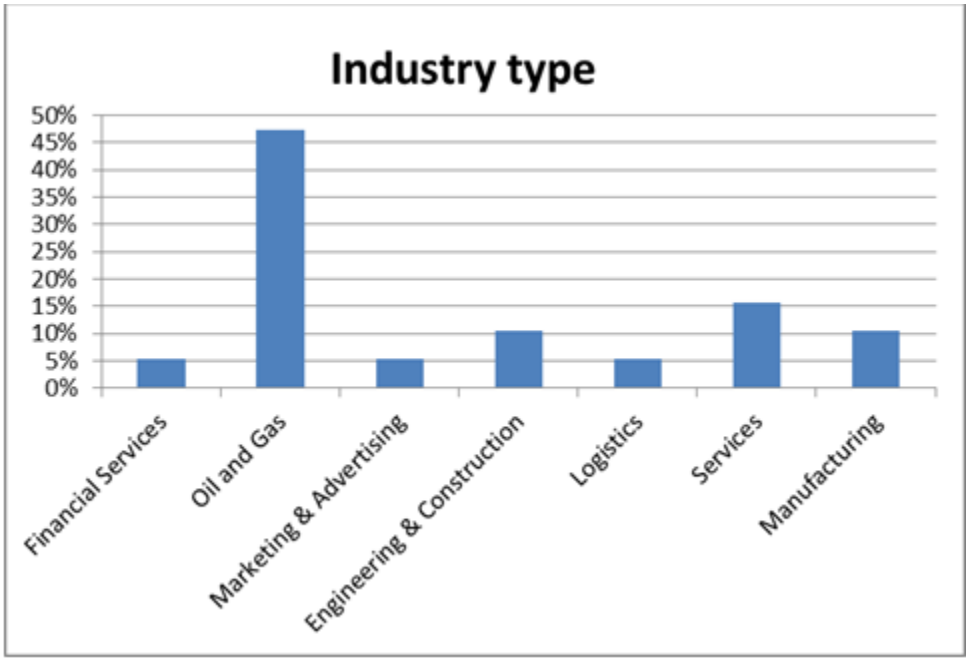

Figure A-1: Respondent organisations Profile

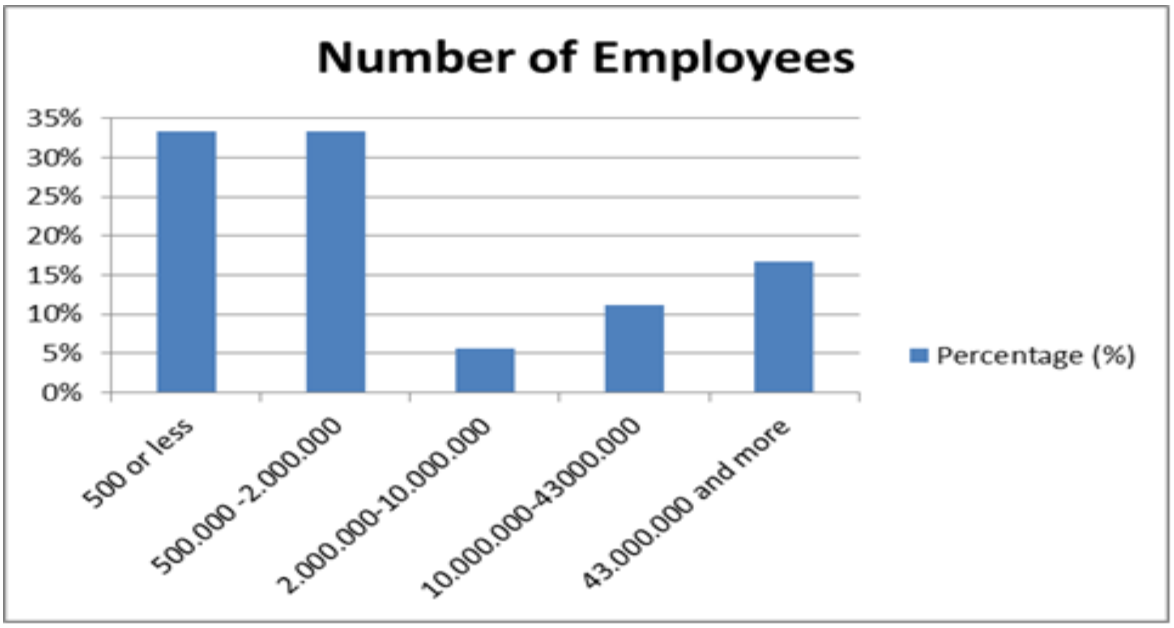

Figure A-2: Number of employees

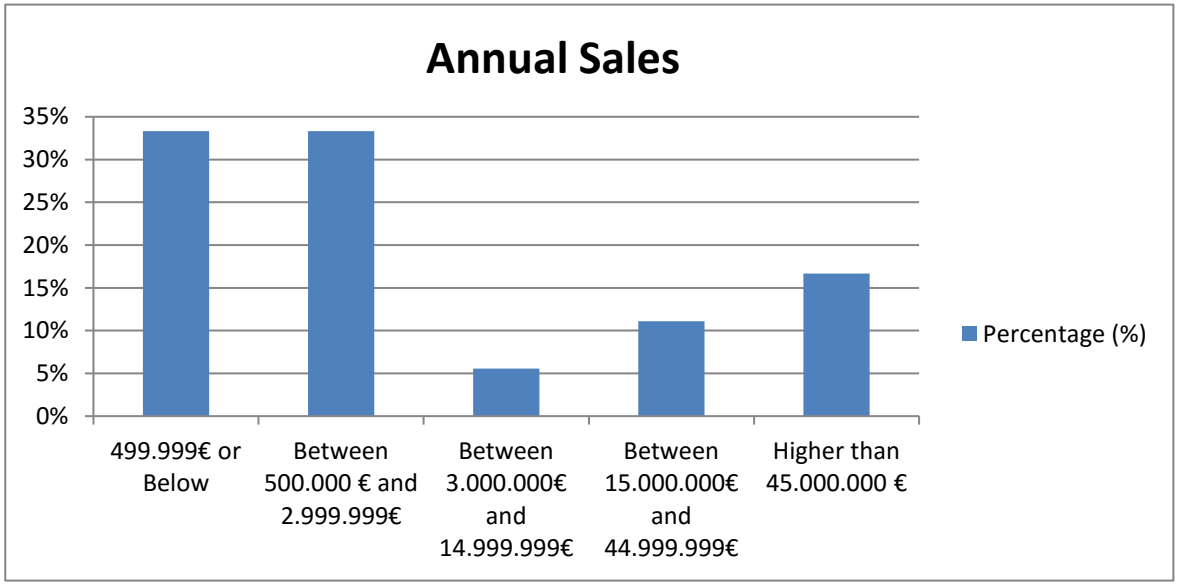

Figure A-3: Annual Sales

Respondents profile

The current study found that there was about 82% (26+21+15+10+10) of the respondents in a relatively high level position at their organisations as shown below in figure A-4, whereas only 15% are in low positions.

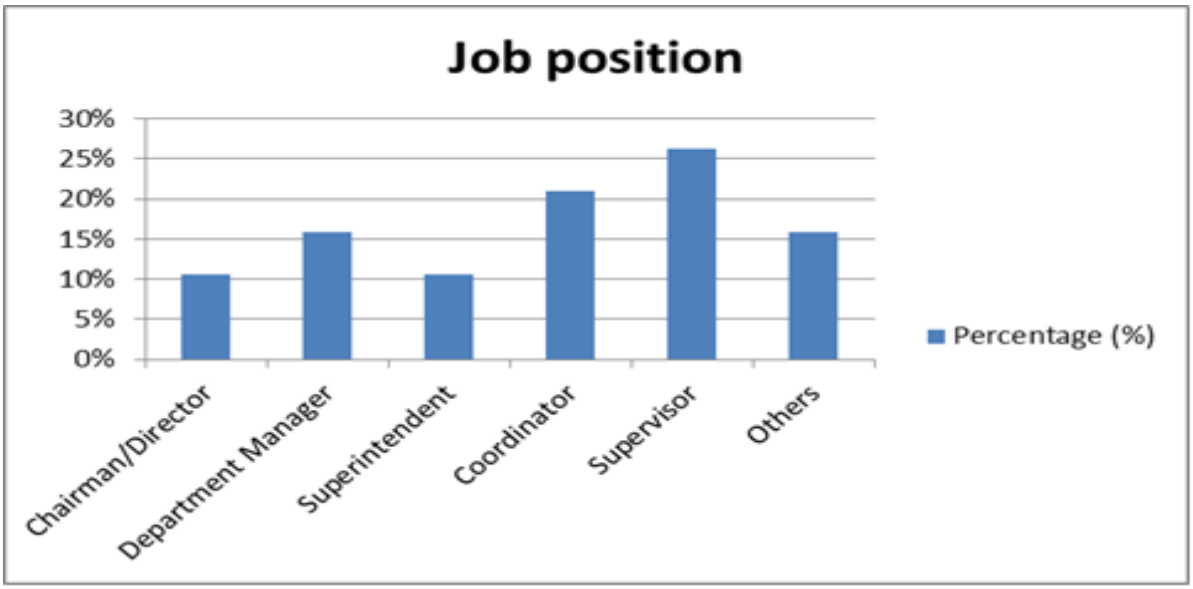

Figure A-4: Job position

5.4 Actual status of e-procurement

Another important finding was that from the responses, there are only 11% of organisations are currently using e-procurement while 22% were in the process of implementing one or more e-procurement applications (Table 5). Around 28% indicated no consideration and 50% have some consideration but no decision has been made yet.

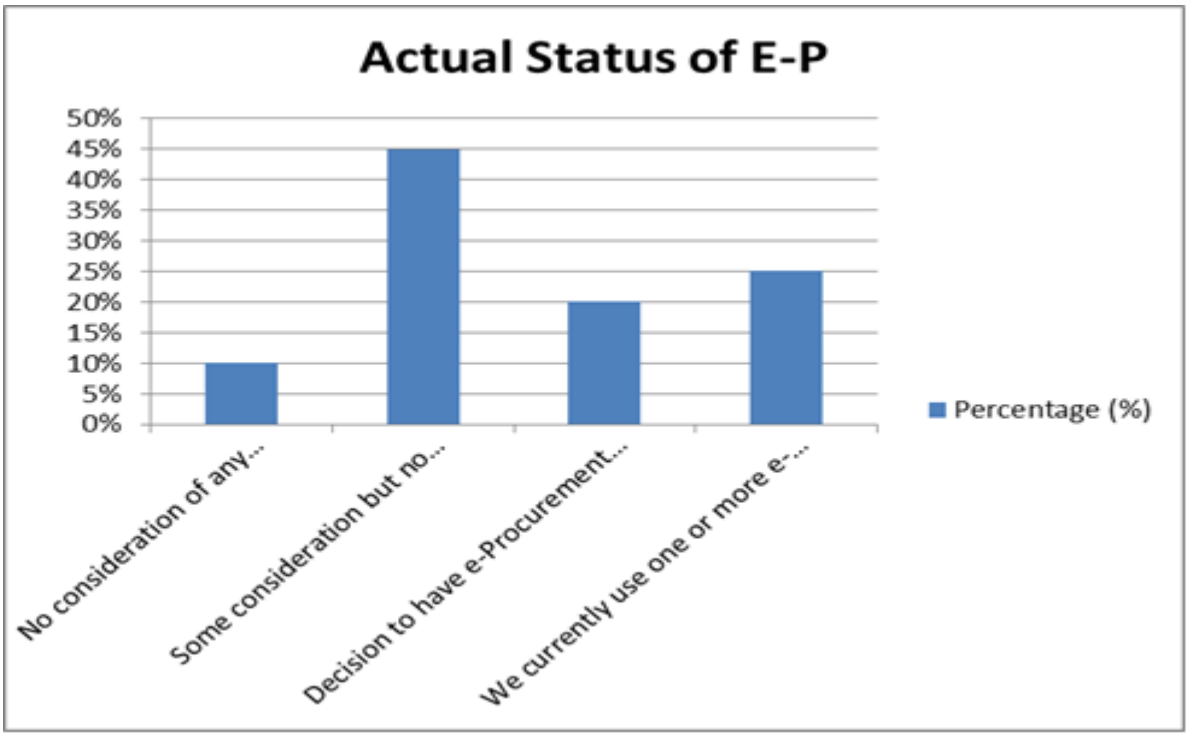

Figure A-5: Actual status of e-procurement

The table.6 below shows that participants were asked about their relevant e-procurement activities related to predefined information. The more relevant e-procurement activities were the electronic catalogue and electronic orders 55% for each, while 50% for both reply for proposal and electronic payment. The electronic invoicing and order delivery conformation have got around 39% for each of them which means did not show any significant increase in them.

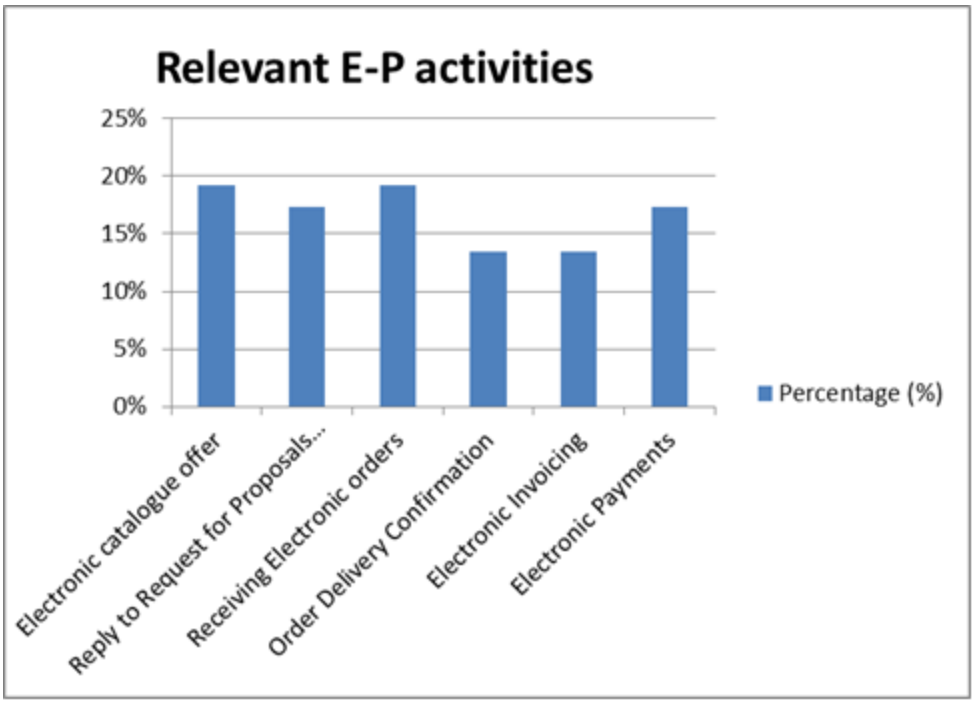

Figure A-6: Relevant e-procurement activities

5.5 e-procurement benefits

The subsequent table 7 is shown that the perception about the benefit of e-procurement is very important which starting with implementing of e-procurement decision. It is also confirms that the participants are strongly agree that e-procurement implementation will contribute to: reduce order processing costs(61%) , Improve relationship with clients (41.2%), Reach new markets and gain of competitive advantage(38.9%).However ,respondents are in average less hopeful about benefit such as sales growth (26%), better operation efficiency (27.8%) and better negotiable transparency(33.3%).

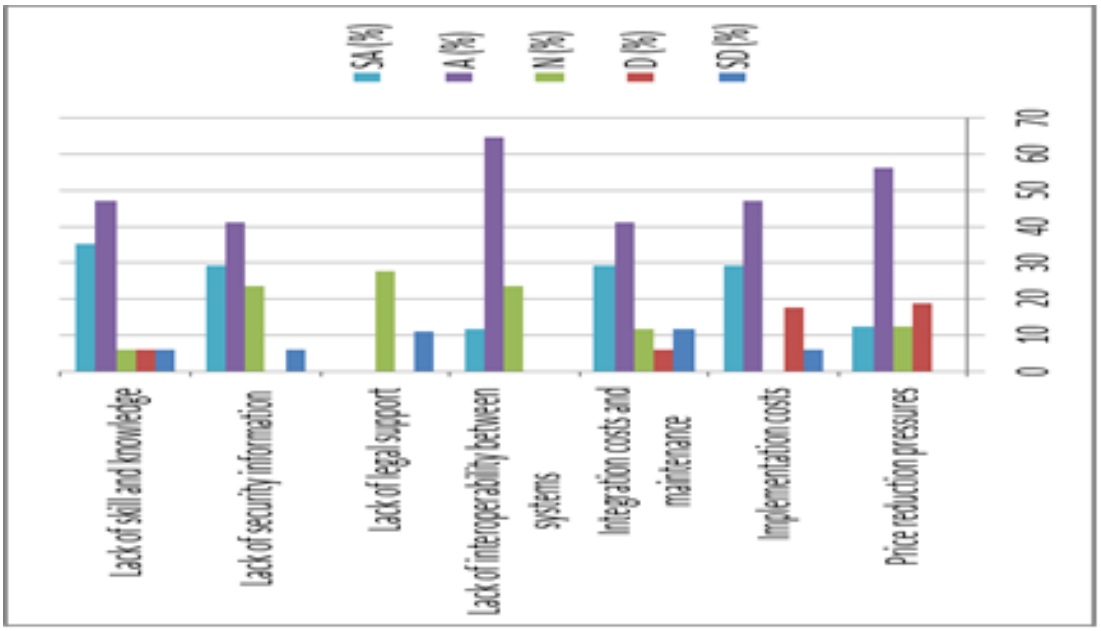

Figure A-7: Mean Rating of perceived benefits

Legend: SD - Strongly Disagree; D - Disagree; N - Neither Agree nor Disagree; A - Agree; SA - Strongly Agree.

5.6 Perceived barriers

The flowing table 9 shows that the survey participant were asked about the barriers of implementing e-procurement and are strongly agree with the lack of skill and knowledge (35.3%), lack of information security, integration costs and maintenance costs (29.4%) for each. However there were agreeing that the lack of interoperability between systems (64.7%), Price reduction pressures (56.3%) costs (47.1%).

The respondents were separated to (27.8% and 23.5%, 23.5%) about Lack of legal support, lack of interoperability between systems and lack of security information was or not a barrier for

implementation of e-procurement. However the majority of confident respondents disagree or strongly-disagree which means lack of legal support and integration costs and maintenance were causes for not adopting e-procurement.

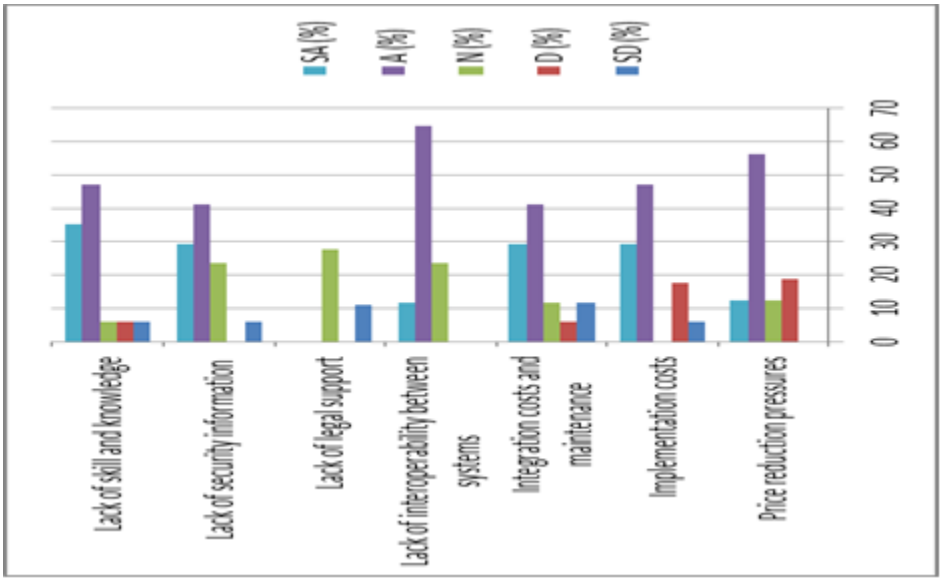

Figure A-8: Mean Rating of perceived barriers to e-procurement implementation

Legend: SD - Strongly Disagree; D - Disagree; N - Neither Agree nor Disagree; A - Agree; SA - Strongly Agree.

5.7 Perceived Critical success factors

There are many of the respondents imaginary to have some form of e-procurement applications in their organisations. These respondents were asked what they note as being critical success factors, for the successful implementation and adoption of e-procurement (see table.10). The Integration with current systems (44.4%) and the Implement Process Support (38.9%) and the top management support (38.9%) has been noticed as critical to the successful implementation of

e-procurement by the respondents. Business process reengineering (22.3%) and initial training (10.5%) have also been reflected as a significant by the most of them. However in comparison with the other factors were less critical.

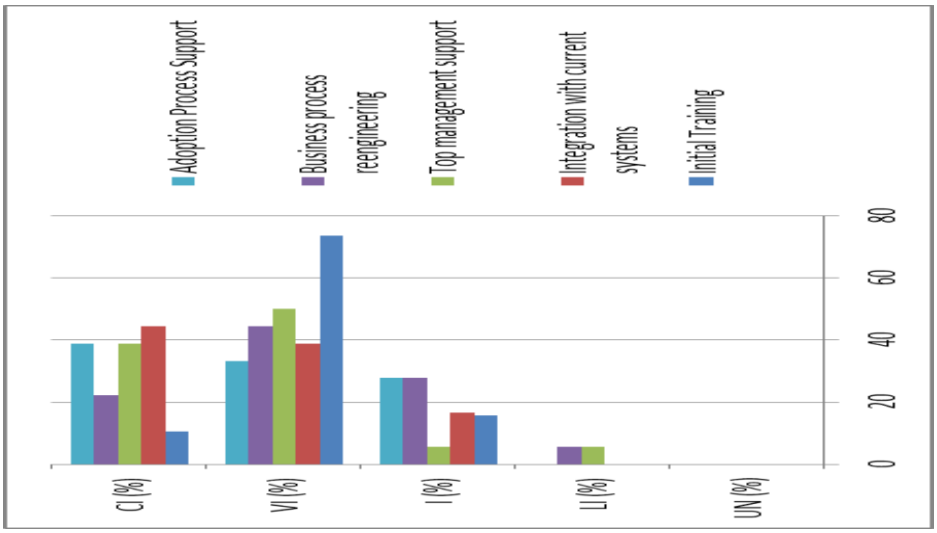

Figure A-9: Mean Rating of CSF´s to e-procurement implementation

Legend: UN – Unimportant; LI - Less Important; I - Important; VI - Very Important; CI – Critical.

5.8 Business partner influence

There is an obvious influence of the business partners in the early stages of the accession of an organisation to e-procurement. More than a half of the respondents admitted to have some kind of influence from business partner to use e-procurement tools (see table 11 below).

Figure A-10: Business partner influence

Appendix (B) Correlation Tables

Table B-1 Correlation among Items

	A1	A2	A4	PU1	PU2	PU3	PU4	OF1	OF2	OF3	OL1	OL2	OL3	OL4	EU1	EU2	EU3	SP1
ATT1	1	.780**	.603**	.665**	.687**	.661**	.692**	.301**	.227**	.129	.293**	.306**	.270**	.369**	.220**	.207**	.340**	.342**
ATT2	.780**	1	.675**	.756**	.690**	.686**	.732**	.324**	.255**	.260**	.368**	.354**	.254**	.377**	.253**	.259**	.374**	.400**
ATT4	.603**	.675**	1	.638**	.526**	.609**	.597**	.297**	.221**	.280**	.270**	.228**	.196**	.332**	.178*	.128	.262**	.273**
PU1	.665**	.756**	.638**	1	.778**	.687**	.706**	.378**	.334**	.308**	.366**	.377**	.308**	.417**	.301**	.319**	.438**	.346**
PU2	.687**	.690**	.526**	.778**	1	.710**	.693**	.364**	.382**	.350**	.393**	.357**	.316**	.419**	.303**	.337**	.461**	.350**
PU3	.661**	.686**	.609**	.687**	.710**	1	.715**	.391**	.356**	.358**	.253**	.255**	.228**	.400**	.244**	.280**	.506**	.339**
PU4	.692**	.732**	.597**	.706**	.693**	.715**	1	.416**	.410**	.349**	.381**	.351**	.321**	.432**	.243**	.317**	.502**	.344**
OF1	.301**	.324**	.297**	.378**	.364**	.391**	.416**	1	.692**	.386**	.504**	.479**	.500**	.559**	.255**	.385**	.332**	.179*
OF2	.227**	.255**	.221**	.334**	.382**	.356**	.410**	.692**	1	.615**	.533**	.517**	.525**	.537**	.301**	.414**	.406**	.245**
OF3	.129	.260**	.280**	.308**	.350**	.358**	.349**	.386**	.615**	1	.416**	.538**	.370**	.572**	.171*	.148*	.243**	.087
OL1	.293**	.368**	.270**	.366**	.393**	.253**	.381**	.504**	.533**	.416**	1	.814**	.655**	.584**	.287**	.296**	.312**	.123
OL2	.306**	.354**	.228**	.377**	.357**	.255**	.351**	.479**	.517**	.538**	.814**	1	.677**	.561**	.284**	.323**	.287**	.123
OL3	.270**	.254**	.196**	.308**	.316**	.228**	.321**	.500**	.525**	.370**	.655**	.677**	1	.670**	.276**	.285**	.289**	.192**
OL4	.369**	.377**	.332**	.417**	.419**	.400**	.432**	.559**	.537**	.572**	.584**	.561**	.670**	1	.251**	.384**	.435**	.187*
EU1	.220**	.253**	.178*	.301**	.303**	.244**	.243**	.255**	.301**	.171*	.287**	.284**	.276**	.251**	1	.391**	.380**	.373**
EU2	.207**	.259**	.128	.319**	.337**	.280**	.317**	.385**	.414**	.148*	.296**	.323**	.285**	.384**	.391**	1	.594**	.309**
EU3	.340**	.374**	.262**	.438**	.461**	.506**	.502**	.332**	.406**	.243**	.312**	.287**	.289**	.435**	.380**	.594**	1	.320**
AEP1	.342**	.400**	.273**	.346**	.350**	.339**	.344**	.179*	.245**	.087	.123	.123	.192**	.187*	.373**	.309**	.320**	1
AEP2	.381**	.458**	.385**	.393**	.392**	.394**	.343**	.199**	.223**	.176*	.184*	.237**	.262**	.243**	.359**	.299**	.331**	.820**
AEP3	.278**	.445**	.258**	.381**	.390**	.329**	.303**	.215**	.286**	.171*	.158*	.222**	.155*	.212**	.425**	.348**	.369**	.696**
AEP4	.226**	.375**	.196**	.292**	.309**	.265**	.234**	.178*	.288**	.172*	.178*	.191**	.193**	.230**	.365**	.344**	.331**	.736**
CHB1	.126	.164*	.035	.154*	.195**	.149*	.183*	.238**	.385**	.106	.340**	.357**	.313**	.242**	.547**	.459**	.399**	.328**
CHB2	.102	.167*	.000	.101	.166*	.073	.186*	.231**	.362**	.146*	.381**	.342**	.360**	.307**	.519**	.406**	.283**	.311**
CHB3	.123	.188*	.067	.164*	.232**	.182*	.206**	.310**	.406**	.241**	.395**	.376**	.403**	.307**	.471**	.413**	.368**	.299**
CHB4	.184*	.280**	.160*	.294**	.328**	.316**	.304**	.472**	.461**	.281**	.430**	.373**	.409**	.422**	.585**	.439**	.394**	.442**
CHB5	.156*	.211**	.180*	.275**	.329**	.288**	.274**	.441**	.415**	.264**	.381**	.318**	.360**	.349**	.555**	.417**	.350**	.385**
CSF1	.396**	.443**	.295**	.400**	.375**	.387**	.392**	.414**	.371**	.324**	.403**	.391**	.355**	.397**	.453**	.354**	.388**	.316**
CSF2	.389**	.386**	.286**	.402**	.407**	.386**	.404**	.423**	.370**	.243**	.340**	.288**	.327**	.385**	.399**	.365**	.465**	.334**
CSF3	.372**	.424**	.315**	.468**	.406**	.409**	.417**	.475**	.379**	.224**	.350**	.319**	.388**	.417**	.455**	.431**	.507**	.390**
CSF4	.398**	.462**	.335**	.439**	.451**	.438**	.447**	.490**	.387**	.274**	.330**	.326**	.327**	.367**	.465**	.367**	.483**	.361**
CSF5	.358**	.330**	.221**	.315**	.397**	.359**	.359**	.409**	.419**	.269**	.412**	.380**	.457**	.391**	.458**	.476**	.530**	.401**
AEP1	.532**	.577**	.408**	.522**	.510**	.487**	.520**	.465**	.454**	.366**	.491**	.478**	.384**	.434**	.284**	.368**	.493**	.326**
AEP2	.483**	.595**	.456**	.542**	.525**	.557**	.530**	.408**	.421**	.356**	.380**	.404**	.372**	.428**	.264**	.324**	.421**	.403**
AEP3	.512**	.574**	.446**	.485**	.529**	.528**	.531**	.400**	.453**	.351**	.425**	.437**	.396**	.481**	.296**	.327**	.491**	.343**
BNF8	.471**	.556**	.498**	.600**	.570**	.526**	.571**	.434**	.401**	.449**	.396**	.361**	.351**	.392**	.355**	.424**	.488**	.417**
BNF9	.508**	.566**	.432**	.516**	.545**	.509**	.570**	.412**	.409**	.406**	.395**	.384**	.396**	.467**	.366**	.436**	.491**	.421**
BNF10	.532**	.555**	.460**	.594**	.617**	.530**	.582**	.344**	.405**	.277**	.401**	.362**	.369**	.430**	.344**	.423**	.526**	.394**
BNF11	.474**	.492**	.425**	.516**	.525**	.498**	.543**	.393**	.422**	.377**	.347**	.304**	.355**	.429**	.403**	.424**	.469**	.446**
BNF12	.415**	.464**	.411**	.446**	.467**	.462**	.498**	.394**	.445**	.419**	.383**	.353**	.407**	.481**	.367**	.425**	.471**	.424**
BNF13	.511**	.583**	.474**	.542**	.509**	.517**	.606**	.397**	.365**	.365**	.341**	.303**	.338**	.419**	.341**	.409**	.530**	.401**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table B-2 Correlation among Items

	SP2	SP3	SP4	C1	C2	C3	C4	C5	CSF1	CSF2	CSF3	CSF4	CSF5	AEP1	AEP2	AEP3
ATT1	.381**	.278**	.226**	.126	.102	.123	.184*	.156*	.396**	.389**	.372**	.398**	.358**	.532**	.483**	.512**
ATT2	.458**	.445**	.375**	.164*	.167*	.188*	.280**	.211**	.443**	.386**	.424**	.462**	.330**	.577**	.595**	.574**
ATT4	.385**	.258**	.196**	.035	.000	.067	.160*	.180*	.295**	.286**	.315**	.335**	.221**	.408**	.456**	.446**
PU1	.393**	.381**	.292**	.154*	.101	.164*	.294**	.275**	.400**	.402**	.468**	.439**	.315**	.522**	.542**	.485**
PU2	.392**	.390**	.309**	.195**	.166*	.232**	.328**	.329**	.375**	.407**	.406**	.451**	.397**	.510**	.525**	.529**
PU3	.394**	.329**	.265**	.149*	.073	.182*	.316**	.288**	.387**	.386**	.409**	.438**	.359**	.487**	.557**	.528**
PU4	.343**	.303**	.234**	.183*	.186*	.206**	.304**	.274**	.392**	.404**	.417**	.447**	.359**	.520**	.530**	.531**
OF1	.199**	.215**	.178*	.238**	.231**	.310**	.472**	.441**	.414**	.423**	.475**	.490**	.409**	.465**	.408**	.400**
OF2	.223**	.286**	.288**	.385**	.362**	.406**	.461**	.415**	.371**	.370**	.379**	.387**	.419**	.454**	.421**	.453**
OF3	.176*	.171*	.172*	.106	.146*	.241**	.281**	.264**	.324**	.243**	.224**	.274**	.269**	.366**	.356**	.351**
OL1	.184*	.158*	.178*	.340**	.381**	.395**	.430**	.381**	.403**	.340**	.350**	.330**	.412**	.491**	.380**	.425**
OL2	.237**	.222**	.191**	.357**	.342**	.376**	.373**	.318**	.391**	.288**	.319**	.326**	.380**	.478**	.404**	.437**
OL3	.262**	.155*	.193**	.313**	.360**	.403**	.409**	.360**	.355**	.327**	.388**	.327**	.457**	.384**	.372**	.396**
OL4	.243**	.212**	.230**	.242**	.307**	.307**	.422**	.349**	.397**	.385**	.417**	.367**	.391**	.434**	.428**	.481**
EU1	.359**	.425**	.365**	.547**	.519**	.471**	.585**	.555**	.453**	.399**	.455**	.465**	.458**	.284**	.264**	.296**
EU2	.299**	.348**	.344**	.459**	.406**	.413**	.439**	.417**	.354**	.365**	.431**	.367**	.476**	.368**	.324**	.327**
EU3	.331**	.369**	.331**	.399**	.283**	.368**	.394**	.350**	.388**	.465**	.507**	.483**	.530**	.493**	.421**	.491**
SP1	.820**	.696**	.736**	.328**	.311**	.299**	.442**	.385**	.316**	.334**	.390**	.361**	.401**	.326**	.403**	.343**
AEP2	1	.656**	.735**	.321**	.254**	.331**	.426**	.303**	.285**	.297**	.370**	.317**	.367**	.303**	.385**	.371**
AEP3	.656**	1	.704**	.422**	.369**	.348**	.400**	.386**	.382**	.375**	.393**	.399**	.416**	.372**	.369**	.401**
AEP4	.735**	.704**	1	.368**	.396**	.416**	.445**	.353**	.343**	.368**	.421**	.342**	.416**	.315**	.314**	.343**
CHB1	.321**	.422**	.368**	1	.821**	.671**	.623**	.622**	.443**	.463**	.425**	.401**	.461**	.328**	.281**	.314**
CHB2	.254**	.369**	.396**	.821**	1	.705**	.568**	.603**	.425**	.402**	.398**	.394**	.440**	.281**	.242**	.284**
CHB3	.331**	.348**	.416**	.671**	.705**	1	.670**	.599**	.446**	.472**	.514**	.497**	.564**	.398**	.352**	.440**
CHB4	.426**	.400**	.445**	.623**	.568**	.670**	1	.803**	.528**	.557**	.518**	.530**	.534**	.425**	.429**	.459**
CHB5	.303**	.386**	.353**	.622**	.603**	.599**	.803**	1	.522**	.516**	.521**	.521**	.520**	.364**	.357**	.360**
CSF1	.285**	.382**	.343**	.443**	.425**	.446**	.528**	.522**	1	.722**	.699**	.654**	.632**	.578**	.468**	.542**
CSF2	.297**	.375**	.368**	.463**	.402**	.472**	.557**	.516**	.722**	1	.743**	.690**	.651**	.566**	.472**	.540**
CSF3	.370**	.393**	.421**	.425**	.398**	.514**	.518**	.521**	.699**	.743**	1	.783**	.674**	.541**	.498**	.536**
CSF4	.317**	.399**	.342**	.401**	.394**	.497**	.530**	.521**	.654**	.690**	.783**	1	.676**	.538**	.532**	.546**
CSF5	.367**	.416**	.416**	.461**	.440**	.564**	.534**	.520**	.632**	.651**	.674**	.676**	1	.553**	.491**	.532**
AEP1	.303**	.372**	.315**	.328**	.281**	.398**	.425**	.364**	.578**	.566**	.541**	.538**	.553**	1	.775**	.829**
AEP2	.385**	.369**	.314**	.281**	.242**	.352**	.429**	.357**	.468**	.472**	.498**	.532**	.491**	.775**	1	.784**
AEP3	.371**	.401**	.343**	.314**	.284**	.440**	.459**	.360**	.542**	.540**	.536**	.546**	.532**	.829**	.784**	1
BNF8	.514**	.422**	.387**	.303**	.269**	.411**	.447**	.395**	.510**	.517**	.474**	.490**	.521**	.568**	.562**	.578**
BNF9	.477**	.435**	.429**	.359**	.334**	.428**	.475**	.355**	.527**	.573**	.543**	.501**	.573**	.556**	.578**	.582**
BNF10	.430**	.417**	.396**	.305**	.319**	.384**	.373**	.321**	.467**	.451**	.484**	.452**	.517**	.513**	.493**	.547**
BNF11	.554**	.443**	.470**	.381**	.386**	.487**	.435**	.375**	.438**	.517**	.514**	.475**	.514**	.492**	.538**	.537**
BNF12	.519**	.432**	.434**	.351**	.398**	.418**	.428**	.331**	.395**	.446**	.464**	.422**	.531**	.436**	.500**	.514**
BNF13	.490**	.352**	.421**	.296**	.273**	.365**	.378**	.298**	.419**	.478**	.524**	.500**	.537**	.502**	.546**	.541**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table B-3 Correlation among Items

	BNF 8	BNF 9	BNF 10	BNF 11	BNF 12	BNF 13
A1	.471**	.508**	.532**	.474**	.415**	.511**
A2	.556**	.566**	.555**	.492**	.464**	.583**
A4	.498**	.432**	.460**	.425**	.411**	.474**
PU1	.600**	.516**	.594**	.516**	.446**	.542**
PU2	.570**	.545**	.617**	.525**	.467**	.509**
PU3	.526**	.509**	.530**	.498**	.462**	.517**
PU4	.571**	.570**	.582**	.543**	.498**	.606**
OF1	.434**	.412**	.344**	.393**	.394**	.397**
OF2	.401**	.409**	.405**	.422**	.445**	.365**
OF3	.449**	.406**	.277**	.377**	.419**	.365**
OL1	.396**	.395**	.401**	.347**	.383**	.341**
OL2	.361**	.384**	.362**	.304**	.353**	.303**
OL3	.351**	.396**	.369**	.35 5**	.407**	.338**
OL4	.392**	.467**	.430**	.429**	.481**	.419**
EU1	.355**	.366**	.344**	.403**	.367**	.341**
EU2	.424**	.436**	.423**	.424**	.425**	.409**
EU3	.488**	.491**	.526**	.469**	.471**	.530**
RIS1	.417**	.421**	.394**	.446**	.424**	.401**
RIS2	.514**	.477**	.430**	.554**	.519**	.490**
RIS3	.422**	.435**	.417**	.443**	.432**	.352**
RIS4	.387**	.429**	.396**	.470**	.434**	.421**
CHB1	.303**	.359**	.305**	.381**	.351**	.296**
CHB2	.269**	.334**	.319**	.386**	.398**	.273**
CHB3	.411**	.428**	.384**	.487**	.418**	.365**
CHB4	.447**	.475**	.373**	.435**	.428**	.378**
CHB5	.395**	.355**	.321**	.375**	.331**	.298**
CSF1	.510**	.527**	.467**	.438**	.395**	.419**
CSF2	.517**	.573**	.451**	.517**	.446**	.478**
CSF3	.474**	.543**	.484**	.514**	.464**	.524**
CSF4	.490**	.501**	.452**	.475**	.422**	.500**
CSF5	.521**	.573**	.517**	.514**	.531**	.537**
AEP1	.568**	.556**	.513**	.492**	.436**	.502**
AEP2	.562**	.578**	.493**	.538**	.500**	.546**
AEP3	.578**	.582**	.547**	.537**	.514**	.541**
BNF8	1	.759**	.696**	.711**	.655**	.721**
BNF9	.759**	1	.743**	.758**	.757**	.776**
BNF10	.696**	.743**	1	.797**	.709**	.710**
BNF11	.711**	.758**	.797**	1	.841**	.804**
BNF12	.655**	.757**	.709**	.841**	1	.761**
BNF13	.721**	.776**	.710**	.804**	.761**	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table B-4 Variables and p-value

Variable	Value	p-value
ATT1	7.172	0.518
ATT2	8.251	0.509
ATT3	80.33	0.165
ATT4	9.3	0.317
PU1	8.408	0.298
PU2	11.080	0.135
PU3	9.464	0.221
PU4	11.42	0.179
OF1	9.128	0.426
OF2	12.813	0.077
OF3	186.0	0.045
OF4	186.0	0.045
OF5	186.0	0.045
OL1	2.704	0.746
OL2	5.668	0.579
OL3	7.549	0.580
OL4	8.765	0.555
OL5	10.823	0.147
EU1	17.752	0.059
EU2	15.992	0.067
EU3	10.061	0.346
RIS1	37.546	0.107
RIS2	31.154	0.358
RIS3	31.085	0.411
RIS4	32.167	0.311
RIS5	32.815	0.203
CHB6	186.0	0.115
CHB1	24.397	0.018
CHB2	18.85	0.171
CHB 3	20.644	0.056
CHB 4	22.24	0.176
CHB 5	24.534	0.106
CSF1	10.88	0.539

CSF2	21.054	0.050
CSF3	23.941	0.047
CSF4	19.205	0.084
CSF5	21.252	0.095
CSF6	13.486	0.411
CSF7	11.373	0.497
CSF8	14.330	0.351
CSF9	20.417	0.157
CSF10	13.072	0.364
CSF11	14.004	0.300
AEP1	8.383	0.397
AEP2	10.136	0.181
AEP3	13.182	0.155
BNF 1	11.218	0.341
BNF 2	18.919	0.008
BNF 3	15.712	0.108
BNF 4	17.890	0.036
BNF 5	24.233	0.029
BNF 6	19.457	0.022
BNF 7	12.144	0.205
BNF 8	12.651	0.081
BNF 9	15.237	0.055
BNF 10	9.813	0.278
BNF 11	17.188	0.070
BNF 12	16.784	0.019
BNF 13	18.661	0.017

Table B-5 Standard of Alpha values and Degree of Freedom

TABLE of CRITICAL VALUES for STUDENT'S *t* DISTRIBUTIONS

Column headings denote probabilities (α) ***above*** tabulated values.

d.f.	0.40	0.25	0.10	0.05	0.04	0.025	0.02	0.01	0.005	0.0025	0.001	0.0005
1	0.325	1.000	3.078	6.314	7.916	12.706	15.894	31.821	63.656	127.321	318.289	636.578
2	0.289	0.816	1.886	2.920	3.320	4.303	4.849	6.965	9.925	14.089	22.328	31.600
3	0.277	0.765	1.638	2.353	2.605	3.182	3.482	4.541	5.841	7.453	10.214	12.924
4	0.271	0.741	1.533	2.132	2.333	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	0.267	0.727	1.476	2.015	2.191	2.571	2.757	3.365	4.032	4.773	5.894	6.869
6	0.265	0.718	1.440	1.943	2.104	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	0.263	0.711	1.415	1.895	2.046	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	0.262	0.706	1.397	1.860	2.004	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	0.261	0.703	1.383	1.833	1.973	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	0.260	0.700	1.372	1.812	1.948	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	0.260	0.697	1.363	1.796	1.928	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	0.259	0.695	1.356	1.782	1.912	2.179	2.303	2.681	3.055	3.428	3.930	4.318
13	0.259	0.694	1.350	1.771	1.899	2.160	2.282	2.650	3.012	3.372	3.852	4.221
14	0.258	0.692	1.345	1.761	1.887	2.145	2.264	2.624	2.977	3.326	3.787	4.140
15	0.258	0.691	1.341	1.753	1.878	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	0.258	0.690	1.337	1.746	1.869	2.120	2.235	2.583	2.921	3.252	3.686	4.015
17	0.257	0.689	1.333	1.740	1.862	2.110	2.224	2.567	2.898	3.222	3.646	3.965
18	0.257	0.688	1.330	1.734	1.855	2.101	2.214	2.552	2.878	3.197	3.610	3.922
19	0.257	0.688	1.328	1.729	1.850	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	0.257	0.687	1.325	1.725	1.844	2.086	2.197	2.528	2.845	3.153	3.552	3.850
21	0.257	0.686	1.323	1.721	1.840	2.080	2.189	2.518	2.831	3.135	3.527	3.819
22	0.256	0.686	1.321	1.717	1.835	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	0.256	0.685	1.319	1.714	1.832	2.069	2.177	2.500	2.807	3.104	3.485	3.768
24	0.256	0.685	1.318	1.711	1.828	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	0.256	0.684	1.316	1.708	1.825	2.060	2.167	2.485	2.787	3.078	3.450	3.725
26	0.256	0.684	1.315	1.706	1.822	2.056	2.162	2.479	2.779	3.067	3.435	3.707
27	0.256	0.684	1.314	1.703	1.819	2.052	2.158	2.473	2.771	3.057	3.421	3.689
28	0.256	0.683	1.313	1.701	1.817	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	0.256	0.683	1.311	1.699	1.814	2.045	2.150	2.462	2.756	3.038	3.396	3.660
30	0.256	0.683	1.310	1.697	1.812	2.042	2.147	2.457	2.750	3.030	3.385	3.646
31	0.256	0.682	1.309	1.696	1.810	2.040	2.144	2.453	2.744	3.022	3.375	3.633
32	0.255	0.682	1.309	1.694	1.808	2.037	2.141	2.449	2.738	3.015	3.365	3.622
33	0.255	0.682	1.308	1.692	1.806	2.035	2.138	2.445	2.733	3.008	3.356	3.611
34	0.255	0.682	1.307	1.691	1.805	2.032	2.136	2.441	2.728	3.002	3.348	3.601
35	0.255	0.682	1.306	1.690	1.803	2.030	2.133	2.438	2.724	2.996	3.340	3.591
36	0.255	0.681	1.306	1.688	1.802	2.028	2.131	2.434	2.719	2.990	3.333	3.582
37	0.255	0.681	1.305	1.687	1.800	2.026	2.129	2.431	2.715	2.985	3.326	3.574
38	0.255	0.681	1.304	1.686	1.799	2.024	2.127	2.429	2.712	2.980	3.319	3.566
39	0.255	0.681	1.304	1.685	1.798	2.023	2.125	2.426	2.708	2.976	3.313	3.558
40	0.255	0.681	1.303	1.684	1.796	2.021	2.123	2.423	2.704	2.971	3.307	3.551
60	0.254	0.679	1.296	1.671	1.781	2.000	2.099	2.390	2.660	2.915	3.232	3.460
80	0.254	0.678	1.292	1.664	1.773	1.990	2.088	2.374	2.639	2.887	3.195	3.416
100	0.254	0.677	1.290	1.660	1.769	1.984	2.081	2.364	2.626	2.871	3.174	3.390
120	0.254	0.677	1.289	1.658	1.766	1.980	2.076	2.358	2.617	2.860	3.160	3.373
140	0.254	0.676	1.288	1.656	1.763	1.977	2.073	2.353	2.611	2.852	3.149	3.361
160	0.254	0.676	1.287	1.654	1.762	1.975	2.071	2.350	2.607	2.847	3.142	3.352
180	0.254	0.676	1.286	1.653	1.761	1.973	2.069	2.347	2.603	2.842	3.136	3.345
200	0.254	0.676	1.286	1.653	1.760	1.972	2.067	2.345	2.601	2.838	3.131	3.340
250	0.254	0.675	1.285	1.651	1.758	1.969	2.065	2.341	2.596	2.832	3.123	3.330
inf	0.253	0.674	1.282	1.645	1.751	1.960	2.054	2.326	2.576	2.807	3.090	3.290

Appendix (C) – Online Research Survey

DUBLIN CITY UNIVERSITY

ONLINE QUESTIONNAIRE SURVEY

SECTION- A: PERSONAL INFORMATION

What is the purpose of the project?

The purpose of this study is to examine the adoption of electronic procurement and the impact of Islamic Traditional Regulations (ITR) on the performance of Islamic compliant organisations and non-Islamic compliant organisations.

E-Procurement for this project is described as ' a type of buying and selling between producers and consumers or between businesses, through the use of information technology and communications'

What are the questions about?

The questions relate to procurement, e-procurement and the impact of Islamic Traditional Regulations on the adoption of e-procurement technologies

How long will it take?

The survey will take about 10 to 15 minutes to complete.

Which part of the organisation should I think of as I complete the survey?

Please answer in respect of the local firm/unit of which you are part.

Who will read the results?

We assure you that this is a strictly confidential survey. Under no circumstances will your individual responses be made available to anyone in your organisation or other organisations. Only the directors of this research can read your answers.

We would like to thank you in advance for your time and effort.

1. What is your title or position in the organisation?

Sales/ Marketing Manager	Consultant	Proc. Manager
Administrator	Director/CEO	Chief Executive Officer
Engineer	Manager	Chief Operating Officer
Other (please specify)		

2. Please provide information about your organisation number of employees? (Indicate the value)

500 or less	1500	2500
1000	2000	3000 or more

3. What is your organisation turnover?

1 million or less	5-10 millions	More than 15 millions
2-5 millions	10-15 millions	

Other (please specify)

4. In what functional area do you work? (Please Tick One)

Engineering	Supplier	Contracting &Tendering
Operations	Buyer	Business Advisory
General Services	Projects department	
Financing	General management	

Other (please specify)

5. In what country is your organisation based? (Please Tick One)

Kuwait	USA	Saudi
Ireland	Libya	Malaysia
UK	UAE	

Other (please specify)

6. What age are you? (Please Tick One)

Under 25	35-45 years	55-65 years
25-35 years	45-55 years	Above 65

7. In which sector does your organisation operate? (Please Tick One)

Oil & Gas	Electrical and Electronic	Textile, Clothing & Footwear
Plastics & Rubber	Wood and Furniture	Clay & Building Ind. Products
Metal & Mech. Eng.	Stationery, Paper & printing	Water& agriculture
Chemical & Allied Products	Industrial equipment	Finance & Banks
Food, Tobacco & Beverages	Automotive & Transportation	Management & Administration

Other (please specify)

8. How many years have you worked in your present organisation? (Please Tick One)

5 years or less	10-15 years	20-25 years
5-10 years	15-20 years	25-30 years or more

9. What is the highest degree you have obtained? (Please Tick One)

- HND
- Diploma
- Secondary school
- Bachelor's Degree
- Masters
- PhD
- None

Other (please specify)

SECTION B : INVESTIGATION OF E-PROCUREMENT ADOPTION

10. In your organisation (Attitude)

	Strongly disagree	Disagree	Neither agree or Disagree	Agree	Strongly agree
Using e-procurement technology is a good idea	○	○	○	○	○
Using e-procurement technology is/would be an intelligent idea	○	○	○	○	○
Using e-procurement is/would unpleasant	○	○	○	○	○
It is desirable to use e-procurement technology	○	○	○	○	○
Other (please specify)					

11. In your organisation (Usefulness)

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
Using e-Procurement enables (would enable) me to accomplish my tasks more quickly					
Using e-Procurement does/would make it easier for me to carry out my tasks					
E-procurement technology is a useful way of doing. business					
Compared to traditional procurement, using e-Procurement is advantageous.					

Other (please specify)

12. Does your organisation provide?

	Strongly Disagree	Disagree	Neither Agrees nor Disagree	Agree	Strongly Agree
Sufficient training for IT					
Sufficient training for e-procurement					

Other (please specify)

13. In your organisation does

	Strongly Disagree	Disagree	Neither Agrees nor Disagree	Agree	Strongly Agree
Management encourage the adoption of e-procurement					
Management reward staff to use E-procurement					

14. Does your organisation given? (Leadership)

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
Management support					
Lead role by management					
Invested time, effort & money					
Proactive about e-Procurement					
Stresses on importance of e-Procurement					

Other (please specify)

15. within your organisation? (Ease of use)

	Strongly Disagree	Disagree	Neither Agrees nor Disagree	Agree	Strongly Agree
Learning to use e-procurement technology was not/would not be easy					
The interaction with e-Procurement does not require a lot of mental effort					
It is easy to use e-procurement technology to accomplish my procurement tasks					

Other (please specify)

Next question is concerned with establishing whether Islamic Sharia provisions can be (or should be) considered within an e-Procurement strategy or these provisions presented obstacles to e-Procurement.

If you are familiar to such provisions please answer the question. Otherwise skip Question 16.

16. In your organisation does (Rules of Islamic Sharia)

	Not affect	Minor affect	Neutral	Moderate affect	Major affect
Islamic regulations have a positive effect on e-Procurement.	○	○	○	○	○
Islamic regulations are related to e-Procurement implementation strategy	○	○	○	○	○
Islamic regulations forbid 'Riba' or interest which causes economic problems	○	○	○	○	○
You are adopting e-Procurement due to Islamic regulations	○	○	○	○	○
Islamic regulations are supporting e-Procurement benefits	○	○	○	○	○

Other (please specify)

17. Please rank the suggested challenges to e-procurement:-

	Not a Challenge	Slightly Challenge	Somewhat of Challenge	Moderate Challenge	Extreme Challenge
Technical challenges make use of e-Procurement technology difficult	○	○	○	○	○
Strategic challenges are hurdles in using e-Procurement technology	○	○	○	○	○
Human and process problems are causing a negative effect on e-Procurement adoption	○	○	○	○	○
Misunderstanding of non-Islamic rules may create problems in e-procurement adoption	○	○	○	○	○
Misunderstanding of Islamic rules may create problems in e-procurement adoption	○	○	○	○	○

Other (please specify)

18. Please rank the suggested critical success factors to e-procurement:-

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
End-user uptake and training					
Supplier adoption					
System integration					
Business case/project management					
Re-engineering of the process					
Security and authentication					
Top management support					
Change management					
Performance measurement					
E-procurement implementation strategy					
Technical standards					

Other (please specify)

19. Please rate the adoption of e-Procurement in your organisation

	Strongly Disagree	Disagree	Neither Agrees nor Disagree	Agree	Strongly Agree
I am using/would use e-Procurement technology for my procurement needs.	○	○	○	○	○
Using e-Procurement technology for handling my procurement tasks is something I am doing/would do	○	○	○	○	○
I am seeing/would see myself using e-Procurement technology for handling my procurement tasks	○	○	○	○	○

Other (please specify)

DUBLIN CITY UNIVERSITY

SURVEY OF E-PROCUREMENT ADOPTION AND PRACTICE IN ISLAMIC AND NON-ISLAMIC ORGANISATIONS

SECTION C : INVESTIGATION OF E-PROCUREMENT TOOLS AND BENEFITS

20. Which of the following e-procurement tools do you use in your organisation?

	Not at all familiar	Slightly familiar	Somewhat familiar	Moderately familiar	Extremely familiar
E-Sourcing- a way of identifying new sources of supply using Internet technologies	○	○	○	○	○
E-Tendering- the process of inviting offers from suppliers' responses electronically	○	○	○	○	○
E-informing (EI)- Web-based enterprise resource planning	○	○	○	○	○
E-reverse auctioning-The prices of their offer against other bidders "until no further downward bids are received"	○	○	○	○	○
E-MRO - Mechanism for ordering indirect items from online catalogue	○	○	○	○	○
E-collaboration –collaborative procurement related planning and design	○	○	○	○	○
Other (please specify)	○	○	○	○	○

21. When did you first introduce one of the above mentioned e-Procurement tools to your organisation? (Please Tick One)

- Never
- Before 2000
- 2000-2005
- 2005-2010
- 2010-2012
- 2012-2014

22. Please rank the following potential benefits for E-Procurement as they relate to your organisation:-

	Not at all beneficial	Slightly beneficial	Somewhat beneficial	Moderately beneficial	Extremely beneficial
Reduced paperwork					
Expanded supplier bases					
Generating original solutions for problems					
Reduced order cycle times					
Acquiring approval for innovative ideas					
Saving time					
Improved productivity and/or service					
Improved communication and collaboration with suppliers					
Decentralise-procurement management					
Reducing costs					
Allowed the purchasing department to concentrate on more strategic tasks					
Reduce of purchasing department size and number of functional areas					
Improved effectiveness of purchasing process					

Other (please specify)

23. Additional comments from the participants:

We certainly welcome any comments that you may have about how your organisation motivates employees to accumulate and share information and knowledge with each other in order to increase your organisation's ability to solve clients' problems. Thank you once again for helping us to increase our understanding of e-procurement in your organisations.

24. Would you mind to provide your name and address, please? (Optional)

Name (Optional):

Company:

Country:

Email Address: