



# THESIS

## Supply Chain Management and procurement in the Petrochemical Industry

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## **Chapter 2: Literature Review**

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## Introduction

This literature review is an attempt to investigate and weigh the advantages and disadvantage of using information technology in supply chain management specifically in procurement, and then investigate its effectiveness in the petrochemical industry procurement through a case study on Kuwait National Petroleum Company.

## Information Technology

Since the year 2000 authors stated the importance of information technologies, where Information Technology and computerization is becoming part of modern organizations where it is believed to reduce the cost of different business functions such as coordination, communication and information processing (Brynjolfsson & Hitt, 2000). Supply Chain Management is an area that could benefit from Information Technology in its different segments.

## Supply Chain Management

To investigate the relationship between supply chain management and information technology it is needed to define supply chain management and how it is related to Information Technology. Supply chain management is defined as “the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole” (Mentzer *et al.* 2001, p.18). Another definition of Supply Chain Management that includes adding value to customers was introduced by Christopher (2005, P.5) as “The Management of the upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole”.

The high competitiveness between organizations and the increasing market dependence on electronic connections made companies seek to be more flexible and responsive to the continuous market changes and led to making Information Technology an essential tool to achieve an effective Supply Chain

when suppliers are scattered around the globe (Gunasekaran & Ngai, 2004). The fast pace of technology development in the area of information technology and the more businesses are depending on the internet made software based supply chain management a necessity (Helo & Szekeley, 2005). All these market changes in the last century made information technology one of the essential tools to achieve effective supply chain management.

### **Benefits of information technology in Supply Chain Management**

There are many benefits discussed in the literature of integrating Information Technology in Supply Chain Management. Some of these benefits are minimize the bullwhip effect, better management and exchange of information, minimize inventories, minimize cycle times, and increasing quality (Patterson, Grimm & Corsi, 2003). Information Technology ease access to global suppliers through databases, which helps to increase competition base (Gunasekaran & Nath, 1997). Moreover, using Information Technology in Supply Chain Management has a positive effect on the supply chain responsiveness (Wu et al. 2006).

### ***The Bullwhip Effect***

The Bullwhip effect is one of the areas that can be reduced using Information Technology in Supply Chain Management. The Bullwhip Effect can explained as follows “if demand for products is transmitted along a series of inventories using stock control ordering, then demand variations will increase at each transfer”(Burbidge, 1984). Using Information Technology to facilitate and increase the information sharing have a crucial result in reducing uncertainty which result in reducing the Bullwhip Effect and enhance the performance of the Supply Chain. (Yu, Yon and Cheng, 2001).

### ***Information Flow and Sharing***

Information Flow is an essential requirement for a successful Supply Chain where its importance can be seen in investigating demand, sharing information, defining scope of work and eventually reducing uncertainty and Supply Chain Risk (Ellram, Tate & Billington, 2006).

In an numerical study done by Cachon and Fisher (2000) using a wide range of parameters they found that applying Information technology to the supply chain process precisely in information sharing had reduced Supply Chain cost by 2.2% and had an impact of cutting lead time by nearly half.

### ***Inventories***

Information Technology is used in Inventory Control where it tracks inventory levels and ensure replacements are available when needed (Gunasekaran & Nath, 1997).

### ***Minimize Cycle Time***

Using Information Technology systems lead to “cycle reliability” improvement and reduce the cycle time of supply chain orders. (Tan, 2001). Using Information technology in procurement is believed to reduce the purchasing cycle time which lead to increasing flexibility and having the latest information available while placing orders. **(Davila, Gupta & Palmer, 2003)**

### ***Supply Chain Responsiveness***

Supply Chain Responsiveness is defined as “the ability to respond and adapt time-effectively based on the ability to “read” and understand actual market signals in real-time backwards the chain according to changes in end-user demand” (Catalan & Kotzab, 2003, p. 677). The supply chain responsiveness is improved by using Information Technology tools where it makes the process of studying the market and responding to its changes faster and more efficient (Wu, et al. 2006).

### ***Implementation Difficulties***

Although Information Technology is important and increasingly used in Supply Chain Management, its implementation is still costly and risky. The difficulties of implementing Information Technology are mostly because of human factors where ignorance, project management and cultures of both the organization and the industry have an impact on Information Technology implementation (Russell & Hoag, 2004). Also a study among different industries concluded that resistance to change and low level of supply chain integration are two of the major problems when trying to enable Information Technology in Supply Chain Management (Jharkharia & Shankar, 2005).

## **Information technology Tools and Methods**

To be able to measure the effect of information technology on supply chain management it is important to know what technological tools are available to support supply chain, what features it contains and how effective it is? The Information Technologies tools advised to be implemented in Supply Chain Management should have both short and long term value when used. Where it should take care of daily transactions, electronic commerce and sharing information to balance between supply and demand, while also in the long run should facilitate scenario planning by analyzing data through different synthetic tools (Anderson, Britt & Favre, 1997).

## **E-Commerce**

E-commerce is one of the activities that benefit from information technology, the literature provided different definitions of e-commerce, but Aalst (2002, p.195) definition was the most appropriate for this paper where he defines e-commerce as “enabling of purchasing and selling of goods and services through a communications network where it has the ability to conduct business activities involved in the marketing, finance, manufacturing, selling, and negotiation, electronically”. A general definition was introduced by Neef (2001) that described Business-to-business (B2B) e-commerce as a tool that deals with the transactions between organizations, and he considered e-procurement as a main function in e-commerce.

## **E-Procurement**

In the beginning of the last decade an increasing interest in e-procurement was found in literature, where Christiaanse & Kumar (2000) mentions e-procurement as one of the recently introduced technologies to Supply Chain Management that found a solution to some of the problems supply chain faces such as the limited Information technology tools and the cost of information exchange. According to Lancioni, Smith & Oliva (2000) the procurement activities took advantage of the Internet in many of its applications such as communication, checking quote prices and placing orders through suppliers online catalogs.

E-procurement is defined as “any technology designed to facilitate the acquisition of goods by a commercial or a government organization over the Internet. E-Procurement technologies including e-Procurement software, B2B (business-to-business) auctions, B2B market exchanges, and purchasing consortia” ((**Davila, Gupta & Palmer, 2003, p.11**)). another definition which is more detailed was introduced by Tatsisa et al. (2006, p.64) that defines E-Procurement as “the integration, management, automation, optimisation and enablement of an organisation’s procurement process, using electronic tools and technologies, and web-based applications”. In the late nineties a study took place to investigate at the time the newly introduced e-procurement where Chia (1998) stated that Procurement personnel time is wasted due to data entry and paper work where it uses 80% of their time leaving only 20% of their time and effort for value added procurement activities and that problem can be solved by using e-procurement and taking advantage of the different IT tools available.

To be able to measure the effectiveness of e-procurement both the advantages and disadvantage of e-procurement need to be investigated and discussed.

### **E-Procurement Advantages**

In the literature there were many benefits of e-procurement, which can be summarized in the following points:

- **Cost Reduction:** There are many ways that e-procurement contribute to cost reduction that have been discussed in the literature, Croom (2000) presented three forms of these savings where he stated that e-procurement has a big impact on reducing administrative costs where it can save up to two-thirds of the procurement administrative costs, and he added that it also reduces cost by providing different alternatives for raw materials, finally he stated that due to just –in-time inventory management costs of inventory can be reduced very significantly. Tatsis et al. (2006) discussed the possibility of discount prices through advantage bargaining due to contracting with preferred suppliers.



- **Reduces Inventory:** Reducing inventory volume and cost is one of the main aims to supply chain personnel and using e-procurement can help in achieving their goal. Where e-procurement reduces Inventory Management cost specifically in reducing inventory holding and obsolete inventory costs (Dai & Kauffman, 2006). Moreover, e-procurement facilitate faster cycle times which decreases stock levels that can lead to reduction in inventory, reducing inventory levels allows more cash flow to be available instead of restrict the money in inventory (Tatsis et al. 2006)
- **Cycle Time Reduction:** Using e-procurement has been proven in the literature to reduce cycle time, according to Osmonbekov, Bello and Gilliland (2002) Procurement personnel are empowered by using e-procurement where it allows them to access the data directly which have an impact on reducing number of workers involved in procurement and reducing the cycle time of the whole process. Moreover, the use of e-procurement can obtain orders approvals systematically and then forward the orders to suppliers, which lead to reduction in orders transaction cycle time, and it has been investigated with companies using e-procurement where it was proven that a significant reduction in cycle time was obtained (Subramaniam, 2004). In addition Presutti Jr. (2003) stated that reduction in raw material cycle time by 25-30 percent could be achieved by using e-procurement.
- **Increase communication efficiency:** The availability and low cost of internet have facilitated different types of communication. Osmonbekov, Bello & Gilliland, (2002) discussed how e-procurement helps in reducing formalization and make the relation and communication between the organization and its suppliers less formal. They added that different IT tools used in e-procurement facilitate exchange of all type of information, which positively effect the communication between the supply parties.

- **Planning and Control:** The use of e-procurement increase the volume of information shared and the speed of information flow, which leads to a higher forecasting quality and improve organization supply chain process (Ageshin, 2001).

### Implementation Difficulties:

Previously in this chapter the advantages of e-procurement were discussed, but the supply chain management literature discussed also some disadvantages and implementation difficulties of e-procurement and following are some of these barriers:

- **Security Concerns:** One of the main disadvantages of e-procurement is security related to data exchange, Angeles and Nath (2007) stated that organizations considering integration to e-procurement have security concerns where the exchange of data in e-procurement may breach confidentiality. Moreover the controlling of the type of information accessed and limiting private data exchange are one of the major concerns when e-procurement is used (Osmonbekov, Bello & Gilliland, (2002).
- **Fear of Change:** Introducing new ways to do business is usually faced with rejection and resistance, based on (Angeles & Nath, 2007) fear of change is one of the biggest problems facing implementation of E-procurement. The rejection of use from procurement employees is one of the post-implementation problems of e-procurement although initial acceptance to use the new technology takes place, when the system is implemented hesitating and rejection of use occurred (Elbanna, 2010). The fear of change is a human nature fact and based on literature it is one of the problems when considering or implementing e-procurement, although the resistance to use is high in the beginning time will help in accepting and embracing it's usage.
- **Cost and Time Wasted:** integrating the procurement process and training procurement employees to use it needs money and time, where the high cost of implementation and the time required to integrate the system and train employees is a major concern to many organizations (Angeles &

Nath, 2007). Organizations should consider and balance the potential benefits against the cost before deciding to go for or against e-procurement.

### ***E-Procurement Forms:***

To understand e-procurement in an integrated and comprehensive way different types of e-procurement need to be shown. Based on literature, there are different forms of e-procurement, which can be summarized based on Gunasekaran and Ngai (2008) as e-MRO, web-based ERP, e-sourcing, e-tendering, e-reverse auctioning, e-informing and e-collaboration.

- **E-MRO:** Electronic Maintenance, Repair and Operation (E-MRO) based on Boer, Harink and Heijboer (2001, p.120) is a “process of creating and approving purchasing requisitions, placing purchase orders and receiving goods and services ordered, by using a software system based on Internet technology” where the system provide goods and maintenance required for repairs and operation, also they added that e-MRO is a system that all organization employees have an access to using an “ordering Catalogue system”.
- **Web-based ERP:** The web-based enterprise resource planning (ERP) system can have the same definition as E-MRO except that web-based ERP provide product related goods and services and it is usually used by the procurement and planning employees (Boer, Harink and Heijboer (2001). ERP can be useful in managing the procurement advance planning applications, keep track of production constrains and demand, order delivery follow up and help in analyzing the procurement data and performance (Yen, Chou & Chang, 2002).
- **E-sourcing:** Can be defined as the “whole process of requirements definition, suppliers scouting and qualification, request for bid and final negotiation and selection carried out by an industrial customer” (Bartezzaghi & Ronchi, 2005, p.406). E-sourcing can be used in supplier

selection by helping to put criteria's to rank them, put a list of potential suppliers and after selection it can facilitate supplier monitoring. (Massay & Testa, 2007).

- **E-tendering:** Is the “ issue and receipt of tender documentation through electronic means which facilitates the procurement process and the award of contracts” .(Tindsley & Stephenson, 2008, p.273). Another definition of e-tendering is “a process which replaces the traditional paper tendering system in the purchasing of products and services and is a means of electronically notifying, involving, vetting and selecting suppliers. For the seller it is a means of electronically competitively bidding for contracts”. (Weng Lou & Alshawi, 2009, p.99). There are many benefits discussed in the literature of e-tendering where Kajewski and Weippert (2004) discussed some of them as:

1. Assuring the security of the tendering process.
2. Facilitate the download of a user friendly tender version.
3. Helps suppliers to upload their offers electronically to minimize errors.
4. Help Suppliers to access the tender document and submit their offer on time.
5. Saves time in the tendering cycle.
6. Saves different types of resources that related to printing, which helps in saving money.
7. Increase competitive bidding by Increasing the suppliers platform.

- **E-reverse auctioning:** E-reverse auction is one form of E-procurement “where multiple suppliers compete for a buying firm’s business by offering competitive bids over the Internet in a time-limited bidding event” (Talluri, Narasimhan & Viswanathan, 2007, p.2616). Another definition of e-reverse auction was introduced by Carter et al. (2004, p. 230) where they defined it as “an online, real-time auction between a buying organization and two or more invited suppliers, where suppliers can submit multiple bids during the time period of the auction, and where some degree of visibility exists

among suppliers regarding the actions of their competitors”. In e-reverse auctions suppliers bid the prices down in an attempt to win the contract they are auctioning on (Neef, 2001). E-reverse auction can have many benefits when used where it helps in getting a competitive price for the organization, suppliers productivity increase, helps in shortening the cycle time, give the opportunity to approach wide range of suppliers which helps in providing a competitive offer and finally it facilitate the supply process in a transparent manner. (Gumussoy & Calisir, 2009).

- **E-informing:** Can be defined as a form of e-procurement that “is not directly associated with the process of purchasing, but rather with seeking and distributing additional information about suppliers and their offerings (Santema & Kopecka, 2006, p.5), where this system handles suppliers information and all their related documents such as quality certifications, financial status and any other capabilities that can be of use to the organization (Knudsen, 2003).
- **E-collaboration:** can be defined as “collaboration among individuals engaged in a common task using electronic technologies” (Dasgupta, Granger & MCGarry, 2002, p.87). E-collaboration assure more coordination between the organization and its suppliers where the internet is used as a media to facilitate collaboration in terms of demand and inventory management also helps in the planning and development processes (Bartezzaghi & Ronchi, 2005).

## The Petrochemical Industry

To be able to investigate the effect of using the Internet and information technologies on supply chain management especially on procurement an industry overview must take place to investigate the effect of e-procurement on its supply chain management.

## **Petrochemical Industry Market Overview**

Quality assurance and conformity is essential in the petrochemical industry, where compliance to the regulations is a must in this business (Gebauer & Segev, 2000)

## **Supply Chain Management and procurement in the Petrochemical Industry**

Petrochemical companies supply chain management is very critical due to its activities operating in different countries and have worldwide business relations where suppliers of raw materials and customers are scattered around the world (Lababidi et al. 2004). The oil and gas supply chain is a series of interrelated operations that includes purchasing and transporting of crude oil, refining raw materials and also final refined products which makes the supply chain of the oil sector suffering from uncertainty, high risk and difficulty of forecasting (Carneiro, Ribas & Hamacher, 2010). The procurement in the petrochemical industry mostly require transfer of technology which includes tricky negotiations also the procurement is centralized in most cases, which lead to complexity and high overhead costs ((Gebauer & Segev, 2000).

## **E-Procurement in the Petrochemical Industry**

A case study of a petrochemical refinery made by Chen et al. (2005) showed that the manual procurement procedures in the petrochemical industry faced problems of time consuming and the need for big workforce number where setting procurement deadlines, selecting suppliers, requesting quotations, checking quote price and all of the procurement functions are made manually. According to Chen et al. these problems were solved by using e-procurement, which reduced the manpower required for the procurement process, saved money and time of procurement.

## The Kuwait National Petroleum Company Case Study

In this research paper a case study from Kuwait National Petroleum Company, which is an organization from the petrochemical industry, is used to demonstrate the affect of technology and internet in the form of e-procurement on the supply chain management of petrochemical companies.

Kuwait National Petroleum Company (KNPC) is a subsidiary of Kuwait Petroleum Cooperation (KPC) and owned 100% by Kuwait Government. KNPC was established in 1960 to add value to the national oil resources ([www.knpc.com](http://www.knpc.com)). KNPC runs three refineries in Kuwait where it provides hydrocarbon products and fuel for the domestic market as well as for the international market ([www.knpc.com](http://www.knpc.com)). The supply chain management activities are done by the Commercial Department in KNPC, where its main activities are:

- Pre-qualification of vendors and contractors.
- Tendering process for services and goods procurement.
- Signing contracts.
- Provide inventory control management services including warehousing.

(<http://application.knpc.com/commercial/>)

KNPC is using one form of e-procurement at the moment, which is e-tendering. The implementation of e-tendering took place in two stages. The first phase was in 2006 then followed by the second phase in 2008.

# Chapter 3: Methodology

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## Introduction

Nowadays, it is vital for a business or an organization to succeed in the procedures of such a transaction and reduction of the cycle times of procurement. In order to achieve this goal, they must do radical changes to the former procurement systems they used to use, because traditional systems are not able to face the requirements that are set by the present global commerce. The use of the internet has driven to important changes and as a result all aspects and factors of previous procurement systems should be replaced. All companies should take advantage of this change in order to survive. Otherwise, it is highly possible to stop existing.

The steps internet achieved has overcome the growth of e-procurement and “ordered” – in some ways – businesses to adopt new computer systems. *“Today e-Procurement and e- Sourcing are two of the most useful practices in purchasing. Ten Years ago, those terms were unheard of”* (Charles, 2008, p1). In Kuwait, the Kuwait Petroleum Company, has started the study during 2006, on all K-Cos, via famous organizations like Oracle and Commerce 1, in order to identify the ability and future positive results of implementing the new computer systems of e-procurement. The research reached the conclusion that several benefits exist and became the basis for initiating e-procurement implementation in the K-Cos.

In order to be an e-procurement implementation successful, the buy – in forms from all parties who are involved in such a procedure should be ensured except from the resolving barriers, as far as the resistance to new technology, the difficulty of implementation, the lack of skills, the security and the cost concerns are concerned. Success is achieved by effectively managing issues such as starting and stopping at the right place, ensuring necessary process changes, state requirements from employees, supplier as well as user perspectives.

Kuwait Oil industry managed by the Kuwait Petroleum Company (KPC) and Operating Companies (K-Cos) are ready to set in function e-procurement components in their full form. Many of the K-Cos have already started this procedure of implementation, while only few of them already have

implemented a part. Only one company, the KNPC, has implemented a specific component of e-procurement, e-tendering. This component is for materials and services and its value is up to KD 5 million. It is appropriate to study the implementation at KNPC by using the model of CSF, in order to identify the effectiveness and the benefits of e – procurement of a public organization in Kuwait.

### Discussion on Models (from various perspectives)

#### *Satisfaction:*

As far as the satisfaction is concerned, Dooley and Purchase (2006) have suggested a model which is based on the aspects which are positively affecting e-procurement implementation. This model notices the need for cooperation by both parts - supplier and buyer- . It takes into account the intention, the willingness and the relationships which will be created, with the use of e-procurement.

In a similar way, we found that Croom and Johnson(2003) clearly identify employees' satisfaction as one of the main three steps for a successful implementation.

Other models, which study this factor, also notify that customers' satisfaction or expectations are of high importance. One of this models is this of Vaidya (2002), which definitely highlights the customers' satisfaction and expectation as one of the main components of a successful implementation.

One similar model is this of Leipod, Klemow, Holloway and Vaidya (2004). In this model the human factors are essential for a successful implementation.

### *Technology:*

Technology is the common part between most models. Croom and Johnson (2003) have notified the availability of technology and the possibilities offered. Moreover, Vaidya (2002) noticed the need of using technology in a friendly way.

Apart from customers' satisfaction, technology has an important role in a successful implementation of e-procurement. In the model of Boyer and Olson (2002), some specific factors of the internet are noticed due to the fact that these factors can predict the results of this procedure. Furthermore, Ken and Purchase (2006) suggest that the interaction through network systems is the leading force which affects in many ways the procedures of e-procurement implementation.

### *Training:*

Last but not least is the factor of training in order to hold a beneficial implementation. Human factors, suppliers, customers or even users, is highly important to be trained in some degree. The model of Croom and Johnson (2003), mentioned the need of some leaders who can help, support and train all the involved in this implementation parts. It is vital these leaders to be grouped.

### **Purpose of the study**

Businesses and organizations are urgently searching for modern and innovative solutions and procedures, in order to cope with the competition they face. According to Tara (2008), one of the most important procedures is the adoption of e-procurement. Although the differences of this advent, its use is increased rapidly. E-procurement is already a vital procedure in doing innovative business and face the current and future competitors.

Businesses and organizations which deal with the barriers of the e-procurement adoption, should, first of all manage the crucial success factors. The main purpose of this study is to investigate the results of e-procurement systems, which are already in operation. One other purpose is to comment the procedure of e-procurement adoption.

As a conclusion, we will reach the point at which, we will be able to see whether this implementation is advantageous or not, and if not why. The ability to mention and deal well with the success factors of e-procurement adoption in KNPC is likely to make a crucial contribution to easy and successful implementations at other companies in oil and gas sector of Kuwait.

The objectives can be summarized as follows:

- **Objective 1:** To identify whether e-procurement has advantages or disadvantages.
- **Objective 2:** To identify the factors that has made e-procurement in KNPC successful.

KNPC has adopted the e-procurement systems over a period of time. This research intends to investigate whether the e-procurement procedure was successfully adopted. For this reason, the CSF of implementing e-procurement will be identified through both the literature review and a conceptual and empirical data collection, which will be identified and discussed in the data analysis and conclusion chapters.

## Research Strategy

The major research question to be answered is:

*Which are the advantages and disadvantages of implementing the e-procurement procedures?*

This question was designed through a review in the field of e-procurement via different literature and scientific statements. The result excluded will help to understand better the current strategy and measure its effectiveness. It will also help the readers and us, as well, to separate the KNPC from the other global oil and gas enterprises and benchmark it against them. The success or failure of this implementation will also help to conclude whether this procedure can work or not for the rest of the K – companies in Kuwait.

The minor questions, which are going to be answered, are for the success of such an implementation, especially in the field of oil and gas companies.

A case study method was suggested as the most suitable approach, because it is well set to looking for practices within organizations. Literature review and scientific articles contributed also to this selection through important questions about the procedures in order to gather the data we need for this study.

Data will be collected from human components (appropriate staff within the organization) involved in the process and connected to each other.

### **Research Method**

In this dissertation two research methods were considered quantitative and qualitative, both methods should be examined to choose the appropriate one for this research. Based on Strauss and Corbin (1998, p. 11) qualitative research is defined, as “any type of research that produces findings not arrived at by statistical procedures or other means of quantification”.

Based on Bryman and Bell (2011) research strategies can be divided into two areas quantitative and qualitative, where quantitative research strategies or methods focuses on quantitative data collection and analysis and it is used in testing theories and not generating them, where it depicts the social reality

from the perspective of objectiveness. Moreover Bryman and Bell stated that qualitative research focuses on words instead of quantification in the data collection and analysis process and usually used in generating theories by using an inductive approach, where it depicts the social reality as a result of the continuous change and additions of individuals' makings.

In the same context, Gill and Johnson (2010) discusses both research methods stating that quantitative method challenge established theories of human behavior as well as experimental data, through the neutral record of reality that draws implicitly on a set of philosophical assumptions and commitments. On the other hand Gill and Johnson added that qualitative method is used in building theory through observation of the world, as well as the use of culturally subjective interpretations of the situation by theory to explain different behaviors.

To be able to make the right choice of methodology method the question of the dissertation should be examined; the purpose of this research is to examine the supply chain management effectiveness improvement by using e-procurement and that through investigating the advantages and disadvantages of e-procurement in general and highlighting e-procurement usage in the petrochemical industry. To be able to measure the advantages and disadvantages of e-procurement and its effectiveness the following questions need to be asked and answered:

1. Is the application of e-procurement reducing costs?
2. Is Using e-procurement reduces Inventory levels?
3. Is Using e-procurement reduces procurement process cycle time?
4. Is using e-procurement increase the communication between Organizations and their suppliers?
5. Do E-procurement has a positive impact on supply chain planning and forecasting?

6. Do organizations using e-procurement have security concerns due to exchange of data breach of confidentiality?
7. Do fear of change is one of the biggest problems facing implementation of e-procurement?
8. Is procurement employees rejection of use is one of the post-implementation problems of e-procurement?
9. Is the high cost of implementation and the time required to integrate the system and train employees are major concern to organizations considering the use of e-procurement?
10. Do e-procurement allows the possibility of discount prices through contracting with preferred suppliers?

Since the above questions are investigating the validity of the advantages and disadvantages of using e-procurement which are mentioned in literature, and from the Bryman and Bell (2011) and Gill and Johnson (2010) opinions that quantitative approach is to test and challenge already existing theories, therefore a quantitative method will be used in this research to investigate the validity of what is mentioned in literature about the advantages and disadvantages of e-procurement.

The quantitative research method has its benefits and limitations, some benefits of the quantitative method were discussed by Brandon-Jones and Slack (2008) mentioning that quantitative method is easy to understand and communicated due to transparency and clear assumptions. They added that it is simpler and quicker to discover alternative decisions when using the quantitative method; moreover the results of this method are more explicit for interpretation.

On the other hand, the quantitative method questionnaire If not carefully constructed and if the research subjects misunderstand the questions they are asked that could lead to a false and misleading results (Kelle, 2006)

### Source of Data

The targeted population of this quantitative research is the procurement employees of Kuwait National Petroleum Company, in order to gain data from their experience of interacting with e-procurement.

### Primary Data

In this research primary data is collected using a survey to collect the required data from procurement employees, according to Waters (2008) "Primary Data is new data collected by an organisation itself for a specific purpose", in this research the data is collected in August 2011 to investigate the effectiveness of e-procurement. Using primary data can provide the required information needed for the research and also assure that all the data collected are up to date while it has a disadvantage of time consuming and the need of deep and comprehensive planning (Buglear, 2005).

### Data Collection

In this research primary data is collected using a questionnaire to collect the required information from employees who occupy with e-procurement procedures, both senior and upper placed. The collection of data was held in August 2011 and the questionnaires were sent through e-mails and received by the same way.

### Questionnaire

**ΤΟ ΕΡΩΤΗΜΑΤΟΛΟΓΙΟ, ΠΑΡΟΛΟ ΠΟΥ ΤΟ ΖΗΤΗΣΑ ΜΑΖΙ ΜΕ ΤΙΣ ΑΠΑΝΤΗΣΕΙΣ ΑΝΑΛΥΤΙΚΑ, ΔΕΝ ΤΟ ΕΧΩ. ΟΠΟΤΕ ΔΕΝ ΜΠΟΡΩ ΝΑ ΤΟ ΕΠΙΣΥΝΑΨΩ ΣΤΟ ΕΓΓΡΑΦΟ.**

### Case Study

Kuwait oil sector is managed by a public organization which is responsible for Kuwait's hydrocarbon corporations and is known as Kuwait Petroleum Corporation.

In order to fully understand the situation and the position of this organization in global, it is essential to go to its past and mention some important points.



In the beginning of the Kuwait's oil industry things were different. In the decade of 1920's Kuwait was depended on a disastrous pearl industry. However, Amir of Kuwait, who was a newly crowned, came to help his people to face these difficulties. So, he signed an Oil Concession Agreement in 1934. Together with Sheikh Ahmad Al-Jaber Al-Sabah, they signed a statement in order to change the course of the country and increase country's wealth and international status.

In 1938 oil was discovered and "Burgan No. 1" was created. Even nowadays, it keeps on producing oil. Furthermore, in 1946 the first shipment of oil was sent from Kuwait. This was the beginning of Kuwait's entrance in global markets. In 1975 Kuwait turned the oil industry to public sector, giving at the same time to the state of Kuwait the total control of the oil industry. However, KPC was created to control its own oil industry.

### **Data Analysis**

Al Tejari.com, which is an Emirati company with office in Kuwait, covered KNPC's pilot project before implementing phase one. The information which was collected during this stage is crucial in determining whether KNPC should go ahead in adopting e-procurement or not and whether vendors were ready and prepared to adopt KNPC's strategies or not, in order to pass to next stage. It was obvious through the pilot project that suppliers were quite adaptable to any changes made by KNPC. Moreover, KNPC has noticed another and larger sector of local companies, which are able to provide staff to participate in the pilot project.

This important issue can be referred to one of the CSF factors. These factors are indicated in Vaidiya's (2006) model, which mentioned that a successful implementation depends on the suppliers, who are a major factor in such a procedure.

### **Reliability**

A Central Tendering Committee (CTC) was stated by an Amiri in Kuwait in the year 1964(CTC.1999). The committee's work was to review, issue and award

all purchasing, and services request for the public sector that exceed KD5,000/-.

To this context, it is noticeable that in spite of the fact that CTC was formed in 1964, the regulations are not yet updated. Furthermore, another noticeable point is for the amount which is awarded. In those days, such an amount could be substantial, but nowadays this can be considered minor. This fact has caused serious problems when the issue for awarding came up. This exact problem was caused in 2000, in oil sector, when some major issues about the limits of stream production came on surface. Despite all above incidents, Kuwait Petroleum Corporation (KPC) manages and governs the whole oil sector in Kuwait, having autonomy to some extent and considered as public sector, with its own regulations and rules.

In 2006, a statement was announced by the ministers' council for allowing the oil sector to manage its procurement requirements up to KD 5,000,000/- (five million Kuwaiti Dinars) within the organizations. This decision allowed the companies to continue without former approvals or awards.

With such freedom experienced by the oil sector, the K-Group inevitably wanted to continue this process even further, to have more transparency and efficiency and improved the time cycle. In such an extent, most of the K-Group companies started their own versions of e-procurement strategies mentioned by the World Bank for both e-purchasing and e-tendering procedures.

One of the leaders in this process is KNPC, which had successfully completed the whole cycle of e-tendering and e-purchasing, meeting their requirements in all stages.

This adoption has changed the perception of end users, staff, and the working environment along with the commercial operation of the staff. This

implementation also helped suppliers who took part in the adoption of new procedures.

One of the problems faced in defining the scientific term *theory*, is that there is not a specific definition neither in the literature review nor in scientific community. Some scientists suggest some proposals about the difference between the terms hypothesis and theory, but at the same time some others use both of them in a wrong way. A hypothesis is a term which refers to a proposed explanation of a phenomenon which is observed. Both hypothesis and theory are depended and based on researchable observations.

It is often a scientist to propose a hypothesis before the confirmation, as a result of the predicting outcome of the study. This helps to define the factors of the research. A major component of an observable hypothesis is that it is testable and can be false. Every scientific experiment, has a major hypothesis and an alternative, in order to explain the study if the result does not support the major hypothesis.

In this research the first hypothesis, is whether the e-procurement is advantageous for a business or a corporation, and the second hypothesis is whether the disadvantages are more than the advantages of such an implementation.

## Data analysis

		job_description			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	procurement personnel	38	76,0	76,0	76,0
	senior procurement personnel	11	22,0	22,0	98,0
	procurement team leader	1	2,0	2,0	100,0
	Total	50	100,0	100,0	

**commercial\_department**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	contracts division	22	44,0	44,0	44,0
	purchasing devision	11	22,0	22,0	66,0
	warehouse	8	16,0	16,0	82,0
	commercial support	9	18,0	18,0	100,0
	Total	50	100,0	100,0	

**types\_of\_systems**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	E-MRO	2	4,0	4,0	4,0
	web-based ERP	5	10,0	10,0	14,0
	e-sourcing	5	10,0	10,0	24,0
	e-tendering	23	46,0	46,0	70,0
	e-reverse auctioning	1	2,0	2,0	72,0
	e-informing	10	20,0	20,0	92,0
	e-collaboration	4	8,0	8,0	100,0
	Total	50	100,0	100,0	

**reducing\_cost**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	9	18,0	18,0	18,0
	agree	39	78,0	78,0	96,0
	disagree	2	4,0	4,0	100,0
	Total	50	100,0	100,0	

**reducing\_administrative\_costs**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	11	22,0	22,0	22,0
	agree	34	68,0	68,0	90,0
	disagree	5	10,0	10,0	100,0
	Total	50	100,0	100,0	

**reducing\_inventory\_levels**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	4	8,0	8,0	8,0
	agree	35	70,0	70,0	78,0
	disagree	10	20,0	20,0	98,0
	strongly disagree	1	2,0	2,0	100,0
	Total	50	100,0	100,0	

**decreasing\_stock\_levels**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	4	8,0	8,0	8,0
	agree	35	70,0	70,0	78,0
	disagree	11	22,0	22,0	100,0
	Total	50	100,0	100,0	

**more\_cash\_flow**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	7	14,0	14,0	14,0
	agree	36	72,0	72,0	86,0
	disagree	7	14,0	14,0	100,0
	Total	50	100,0	100,0	

**reducing\_number\_of\_workers**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	2	4,0	4,0	4,0
	agree	40	80,0	80,0	84,0
	disagree	8	16,0	16,0	100,0
	Total	50	100,0	100,0	

**assist\_in\_obtaining\_orders**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	5	10,0	10,0	10,0
	agree	38	76,0	76,0	86,0
	disagree	7	14,0	14,0	100,0
	Total	50	100,0	100,0	

**reducing\_procurement\_process\_cycle\_time**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	7	14,0	14,0	14,0
	agree	36	72,0	72,0	86,0
	disagree	7	14,0	14,0	100,0
	Total	50	100,0	100,0	

**increasing\_the\_communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	6	12,0	12,0	12,0
	agree	37	74,0	74,0	86,0
	disagree	7	14,0	14,0	100,0
	Total	50	100,0	100,0	

**positive\_impact\_on\_supply\_chain**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	6	12,0	12,0	12,0
	agree	39	78,0	78,0	90,0
	disagree	5	10,0	10,0	100,0
	Total	50	100,0	100,0	

**security\_concerns**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	3	6,0	6,0	6,0
	agree	38	76,0	76,0	82,0
	disagree	9	18,0	18,0	100,0
	Total	50	100,0	100,0	

**information\_access**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	3	6,0	6,0	6,0
	agree	38	76,0	76,0	82,0
	disagree	9	18,0	18,0	100,0
	Total	50	100,0	100,0	

**limiting\_data\_exchange**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	2	4,0	4,0	4,0
	agree	39	78,0	78,0	82,0
	disagree	9	18,0	18,0	100,0
	Total	50	100,0	100,0	

**employees\_fear**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	6	12,0	12,0	12,0
	agree	26	52,0	52,0	64,0
	disagree	16	32,0	32,0	96,0
	strongly disagree	2	4,0	4,0	100,0
	Total	50	100,0	100,0	

**rejection\_of\_use**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	4	8,0	8,0	8,0
	agree	26	52,0	52,0	60,0
	disagree	19	38,0	38,0	98,0
	strongly disagree	1	2,0	2,0	100,0
	Total	50	100,0	100,0	

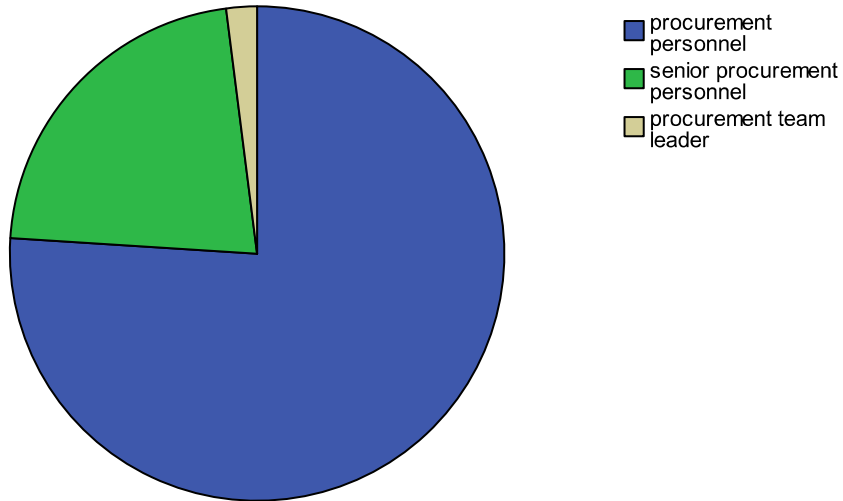
**high\_cost**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly agree	4	8,0	8,0	8,0
	agree	33	66,0	66,0	74,0
	disagree	13	26,0	26,0	100,0
	Total	50	100,0	100,0	

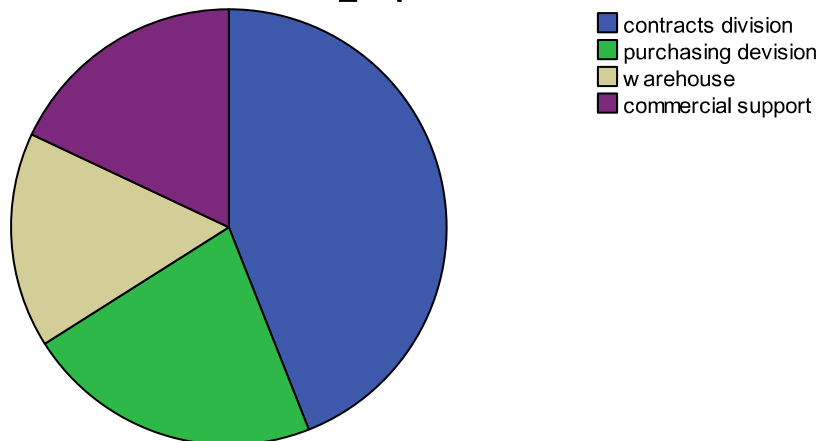
**possibility\_of\_discount\_prices**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	2	4,0	4,0	4,0
agree	31	62,0	62,0	66,0
disagree	17	34,0	34,0	100,0
Total	50	100,0	100,0	

**job\_description**

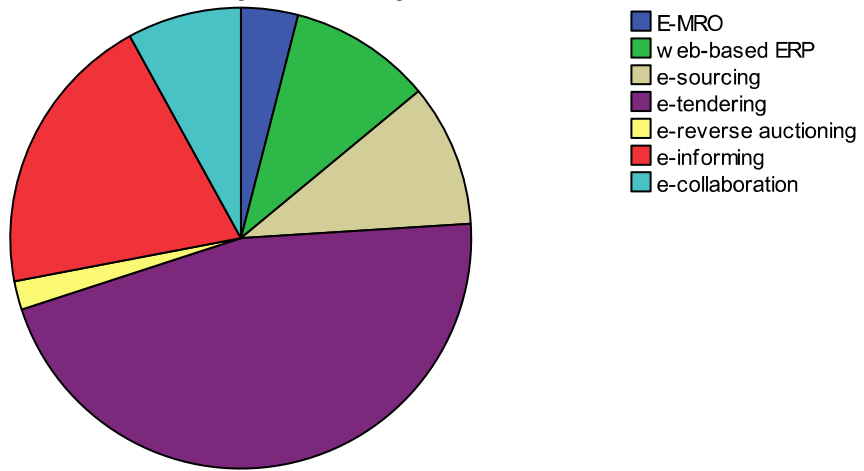


**commercial\_department**

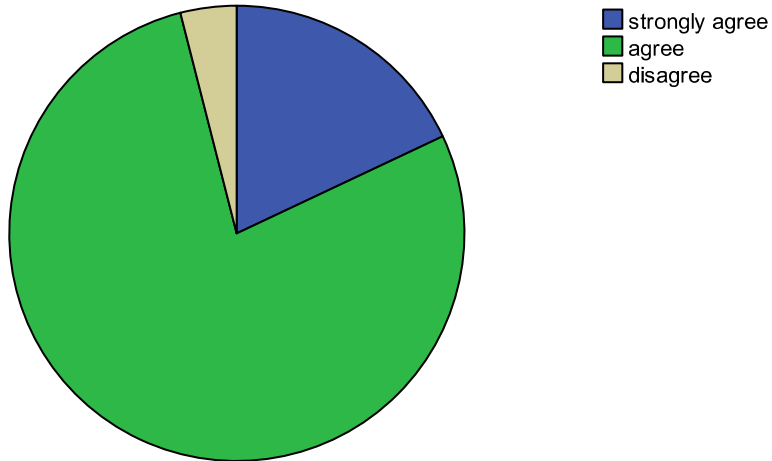




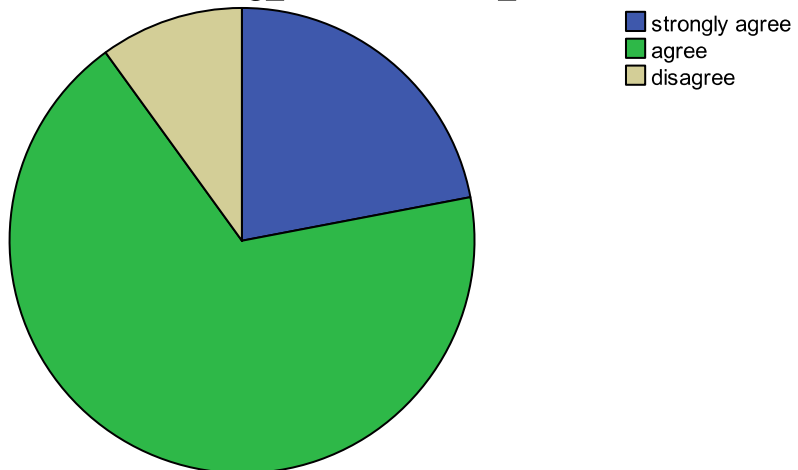
types\_of\_systems



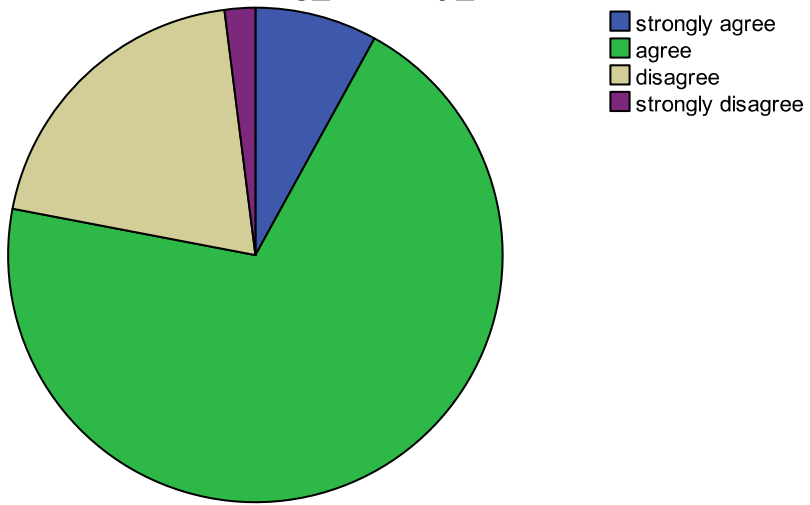
reducing\_cost



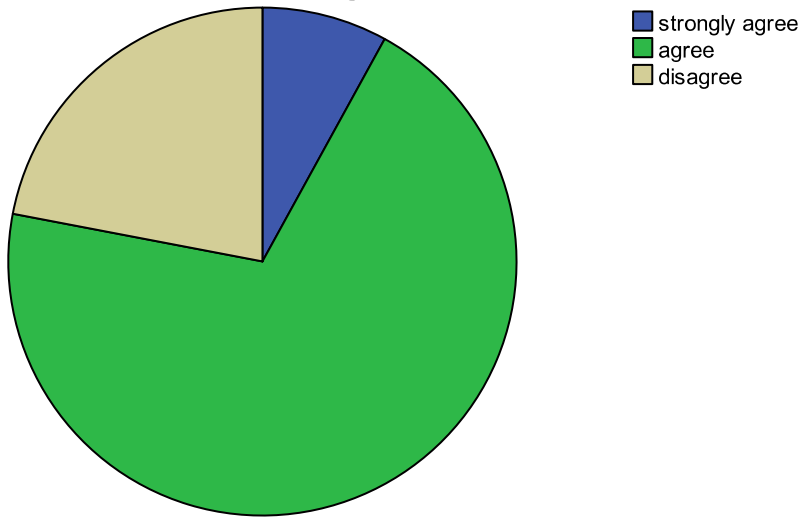
reducing\_administrative\_costs



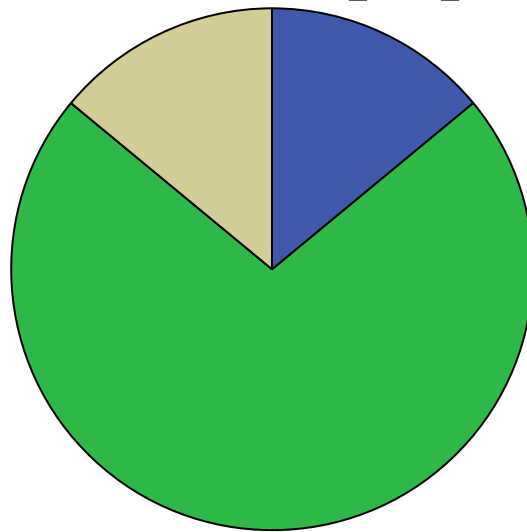
**reducing\_inentory\_levels**



**decreasing\_stock\_levels**

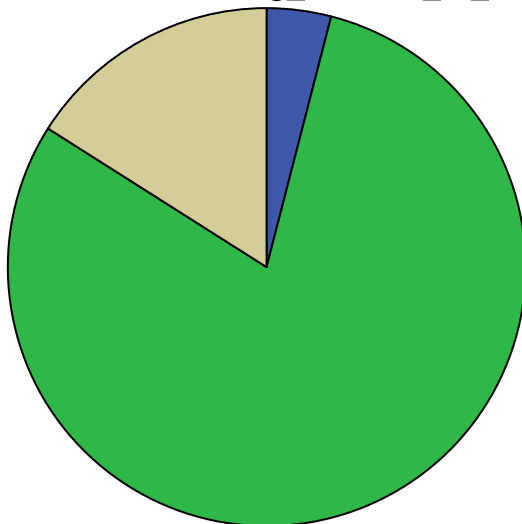


**more\_cash\_flow**



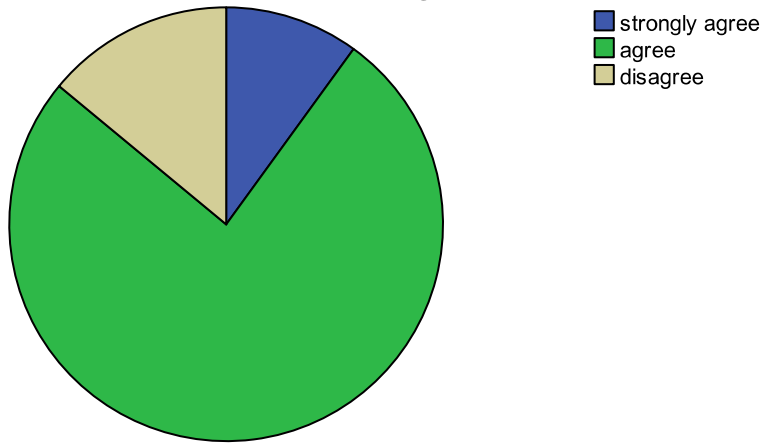
- strongly agree
- agree
- disagree

**reducing\_number\_of\_workers**

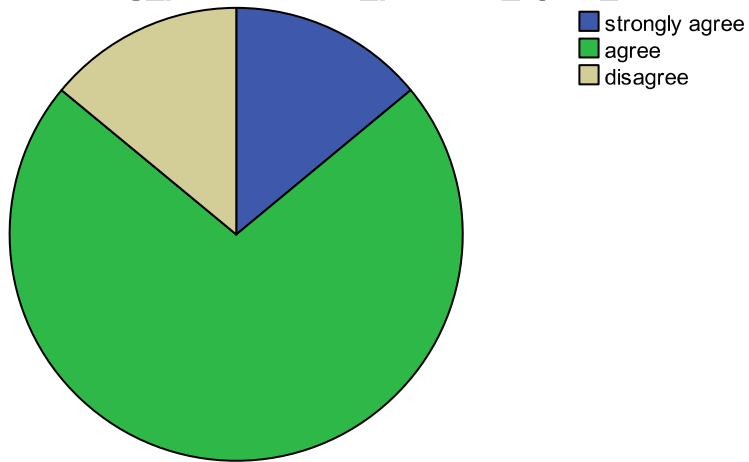


- strongly agree
- agree
- disagree

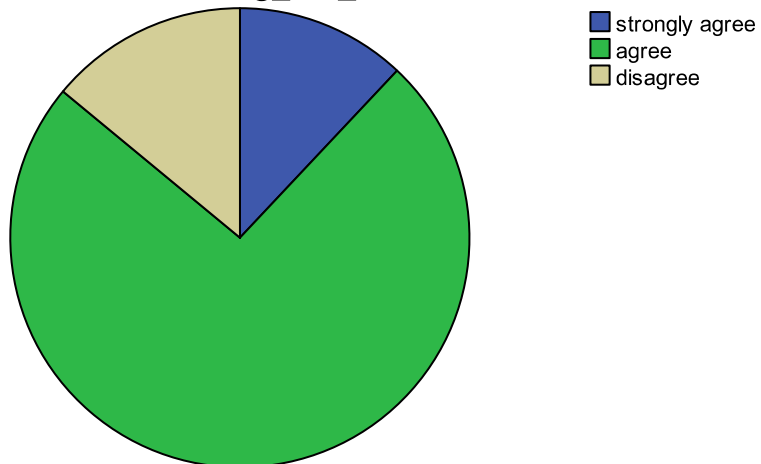
**assist\_in\_obtaining\_orders**



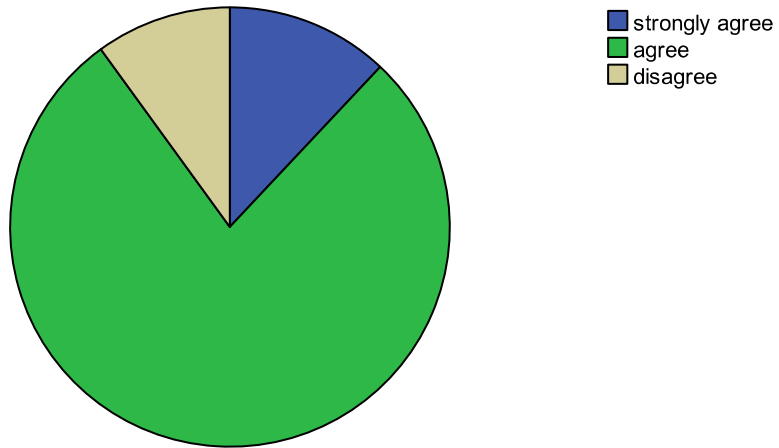
**reducing\_procurement\_process\_cycle\_time**



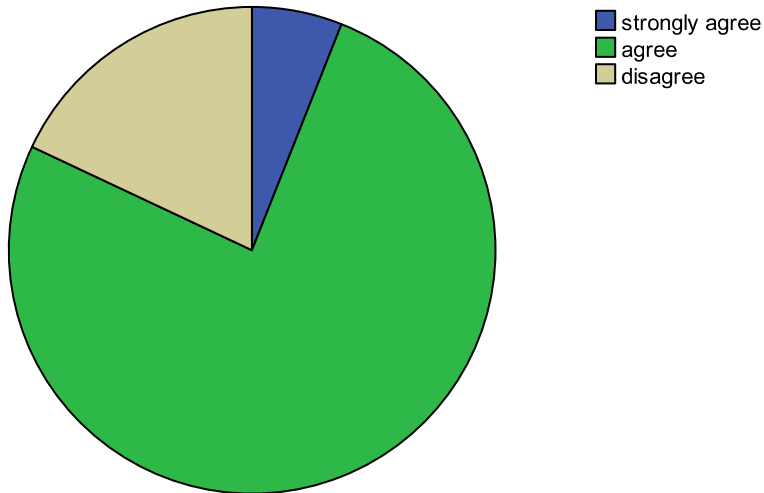
**increasing\_the\_communication**



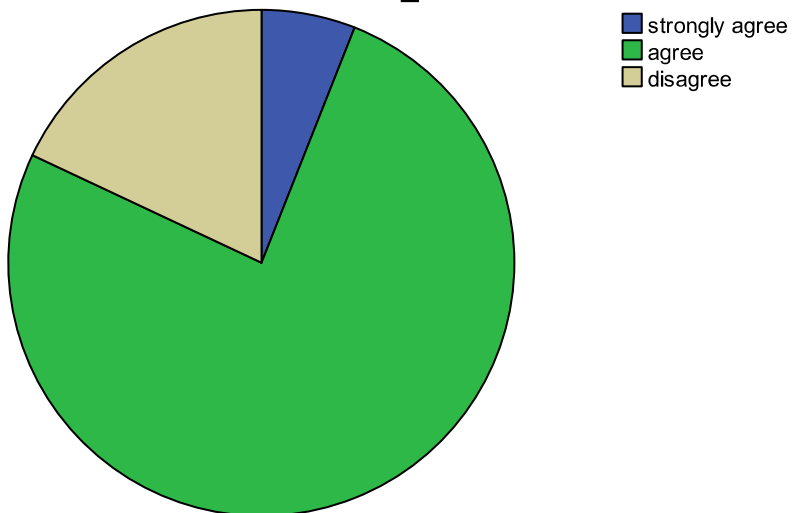
**positive\_impact\_on\_supply\_chain**



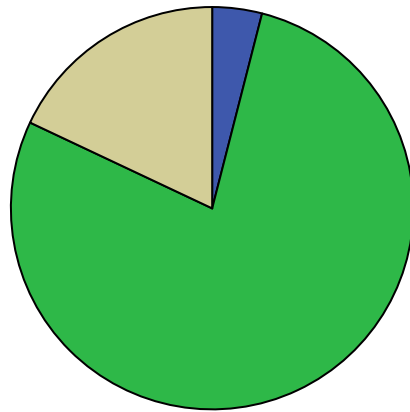
**security\_concerns**



**information\_access**

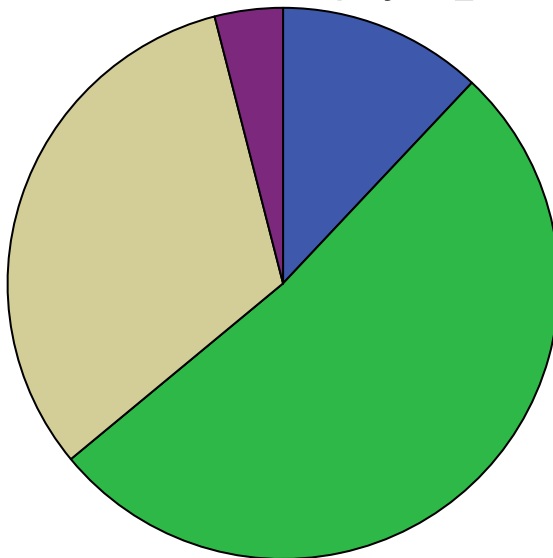


**limiting\_data\_exchange**



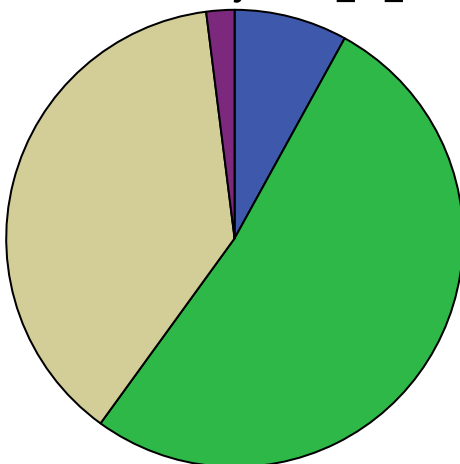
- strongly agree
- agree
- disagree

**employees\_fear**

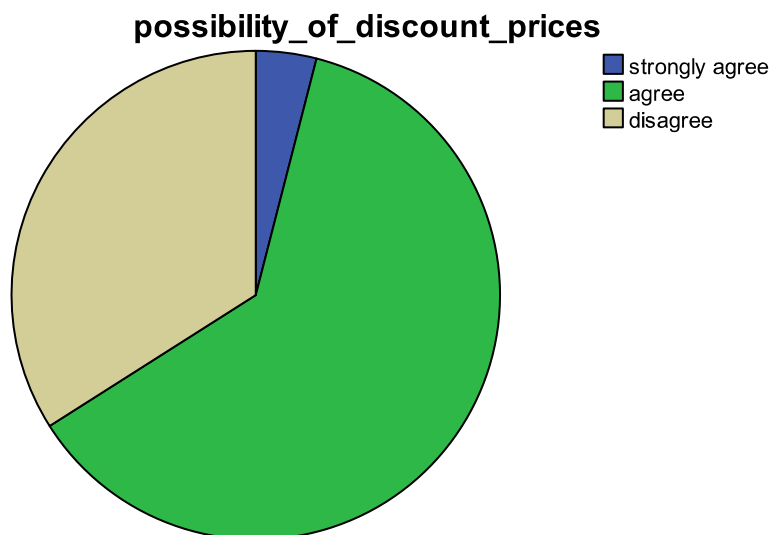
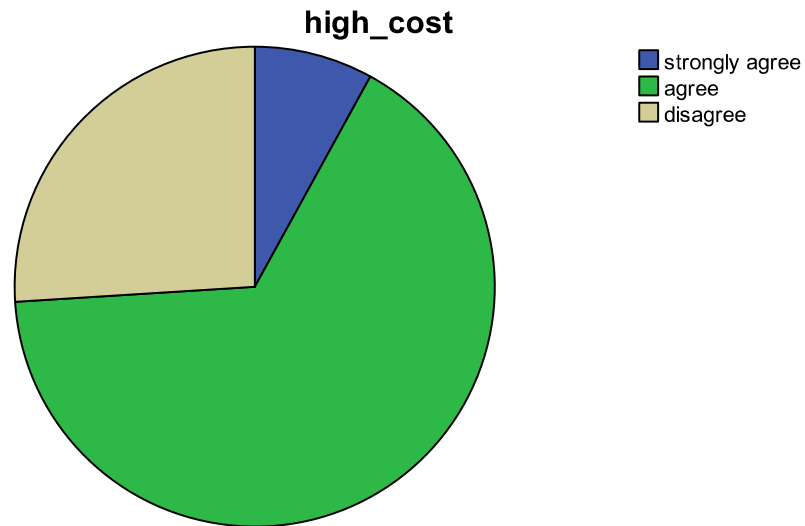


- strongly agree
- agree
- disagree
- strongly disagree

**rejection\_of\_use**



- strongly agree
- agree
- disagree
- strongly disagree



Based on literature review and the data collected via the questionnaires, an organization's vision of e-procurement implementation could be summarized as to achieve a standardized business process that reduces the cycle time, costs and become a class supply chain organization, with global access. E-procurement also offers opportunities such as value creation or value enhancement and lowering costs of providing goods and services.

The benefits of e-procurement can be both tangibles and intangibles. Tangibles are the advantages that can be directly measured such as the automation of purchase, the reduction of prices, inventory and staff, and the limitation in time wasted by efficient procedures.

Intangibles advantages are these, which cannot be measured so easily and directly, but actually helps the process and includes issues like culture changes, most of the time (Kenneth, 2006). Other intangible advantages can be strategic sourcing, end-user attitude shift, convenience, satisfaction and new consumption strategies (Jason, Dale, 2000).

The components of e-procurement make automation of transactions possible and lead to a greater competition, to creation of new standards and consolidation of supply and demand as set by Innovation and Information Consultants, Inc. Concord, MA (2004). This will result to an overall reduction in the costs of doing business more competitive.

The benefits and the importance of e-procurement has been mentioned in the statement *"This is not some activity outside the business – this is the business"* (Welch, 2008, p1), which is confirmed by business volume statistics.

Another company, Linde Gas operated an e-procurement strategy which was developed by Healy Hudson's and enabled the standardization and a cost reduction. *"With the integration of solution standardization internal processes took place and a reduction of the purchasing price could be realized. A return on investment (ROI) could thus be reached faster than expected"* (Hudson, 2006, p1).

Elizabeth and Spears (2001) has concluded in 33.6% reduction in procurement costs and 11% reduction in process costs by using e-procurement strategies.



The components of e-procurement involved procedures which are up to the purchasing processes, the distribution of purchasing power to authorized employees, the standardization in buying methods, the whole control of spending and leverages in order to negotiate better deals. In order to investigate other benefits of such an implementation such as the increase in productivity, the growth of efficiency, the reduction in buying costs, and the reduction in transaction costs, we should first make the appropriate implementation. The statement that “organizations are willing to commit not only to technology changes; but fundamental changes in how they focus their energies day-today will benefit from e-procurement” as was set by Lydon et al., (2002) is related to the results of this research.

To summarize the benefits, based on data collected and literature reviews, most of them are agreed to be: reduction in cost, improvement in efficiency, improvement in processes, increase in revenues, better work environment and of course, better relationship between buyer and seller (Colin and Burn, 2002). It is crucial to keep in mind that e-procurement implementation is not to be considered as an enhancement of business process, but as a “*successful e-procurement initiative which should complement your existing systems and support good procurement practice. It should be procurement-driven and not system-driven*” (Hayward, 2001).

All the above were referred to the advantages and benefits of implementing the e-procurement strategies and systems. All the below, will refer to the disadvantages and barriers this procedure might face.

Some of the disadvantages could be summarized below:

#### *Relationship:*

As far as the field of relationships is concerned, it is crucial in transaction between buyer and seller to exist a kind of communication. In this adoption, some problems in terms of relationships may arise, because the interaction

between these two parts stops existing. As a result, in some techniques such as reverse auctions, the interaction between these parts is electronic. This can lead to an absence of exchanging knowledge, and to poor relationship.

#### *Trust:*

In section of trust the things are similar as above, especially in transactions which involve procurements of one source and limited source material. This can affect the flexibility of both sides in transactions. (Sunil et al., 2008).

#### *Privacy:*

According to James et al., (2005) information which is transferred through e-procurement systems could affect the privacy of both buyers and suppliers. Private data in the context of e-procurement is primarily. The cost information of the suppliers which is published by buyers and information of buyers might be available on-line.

#### *Security:*

All businesses that use electronic systems and the internet in daily basis in order to do their transactions should operate highly performance security programs, but, "*Security is not free, and in fact on the web, it is particularly expensive*" (Adam et al., 2005, p.1).

#### *Social and Legal:*

Using e-procurement strategies apart from the reduction in costs, there are plenty of losses that should be faced. Due to the fact that it enables an extensive market, job losses, loss of local shopping, loss of sales of local products, reduction in tax incomes from business, e-procurement affect local community in tremendous way.

Moreover, some legal regulations about e-commerce should be addressed in order to exist a safe and legal internet environment.

Other issues of minor meaning such as increased computer maintenance, increased work, reduction of flexibility, monotony, dependence and technology and loss of convenience are mentioned by Roberts (2005).

Apart from advantages, benefits and disadvantages there are also some barriers which should be managed in order to ensure a successful implementation of e-procurement. Most of them refer to the technology such as internet and application software compatibility. Some others refer to the field of market, such as economic recession. Few of them are related to the Government sector, such as not legalizing electronic signature. For small and medium firms their size could be a barrier in terms of investment on hardware and software required for e-procurement adoption (Concord MA, 2003).

## **Ethical Consideration**

Scientific ethics are related to honesty and integrity in all stages of scientific practices. This system of ethics leads the practice of science, from data collection to publication. As in many professions, the scientific ethic is deeply integrated into the way scientists work. They should be aware of the reliability of their study because knowledge and especially scientific depends deeply in that ethics. Many of the ethical principles in science are connected with the production of unbiased scientific knowledge, which is highly important when other scientists try to build upon or extend research findings, which are not theirs. The open publication of data, the peer review, the replication, and the cooperation are required by the scientific ethic in order all to help to keep science get improved and make steps by accumulating research findings and confirming or raising doubts about the existing results.

Until the middles of the 20<sup>th</sup> century, there was not a formal system of ethics and guidelines about the conduction of a research. A formal system came up after some well – published ethical regulations and rules and war crimes.

Scientific ethics now refers to a standard model of how to conduct a research or a survey and in general can be separated in two categories, as Bolton (2002) mentioned. Firstly, the standards of methods and the process which are followed in order to address the design, the procedures, the data analysis, the interpretation, and the reports of research efforts. Secondly, the standards of topics and findings which address the use of human and animal subjects in research and the ethical barriers of certain research findings. These two categories together, can help to guide scientific research and ensure that research efforts (and researchers) consist of several crucial principles (Resnik, 2008), including:

1. Honesty in reporting the scientific data.
2. Careful transaction and analysis of scientific results in order to avoid errors.
3. Separate analysis and interpretation of the excluded results which are based on data and not on the influence of various external sources.
4. Open transfer of methods, data, and interpretations through publications and presentations.
5. Sufficient validation of excluded results through replication and collaboration with peers.
6. Proper validation of sources of information, data, and ideas.
7. Moral obligations to society in general, and, in some principles, and high responsibility in terms of the rights of human and animal components.

## Limitations

We have mentioned below some of the major advantages and benefits of such an adoption. We have not still mentioned the limitations for an implication like this.

It is obvious that the limitations for an individual business relates to issues that can be potentially turned in barriers for a successful implementation. These can be summarized in the risk, the uncertainty, the lack of efficiency from supplier and catalogue-content readiness, the cultural differences, the staff resistance, the need for firm to train the whole personnel at the same time when some other activities are running etc.

Each one of these limitations makes it difficult for businesses to implement e-procurement rules and procedures. And if they try to apply these strategies, the implementation will be surely extremely difficult.

In the KNPC case, the cost, the top management support, the inadequate e-procurement solutions, the business partners and the lack of skilled personnel might be proved important barriers (Hawking *et al.* 2004; Stein and Hawking, 2004). In the case of small businesses in Kuwait, security issues and the realization that *'once committed to automating business processes, nothing in those businesses will ever be the same again'* grounds the argument that *'big businesses, universities and governments can survive e-business failures. Smaller businesses cannot afford them at all'* are mentioned by Bray (2004: 6).

Grounding on this assumption, we should mention that it has taken many years since businesses apply this system in Kuwait, although the government has stated that this implementation is crucial.

It has been stated that a firm which is not an e-procurement player now, most definitely will not be a major player in the future (Kiel 2000). This can be interpreted by mentioning that it might be too late to adopt e-procurement successfully. Although, there might be some advantages for the leaders, there is no proof about this assumption. E-procurement is existing and has the ability to grow the creation of real value for all firms, even the smallest ones.

One possible explanation for a slow adoption process is that the adoption decision is very complicated— because many benefits arise in the longer term, major barriers and associated possible costs may be in a very short term (e.g. extensive staff training). The benefits and costs are difficult to be estimated in real terms.

But firms should consider the adoption procedure seriously. The essential fact is that e-commerce (and therefore e-procurement) is widely open. Without careful analysis, no firm can see itself protected from the influence of e-procurement just by choosing to ignore it. Decisions about e-procurement must be crucially strategic, influenced by a variety of factors (e.g. supply chain considerations, long term contracts, nature of customer-supplier relationships, organizational culture and industrial relations).

Furthermore, although there is a lack of information about e-procurement in the SME context, the suggestion in the literature is that the different context involves different benefits and of course different barriers. Applying strategies designed for large businesses to SMEs may result in waste of resources and the outcomes are going to be missed. It is obvious that the identification of the specific components of e-procurement adoption is crucial and basic for the development of knowledge in order to make them capable to apply successfully that adoption.

But all the benefits from the adoption will come in surface only when post-adoption implementation difficulties are overcome.

## CONCLUSIONS AND FUTURE RESEARCH

Despite the importance of adoption and the government who makes efforts in pushing the use of ICT in businesses, the adoption rate of e-procurement is still low. This may exist due to the lack of information about the whole procedure.

In order to investigate the low rate in e-procurement adoption, there is an urgent need for research that can identify various factors in e-procurement adoption which are based on industry differences, business size differences and complexity of products. This is necessary to be done so to enable the development of a predictive model of e-procurement adoption that can help in identifying firms, management styles and activities.

E-procurement is still a relatively current phenomenon and the need for the research framework is apparent because of the inconsistency between proclaimed national and business benefits deriving from a faster growth, and the slow pace of adoption. A predictive model of adoption should be used to improve the formulation and targeting of industry and innovation policies by focusing on how to access these advantages and the removal of limitations or barriers. Improvement in the rate of e-procurement adoption will have national economic benefits through improved productivity that can strengthen competitive advantages in rapidly adopting firms and industries. However, there is no need for the business sector to be innovative in the use of e-procurement, for the sake of innovation. Management orientation should be towards effectiveness and practicability.

Similar to e-business, some companies may find it difficult to adopt e-procurement successfully. However, it is essential for managers to consider that a company which does not apply e-procurement strategies will eventually lose comparative advantages against those competitors who adopt the new technology, and conclude to its absence of the market. Business access to the advantages and the reduction or absence of the limitations in e-procurement implementation will be armed by industry specific solutions. To

the extent that these solutions gain lower production cost, they will help to increase the competitiveness of local products against imported ones.

At the same time various policies are encouraging public sector agencies to adopt e-procurement systems. This adoption does not appear to be smooth and the rate of e-procurement implementation success has been less than expected, as supported by Steinberg's (2003, p. 1) claim that "*Government e-procurement projects have been notoriously unsuccessful*". The growth and success of e-procurement implementation have not been as easy as some of the solution providers have suggested.

It is very essential to decide the level of integration required between the e-procurement solution and existing information systems (KPMG, 2001). The CIPFA report stated that if integration issues are complicated, it is more possible that underlying business procedures within an organization should be changed or adapted (ECOM, 2002). It is also important to connect the e-procurement system to the financial management system in order to apply easily the process of online payment to suppliers (WB, 2003). It is obligatory for purchase transactions which are carried out through an electronic ordering transaction support system to be transported in agency's Financial Management Systems and communicated to suppliers for fulfilment (DOF, 2001).

Due to the sensitivity of the government data and the legal nature of orders and payments, security of data is fundamental in e-Procurement systems. The system must have systems and software for identifying and authenticating the user who places an order so that the supplier knows if it is safe to fulfil the order or not. In an e-procurement environment, Birks *et al.* (2001) relate the security acquisitions at the e-tendering stage to authentication, arguing that e-purchasing systems and processes need protection because they involve a financial transaction and may be sensitive to fraud. Stenning and Associates (2003) mention the need for transactions between different systems to be exchanged in secure ways with absolute assurances regarding the identities



of the buyers and suppliers. In order to encourage buyers and suppliers to participate in e-procurement, it is critical that both parties have complete confidence and trust in the underlying security structures.

E-procurement should be considered as a potential system to make the procedure of procurement more efficient in terms of cost, time, and achievement of value for money (ECOM, 2002). Where existing procurement practices and procedures may be against the goals and objectives of the new initiative, applying e-procurement will require the reconstruction of existing purchasing processes (KPMG, 2001). Birks *et al.* (2001) mention that roles and responsibilities might change with the new process, which requires staff to adapt according to these.

According to the Stenning and Associates Report (2003), as a significant proportion of the benefits to be gained from implementing e-procurement initiatives are related to the changes made through process re-engineering rather than the implementation of the e-Procurement initiatives themselves, existing processes for dealing with procurement will need to be revised. Birks *et al.* (2001) suggest that the process of reengineering should not only address process but also supplier relationships and all the internal groups affected by procurement.

The continuous measurement of the key benefits is regarded as vital to the successful delivery of the business case. Measurement drives behaviour and is a key to making the change a success (Birks *et al.*, 2001). Establishing goals and baselines is very important. According to CGEC (2002), a general lack of measurement capability ensures management has only limited tools for assessing organizational progress. It is important to define key performance indicators (KPIs) early in the process to enable successful benefits tracking and distil the business case into measurable KPIs. These KPIs should then be monitored throughout the project.

There is little doubt that senior management leadership is critical to the success of an e-procurement implementation (AGV, 2003). The top

management team (steering committee) must involve the project manager, any consultants working with the committee, and agency staff to develop an implementation strategy (ECOM, 2002). In this regard, considerable attention and support need to be provided by senior management to ensure that the procurement reform has been well understood in the agency (S&A, 2003). Furthermore, the executive management team is responsible for setting the vision and goals, bringing about collective commitment for change in process and organizational structures, and formulating the policies and strategies necessary to put an e-Procurement initiative in place (WB, 2003).

Changes required supporting business processes are directly related to the speed of adoption of e-procurement. With change management issues seeming to become more substantial as stakeholder needs increase (CGEC, 2002). The OGC (2002) recommends that increasing change in underlying processes requires more learning and effort on the part of users. Consequently, the OGC suggest more attention should be given to change management issues, citing three ways to achieve successful change management for e-Procurement: consultation, communication, and issue resolution (OGC, 2002). The World Bank Report cautions that while change management may be the least expensive aspect of an e-Procurement project, a lack of it can be a leading cause of project failure (World Bank, 2003).

The creation of documented and executable strategies prior to the deployment of the e-Procurement solution is an important CSF (Neef, 2001). This notion is further supported by the OSD Report (2001) findings that as the procurement strategy is intended to provide savings enabled by the technology, e-Procurement should be procurement-driven as well as technology-driven. Therefore, a clearly defined e-procurement strategy not only emphasizes the importance of e-procurement in the public sector but takes into consideration major institutional changes from the procurement process perspective as well as from the organizational perspective (WB, 2003). Another report (DOF, 2001) notes that the e-Procurement strategy should be based on the introduction of sound procurement practices while

taking into account the differences in requirements of the public and private sectors.

E-procurement requires various buyer-supplier systems to exchange information and electronic documents. This requires common standards. It seems that there is agreement emerging on the adoption of extensible Markup Language (XML) as the basis for standards (S&A, 2003). The XML standard defines the content in communication and in the selection of general data formats (KPMG, 2001). In defining e-procurement requirements, Birks *et al.*, (2001) claim a key concern is the standard for formatting electronic catalogues. The World Bank (2003) suggests that developing an e-Procurement system in an open environment allows it to link to other systems for interoperability and simplifies upgrading the system. According to the DOF (2001), successful introduction and adoption of e-Procurement in the public sector also depend on the ease with which procurement-related data can be exchanged both within the agencies and between their supply bases.

E-procurement solutions are seen as a way to address many public sector procurement requirements. It has become apparent that the more the procurement process is supported by Internet technology, the easier it will become to develop and implement e-procurement. The e-procurement infrastructure and procedures can facilitate the achievement of the principles including transparency and accountability requirements of the public offices while enhancing efficiency, effectiveness, and flexibility in the procurement process (DOFA, 2002). E-procurement has the potential to promote operating efficiency in public sector procurement and provide significant cost savings (OCIO, 2000).

One of key logical advantages of electronic transaction management is that it frees procurement staff for procurement evaluation and contract management roles. Furthermore, management information can be extracted from the e-Procurement system using standard reporting software (OGC, 2002). The transparent management information provided by e-procurement also permits

the monitoring of compliance with service level agreements and measurement of many other elements of supplier performance (OSD, 2001).

The implementation of e-procurement initiatives should be seen as an effort to improve the procurement goals, which normally include quality; timeliness; cost; minimizing business, financial and technical risks; maximizing competition; and maintaining integrity (Thai, 2001). In a similar way, CGEC (2002) has identified cost, quality, program management progress measures (on-time, on-budget, and issue management), process performance factors, and Return on Investment as the most relevant measurements. There remains, however, the challenge of controlling the range of variables required to reap the benefits of e-procurement implementation. It should be remembered that because an e-Procurement initiative is expensive, demanding upon staff, and time consuming, it may take several years for public sector agencies to fully reap the strategic and operational benefits of e-procurement.

Analysis of the critical success factors through the use of citation frequency as a measure of their importance revealed that among the eleven CSFs, no one single factor was overly predominant. In order to further understand the relative importance, the CSFs were split into two categories: human factors and technology factors. Human factors are those issues dependent on human behavior and expertise while technology factors are those issues dependent on construction and deployment technologies. Human factors consist of end-user uptake and training, supplier adoption, business case and project management, and top management support. Technology factors consist of system integration and security and authentication. Change management, e-Procurement implementation strategy, process re-engineering, performance measurement, and technology standards are factors that involve aspects of both categories.

While this type of analysis is subjective, the prominence of human factors in the success of e-Procurement implementations is apparent. This suggests that where there is a conflict between human and technological issues, the

returns on e-Procurement initiatives may be higher if more attention is given to the human issue.

While e-procurement uses ICT, the drivers of the latter are not necessarily those of the former. Even within the introduction of new technologies, the adoption of management and production technologies differs between large and small firms (Jacob, 1998). In the adoption of soft process technology, the determinants also vary from technology to technology for firms of the same size class (Mole *et al.* 2004) linking to the observation that, in adopting ICT, the task for small firms is to understand the strategic and competitive implications (Raymond 1998, p.326). While ICT adoption models have been proposed, such models are not necessarily transferable to e-procurement adoption. One major problem is the conflict of the networking requirement of e-procurement with the finding of a limited integration between the Internet and internal systems in SMEs (Shiels, *et al.* 2003). SMEs may embrace ICT without adopting e-procurement.

At the public level, e-procurement facilitates unlimited and non-restricted access to government information and increases market transparency (no barriers to entry) and economic integration based on complementarities (Carayannis and Popescu 2005). It also increases international procurement opportunities for local businesses. Recognition of the potential benefits of e-procurement for Australian business is reflected on the establishment of web sites by federal and state governments to facilitate the adoption of e-procurement (OGO, 2001; PRC, 2001; NSW, 2000).

E-procurement has the potential to lower overhead costs associated with purchasing (Chircu and Kauffman, 2000), and to increase a firm's bargaining power. This power can result in better purchasing terms and conditions, better suppliers, more reliable supply of quality goods and services, better prices and, ultimately, lower all-inclusive purchasing costs. Purchasing cost savings add to profit (Simonaska, 2001; Tulloch, 2001; Wagner, 1993). For these type of reasons, e-procurement has been seen to have the potential to play a

pivotal role in a firm's endeavors to "create a competitive cost advantage that lasts for many years" (Bloomberg *et al.* 2002), hence grounding sustainable competitive advantage.

This is particularly important because ICT is the critical enabling technology and is a major contributor to national productivity and growth. This is a compelling motivation not only for e-procurement adoption by firms, but also for this adoption to be a matter of urgency given the belief that "early adopters will obtain maximum benefits" (Nestle, 2001).

Overall, e-procurement adoption may be below expectations due to a lack of understanding of the consequences from non-adoption and link to competitive advantage, a presumption that e-procurement is mostly for large businesses, and the notion that it is too early to assess conclusively (CFO Europe, 2003).

In addition, there is evidence that the adoption process is complex and onerous, and intervention may be necessary to stimulate initial adoption and subsequent implementation. E-procurement adoption is an area of both threat and opportunity in terms of business productivity and competitiveness.

Common important drivers for e-procurement adoption are process design, international operational efficiency, and cost reduction and leadership. However, particularly conspicuous is the apparent lack of a perceived link between e-procurement adoption and competitive advantage. It is important to understand what may ensue from this state of affairs. Implementing a globalization strategy relies on two strategic aspects: a marketing strategy and a procurement strategy. A global marketing strategy requires the same goods and services to be made available to the global market in the same way. A global procurement strategy prescribes that a firm select and use the best suppliers of the better price-quality inputs independently of geographical concerns.

ICT and the adoption of e-procurement are instrumental in these areas. If a firm does not adopt a global procurement strategy and its competitors implement a global procurement strategy, in the long run they may attain a cost-quality based competitive advantage. Conversely, a firm that neglects to select and use the best suppliers of the better price-quality inputs may not survive in the long run.

An additional implication is that competitors will be able to access the firm's traditional suppliers (as long as these are electronically available). In fact, even the firm's foreign competitors can do their purchasing adoption based on potential benefits and impediments that will ensue or influence that adoption – advantages and problems ensuing from a no adoption decision need to be assessed.

For an individual business, dealing with the impediments and accessing the benefits afforded by e-procurement can be argued to be essential for sustainable competitive advantage, possibly determining its survival. Arguably, businesses have no choice but to adopt e-procurement, or risk seeing competitors lure away their customers 'with Internet-based supply chains that are faster and cheaper' (Koch, 2000; Semple, 2005).

The literature advances a large array of benefits driving e-procurement adoption (Tomorrowfirst, 2000). In this case, a recent study identified price (process) reduction, unit cost, customer demand, administration costs and market intelligence as the most important drivers in this order (Hawking *et al.* 2004; Stein and Hawking, 2004).

There are also differences in e-procurement adoption between large businesses and SMEs. The adoption of e-procurement practices is likely to involve some departure from traditional purchasing strategies and methods, to involve changes in the process and criteria used by firms to select their suppliers, to require new skills and, in some cases, new capital investment in equipment. Hence different businesses may be more or less prepared to

enact change whilst ensuring the on-going performance of the procurement function.

It ensures that the extent of the adoption may be variable and resource dependent. Studies of e-procurement in Australia are limited to large businesses and little is known about e-procurement when small businesses are concerned. There are, however, indications that the situation for small businesses may be even bleaker, possibly involving drivers and barriers distinct to those applicable to large businesses.

This research helped to identify e-procurement implementation and its success in KNPC. Opinions of KNPC employees and KNPC vendors were collected to identify e-procurement success in KNPC. Since e-procurement is still in its infancy stage in KNPC, vendors are yet to gain experience and find its advantages and benefits.

KNPC needs to find out the faults in the system and change the system so that it becomes user friendly. E-procurement advantages primarily include saving money, time, and extra workload normally associated with paper works. KNPC should study the cost savings and time savings and the reduction in processing cost from implementation of e-procurement. It should also find out the returns from e-procurement and how it measures up to the initial investment. Some of the other advantages of e-procurement are reduction of overhead costs such as purchase agents, as well as improved control of inventories, and the overall improvement of the manufacturing cycle. A future study should place emphasis on these factors to find out the long term success of e-procurement in KNPC.

With the successful implementation of e-procurement in KNPC, the new system can now be applied in other oil companies in Kuwait's oil sector. This can be taken up by the government who can ask other oil companies to use this procedure in their organizations.



A blueprint of the e-procurement plan at KNPC can be applied to other companies for implementation. This blueprint should detail roles of suppliers, end users etc., so that it is clear to all regarding the activities which each implementer has to pursue. In Kuwait the benchmark for the e-procurement system should be that followed by companies internationally.

KNPC should learn from their mistakes which are to take the suppliers and end users into confidence by offering training and seminars. KNPC should have involved them at the planning stage so that the suppliers could incorporate the new system within their organizations. This model itself is not perfect. A better model than Vaidiya's model which can assess the effects of e-procurement needs to be created for implementation. Although the model is a success in KNPC's point of view, all outcomes have not been researched in the model. The effect of e-procurement on each department needs to be studied and immediate action taken to improve the system.