A WEB-BASED PUBLIC PROCUREMENT SYSTEM

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ABSTRACT

A WEB-BASED PUBLIC PROCUREMENT SYSTEM

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This study focuses on developing and implementing a web-based public procurement system. As one innovative way of enhancing public procurement, an attempt to develop and implement electronic tendering system is to be made. In designing the system, not only technological aspects but also issues related to public procurement process improvement are considered. As an analysis and design approach, object oriented methodology was chosen and UML was used. Java as a development language was preferred because the resulting system is expected to be portable. This study also puts forward propositions as to how the government should perform direct purchases to ensure that both public and private sector benefit from e-Procurement to achieve full value.

Keywords: e-Procurement, e-Purchasing, e-Tendering, Public Procurement Process

ÖZ

KAMU ALIMLARI İÇİN WEB TABANLI BİR SİSTEM

Karahan Turan, Hamide

Yüksek Lisans, Bilişim Sistemleri Bölümü

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Hem e-Alım'ın sunduğu fırsatların farkında olmayan hem de e-Alım çalışmalarında yol almaya başlamış kurumlar için faydalı olabilecek olan bu çalışmada, kamu alımlarının iyileştirilmesinin bir yöntemi olarak e-Alım sunulmaya çalışılmıştır. Bu kapsamda bu tezin amacı, kamu ihale sürecini destekleyecek İnternet tabanlı bir sistemin geliştirilmesidir. Yapılan çalışmada sadece teknolojik çözüm değil kamu alım sürecinin iyileştirilmesine yönelik öneriler de sunulmaktadır. Sistem analizi ve tasarımı nesneye dayalı yaklaşım kullanılarak gerçekleştirilmiştir. Sistemin geliştirilmesi aşamasında, her türlü ortamın desteklenebilmesi için Java programlama dili tercih edilmiştir.

Anahtar Kelimeler: e-Alım, e-Satınalma, e-İhale, Kamu Alımları, Kamu Alım Süreci

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LIST OF ABBREVIATIONS AND ACRONYMS

B2B	Business to Business
BOAMP	Bulletin officiel des annonces des marchés publics
CPV	Common Product Vocabulary
DCITA	Department of Communications, Information Technology and the Arts
DMO	State Supply Office (Devlet Malzeme Ofisi)
EANCOM	International EDI std. for trade, industry, transport and logistic services
ERI	The Enterprise Research Institute
EU	European Union
FAQ	Frequently Ask Questions
GNP	Gross National Product
GUI	Graphical User Interface
ICT	Information and Communication Technology
IPPR	Institute for Public Policy Research
IT	Information Technology
JDBC	Java Database Connectivity
KIK	Public Procurement Authority (Kamu İhale Kurumu)
NAFTA	North American Free Trade Agreement
NAPM	The National Association of Purchasing Management
NASPO	National Association of State Procurement Officials
ODBC	Open Database Connectivity
OGC	Office of Government Commerce
OJS	Open Journal System
OS	Operating System
PPL	Public Procurement Law
RFP	Request For Proposal
SME	Small and Medium Sized Enterprises
SMI	Small and Medium Sized Industries
TED	Tenders Electronic Daily
TUSIAD	Türk Sanayicileri ve İşadamları Derneği
UC	Use Case
UML	Unified Modeling Language
UN/SPSC	The United Nations Standard Products and Services Code
UNCTAD	United Nations Conference on Trade and Development
US	United Nations
VEDOP	Internet Tax Office Project (Vergi Daireleri Otomasyon Projesi)
XML	Extended Markup Language

CHAPTER 1

INTRODUCTION

1.1. Objectives Of The Study

e-Business continues to grow and thrive as more organizations begin to utilize the Internet infrastructure and align their processes. The same case is true for e-Procurement. Online solutions allow procurement officers to perform their tasks more effectively and efficiently. [Moore, 2001] Other benefits of e-Procurement include:

- Centralized data and information management
- Savings in terms of cost and time
- Better relationships between public institutions and vendors
- Real-time control of organizational spending

e-Procurement uses web-based technologies to connect public institutions as buyers and businesses as sellers, and offers the potential for significant savings. However, e-Procurement initiative brings not only lots of opportunities but also some challenges facing both public and private sector. Public institutions and businesses, from the big enterprises to SMEs, should examine the challenges they face and the opportunities that e-Procurement has offered.

Two components of e-Procurement system are e-Tendering and e-Purchasing. e-Tendering component is developed to support competitive tendering process that is regulated by law. It is a solution designed to electronically handle the process of

tendering for the acquisition of specialized goods, works, and consulting services that are of high value and low volume. When it comes to the e-Purchasing component, it is a solution to electronically facilitate the acquisition of low-value and high-volume standard goods and services such as purchasing of off-the-shelf products, routine system maintenance and back up.

The main purpose of this study is to design a Web-based public procurement system and to implement e-Tendering component that will support the tendering activities of the government. Although a detailed definition of all requirements for components, including the e-Tendering, e-Purchasing and auditing, is provided, the scope of the resulting e-Procurement system is limited to only the e-Tendering component. Other components will not be implemented in the context of this study.

The other implementation decision is concerned with the tendering procedures. In the existing public procurement process in Turkey, there are four tendering procedures applied. Among them, open procedure and restricted procedure are considered in the context of e-Tendering component. The other two procedures namely negotiated procedure and direct procurement are taken into account as parts of e-Purchasing component. Therefore, only first two procedures mentioned above are implemented in this study.

To achieve the purpose of this study, the following objectives are established:

- To design a system that provides support for the tendering activities of the government
    - To enable transparency in the public sector business opportunities
    - To make management of procurement information easier and more effective
    - To allow the government to select qualified government suppliers and to monitor them
- Implementation of e-Tendering component

1.2.

Problem Statement

Electronic transformation of public procurement process has become important in the information age. Procurement is central to the management of any operation and a comprehensive process that covers every aspect of acquiring goods and services such as determining the need, buying, delivering, etc. The effectiveness and efficiency of this process is essential to obtain goods and services of the right quality, at the right price and at the right time. Considering this and the government expenditure on goods and services (in Turkey approximately $22-24 Billion - 12% of GNP) [Emek, 2001], the development of the government's approach to e-Procurement is one of the key activities in e-Government transformation.

The previous study (SPO thesis) conducted by the same author constitutes the background of this study. SPO thesis was a thesis submitted to the State Planning Organization in September 2003. It is about electronic public procurement process and focuses especially on the policies and strategies through which it is aimed to make public procurement process more efficient and more effective. The details of this previous study are given in the Chapter 2.

The main feature supported by the proposed electronic procurement system was tendering. This feature is assumed to provide an online tendering environment for government purchasing. The driving force of selecting tendering process to implement is because there are no solutions supporting government tendering in the IT market.

There are several IT organizations that provide e-Procurement software solutions especially for e-Purchasing and e-Marketplaces targeting governments and public sector entities. In general, these products are being widely accepted and provide cost-effective solutions to the most common problems faced by the public institutions. On the other hand, solutions for e-Tendering component are seldom found in the IT Market since the public procurement process in Turkey is not mature enough to invest in this area. Also in Turkey, tendering activities of the government are regulated by the Public Procurement Law that is subject to frequent changes. In this respect, this study is an attempt to design and develop an asynchronous tendering system that promotes an effective government purchasing.

1.3. Methodology

The study is based on the previous work [Karahan Turan, 2003] about policies and strategies of the e-Procurement. Based on these policies and strategies, an object-oriented analysis and design approach is preferred to design the e-Tendering system. In accordance with this selection and due to the requirement of platform-independency, Java is chosen as the development language. For database management system, Microsoft Access is used.

UML modeling notation is utilized during analysis and design phases. Use-case diagrams, activity diagrams and class diagrams are used to model the e-Tendering system. The sample template for the use-case descriptions and notation for activity diagrams are given in the Appendix-B and the Appendix-C respectively.

In requirements specification phase, use-cases are utilized to define the external behavioral aspects of the e-Tendering system.

Following the implementation of the e-Tendering system, in order to evaluate the effectiveness, applicability, and usability of the system, trials have been performed involving real users (4 vendors and 2 public institutions). Recommendations and evaluations of participants, obtained by the questionnaire, are utilized as the deciding factors in the assessment of effectiveness and usability of the system. At the end of the study, based on these factors, further improvements to the system developed are proposed.

1.4. Organization Of The Study

In this study, regarding what has come out from the SPO thesis [Karahan Turan, 2003], the opportunities offered by electronic transformation of public procurement processes are to be examined. In addition, reviewing the best practices and lessons learned of the other country experiences on e-Procurement, major improvements that can have the greatest impact on public procurement process are specified. As a result, a web-based public procurement system is designed.

In this context, this study is organized as follows:

Chapter-1 provides introductory information about the study. The methodology employed in the development of e-Tendering system and the objectives of this study are described in this chapter.

Chapter-2 begins with detailed information about e-Procurement, which is collected by a literature survey. After the opportunities offered by the e-Procurement to both public institutions and vendors are stated, brief information about the components of e-Procurement is given. Also the detailed description of the previous study that shapes the background of this thesis is presented. This chapter concludes with the review of the studies performed by other countries on e-Procurement, best practices and lessons-learned.

Chapter-3 gives information about the existing public procurement process.

Chapter-4 gives the description of e-Procurement system in terms of requirements. System functions are demonstrated by the means of use-case diagrams and details of these functions are explained in activity diagrams. In addition to this, the purpose, proposed architecture, stakeholders and design issues are explained in detail.

Chapter-5 provides the utilization of the e-Tendering system. Also, in this chapter, the findings obtained through questionnaires are summarized.

Chapter-6 summarizes the study. Conclusions are presented and recommendations for future works to improve the e-Tendering system are discussed.

In addition to these chapters, Appendices include:

Appendix-I, the interview guide is presented.

Appendix-II, the questions included in the e- Tendering Questionnaire used for the utilization of the e-Tendering system are provided.

Appendix-III, a glossary is included to define terms commonly used throughout this thesis.

In technical report, the following items are presented:

- Entity-Relationship Diagram is given.
- A description for the use-case template used in this thesis is provided. The detailed explanation of each section in the use-case template is given.

- A description of the notation for the activity diagram used in this thesis is presented.
- Requirements specification is given.
- Use-case models for e-Tendering component are displayed.
- Use-case details are given and activity diagrams are shown.
- Software design description is detailed.
- Test scenario for eTS is explained.

CHAPTER 2

E-PROCUREMENT

2.1. Introduction to Public Procurement

Among several activities of the government, public procurement takes an important share due to both its financial aspect and its contribution to decision-making process. In most European Union Member Countries, expenditures in public procurement are estimated at 10-15 percent of GNP [ERI, 1998]. This rate was around 30% and 35% in Canada and US respectively in 1992 [Mckenna and Cuneo, 1993].

When it comes to Turkey, between 1997 and 2001 expenditures of public institutions in the extent of Public Procurement Law are approximately at 11-12 percent of GNP as shown in the Table-1. This table underlines the importance of public procurement in the economy.

Table 1: Expenditures of Public Inst. in the extent of Public Procurement Law [Emek, 2001]

					Trillion TL
Public Institutions	**1997**	**1998**	**1999**	**2000**	**2001**
TOTAL	3219	6040	9293	15360	18652
GNP	29393	53518	78242	124405	153404
TOTAL / GNP	%11	%11	%12	%12	%12

In general, the goal of procurement is to make purchasing decisions more effective and efficient to provide the best value for money. In this respect, organizations can

use some techniques like performance measures, quality control and standardized procedures to make their procurement activities efficient and cost-effective.

However, procurement within the government is complex and requires some adjustment to associated processes. When compared with the private sector procurement, public procurement differs from it in a way that is outlined in the Table-2. [Hinson, 1999]

Table 2: Private Sector Procurement vs. Public Procurement

Private Sector Procurement	Public Procurement
Informal process	Formal Process with public opening
Supplier selection process is closed	Advertising required, selection open
Not subject to open records	Legal access to documents
Loosely structured process	Highly structured process
Bottom line is profit	Bottom line is service to taxpayer
Award is based on both cost and service	Award is based on mostly cost and then service
Long-term supplier partnership & alliances	Competition is required on a frequent basis

2.2. Definition of e-Procurement

Any system that uses information and communication technologies (ICT) in order to do business can be classified as e-Business system. In fact, e-Business is a broader definition of e-Commerce because it includes not only the buying and selling of goods and services, but also servicing customers, collaborating with business partners, conducting electronic transactions within an organization. [Lang, Class Lecture, 2004]

EU literature defines e-Commerce as follows:

"*Electronic commerce is about doing business electronically. It is based on the electronic processing and transmission of data, including text, sound and video. It encompasses many diverse activities including electronic trading of goods and services, on-line delivery of digital content, electronic fund transfers, electronic share trading, electronic bills of lading, commercial auctions, collaborative design*

and engineering, on-line sourcing, public procurement, direct consumer marketing and after-sales service. It involves both products (e.g. consumer goods, specialized medical equipment) and services (e.g. information services, financial and legal services); traditional activities (e.g. healthcare, education) and new activities (e.g. virtual malls)." [EU, 1997, p.2]

In this respect, e-Procurement is defined as a subset of e-Business concerning e-Commerce between private sector and public institutions where e-Commerce is intended as the activity of exchanging goods and services with some kind of payment by means of ICT.

From this point of view, it is possible to make many definitions for e-Procurement. In the simplest sense, e-Procurement means carrying out procurement decisions of the government online through the use of the Internet. In other words, e-Procurement is about transforming the processes associated with public procurement and refers to automating corresponding processes of public institutions. [IPPR, 2003]

In other words, e-Procurement is more than simply buying online and it is changing the traditional way in which public institutions do business. [Coulthard, 2000] e-Procurement involves the use of ICT in each step of the public procurement process from identification of the need to payment. Implementation of e-Procurement initiates automation of both internal and external processes associated with public procurement process.

It is also possible to characterize e-Procurement as a comprehensive process in which the government establishes agreements with vendors for purchasing goods and services. [Coulthard, 2000] This process is achieved by either tendering or acquiring directly through e-Marketplaces in exchange for the payment that can be made by the purchasing cards. Shortly, e-Procurement is "*the electronic management of all the procurement activities. It is the use of web communications to e-Enable purchasing processes and strategy, and is part of the wider e-Commerce revolution.*" [BuyIT (a), 2002]

As a system, e-Procurement is a Web-based purchasing system that offers the functionality of electronic ordering, electronic payment and enhanced administrative utilities to the public institutions. In general, e-Procurement systems are developed

by using the Internet to streamline, manage and analyze the government procurement activities. These systems range from basic ordering tools to complex systems that cover the entire tendering process. [BuyIT (b), 2002] In each case, setting up an e-Procurement system involves implementing a software application that is customized based on the public procurement processes and rules. The resulting system should be accessible by each public institution through a Web browser that enables a secure and open purchasing environment.

2.3. Components of e-Procurement

Procurement transactions fall into two categories, namely Tendering and Purchasing, according to volume, value, complexity, frequency, number of suppliers, etc. as illustrated in Figure-1.

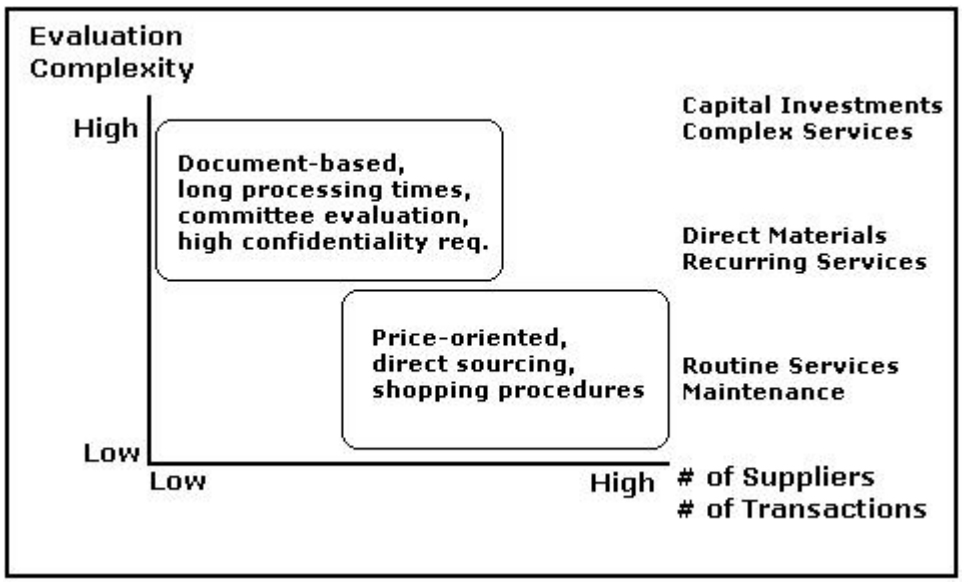

Figure 1: Procurement Transactions [Talero, 2001]

In the context of these two categories, e-Procurement system covers the following components.

- e-Tendering
- e-Purchasing
- Auditing

2.3.1 e-Tendering

e-Tendering component is developed to support competitive tendering process that is regulated by law (in Turkey, Public Procurement Law). This component is suitable for acquisition of complex goods and services associated with the ICT[1] such as embedded systems and obtaining of goods like construction and capital investment. These transactions are among the most challenging procurement activities because their technical content is diverse and difficult to define and they are subject to rapid technological change over the project life cycle. In addition, they involve combination of professional engineering services and supply of diverse hard and soft technologies. [WB, 2003]

The important point is to identify functionality to be performed online. Theoretically, all the functionality related to tendering can be performed online. The decision should be based on criteria such as culture, electronic readiness and human resources of public institutions.

2.3.2 e-Purchasing

The e-Purchasing component is developed to address mainly low complexity, precisely defined transactions such as purchasing of off-the-shelf products, routine system maintenance and back up. These transactions are mostly related with the price-performance of the vendors. Therefore, it requires for the public institutions to reach as many vendors as possible.

There are two types of e-Purchasing according to the price setting mechanism namely e-Shopping and e-Auction.

e-Shopping: In this method, prices of goods and services are fixed. [Talero, 2001] The authorized procurement officers buy goods and services by using e-Catalogs of vendors. In e-Catalog of each vendor, they can find required information for comparing prices and features of various goods and services.

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[1] ICT related acquisition is the common term used to indicate all procurements having to do with information and communications technologies regardless of their hardware, software, supply or service components.

e-Auction: In this method, prices are determined through the electronic negotiations among several public institutions. [Talero, 2001] e-Auction is appropriate for large purchases of off-the-shelf products. Also, public institutions may aggregate their purchases to get a price advantage.

It is important to recognize that e-Purchasing component is mostly equivalent to the e-Commerce systems in the private sector. However, since it is developed for the government usage, the terms and conditions for the qualification of vendors who can make registration are determined by the government. In addition, technical and quality standards, warranty requirements, maintenance services and ceiling prices are pre-established.

e-Purchasing component requires e-Marketplaces, e-Catalogs and Public Procurement Cards to be implemented as well.

2.1.1.1 e-Marketplaces

The e-Procurement component involves an electronic equivalent of physical marketplace called e-Marketplace where goods and services are demonstrated figuratively. It is possible to make several definitions for e-Marketplace ranged from emphasizing the Web-based characteristics [mySupplyChain, 2002] to describing the functionality and value-added features [Nishimura, 2002]. However, all definitions share in common the statement that e-Marketplace is a web-based application and offers opportunities for online trading.

In the context of e-Procurement, e-Marketplace is defined as virtual trading environments that bring public institutions and vendors together for e-Procurement by enabling public institutions to reach more vendors and vice versa. Many buyers and many sellers coming together in marketplaces where they can obtain sufficient information to make decisions about whether to buy or sell a product, even though payment and delivery may not necessarily be arranged online. [UNCTAD, 2000] It requires that public institutions and vendors meet under the predefined rules. e-Marketplace enables online trading by offering several advanced purchasing techniques such as catalog-based purchasing, electronic auctions, etc. In other words, mechanisms implemented in e-Marketplace combine several business processes to save time and cost for both the public institutions and the vendors. [UNCTAD, 2001]

In addition, e-Marketplaces provide value-added services such as electronic payment, content management, comparison facilities, advanced techniques for finding best prices, etc. [Nishimura, 2002] These tools and services provided by the e-Marketplace changes depending on the type of the sector.

The benefits of e-Marketplaces to the public institutions are:

- Information gaps are removed and as a result better selections can be made.
- Costs are reduced by improvement of the procurement related processes. [Garicano, 2000]
- Competitive environment is enhanced by enabling the public institutions to access more vendors. [ERI, 1998]
    - Various goods and services can be screened and price advantage is achieved.
    - Market search will become easier through the e-Catalogs of vendors.

The benefits of e-Marketplaces to the vendors are:

- Sales related processes of vendors are simplified.
- Costs are reduced by modernization of the processes. [Garicano, 2000]
- Geographical distance is eliminated.
- Trading opportunities are expanded.

It is important to realize that the solutions for e-Marketplace that offers the functions mentioned above are available in the IT Market as commercial software. These solutions can be acquired, tailored according to the needs and can be operated by either the government or the vendors. Also, it is preferred that the existing private sector e-Marketplaces can be utilized.

2.1.1.2 e-Catalogs

e-Catalog is an important concept for e-Marketplaces. In definition, e-Catalog is an organized descriptive list of goods or services made available by vendors to potential buyers via the Internet. [NC e-Procurement@Your Service] This online database of goods and services from multiple vendors facilitates the sale of goods and services

by providing information about them. This information should both include technical specifications, price, picture, etc. and allow comparison with similar goods and services.

There are three functions in e-Catalog:

- Creating the e-Catalog
- Managing the content of e-Catalog
- Searching and finding goods and services

"*Successful e-procurement depends on highly organized and searchable catalogues and the real-time management of content*" [Peter Cosgrove, Director of Global Consulting]. However creating and maintaining searchable and usable e-Catalog is an intensive and time-consuming task. Therefore, management of the content of e-Catalog should not be underestimated.

In the context of e-Procurement, e-Catalog management is generally performed by using the approaches:

- **Hosted by Third Party:** A third party serve as a service provider.
- **Hosted by Vendors:** Each vendor maintains its own e-Catalog, which is accessed by the public institutions via e-Marketplaces.

The other important issue for e-Catalog Management is the quality of the content. For public institutions to find the relevant information easily through effective search techniques, data should be normalized and categorized. But, significant difficulty is encountered especially in deciding on the correct standards of product identification and classification. In this respect, utilizing open standards is preferable to achieve interoperability among public institutions and vendors.

As a summary, the e-Catalog should have the following properties:

- Easy to search
- Allow comparing data
- Detailed information on goods and services
- Standard classification scheme for goods and services

2.1.1.3 Public Procurement Cards

An electronic payment system is defined as "*a financial exchange that takes place online between buyers and sellers*" [Kalakota and Whinston, 1997, p.153]. In fact, e-Payment is the critical part of e-Procurement, especially of e-Purchasing component, that enables online financial transactions. In this context, public procurement cards are becoming more common online payment method because of savings in processing time and cost. By utilizing the public procurement cards, it is possible for the government to link the purchasing information and the accounting information [Robinson, 2001].

In the electronic public procurement process, public procurement cards can be used for small but frequent purchases that are made directly through vendors. The benefits that public procurement cards bring to the procurement management of the government are [NASPO, 2001]:

- Administrative cost reductions
- Productivity increases
- Flexibility of authorized procurement officers
- Reporting improvement

2.3.3 Auditing

The large scope, high level of risk, and software intensity of e-Procurement requires specialized oversight and auditing organization. This organization should balance the interests of the stakeholders of the e-Procurement system and promote cooperation among them to gain rapid adoption of e-Procurement system. The main functions of this organization are as follows:

- Coordinate adoption of e-Procurement system
- Provide strategic advice on procurement and contract management
- Establish operational standards for e-Marketplaces
- Coordinate the reengineering of public procurement processes
- Advice public institutions on human resource education, training, and incentive systems

- Operate the financial and operational auditing system for both e-Tendering and e-Purchasing components
- Monitor outcomes of the e-Procurement system

2.4. Factors for the Success of e-Procurement

Most of the time, public institutions become unsuccessful in developing and carrying out the services they offer to the people in the web environment. The main reasons behind this are the overall ineffectiveness of the business processes, the difficulties of integration with back-office systems and the lack of common standards. [NAPM, 2001] In addition to these obstacles, perceiving ICT by public institutions as the only solution is also important. Each of these obstacles is to be explained below:

Overall Ineffectiveness of Existing Processes: It is important to improve the procurement processes of the government. Since the public procurement is central to the management of any operation and a comprehensive process covering every aspect of purchasing goods and services (such as determining the needs, ordering, payment and etc.), the effectiveness and efficiency of this process is essential to obtain goods and services of the right quality, at the right price and at the right time.

The use of ICT in public services implies that many steps of the process, formerly carried out manually, will be carried out online after the electronic transformation of public services. [NSW, 1998] This case is also true for e-Procurement and it is required to redesign public procurement process accordingly. In other words, e-Procurement should not be developed according to the existing processes because they are intended to work in the traditional paper-based organizational environment. Therefore, for the government to benefit from e-Procurement, it needs to change its well-established public procurement processes. However, such changes are difficult to achieve, particularly for the government because the improvement of the public procurement process requires both the way of thinking and the way of behaving to change.

In summary, automating existing public procurement process using ICT will be the incorrect objective. To maximize e-Procurement benefits, public procurement processes must first be examined and re-engineered. [Hope et al, 2000]

Difficulties of Internal and External Integration: Integration of e-Procurement system and back-office systems such as accounting, inventory management, public investments and etc. is important for both the public institutions and vendors. Since without such integration, the potential benefits of e-Procurement and also targeted efficiency and effectiveness cannot be achieved. In other words, it would not make sense to use the e-Procurement system while performing internal processes manually. It should also be considered that "*investments on back-office systems would be needed for public sector modernization in the wake of the networking revolution. Therefore, e-Procurement can serve as a driver of public information systems modernization investments that governments might otherwise delay.*" [Talero, 2001, p.30]

Lack of Common Standards: e-Procurement remains a relatively new concept and standards for e-Procurement have yet to emerge or be developed. Lack of common open standards is seen as a significant barrier to supplier adoption because of the cost of maintaining electronic data in many different standards. [OGC, 2002]

Open standards facilitate the implementation of e-Procurement system by providing common and interoperable platform for both public institutions and vendors enabling efficient and effective information exchange. [NECCC, 2001]

ICT Support: Electronic transformation of the public procurement process with support of the ICT can enhance both the efficiency and effectiveness of public institutions by simplifying administrative procedures existing in the public procurement process. However, the transformation of e-Procurement is not just a technological effort. [Hope et al, 2000] In contrast, the transformation of e-Procurement requires fundamental changes in public administration and only a small part of this transformation can be done directly with the technology.

In other words, the ICT in itself should not be intended as either a solution or a key to success, but perceived as only an instrument to assess and improve existing procurement processes and to develop the e-Procurement solution. Therefore, attempts should not be made to make the processes fit the solution instead of controlling the technology to enable public procurement strategies.

2.5. Benefits of e-Procurement

e-Procurement uses Web-based technologies to connect the public institutions (as buyers) and vendors (as sellers). Therefore, the public procurement process in some way affects both the public institutions that need goods and services and the vendors that meet this need. Basically, public institutions can access various goods and services from a variety of vendors whereas vendors can reach all the public sector opportunities easier than ever before. As a result, both public institutions and vendors will benefit from a common platform where the former can get all the information to make a purchase decision and the latter can reach potential customers more than usual. [Ontology.Org]

Considering the inefficiencies found in the existing procurement process, the large purchasing power of the government as well as the developments in the ICT, the electronic transformation of the public procurement processes will offer the potential for significant savings from its early stages. It also brings lots of opportunities including reducing costs of goods and services through aggregating purchasing volume, streamlining procedures and etc. for both the government and the private sector.

In the following sub-sections the benefits of e-Procurement will be described regarding the government and private sector separately.

2.5.1 Benefits to the Government

Public procurement is a key process. Both lots of gains can be obtained and it is easy to implement e-Procurement technically. But before defining the gains and efficiencies that e-Procurement offers, it is essential to indicate the importance of strategic purchasing for the government. Strategic purchasing refers to "*the process of determining which goods and services to procure, from which vendor and for what price.*" [MetaGroup] Because of the relationship between strategic purchasing and public procurement, it is obvious that when strategic sourcing is performed well, public procurement becomes more effective and efficient. In addition, by taking advantage of the ICT, purchasing organizations will be able to operate more effective and efficient in the way they buy from, and work together with their vendors. [BuyIT (a), 2002]

The increased efficiency and effectiveness of public procurement process will provide potential to reduce the cost of public procurement. For example, in the United States it was reported that e-Procurement reduced the cost of transactions from $120 to $20 and delay from 40 days to 5 days. [Gunyou and Leonard, 1998] Australian Government estimates that the ratio of the processing cost for check versus electronic payments ranges between 10:1 and 5:1. [DCITA, 2000] These savings are due to:

Decrease in costs associated with publishing and getting information

- Publishing the information related to the public sector opportunities and contract awards electronically in the Internet is both faster and cheaper than the traditional methods. [BuyIT (a), 2002]
- Purchasing activities can be monitored better [Avery, 2000] and statistical data for reporting on public procurement data and vendor activity will be provided. [Leipold, 2003]
- Market search will become easier through the e-Catalogs of vendors. [Nishimura, 2002]
- Public institutions will access various goods and services of multiple vendors in a competitive environment. [OGC, 2002]

Decrease in procurement transaction costs

- Public procurement services like market search, ordering, tendering, etc will become more efficient and effective. [BuyIT (b), 2002]
- Public resources will be used more efficiently and effectively. [Robinson, 2001]
    - Administrative costs and time such as time and cost associated with business meetings will be reduced.
    - Time spent in the requisition-to-payment cycle will be reduced through the use of electronic ordering, electronic invoicing and etc.
- "Maverick buying" will be reduced. [Leipold, 2003]
- Bureaucratic inertia will be reduced. [Leipold, 2003]

Increase competition

- The public sector business opportunities will be accessible by all vendors, which in turn will enhance the competitive environment. [ERI, 1998]
- The purchasing power of the government can be better coordinated [Avery, 2000] and costs of goods and services will be reduced through this aggregating purchasing volume.

e-Procurement will assist the improvement of not only public procurement processes but also other processes to which it must interface such as accounting, public expenditure management and public investments [Talero, 2001] changing the dynamics of public procurement management.

Considering the government expenditures on goods and services in Turkey (approximately $22-24 Billion - 12% of GNP [Emek, 2001]), the efficiency and effectiveness in public procurement process will bring significant cost savings.

There is also a consensus that government's efficiency and effectiveness in doing business will benefit all stakeholders: public administrations, vendors and taxpayers. [The Economists, 2000]

Among the benefits of e-Procurement comes promotion of e-Commerce. As a major purchaser, the government can encourage the e-Commerce activities of the private sector. [NSW, 1998] Basically, through the development of e-Marketplaces the fastest and easiest access to the public sector business opportunities can be enabled. Also, for securing competitive advantage, e-Procurement offers a powerful tool for ensuring that more businesses operate online.

It is also believed that, "*e-Procurement can be a driving force for reform of legal and regulatory framework, technology investments and training that developing countries face as a result of the information revolution.*" [Talero and Carp, 2002, p.9] Improvements in connectivity, adoption of common standards, and legislation on electronic transactions are indispensable not only for e-Procurement, but also for development strategies of most countries today. [Talero and Gaudette, 2001]

e-Procurement not only does enhance the overall quality of public procurement management throughout savings in terms of cost and time but also improves transparency in public administration.

Comparing to the economic benefits, transparency gains are more apparent from the first stages of e-Procurement. [Leipold, 2003] As disclosure of information associated with the public procurement is an obligation under the law, the Internet makes this disclosure easier and also makes procurement related information more accessible. In other words, the Internet offers the easiest way to publish this information on time.

As consequence of transparency, e-Procurement improves public administration further by fighting against corruption. Through the improved accessibility of all parties to the public procurement information and electronic logging of all transactions, equal treatment in the public sector business opportunities can be achieved and the likelihood of detection of illegal transactions can be increased. [Talero, 2001]

As a summary, an effective and efficient procurement process provides public institutions to gain more comprehensive picture of their overall procurement activities, initiate aggregate purchasing with others and improve relationships with the vendors. In addition, public institutions can reduce the maverick buying which is defined as the purchasing of goods and services that do not meet the specified standards or are not supplied from the approved vendors.

2.5.2 Benefits to the Private Sector

Improvement of public procurement process by the means of e-Procurement will also benefit and enable improvement in the private sector. At the simplest level, for vendors, e-Procurement means easier business dealings with the government.

The other benefits that are gained by implementing e-Procurement are listed below:

- The procurement process will become more efficient by reducing the transaction costs associated with gathering information and supply chain.
- Vendors will reach more public institutions.

- The information associated with public sector business opportunities and contract awards will be accessed easier and faster. [Leipold, 2003]
- Vendors will have a chance to present the technical and non-technical descriptions, prices and promotions related with their goods and services. [OGC, 2002]
- The public procurement related processes like managing orders, managing inventories, financing, etc. will be more efficient and effective.
- Time and cost associated with business meetings will be reduced.
- The time consumed in the bureaucratic inertia will be reduced. [Leipold, 2003]
- New opportunities for SMEs will be formed such as increased participation in supply chain. [ERI, 1998]

2.6. An Assessment of "e-Transformation of Public Procurement" Study

The "e-Transformation of Public Procurement" study (SPO thesis) was a thesis submitted to the State Planning Organization in September 2003. Before publishing, SPO thesis was examined by the thesis jury of SPO and accepted at the end of the oral examination. This section presents a summary of the SPO thesis by the same author [Karahan Turan, 2003], which constitutes the background of this study. The SPO thesis is about electronic public procurement process and focuses especially on the policies and strategies through which it is aimed to make public procurement process more efficient and more effective. It involves a set of recommendations for the government to be successful in developing the online public procurement system, provides guidelines for the issues related to public procurement process improvement, design and development and reviews other e-Procurement systems in other countries.

2.6.1 Purpose and Scope

The purpose of the SPO thesis was to investigate the effectiveness of the e-Procurement system and to provide recommendations on the policies and strategies

regarding the transformation of public procurement process by using ICT. It also evaluates the approaches taken by different countries and the initiatives of some public institutions in Turkey. Based on the information gathered from these experiences, the factors contributing to the effectiveness and adoption of e-Procurement system are identified.

2.6.2 Methodology

The SPO Thesis is designed as an exploratory study that is based on descriptive data. In the SPO thesis, qualitative research method is employed to create an understanding of factors influencing the success of e-Procurement systems. In order to identify the factors affecting the success of e-Procurement system, related work, experiences, lessons learned of the other countries and best practices are evaluated. Also, in assessing the current status of Turkey, some other research methods such as interviews and observation were utilized in the study.

While forming the policies and strategies regarding the legal and regulatory framework of e-Procurement, a questionnaire is used. This questionnaire is developed by the World Bank [Talero and Carp, 2002] to explore the country experiences with respect to the scope of e-Procurement legal and regulatory reform. The main purpose of this questionnaire is to identify gaps in the countries legal and regulatory frameworks regarding the e-Procurement.

2.6.3 Findings

Although the SPO thesis is mostly based on the descriptive data, it contributes to the understanding of both existing public procurement process and e-Procurement process. The findings gathered from works, experiences and lessons learned of the other countries showed that the success and acceptance of e-Procurement system among public institutions and vendors depends especially on open standards[2]. Open standards play an important role in the e-Procurement process. They make adoption of e-Procurement system easier and cheaper. "*By standardizing the e-Procurement process on the Internet, the uniform standards make for a more cost-effective process*

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2 Open standards are non-proprietary and available for use by any organization. They enable to exchange data efficiently. In the implementation of e-Procurement systems, it provides a common and interoperable environment for public institutions, vendors and auditing authorities. An example usage area of open standards is in the classification of goods and services.

for businesses because industry-specific and company-specific processes are eliminated." [Sollish, 2000, p.70] In other words, lack of common open standards is seen as a significant barrier to adoption of e-Procurement system due to the cost of maintaining electronic data in many different standards. However, examination of the initiatives of State Supply Office (DMO), Public Procurement Authority (KIK) and some other public institutions in Turkey revealed that the work performed independently from each other and no agreement on standards has been achieved.

The research has indicated that improvement of the existing public procurement process prior to e-Procurement implementation is essential for effectiveness and efficiency of the e-Procurement system.

Moreover, the SPO thesis argues that it is necessary to provide integration with back-office and other e-Government systems for ensuring that both public and private sector benefit from e-Procurement to achieve full value.

The SPO thesis concludes that e-Procurement initiatives in Turkey have encountered difficulties as a result of lack of coordination. The most important problems that should be addressed are identified as follows:

- Forming single access point to public sector business opportunities
- Specification of data communication standards
- Developing common standard for identification and classification of goods and services
- Identification of public institutions by single number and identification of vendors with VEDOP number.

2.7. e-Procurement Studies of Other Countries

In this section, the studies in some countries regarding the e-Procurement, lessons learned and best practices are examined.

2.7.1 France

In this section, the goals and expected benefits of e-Procurement initiatives in France, the scope of it and the achievements are explained. [Berline, 2003]

2.7.1.1 Goals

French Government has begun the modernization and simplification of public services in compliance with the European Union directives regarding e-Signature, e-Commerce and e-Procurement. Among which public procurement is included.

e-Procurement initiative is started by the French Ministry of Defense. The goals of this initiative are defined as follows:

- To simplify the access to the Ministry of Defense contracts
- To expand supplier base, especially in Europe and among SME/SMI
- To take advantage of new electronic procurement methods such as reverse auctions, online catalogs, etc.
- To be more efficient and more reactive in public procurement process

2.7.1.2 Scope

In the context of this e-Procurement initiative, an e-Marketplace and two Internet portals namely ixarm.com portal and achats.defense.gouv.fr portal have been developed to cover the whole range of defense procurement and to separate public defense sector acquisitions from other acquisitions. This architecture is shown in Figure-2.

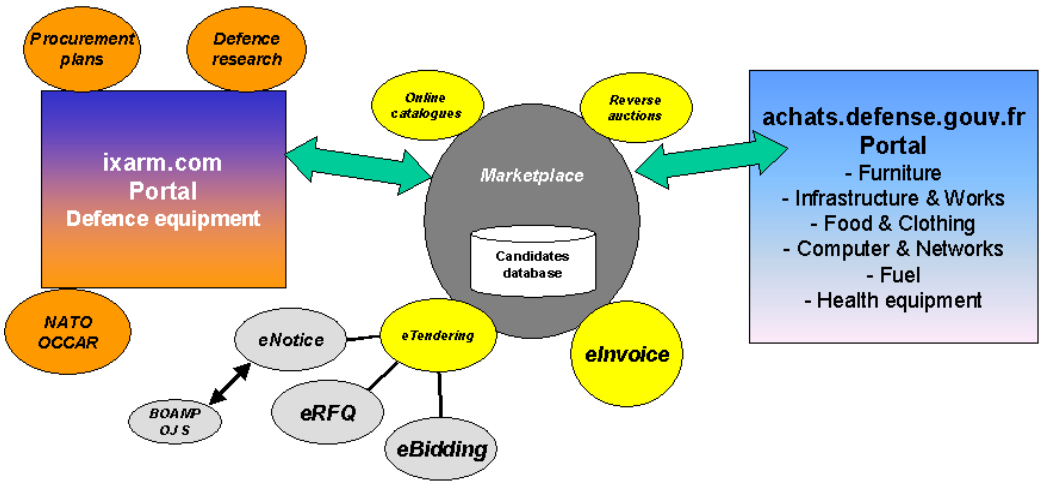

Figure 2: The Overall Architecture for French e-Procurement System [Berline, 2003]

Ixarm.com Portal: This portal is used for the public defense sector acquisitions. It is available in French and in English.

achats.defense.gouv.fr Portal: This portal is used for all other public acquisitions other than the defense sector. It is available only in French.

In both of these portals, legal framework and main procedures are explained. Also, the glossary section and the FAQ section are prepared. In addition, some types of personalization such as e-Mail alerts on new advertisements, personalized homepage, etc are provided. All tender notices are published in online Official Gazette (OJS and BOAMP) and newspapers.

The main element of e-Marketplace is e-Catalogs. By using them digitally signed purchase order can be placed. In addition to direct purchases, e-Tendering and e-Auction functionality are offered. e-Tendering system provides functionality such as online solicitation documents, digitally signed bids, electronic transmission of tender notices. e-Auction is preferred for off-the-shelf products based on price.

e-Marketplace is not defense specific and private sector e-Marketplaces are used. The services in the e-Marketplaces are utilized for some fee that is specified per solicitation, auction, etc.

In addition, to support public institutions during the public procurement process, the following functions has been developed:

- Computer assisted redaction of solicitation documents
- Widened Internet access

2.7.1.3 Expected Benefits

The French Government explains the reasons for transforming their public procurement process electronically by referring some benefits that are offered by the e-Procurement process:

- Easier access to the government contracts (easier access to information especially for SME/SMI, online solicitation documents, easier response, etc.)
- More competitors responding to the government solicitations
- Lower internal costs
- Lower transmission delays

- Quality improvement by using standard clauses and documents

2.7.1.4 Achievements

Finally, the achievements of the French Government regarding the e-Procurement are summarized below:

- 8.000 solicitations are to be advertised in a year
- 80.000 contracts are to be awarded below threshold (90K£) in a year
- 200 procurement entities are available
- 10 M£ is spent for defense equipment and 3M£ for other contracts
- **July 2000:** First electronic reverse auction is performed.
- **November 2002:** Defense public sector e-Marketplace is online together with two portals.
- **March 2003:** First electronic bid is performed.
- **June 2003 Statistics:** 200 awarding authority, 1600 vendors are registered to the system. 100 new electronic solicitations per month are available. 20% of all bids are performed electronically.

2.7.2 England

In this section, the goals and expected benefits of e-Procurement initiatives in England and the scope of it are explained. [Bassanese, 2002 and Leverington, 2003]

2.7.2.1 Goals

In England, e-Procurement strategy is set by the Office of Government Commerce (OGC). OGC's goal is to work with civil government as a catalyst to achieve best value for money in commercial activities.

2.7.2.2 Scope

Key deliverables of e-Procurement program are e-Auctions, e-Tendering, e-Ordering and e-Payment. The main characteristics of the e-Procurement system are as follows:

- Single access point is formed
- The public procurement process is improved before the transformation

- Public procurement process is modeled by using UML
- Data communication is based on XML
- The system supports only the buying side
- Requirements are process driven not message driven

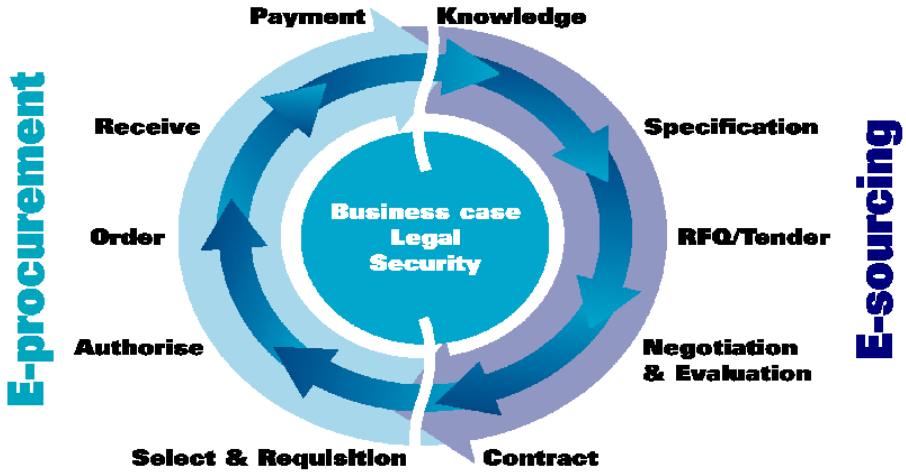

Figure 3: England e-Procurement Process [Leverington, 2003]

The e-Procurement process of the England is shown in Figure-3. This process is supported by e-Marketplace tools, e-Tendering tools and e-Auction tools. The services offered electronically are:

- Browsing e-Catalogs
- Placing electronic order
- Disclosure of tender notice
- Evaluating the bid proposal
- Signing the contract
- Registration for e-Marketplaces
- Search for public sector business opportunities

2.7.2.3 Expected Benefits

In this context, the expected benefits are identified as follows:

- More interesting jobs for procurement professionals
- Knowing what the money is spent for
- A leaner purchasing process
- Working as a group across government
- Low-risk
- Better commercial relations with suppliers

2.7.3 Norway

In this section, the goals and expected benefits of e-Procurement initiatives in Norway and the scope of it are explained. [Olav, 2003]

2.7.3.1 Goals

The goals of e-Procurement system are explained as follows:

- To reduce the time for publishing tender notification online
- To enable local quality control
- To validate correctness of notification through the Internet online dialogue system
- To avoid unintentional altering of notification
- To reduce handling costs
- To provide secure information exchange through an XML-based code structure
- To support awarding authorities regarding technology and legislation

2.7.3.2 Scope

In Norway, e-Procurement system has two main components namely e-Notification and e-Marketplace. e-Procurement system components and their relations are shown in Figure-4.

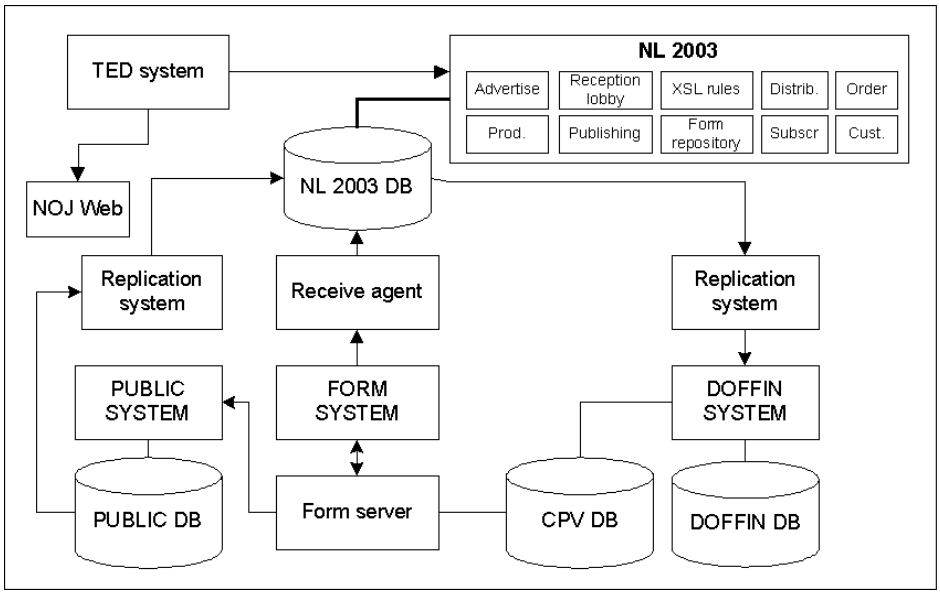

Figure 4: Norway System Overview [Olav, 2003]

These systems were developed from 2002 to 2003. The main characteristics of e-Procurement system are as follows:

- XML-based data communication
- Online validation of forms
- Support for more than one language
- CPV classification scheme for goods and services in two language
- Translation of tender notices above threshold from Norwegian to English
- Tender management

TED system enables searching by free text, CPV Code, Regions, Municipalities, Publishing Reference Number, etc. In this system, standardized vendor qualification and selection criteria are defined.

The objective of e-Notification component is to accomplish electronic flow of tender notices from the awarding authority via e-Sender to TED. In Norway, the disclosure of tender notices is an obligation under law. They are published in Norwegian Official Gazette in paper and also in TED system online since 1997.

When it comes to e-Marketplace, its objective is to reduce purchasing costs by using e-Commerce and to improve the procurement process of public institutions separately. e-Marketplace has been used in Norway since mid 2003. There are 16

public institutions and 100 vendors registered to the e-Marketplace. In this system, both the seller and buyer are supported. Its main element is e-Catalog. This system is integrated with e-Notification system.

2.7.3.3 Expected Benefits

Target users of the e-Procurement system are awarding authority, vendors (national or international), publication office, e-Sender. The benefits of the system for these groups are identified as:

For Awarding Authority:

- Reduced time before publishing
- Easy and effective canal for market
- User support on directives and technology

For Vendors:

- Easy access to notifications on the Internet
- Searching for relevant projects
- Alert subscription service
- Use of databases in historical aspects and marketing planning

For Publication Office:

- Receiving electronic notifications electronically
- Automatically publishing in TED

For e-Sender:

- Achieving a new business area
- Information dissemination
- Access to business networks

2.7.4 Sweden

In this section, the goals of e-Procurement initiatives in Sweden, the scope of it, the lessons learned and achievements are explained. [Holmdahl, 2003]

2.7.4.1 Goals

In Sweden, e-Procurement system supports both the public institutions' processes and vendor processes. The aim of e-Procurement initiative is identified as follows:

- To facilitate automatic processing
- To match the requested products in the tender against the article listsTo benefit from better functions for searching, sorting, selecting and presenting information
- To reduce the amount of information needed

2.7.4.2 Scope

In the e-Procurement system, structure for RFP, contracts, etc is to be provided. This structure makes it possible to create procurement documents. Also, business terms have been defined to establish uniform concepts for procurement professionals.

2.7.4.3 Lessons Learned

e-Procurement is defined as one way of more efficient purchasing and invoicing process. In e-Procurement studies, the most important issue is seen as standards. Therefore, vendors in Sweden are not expected to implement different solutions for different public institutions. Also, public institutions are not expected to implement different solutions for different vendors.

The difficulties encountered during the Swedish e-Procurement program are summarized as follows:

- Lack of commonly accepted standards for the classification of goods and services
- CPV and UN/SPSC are not sufficiently detailed to describe individual products generically. Additional boxes for generic attributes are therefore provided with the product descriptions.

The lessons learned during the e-Procurement program are as follows:

- It is important to use the framework agreements to make better prices and gain other benefits

- To have the information electronically is crucial
- The e-Procurement system must be simple to be used by both public institutions and vendors
- They have started creating the standard messages in Edifact/EANCOM format. But now they start to use XML.
- SMEs are the most difficult parties to reach and convince about benefits of e-Procurement

2.7.4.4 Achievements

According to a recent survey, 83 of 290 municipalities have introduced systems for electronic procurement (i.e. electronic orders and/or receipt of electronic invoice). Further 50 municipalities are planning to introduce electronic procurement, of which 35 have already initiated a pilot study. Over 70 municipalities can envisage introducing electronic commerce over the next few years. At present, in Sweden, procurement units have IT systems for the tender procedure process and for the ordering-invoice process. Some universities are using web-based solutions for tendering. Digital signatures are being used to address security issues.

2.7.5

Comparison of e-Procurement Studies of Countries

Table 3: Comparison of e-Procurement Studies of Countries

Functionality		Fra	Eng	Nor	Swe
Infrastructure	Security	+	+		
	Open Data Communication Std. (such as XML)		+	+	+
	Std. For Goods & Services Classification		+	+	+
	Std. Templates For RFP, Contract, etc.			+	+
	Integration with other e-Government Applications				
	Verification of Vendors				
	Verification of Public Inst.				
	Single Access Point	-	+		
e-Marketplace	Reverse Auctions	+			
	Auction	-	+		
	Online Catalogues	+	+		
	e-Ordering	+	+		
	Track Orders				
e-Tendering	e-Notification	+	+	+	
	e-Evaluation	-	+		
	Online Proposal Submission				
	Online Tender File Submission				
	Online Getting of Proposals				
	Online Getting of Tender Files				
	e-Bidding	+	+		
	e-Contract	+	+		
e-Payment		+	+		
Support Functionality	e-Mail Alerts	+			
	Search		+	+	+
	Redaction of Docs	+			
	Screening of Vendors				

CHAPTER 3

PUBLIC PROCUREMENT IN TURKEY

3.1. Public Procurement Process

The existing manual public procurement process utilized by Turkish Government institutions is depicted in Figure-5. The procurement process is defined and regulated by the Public Procurement Law No: 4734 and Public Procurement Contracts Law No: 4735. The main purpose of these laws is to get the government budget under control. The main principles of them are to improve transparency, to enhance competitive environment and to increase reliability.

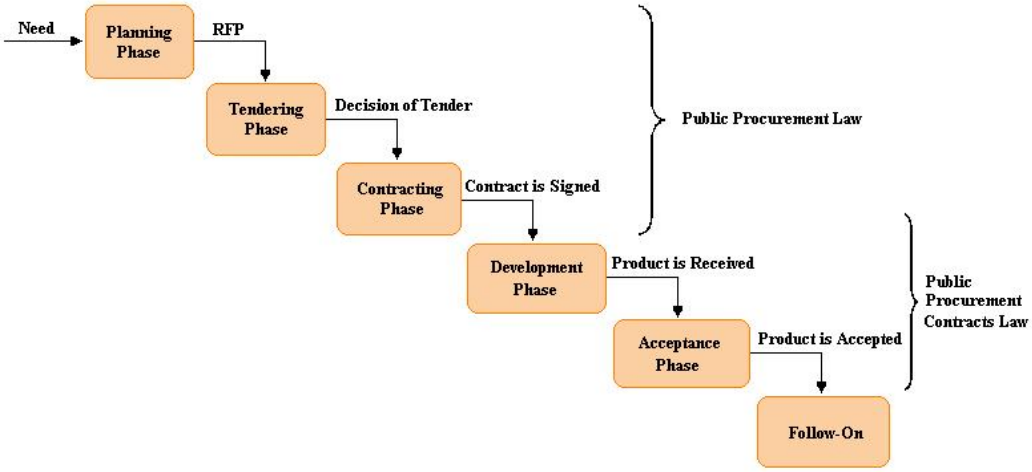

Figure 5: Overall Public Procurement Life Cycle

This thesis focuses on Planning, Tendering and Contracting Phases only. These phases are detailed in the following figures considering the tendering procedures.

3.1.1 Planning Phase

The public procurement process begins with a requisition. When a public institution needs goods and services, it is required to prepare a tender file that includes technical specifications of the required goods and services, administrative specifications, conditions of contract, estimated value and evaluation criteria. To prepare this file, authorized procurement officers do market research for the required goods and services.

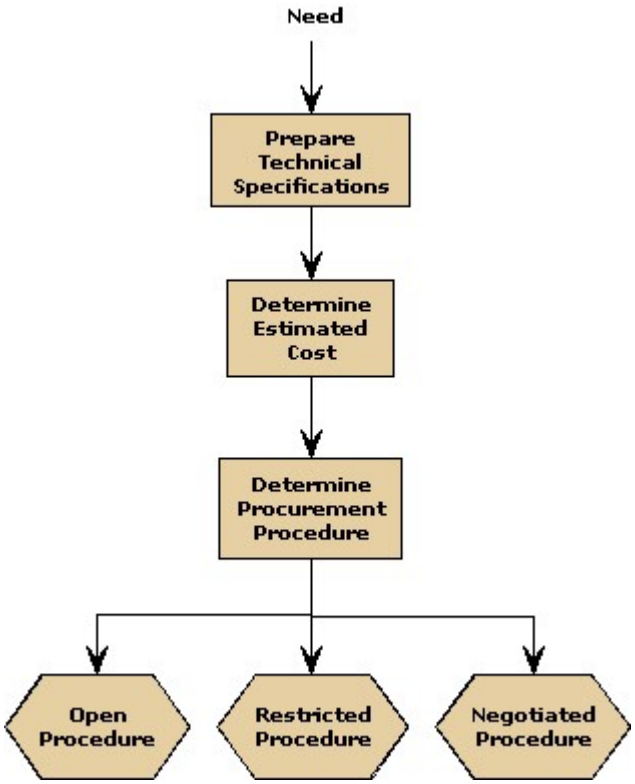

Figure 6: Public Procurement Process

In the planning phase shown in Figure-6, after estimated cost for the goods and services that are intended to be acquired, the method of the tendering procedure is determined.

3.1.2 Tendering Phase

Once deciding on which tendering procedure is applied, tender notice is published in the Official Gazette. At this point, it is important to specify that tender related information needs to be published by using ICT in addition to the traditional way. In other words, to publish tender related information, along with ICT, paper-based

notice should also be used because; the Public Procurement Law does not allow making use of only ICT instead of paper-based notice.

After sending out technical and administrative specifications to potential vendors, the public institution will receive responses called bid proposals by a specified due date. In evaluating the tenders, the proposals of the bidders whose documents are incomplete or not in compliance with the requirements are excluded from the evaluation process. Also, the proposals are examined for their conformity with the qualification criteria so that the bidders that are found in unconformity are disqualified [PPL No.4734]. In general, the award is given to the responsible offer that has the lowest responsive price.

There are four methods of tendering namely open procedure, restricted procedure, negotiated procedure and direct procurement.

Open Procedure: This is the most preferred method of tendering and is used under the following conditions:

- If clear specifications are available
- If the required goods and services are available from more than one vendor
- If an award can be made to the bidder who meets the requirements specified in the technical specifications and has submitted the lowest price.

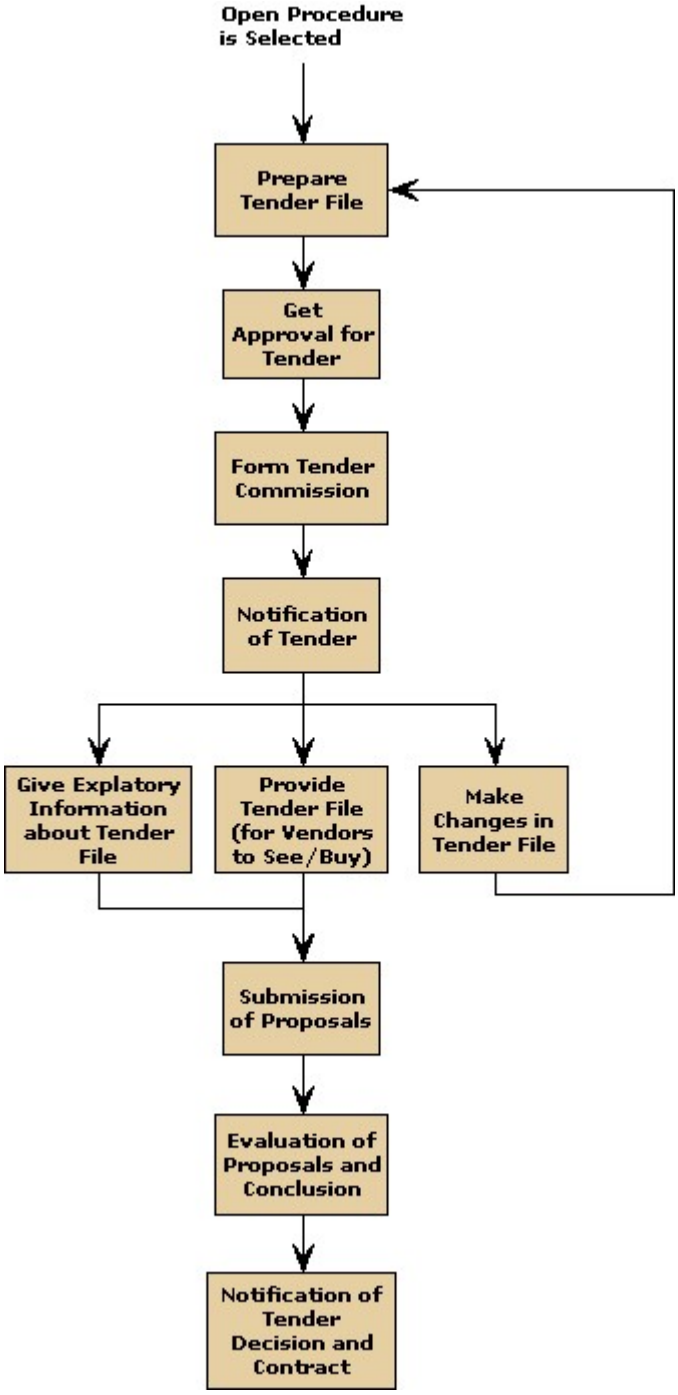

Figure 7: Open Procedure

Restricted Procedure: If the award cannot be based on price alone, this method of tendering is preferred. It is used specifically for procurement of services such as software intensive systems, complex technical systems, consulting, etc. The basis of the award is the evaluation criteria specified in the tender file such as the experience

of the vendor, approach to the project, references of similar scope and size work, qualifications of staff. In this method, each vendor is requested to prepare a bid proposal, and these proposals are open for negotiation.

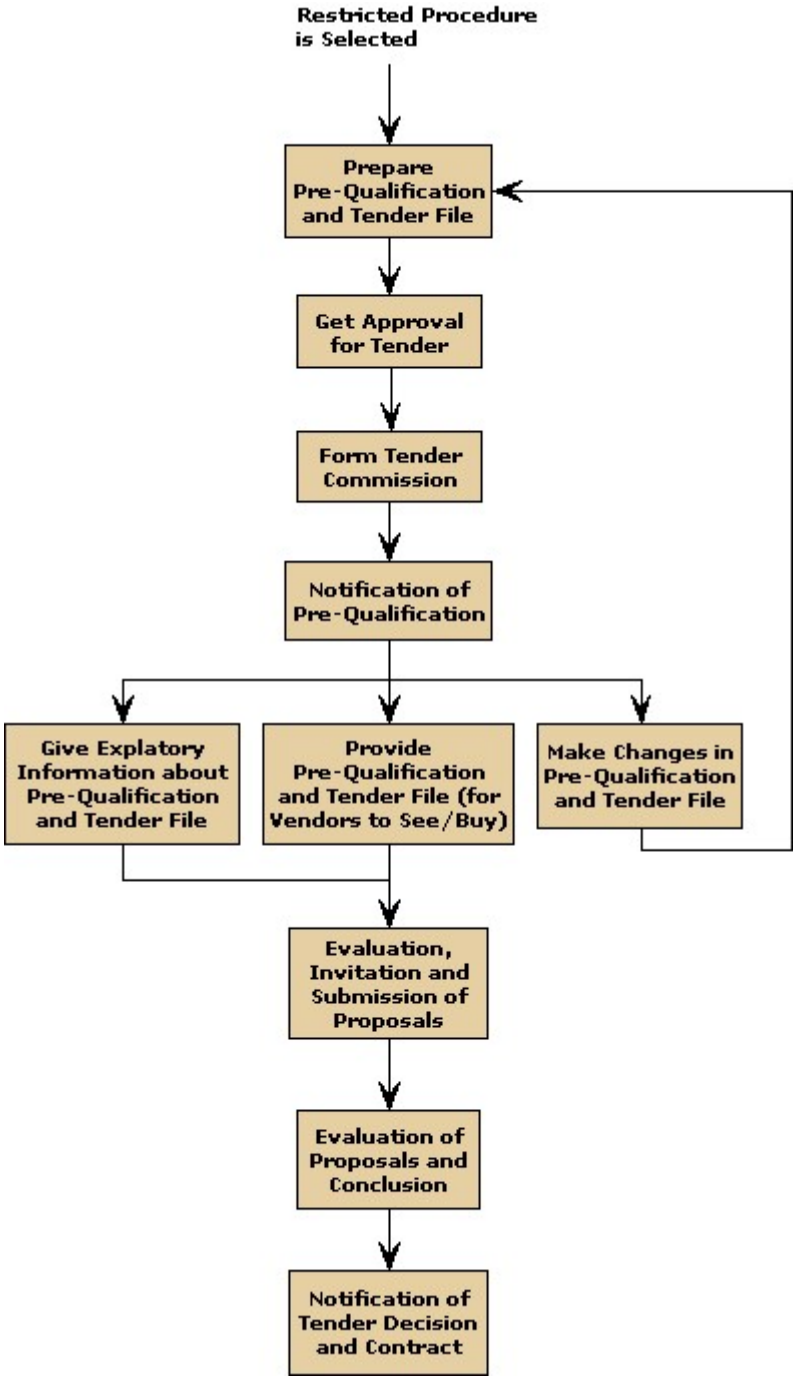

Figure 8: Restricted Procedure

Negotiated Procedure: It is used for emergency cases. On the contrary to the other methods; public announcements and advertising are not mandatory. However, competition and vendor research is still encouraged and often is defined as a requirement.

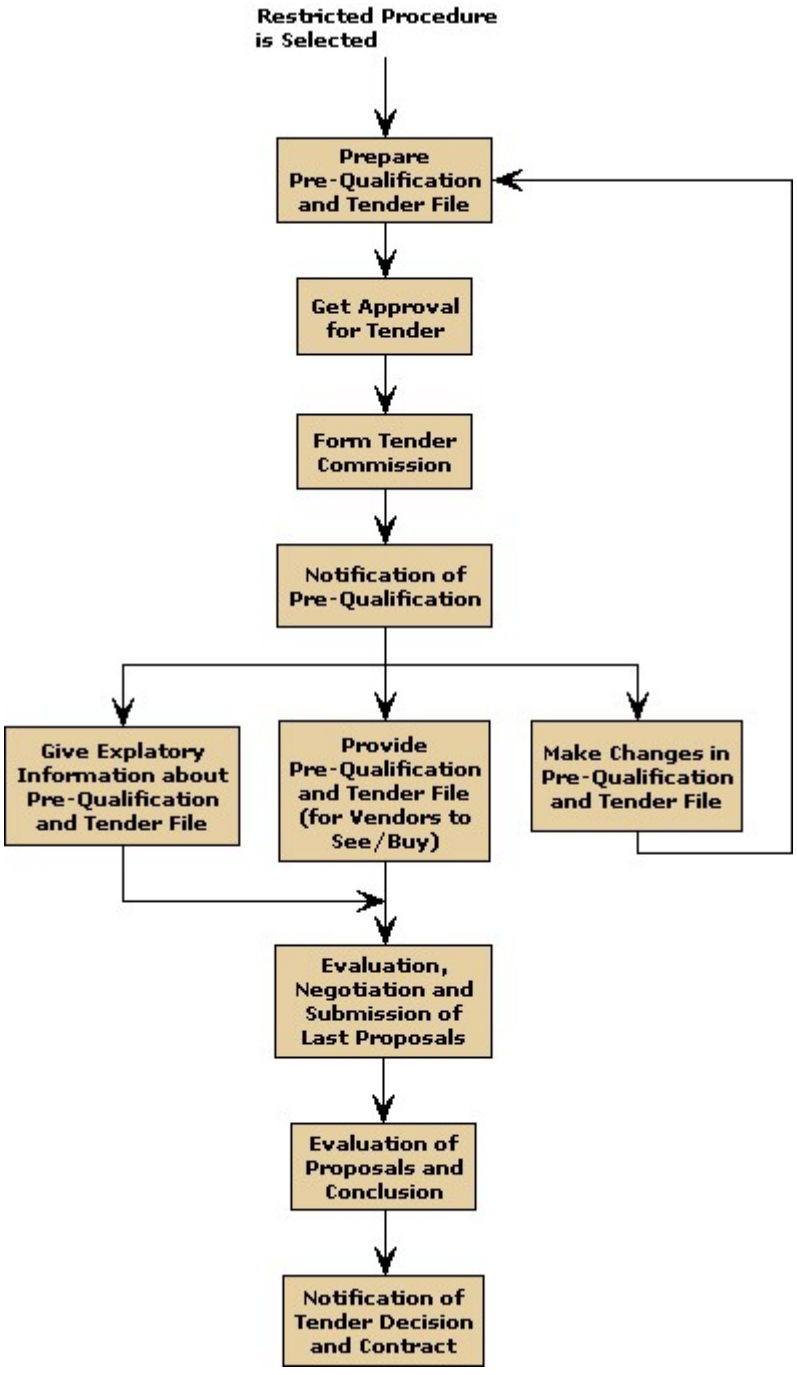

Figure 9: Negotiated Procedure

Direct Procurement: This method is used when there is only one vendor to obtain goods and services or there is only one good and service that will fulfill the need of the public institution. In addition, is can be used for procurement of goods and services that fall in the category below the threshold.

3.1.3 Contracting Phase

Contract is awarded either to the lowest-priced bid or to the bid offering a suitable price. For goods contracts, public institutions generally make awards to the lowest price and for the other procurement transactions, both methods may be applied.

3.2. e-Procurement Initiatives in Turkey

e-Procurement in Turkey is a rather new concept. Although some functions such as online purchasing of goods and services and online participation to a tendering activity cannot be achieved yet, electronic notification of tender information and results are performed by most of the public institutions through their web sites.

In this sub-section, to understand the progress in Turkey regarding the e-Procurement, information will be given about the study of State Supply Office as an e-Purchasing component example and the study of Public Procurement Authority as an e-Tendering component example.

3.2.1 The Study of State Supply Office (DMO)

Although most of the procurement transactions are performed by the public institutions, the Office is the primary procurement center of the government. The Office procures the goods that the public institutions need from both domestic and foreign markets by tendering. Also it produces certain products itself. [DMO Web Site]

The Office publishes the tender related information such as tender notification, tender results, and tender invitations. Besides, it initiated e-Sale service through the use of e-Catalog at its website on the Internet in 1991. [DMO Web Site] This service is used for products that are not available in stock currently.

e-Notification

The Office offers the e-Notification services by which all tender related information are published from the Office's website. As shown in Figure-10, detailed information of tenders, related technical and administrative specification can be accessed electronically. In addition, both domestic and international tender information can be accessed online according to the classified product groups. All the tenders are listed in reverse order with respect to the last dates of the tenders.

İhale İlan Metni No.	Açıklama	Son Teklif Tarihi, Saati ve Şartname Ekleri	
114	1 adet elektronik dizgi sistemi	09/09/2003, 14:00	İdari şartname
113	Muhtelif cins ve miktar	08/09/2003, 14:00	İdari şartname
115	3 adet 6x4 şasi kamyon üzerine monteli kombine kanal temizleme aracı	08/09/2003, 14:00	İdari şartname
109	Muhtelif cins bilgisayar ve bilgisayar malzemesi	01/09/2003, 14:00	İdari şartname
120	6.000 paket kaplık karton,1.000 paket dosyalık karton,4.000 bobin teleks kağıdı,10.000 düzine kopya kalemi,1.000 tk.sümen takımı ve 2.000 adet sigara tablası	28/08/2003, 14:00	İdari şartname
107	Muhtelif cins ve miktar bilgisayar ve yazıcı	27/08/2003, 14:00	İdari şartname

Figure 10: State Supply Office – eNotification

The other service offered in this context is the search facility. In order to find a specific tender, either the search service or the e-Catalog can be utilized. Vendors use the search service by providing keywords to find relevant tender. On the other hand, currently open or archived tenders can also be accessed from e-Catalog by clicking the product groups.

e-Sale

In 1991, the Office initiated "Catalog Sales" on the Internet especially for products that are not available in the Office stock currently. This service covers the functions namely product search, product selection from e-Catalog and product sales.

In this service, a customer database has been developed and a password for each customer has been specified. This service is available to public institutions but to utilize the system, it is required to make registration.

After registration and login, the products that are needed are searched and selected by means of either search service or product classification system in the e-Catalog in

which it is possible to access pictures, prices and technical characteristics of products.

These selected products are placed in the shopping list, which is converted to the order list to make order request. It is possible to add new products into and to remove products from the shopping list. After bank and account information is provided to the system to approve and place order, an order number is given to track related order electronically.

As a next step, the Office is planning to utilize public procurement cards for payment. [Bilgi Toplumuna Doğru, 2002]

3.2.2 The Study of Public Procurement Authority (KIK)

The Public Procurement Authority is assigned and authorized for the effective execution of the Public Procurement Law and for accurate application of the principles, procedures and transactions specified in this Law. [PPL No.4734] Among the duties of the KIK are gathering information relating to the contracts and carrying out tender proceedings to compile and publish statistics relating to quantity, price and other issues. [PPL No.4734] In the following sub-sections the services offered by the KIK in this context is to be examined.

Electronic Public Procurement Bulletin

It is decided that notification of public procurement opportunities and contract awards are published in the public procurement bulletin by KIK beginning from January 2004. This bulletin is to be published both electronically in the format of Doc or Pdf and in printed form as shown in Figure-11.

Sayı	Tarih	Sıkıştırılmış MS Word Dosyası		Pdf formatında
9	22.01.2004	KB009-20040122	(104 KB)	Kamu İhale Bülteni
8	21.01.2004	KB008-20040121	(80 KB)	Kamu İhale Bülteni
7	20.01.2004	KB007-20040120	(136 KB)	Kamu İhale Bülteni
6	19.01.2004	KB006-20040119	(128 KB)	Kamu İhale Bülteni
5	15.01.2004	KB005-20040115	(136 KB)	Kamu İhale Bülteni
4	13.01.2004	KB004-20040113	(84 KB)	Kamu İhale Bülteni
3	12.01.2004	KB003-20040112	(116 KB)	Kamu İhale Bülteni
2	08.01.2004	KB002-20040108	(28 KB)	Kamu İhale Bülteni
1	05.01.2004	KB001-20040105	(28 KB)	Kamu İhale Bülteni

Figure 11: Public Procurement Bulletin

The other service offered by the Authority is the automated preparation of tender notice. This service can be used by the public institutions to prepare tender notice that will be published in the public procurement bulletin after the KIK's approval. In this procedure of tender notification, it is possible to make modification on the tender notice and to learn the phase where the tender notice is at that time.

Online Confirmation of Prohibited Vendors

According to the Public Procurement Law, it is required to confirm that the successful bidders are not banned from participating in tenders prior to signing of contract. KIK keeps the records of those who are banned from participating in tenders. Therefore, this information is accessed through the service offered from the KIK's website. As shown in Figure-12, it is possible to search prohibited vendors according to some keywords.

Figure 12: Prohibited Vendors

Tendering Information System

Tendering information system is prepared for collecting information relating to the tenders and contracts. After registration to the system, public institutions can perform the following functions:

- During registration, give public institution information
- Enter/Change tender information
- Enter/Change contract information
- Enter/Change vendor information

Online Training for Public Procurement Process

Detailed information regarding public procurement process is to be given from the KIK's website through the training service that includes:

- The information about Public Procurement Authority and Public Procurement Law
- Detailed procedure descriptions for goods procurement, service procurement, purchase of construction works and procurement of consulting services from the viewpoint of both public institutions and vendors
- Detailed procedure description of demand for review and complaint resolution issues

3.2.3 Comparison of The Initiatives in Turkey

Two initiatives in Turkey examined are somewhat different from each other. These two initiatives and the e-Tendering system proposed in this study are compared according to their functionalities. This comparison is given in the following table.

Table 4: Comparison of Initiatives in Turkey[3]

Functionality		KIK	DMO	eTS
Infrastructure	Security	-	-	-
	Open Data Communication Std. (such as XML)	-	-	-
	Std. For Goods & Services Classification	-	+	+
	Std. Templates For RFP, Contract, etc.	+	-	-
	Integration with other e-Government Applications	-	-	+
	Verification of Vendors	-	-	+
	Verification of Public Inst.	-	+	+
	Single Access Point	-	+	+
e-Marketplace	Reverse Auctions	**NA**	-	**OS**
	Auction	**NA**	-	**OS**
	Online Catalogues	**NA**	+	**OS**
	e-Ordering	**NA**	+	**OS**
	Track Orders	**NA**	+	**OS**
e-Tendering	e-Notification	+	+	+
	e-Evaluation	-	-	-
	Online Proposal Submission	-	-	+
	Online Tender File Submission	+	-	+
	Online Getting of Proposals	-	-	+
	Online Getting of Tender Files	+	+	+
	e-Bidding	-	-	-
	e-Contract	-	-	-
e-Payment		-	-	-
Support Functionality	e-Mail Alerts	-	-	+
	Search	+	+	-
	Screening of Vendors	+	-	+

[3] NA: Not Applicable; OS: Outside Scope

CHAPTER 4

PROPOSED

ETS: E-TENDERING SYSTEM[4]

eTS is a web-based public procurement system developed in the scope of this study. It supports tendering activities of public institutions during the public procurement process. It is used for conducting the activities performed during the phases of a tendering activity among the public institutions and the vendors. This system is an asynchronous system that lets vendors participate to the tenders.

In this chapter, the description of the components (namely e-Tendering, e-Purchasing and auditing) of e-Procurement system is presented. Although detailed requirements for these three components are provided, the scope of the resulting system is limited to only e-Tendering component. Other components will not be implemented in the context of this study. Therefore, in the following sections, the requirements that are implemented are specified precisely by giving the separate requirement number to each of them.

In addition, as explained in the previous chapter, in the existing public procurement process in Turkey, there are four tendering procedures applied. Among them, open procedure and restricted procedure are considered in the context of e-Tendering component. The other two procedures namely negotiated procedure and direct

[4] In this chapter, the term of e-Procurement System is used when mentioning the broader system including e-Tendering, e-Purchasing and auditing components. On the other hand, the term of eTS is used for the system designed and implemented in the scope of this study.

procurement are taken into account as parts of e-Purchasing component. Therefore, only first two procedures mentioned above are implemented in this study.

This chapter also describes the stakeholders, features and design architectures of both e-Procurement system and eTS. It provides detailed description of eTS by presenting sample views from the system.

4.1. Stakeholders

The users of e-Procurement system are categorized into four groups:

- Approved Vendor (can be Registered Vendor, and Successful Vendor)
- Auditing Commission*[5]
- Bidding Group
- Purchasing Group*

Two of them, namely Approved Vendor and Bidding Group, are users of the eTS.

It is important to understand the functionality that each role can perform and the information that each role can access. Therefore, each e-Procurement role and the functionality associated with each role are to be explained below.

Approved Vendor: The vendors that can register to the system in order to both sell goods and services to the government and participate in tendering process are called as Approved Vendors. Only the vendors that meet the specified criteria can register to the system and become approved vendors after screened by the Auditing Commission as Qualified Government Suppliers.

Users with the Approved Vendor role can perform the following functionalities:

- System Access (Registration, Login and Logout)
- Manage Profile (Change Password, View Profile and Update Profile)
- Manage Tender (Make Registration for Tenders, Submit Proposals, Get Proposals, Ask Questions)

---

5 * Not included in the scope of eTS

The following additional functionalities should be considered in the scope of proposed e-Procurement system. However, they are outside the scope of eTS.

- Manage e-Catalog (Create e-Catalog, Add Item to e-Catalog, Update e-Catalog and Delete Item from e-Catalog, Set Charge Rates)
- Manage Order (Refuse Order, Accept Order, Fill Order, View Order, Track Order and Get Payment)
- Get Penalty
- Make Advertisement
- Make Analysis (Receive Report, View Sales History and Analyze Sales)

Registered Vendor: The Approved Vendor who registers to a tender in order to participate in that specific tender is called a Registered Vendor.

Users with the Registered Vendor role can perform the following functionalities:

- Manage Tender (Get Tender File, Submit Proposals and Ask Questions)

Successful Vendor: The Bidder that is awarded a tender. Users with the Successful Vendor role can perform the following functionalities:

- Manage Contract (Sign Contract)

Auditing Commission: The group of people who have the responsibility of regulating auditing and anti-corruption is called Auditing Commission. This commission is also responsible for evaluating the vendors who initiates the registration.

Users with the Auditing Commission role can perform the following functionalities:

- System Access (Get Membership, Login and Logout)
- Manage Profile (Change Password, View Profile and Update Profile)
- Manage Vendor Profile (View Vendor Profile and Update Vendor Profile)
- Set Auditing Mechanism
- Set Anti-Corruption Mechanism
- Specify Prohibited Acts

- Specify Standards
- Get Complaints
- Check compliance of vendors with standards
- Apply Penalty
- Prepare Blacklist

Bidding Group: The group of people who is responsible from managing tenders is called a Bidding Group. This group also has the authority to approve or cancel the tendering processes.

Users with the Bidding Group role can perform the following functionalities:

- System Access (Get Membership, Login and Logout)
- Manage Profile (Change Password, View Profile and Update Profile)
- Manage Vendor Profile (View Vendor Profile and Update Vendor Profile)
- Manage Tender (Create a Tender, Prepare Tender File, Upload Tender File, Publish Tender Notification, Answer Questions, Cancel Tender, Download Proposals, Evaluate Proposals and Call for Meeting)
- Manage Contract (Invite Contract, Announce Results)

Purchasing Group: The group of people who is responsible from making purchases on behalf of their institutions is called as Purchasing Group. This group also has the authority to approve or cancel the purchases.

Users with the Purchasing Group role can perform the following functionalities:

- System Access (Get Membership, Login and Logout)
- Manage Profile (Change Password, View Profile and Update Profile)
- Manage Vendor Profile (View Vendor Profile and Update Vendor Profile, Rate for Product, Rate for Vendor)
- Make Analysis (Analyze Spending, View Spending History, Receive Report)
- Manage Order (Browse e-Catalog, Compare Goods & Services, Change Order, Make Order Request, View Order, Track Order, Select Good &

Services, Search for Good & Services, Place Order, Approve Order, Cancel Order and Pay for Goods & Services)

4.2. System Architectural Design

As the application architecture of the system, a three-tier architecture (shown in Figure-13) is chosen since in such an architecture, modification of any components is easier and maintenance costs less. Also, three-tier architecture places an emphasis on server-side designs that can support a variety of clients.

In the Figure-13 and Figure-14, architectural designs of both e-Procurement system and eTS are shown respectively.

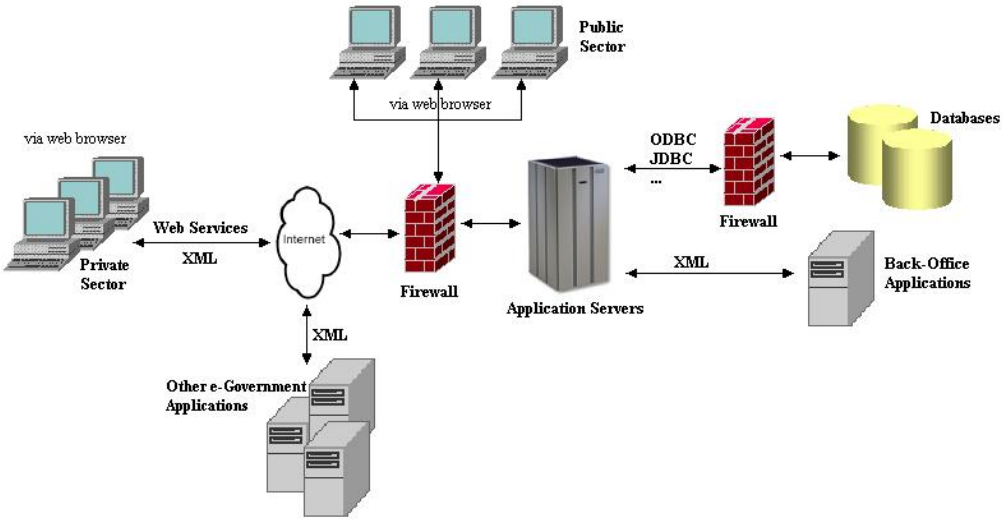

Figure 13: Proposed 3-Tier Architecture (e-Procurement system)

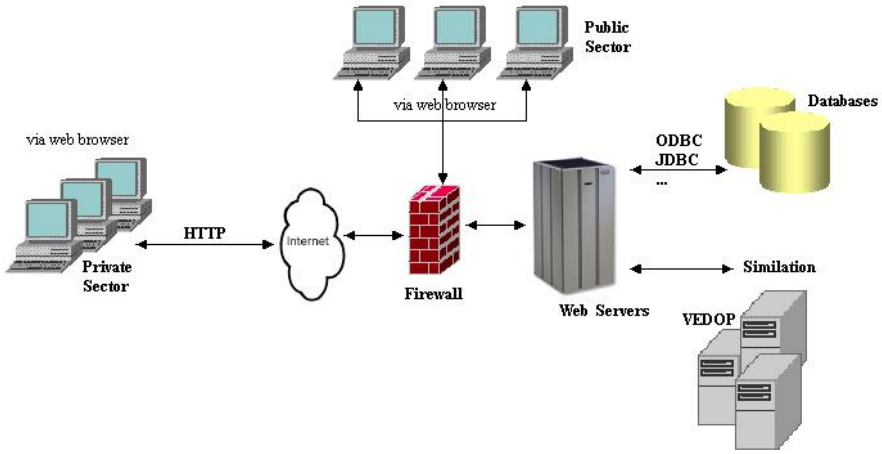

Figure 14: 3-Tier Architecture of eTS

In both architectures, the client-tier deals with the communication protocols enabling interaction of the users and the application. Users (public institutions and vendors) access to the system through web browsers residing on their own computers. By using web browsers, it is implied to use HTTP over TCP/IP for connecting to the system because it runs on the Internet. As a result, the more sophisticated logic is located on the server side and users' computers are only responsible for the presentation of the information. At this point, it is preferred to use HTTP for connecting to the eTS as shown in the Figure-14.

The middle-tier supports several important layers. One of them is the presentation layer. The purpose of the presentation layer is to provide a user interface to users of the application. It responds to user events and serves as the front-end of the application. In the eTS, this is web server that communicates with the clients. Requests of clients cause the web server to initiate the system.

The second layer of the middle-tier is the business logic layer, which contains the business rules and processes. It links the presentation layer and data access layer. Most of the services in this layer are handled by the application server that is the most important part of the middle-tier because it is responsible for processing the business logic of the system. The application server is defined as a component-based and server-centric product that allows organizations to build, deploy, and manage new applications for users through the Internet. [Lisa, 2001] In the eTS, web server handles all the requests.

The last is the data access layer that has the purpose of giving access to the business logic layer to back-end data sources like databases and other back-office applications.

The data-tier includes relational database management systems (RDBMS) and other back-office applications that can be accessed from the middle tier. The main purpose of this tier is to provide information for the middle tier business logic. e-Tendering application mainly implement a database with this tier for storing data of users, tenders, transactions, and etc. All these data are not required all in one place as in this study. They can also be distributed.

4.3. Security

The other important point in the design of the e-Procurement system is to ensure security because electronic public procurement process will only be reliable when confidential information can be transmitted safely and securely between all involved parties. For the government, e-Procurement security is essential to achieve online tendering, to enable enhancements like comparison among the goods and services and to ensure that the e-Catalogues are valid. Also, the dissemination of e-Procurement application depends on reliable security. Therefore, to provide confidence and privacy, to prevent damages and to ensure trusted distribution of services, some level of security should be provided. In this respect, the government has to make commitment to provide secure communication in e-Procurement application.

Threats to the e-Procurement system can be in the form of resource stealing, tampering with documents and leakage of information. These can be done by the following methods:

- Obtaining data without authority
- Using another users' identity without authority
- Intercepting and altering messages

From the government's point of view, in e-Procurement system, a different and digital identity should be assigned to everyone who wants to do business with the government. Therefore, as a general solution, data are required to be encoded and users are required to be authenticated so that data can only be understood by the authorized users.

In this proposed architecture, Public Key Infrastructure (PKI) can be chosen as a security technology. PKI involves one public and one private key to encrypt and decrypt data. If data were sent to a user using PKI, it would be encrypted using the public key, which is issued by a Certification Authority (CA). To decode the data, the recipient uses the private key, which is stored on his/her computer. Also, secure socket layer (SSL) can be preferred to transfer data securely between users and the servers.

Besides PKI and SSL, to separate public and private networks for preventing unauthorized access to databases, firewalls are used both in front of the databases and before accessing to the Internet where private sector is located and Intranet where public sector is located. Also, as seen in the Figure-13, the proposed e-Procurement architecture has a demilitarized zone[6] in which application servers, databases and other back-office applications reside.

In addition, as an application level security to control access, authentication with username and password and a tracking mechanism is proposed to be implemented.

4.4. Proposed Software Architecture

eTS is an applet designed to be used as a distributed application. As a development language Java is selected. The users of the system access this applet through the Internet via web browsers.

eTS utilizes the relational database management system namely Microsoft Access. To provide communication between the Java Runtime Environment and the database, JDBC:ODBC Bridge has been implemented.

In the eTS, there are five packages defined shown in Figure-15. These are Communication, Data, GUIUtility, DBAccess and SystemAccess. The detailed descriptions of these packages and software design of eTS are given in the Appendix-G. In addition, for the analysis and design of the eTS, the object-oriented approach is used.

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6 A demilitarized zone (DMZ) is a network area between an organizations internal network and an external network, usually the Internet. The DMZ allows hosts to provide services to the external network, while protecting the internal network from possible intrusions into those hosts.

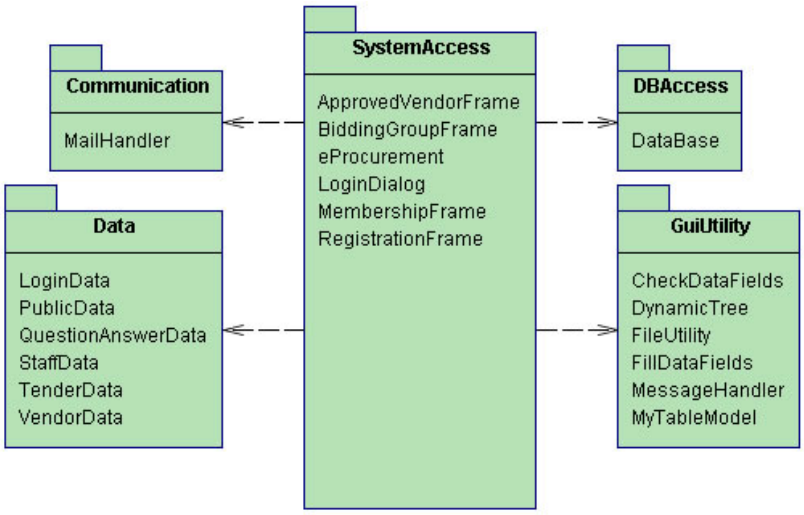


Figure 15: e- Tendering Package Dependency Diagram

The main elements of eTS are public institutions and vendors. Through this system, public institutions share experiences with each other about vendors, publish tender related information, get proposals, etc. On the other hand, vendors participate in tenders, get tender files, and etc. Shortly, eTS facilitates data sharing among them. The requirements and functionality for the eTS are to be detailed in the following sections.

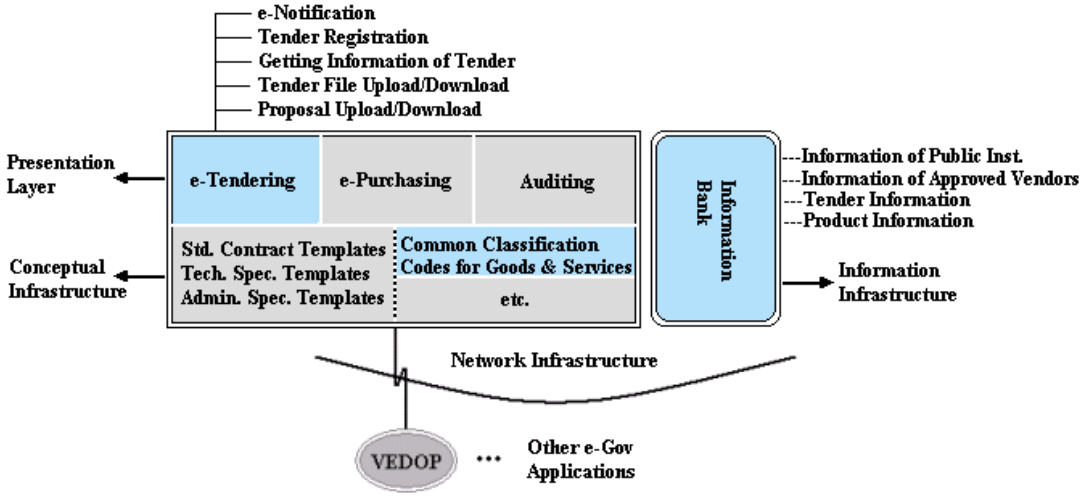


Figure 16: Proposed Model

The functional model for eTS is shown in the Figure-16. In this model, the lower layer is HTTP layer that provides an environment for data communication. The upper layer provides interfaces for e-Procurement services, which are developed by using Java.

The intermediary layer is composed of conceptual and information infrastructure. It provides of data and the standards for interoperability such as contract templates, technical specifications and classifications codes for goods and services.

Information infrastructure includes databases, which contain information related to goods and services, public institutions, approved vendors, tender, and etc.

However, definitions, schemas and standards for presenting this data are in the conceptual infrastructure. This information is not required to be stored in the same location; it can be distributed.

4.5. Non-Functional Requirements

The non-functional requirements of the e-Procurement system are not in the scope of this study.

4.6. Functional Requirements

In this section the functional requirements of the e-Procurement system are to be explained regarding the three components of the system namely e-Tendering, e-Purchasing and auditing. Among these functional requirements, only the ones related with e-Tendering component are applicable requirements within the scope of eTS. These requirements are identified in order to form a basis for the succeeding software development phases. The requirements, which have requirement traceability number, are implemented in the scope of this study.

Since the object oriented analysis and design methodology is used in this thesis, functional requirements are presented in terms of use cases. The detailed descriptions of these use cases represent the requirements of the system. Use cases for eTS are presented in the Figure-17 and Figure-18.

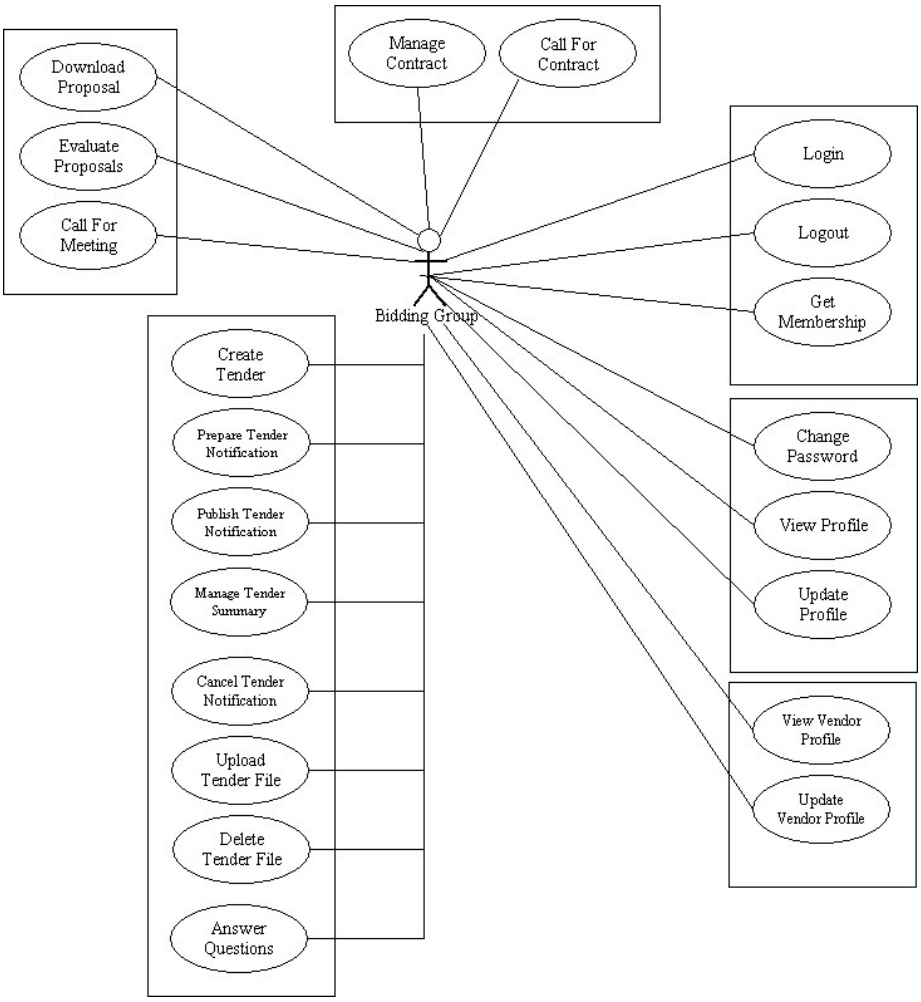


Figure 17: Use-Case Model for e-Tendering Process (Bidding Group)

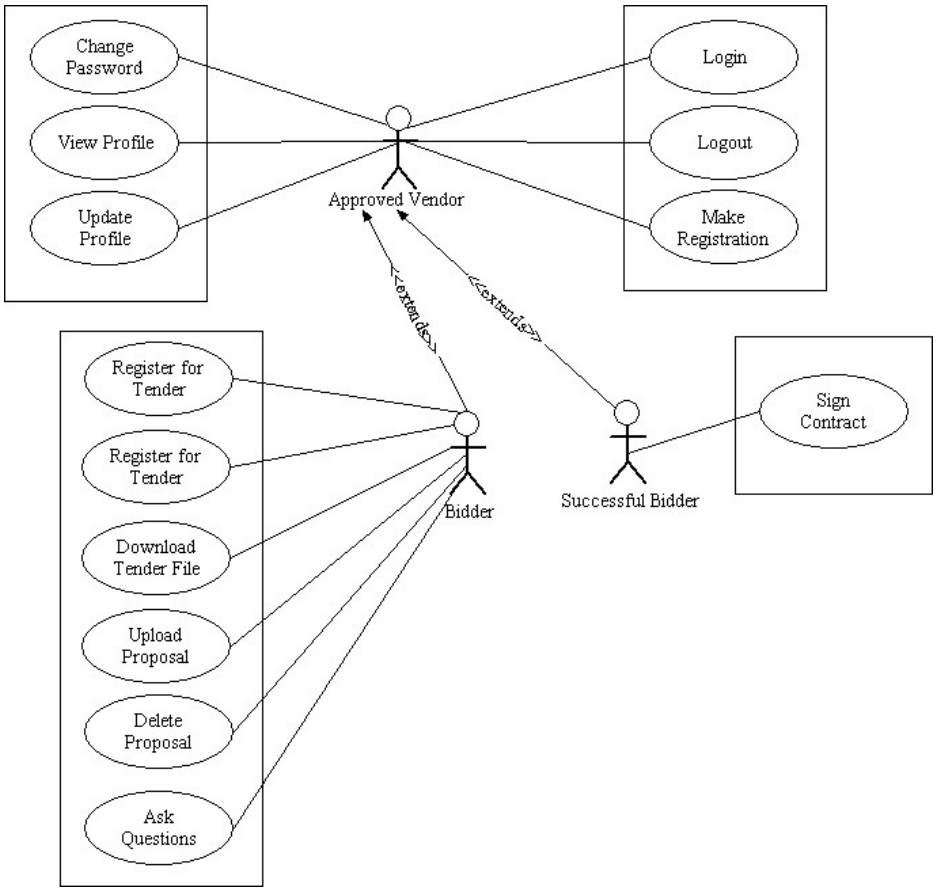


Figure 18: Use-Case Model for e-Tendering Process (Approved Vendor)

In the following table, use cases and detailed use case descriptions are presented separately from each other for the purpose of comfortable reading.

Table 5: The Descriptions of the Use Cases

Use-Cases			Description
System Access	UC01-1	Logout	This use-case is used to log out from the eTS
	UC01-2	Login	This use-case is used to log in to the eTS
	UC01-3	Get Membership	This use-case is used for registration to the System
	UC01-4	Make Registration	This use-case is used for registration to the System
Managing Profile	UC02-1	View Profile	This use-case is used for viewing the profile information
	UC02-2	Update Profile	This use-case is used for updating the profile information
	UC02-3	Change Password	This use-case is used for changing the password
	UC02-4	View Vendor Profile	This use-case is used for viewing the profile information

Table 6: The Descriptions of the Use Cases (cont.)

	UC02-5	Update Vendor Profile	This use-case is used for updating the profile information
Managing Tender	UC03-1	Create a New Tender	This use-case is used for creating a tender
	UC03-2	Manage Tender Summary	This use-case is used for managing tender phases
	UC03-3	Prepare Tender Notification	This use-case is used for disclosure of the tender
	UC03-4	Publish Tender Notification	This use-case is used for publishing the tender notification
	UC03-5	Cancel Tender Notification	This use-case is used for canceling the tender notification
	UC03-6	Ask Questions	This use-case is used for submitting the questions
	UC03-7	Answer Questions	This use-case is used for answering the questions
	UC03-8	Register For a Tender	This use-case is used for registering for the tendering process
	UC03-9	Cancel Registration	This use-case is used for cancel registration for a tender
	UC03-10	Upload Tender File	This use-case is used for uploading the tender file to the system
	UC03-11	Download Tender File	This use-case is used for downloading the tender file
	UC03-12	Upload Proposal	This use-case is used for uploading the bid proposals to the system
	UC03-13	Download Proposal	This use-case is used for downloading the proposals
	UC03-14	Delete Tender File	This use-case is used for deleting the tender file
	UC03-15	Delete Proposal	This use-case is used for deleting the proposal
	UC03-16	Evaluate Proposals	This use-case is used for evaluation of proposals
	UC03-17	Call For Meeting	This use-case is used for call the Registered Vendors to meeting
Managing Contract	UC04-1	Manage Contract	This use-case is used for managing contract
	UC04-2	Call For Contract	This use-case is used for call the Successful Vendors to sign contract

The detailed descriptions of the requirements specification of eTS are also given in the Technical Report (Karahan Turan, 2004).

4.6.1 e-Tendering Component

The e-Tendering component of the e-Procurement system is only available to the public institutions and list of Approved Vendors, which meet the qualifying standards that are specified by the Auditing Commission.

Public institutions use this component to publish public sector business opportunities, to submit tender files, to announce contract awards, etc. For the public institutions to make use of this component, the appropriate role namely Bidding Group and associated permissions with this role should be assigned to the authorized procurement officers in every public institution. These procurement officers will be responsible from performing several tendering activities on behalf of their institutions.

For vendors to use this component, they should be able to register to the system. Once registered, they become Approved Vendor and can use it to get tender files, to access information about public sector business opportunities, contract awards and to participate to any tender that they are interested in.

This component is composed of six modules namely System Access, Profile Management, Preparation for a Tender, Registration for a Tender, Evaluation and Contract. In the following sub-sections, short descriptions and requirements for these modules are to be given.

4.6.1.1 Requirements for System Access - Req-SystemAccess

e-Procurement system requires both the public institutions and vendors to register to the system. The registration process of the public institutions differs from that of vendors. Vendors need to meet the standards that are specified by the Auditing Commission and to be verified against the VEDOP. On the other hand, all the public institutions can get membership from the system.

Once completing the registration process successfully, both the public institutions and vendors perform the functions according to their defined roles and permissions.

The following functions are performed in this module:

- The system shall allow user to register online. [**Req-SystemAccess-1**]
- The system shall permit each user to register only once. [**Req-SystemAccess-2**]
- The system shall require user to accept the terms and conditions regarding the use of system before the registration is completed.
- The system shall verify vendor status with the VEDOP to ensure if the vendor meets the criteria specified by the Auditing Commission. [**Req-SystemAccess-3**]
- The system shall require each vendor to submit the required information and documents online that are used by the Auditing Commission to assess whether the vendor is qualified according to the specified standards.
- The system shall require the Auditing Commission to provide approval or disapproval information for each vendor before continuing the registration.
- The system shall specify a MemberID and password for each user if this user becomes approved. [**Req-SystemAccess-4**]
- The system shall send the MemberID and password to the corresponding user via e-Mail. [**Req-SystemAccess-5**]
- The system shall inform the vendor which is not qualified as an Approved Vendor by sending e-Mail. [**Req-SystemAccess-6**]
- The system shall restrict access if the user fails to give the correct MemberID and password. [**Req-SystemAccess-7**]
- The Auditing Commission shall send the MemberID and password to the public institutions before getting the membership.
- The system shall require the public institutions to complete their membership forms. [**Req-SystemAccess-8**]
- The system shall allow users to logout system in any screen. [**Req-SystemAccess-9**]

4.6.1.2 Requirements for Profile Management - Req-ProfileManagement

In the e-Procurement system, each user has its own profile. User profiles are created during the registration process. Once registered to the system, all the users can manage and keep track of their own profiles online.

In addition, the public institutions can manage the information about vendors such as performance of vendors, comments, experiences of the public institutions with vendors, etc. This information is accessed only by the public institutions to evaluate the vendors.

The following functions are performed in this module:

- The system shall only grants users access to their own profiles. [**Req-ProfileManagement -1**]
- The system shall allow users to manage their own profiles online. [**Req-ProfileManagement -2**]
- The system shall allow users to modify their personal profiles like password, e-mail, address, phone numbers, fax and web address. [**Req-ProfileManagement -3**]
- The system shall maintain a record of past trading histories of Approved Vendors.
- The system shall maintain a record of past activities performed by the public institutions.
- The system shall keep track of penalty status of Approved Vendors.
- The system shall provide user interface for the public institutions to maintain a record of performance for each vendor. [**Req- ProfileManagement -4**]
- The record of performance shall only accessible by the public institutions. [**Req- ProfileManagement -5**]

4.6.1.3 Requirements for Preparation for a Tender - Req-Preparation

In the e-Procurement system, it is a prerequisite for the public institutions, which will conduct a tendering process, to make preparation for this tender. In other words,

before carrying out any tendering process, the public institutions are required to prepare and upload a tender file and to publish a tender notice.

The following functions are performed in this module:

- The system shall only grants the Bidding Group to create a new tender. [**Req-Preparation-1**]
- The system shall only grants the Bidding Group to prepare tender notices. [**Req-Preparation-2**]
- The system shall only grants the Bidding Group to publish tender notices. [**Req-Preparation-3**]
- The system shall only grants the Bidding Group to cancel tender notices. [**Req-Preparation-4**]
- The system shall only grants the Bidding Group to upload tender files to the system. [**Req-Preparation-5**]
- The system shall only grants the Bidding Group to specify the tender file fee. [**Req-Preparation-6**]
- The system shall require the Bidding Group to enter fee for the tender file before the publishing corresponding tender notices. [**Req-Preparation-7**]
- The system shall prevent the Bidding Group from modifying tender files and fees after publishing tender notices through the system. [**Req-Preparation-8**]
- The system shall support both open tender and restricted tender. [**Req-Preparation-9**]
- The system shall require the Bidding Group to specify the type of the tender process before publishing corresponding tender notices. [**Req-Preparation-10**]
- The system shall alert all the Approved Vendors in the case of a new tender when any tender notice is published through the system. [**Req-Preparation-11**]

- In the case of restricted tender, the system shall allow the Bidding Group to choose among Approved Vendors who are to be invited to the specific tender. [**Req-Preparation-12**]
- The system shall only grants the Bidding Group to manage tender phases and state. [**Req-Preparation-13**]

4.6.1.4 Requirements for Registration for a Tender - Req-Registration

e-Procurement system requires Approved Vendors who want to participate in any tender to register for corresponding tenders. By this way, they can get right to download the associated tender files in return for payment, to submit bid proposals and to ask questions regarding the tender to the Bidding Group.

The following functions are performed in this module:

- The system shall only grants the Approved Vendors to register for Tenders. [**Req-Registration-1**]
- The system shall list all tenders for Approved Vendors to select for registration. [**Req-Registration-2**]
- The system shall allow Bidders to cancel their registrations just one time. [**Req-Registration-3**]
- The system shall alert the corresponding Bidding Group each time a new registration or cancellation is performed. [**Req-Registration-4**]
- The system shall provide an interface for Bidders to send their tender related questions to the corresponding Bidding Group. [**Req-Registration-5**]
- The system shall alert the corresponding Bidding Group each time a new question is submitted. [**Req-Registration-6**]
- The system shall provide an interface for the Bidding Group to send answers to the system. [**Req-Registration-7**]
- The system shall make all questions and related answers regarding a tender available to all Bidders of this tender. [**Req-Registration-8**]

- The system shall alert the corresponding Bidder each time the answers to his/her questions are submitted. [**Req-Registration-9**]
- The system shall allow the Bidding Group to post explanatory notes to the system.
- The system shall allow the Bidders to download tender files only after required payment is made.
- The system shall prevent the Bidders from submitting their proposals out of the defined period of time. [**Req-Registration-10**]
- The system shall allow the Bidders to modify their proposals within the defined period of time. [**Req-Registration-11**]
- The system shall alert the Bidding Group each time a new proposal is submitted to the system or a change to the submitted proposal is made. [**Req-Registration-12**]
- The system shall allow the Bidding Group to download submitted proposals. [**Req-Registration-13**]
- The system shall allow the Bidders to download submitted corresponding tender files. [**Req-Registration-14**]
- The system shall allow the Bidding Group to modify tender files within the defined period of time. [**Req-Registration-15**]
- The system shall alert the Bidders each time a new tender file is submitted to the system or a change to the submitted tender file is made. [**Req-Registration-16**]

4.6.1.5 Requirements for Evaluation -Req-Evaluation

In the e-Procurement system, some parts of the tendering process are performed manually. In these offline parts, the meeting is held at the specified time and at the specified place. All Bidders should participate to this meeting at which submitted bid proposals are opened. After opening the bid proposals, the Bidding Group initiates negotiations. And at the end of the meeting, the Bidding Group evaluates the proposals together.

The automated part of the tendering process is to call for meeting and to announce the results. Based on the decision of the Bidding Group, the information regarding the tendering process is published through the system by the Bidding Group.

The following functions are performed in this module:

- The system shall require the Bidding Group to prepare the evaluation report. [**Req-Evaluation-1**]
- The system shall allow the Bidding Group to announce the evaluation results and to call for meeting. [**Req-Evaluation-2**]
- The system shall alert the Bidders as soon as the invitation to the meeting is published. [**Req-Evaluation-3**]

4.6.1.6 Requirements for Contract - Req-Contract

As in the evaluation, in the contract phase, signing the contract is performed offline but invitation for contract is performed online. Upon completion of the meeting, the Bidder(s) who are awarded a tender are invited to sign the contract by the Bidding Group.

The following functions are performed in this module:

- The system shall require the Bidding Group to prepare the result report. [**Req-Contract-1**]
- The system shall allow the Bidding Group to invite the Successful Bidder(s) to sign the contract. [**Req-Contract-2**]
- The system shall alert the Successful Bidders as soon as the invitation to the contract is published. [**Req-Contract-3**]

4.6.2 e-Purchasing Requirements

Like e-Tendering component, the e-Purchasing component of the e-Procurement system is also available only to the public institutions and list of Approved Vendors, which meet the qualifying standards that are specified by the Auditing Commission.

Public institutions use this component to make market research, to compare goods and services and to purchase required goods and services directly from vendors in the cases that are specified in the Public Procurement Law. For the public institutions to

make use of this component, the appropriate role namely Purchasing Group and associated permissions with this role should be assigned to the authorized procurement officers in every public institution who are responsible from performing several purchasing activities on behalf of their institutions. The authorized procurement officers assigned these roles may be the same as that of e-Tendering component.

For vendors to use this component, they should be able to register to the system. Once registered, they become Approved Vendor and can use it to make business with the government through e-Marketplaces and e-Catalogs.

This component is composed of seven modules namely System Access, Profile Management, Analysis, Preparation of Order, Order Management, Manage e-Catalog and Payment. In the following sub-sections, short descriptions and requirements for these modules are to be given.

4.6.2.1 Requirements for System Access

Same as that of e-Tendering component

4.6.2.2 Requirements for Profile Management

In addition to that of e-Tendering component, rating of Approved Vendors and goods and services of the Approved Vendors is performed in order to share information on Approved Vendors' experiences and performances. By this way, as a qualified government supplier, the approved Vendors' performance could be evaluated. The rating process also lets the Approved Vendors understand expectations and requirements better and improve relationship with public institutions.

The following additional functions are performed in this module:

- The system shall provide an interface for Purchasing Group to rate for Approved Vendors according to specified criteria like warranty service, staff, etc.
- The system shall provide an interface for Purchasing Group to rate for goods and services according to specified criteria: properties, price, quality and usability.

4.6.2.3 Requirements for Analysis

The following functions are performed in this module:

- The system shall be able to present purchasing information in graphs or charts.
- The system shall allow the Approved Vendors to get reports regarding their sales history.
- The system shall allow the Purchasing Group to get reports regarding their spending history.
- The system should provide financial reports for public procurement cards of each public institution.

4.6.2.4 Requirements for Preparation of Order

In the e-Procurement system, functionalities in e-Marketplaces and e-Catalogs enable Purchasing Group to make detailed product search, to compare goods and services according to their price, technical specifications and etc. and to make order requests.

The following functions are performed in this module:

- The system shall allow the Purchasing Group to search goods and services by name, classification code, properties, price and vendor.
- The system shall allow the Purchasing Group to compare up to 5 goods and services in the same category but of different vendors according to their price and properties.
- The system shall provide an interface to report comparison of goods and services.
- The system shall allow the Purchasing Group to select goods and services.
- The system shall automatically create a shopping basket for the Purchasing Group upon selecting goods and services.
- The system shall keep history for the shopping basket for each Purchasing Group.

- The system shall recommend the goods and services from other approved vendors that are in the same category as goods and services in the shopping basket or in the search list or in the comparison list of the Purchasing Group.
- The system shall allow the Purchasing Group to delete from the shopping basket.
- The system shall allow the Purchasing Group to include or not to include goods and services in the shopping basket to the order request.
- The system shall require the Purchasing Group to submit an order request.
- The system shall allow the Purchasing Group to change order request before submitting it.

4.6.2.5 Requirements for Order Management

e-Procurement system provides public institutions the benefits of placing order online anytime. Purchasing Group of each public institution can place orders by specifying the classification code for goods and services and quantity as inputs. After that, Purchasing Group checks the validity of each order once again before sending out for actual transaction.

The following functions are performed in this module:

- The system shall require the Purchasing Group to approve or cancel the order request.
- The system shall require the Purchasing Group to place order.
- The system shall alert related Approved Vendors as soon as the order is placed by the Purchasing Group.
- The system shall require the Approved Vendor to accept or refuse order partially or completely.
- The system shall support iteration and versioning of order requests and offers.
- The system shall allow both the Purchasing Group and Approved Vendor to track order.

- The system shall require the Approved Vendors to submit current status of the order.
- The system shall keep a list of orders that the Purchasing Group placed with their status that is either success or pending or fail.

4.6.2.6 Requirements for Managing e-Catalog

The e-Procurement system requires that the Approved Vendors should represent their goods and services by the means of e-Catalogs. In this case, Approved Vendors choose either to manage their e-Catalogs themselves or to have third party managed their e-Catalogs.

The following functions are performed in this module:

- The system shall require the Approved Vendors to define their e-Catalogs.
- The system shall require the Approved Vendors to be in compliance with the identification and classification standard of the goods and services defined by the Authority Commission.
- The system shall provide an interface for the Approved Vendors to add new goods and services to their e-Catalogs.
- The system shall provide an interface for the Approved Vendors to delete goods and services from their e-Catalogs.
- The system shall provide an interface for the Approved Vendors to update information related to goods and services in their e-Catalogs.
- The system shall allow the Approved Vendors to advertise their goods and services.
- The system shall alert the Purchasing Group as soon as the advertisement is made and in the case of the Purchasing Group selects to take messages from the system.

4.6.2.7 Requirements for Payment

The e-Procurement system can utilize the electronic payment by means public procurement cards. The payment for goods and services is made after the Approved Vendors fulfill the order.

The following functions are performed in this module:

- The system shall ensure public institutions can never purchase above their account balance.
- The system shall allow the Purchasing Group to make payment by public procurement cards.

4.6.3 Auditing Requirements

The e-Procurement system requires an auditing mechanism to ensure that the standards are applied, terms and conditions are followed, and to solve problems. The auditing of e-Procurement system is mostly handled manually by the Auditing Commission except the publishing of blacklist which is available online.

In this context, the following functions are performed in this module:

- The system shall allow the Auditing Commission to publish the blacklist.
- The system shall allow the Auditing Commission to restrict access and functionality of Approved Vendors for a definite time according to their penalty.

4.6.4

Traceability Matrix for Use-Cases and Requirements

In the following table, each implemented requirement is mapped to the corresponding use-case for traceability purpose.

Table 6: Traceability Matrix

Use-Cases			Requirements
System Access	UC01-1	Logout	**Req-SystemAccess-9**
	UC01-2	Login	**Req-SystemAccess-7**
	UC01-3	Get Membership	**Req-SystemAccess-4** **Req-SystemAccess-5** **Req-SystemAccess-8**
	UC01-4	Make Registration	**Req-SystemAccess-1** **Req-SystemAccess-2** **Req-SystemAccess-3** **Req-SystemAccess-4** **Req-SystemAccess-5** **Req-SystemAccess-6**
Managing Profile	UC02-1	View Profile	**Req- ProfileManagement -1**
	UC02-2	Update Profile	**Req- ProfileManagement –2** **Req- ProfileManagement –3**
	UC02-3	Change Password	**Req- ProfileManagement –2** **Req- ProfileManagement -3**
	UC02-4	View Vendor Profile	**Req- ProfileManagement –1** **Req- ProfileManagement -5**
	UC02-5	Update Vendor Profile	**Req- ProfileManagement –2** **Req- ProfileManagement –3** **Req- ProfileManagement -4**
Managing Tender	UC03-1	Create a New Tender	**Req-Preparation-1** **Req-Preparation-9** **Req-Preparation-10**
	UC03-2	Manage Tender Summary	**Req-Preparation-13**
	UC03-3	Prepare Tender Notification	**Req-Preparation-2** **Req-Preparation-6** **Req-Preparation-7** **Req-Preparation-8** **Req-Preparation-12**
	UC03-4	Publish Tender Notification	**Req-Preparation-3** **Req-Preparation-11**
	UC03-5	Cancel Tender Notification	**Req-Preparation-4**

Table 6: Traceability Matrix (cont.)

	UC03-6	Ask Questions	**Req-Registration-5** **Req-Registration-6** **Req-Registration-8**
	UC03-7	Answer Questions	**Req-Registration-7** **Req-Registration-8** **Req-Registration-9**
	UC03-8	Register For a Tender	**Req-Registration-1** **Req-Registration-2** **Req-Registration-4**
	UC03-9	Cancel Registration	**Req-Registration-3**
	UC03-10	Upload Tender File	**Req-Preparation-5**
	UC03-11	Download Tender File	**Req-Registration-14**
	UC03-12	Upload Proposal	**Req-Registration-10**
	UC03-13	Download Proposal	**Req-Registration-13**
	UC03-14	Delete Tender File	**Req-Registration-15** **Req-Registration-16**
	UC03-15	Delete Proposal	**Req-Registration-11** **Req-Registration-12**
	UC03-16	Evaluate Proposals	**Req-Evaluation-1**
	UC03-17	Call For Meeting	**Req-Evaluation-2** **Req-Evaluation-3**
Managing Contract	UC04-1	Manage Contract	**Req-Contract-1**
	UC04-2	Call For Contract	**Req-Contract-2** **Req-Contract-3**

4.7. Testing of e-Procurement System

After developing e-Procurement system, an acceptance test was conducted with two testers who were software engineers. The testing environment had the following properties:

- A server has 512 MB RAM and 10 GB hard disk space
- Each tester has separate PCs with at least 128 MB RAM and 1 GB hard disk space

The testing scenarios are described in the Appendix-H. According to the test results, the system became successful in this test.

4.8. User Interface Design of eTS

In this section, the detailed description of eTS is presented with sample views from a tendering activity conducted by using this system. The detailed description of the functionality provided through these user interfaces are also given in the Technical Report (Karahan Turan, 2004). In the following table, user interfaces and the corresponding use cases are presented for the purpose of comfortable reading.

Table 7: The Matrix of User Interfaces and Functions of eTS

Use-Cases			Related User Interface
System Access	UC01-1	Logout	All Screens
	UC01-2	Login	Login Screen
	UC01-3	Get Membership	Membership Screen
	UC01-4	Make Registration	Registration Screen
Managing Profile	UC02-1	View Profile	Bidding Group Screen-PROFILE (View Profile Sub-Screen)
	UC02-2	Update Profile	Bidding Group Screen-PROFILE (Update Profile Sub-Screen)
	UC02-3	Change Password	Bidding Group Screen-PROFILE Approved Vendor Screen-PROFILE (Change Password Sub-Screen)
	UC02-4	View Vendor Profile	Approved Vendor Screen-PROFILE (View Vendor Profile Sub-Screen) Bidding Group Screen-VENDOR
	UC02-5	Update Vendor Profile	Approved Vendor Screen-PROFILE Bidding Group Screen-PROFILE
Managing Tender	UC03-1	Create a New Tender	Bidding Group Screen-TENDER (Create a New Tender Sub-Screen)
	UC03-2	Manage Tender Summary	Bidding Group Screen-TENDER (Tender Summary Sub-Screen)
	UC03-3	Prepare Tender Notification	Bidding Group Screen-TENDER (Tender Notification Sub-Screen)
	UC03-4	Publish Tender Notification	Bidding Group Screen-TENDER (Publish/Cancel Tender Sub-Screen)
	UC03-5	Cancel Tender Notification	Bidding Group Screen-TENDER (Publish/Cancel Tender Sub-Screen)
	UC03-6	Ask Questions	Approved Vendor Screen-TENDER (Questions Sub-Screen)
	UC03-7	Answer Questions	Bidding Group Screen-TENDER (Questions Sub-Screen)
	UC03-8	Register For a Tender	Approved Vendor Screen-TENDER (Tender Registration Sub-Screen)

Table 7: The Matrix of User Interfaces and Functions of eTS (cont.)

	UC03-9	Cancel Registration	Approved Vendor Screen-TENDER (Tender Registration Sub-Screen)
	UC03-10	Upload Tender File	Bidding Group Screen-TENDER (Tender Files Sub-Screen)
	UC03-11	Download Tender File	Approved Vendor Screen-TENDER (Tender Files Sub-Screen)
	UC03-12	Upload Proposal	Approved Vendor Screen-TENDER (Proposals Sub-Screen)
	UC03-13	Download Proposal	Bidding Group Screen-TENDER (Proposals Sub-Screen)
	UC03-14	Delete Tender File	Bidding Group Screen-TENDER (Tender Files Sub-Screen)
	UC03-15	Delete Proposal	Approved Vendor Screen-TENDER (Proposals Sub-Screen)
	UC03-16	Evaluate Proposals	Bidding Group Screen-TENDER (Evaluation Sub-Screen)
	UC03-17	Call For Meeting	Bidding Group Screen-TENDER (Evaluation Sub-Screen)
Managing Contract	UC04-1	Manage Contract	Bidding Group Screen-TENDER (Contract Sub-Screen)
	UC04-2	Call For Contract	Bidding Group Screen-TENDER (Contract Sub-Screen)

Figure-19 shows the starting point of eTS. This screen has 3 main functions namely "Log In" for users to log into the systems, "Get Membership" for public institutions to get membership and "Make Registration" for vendors to register.

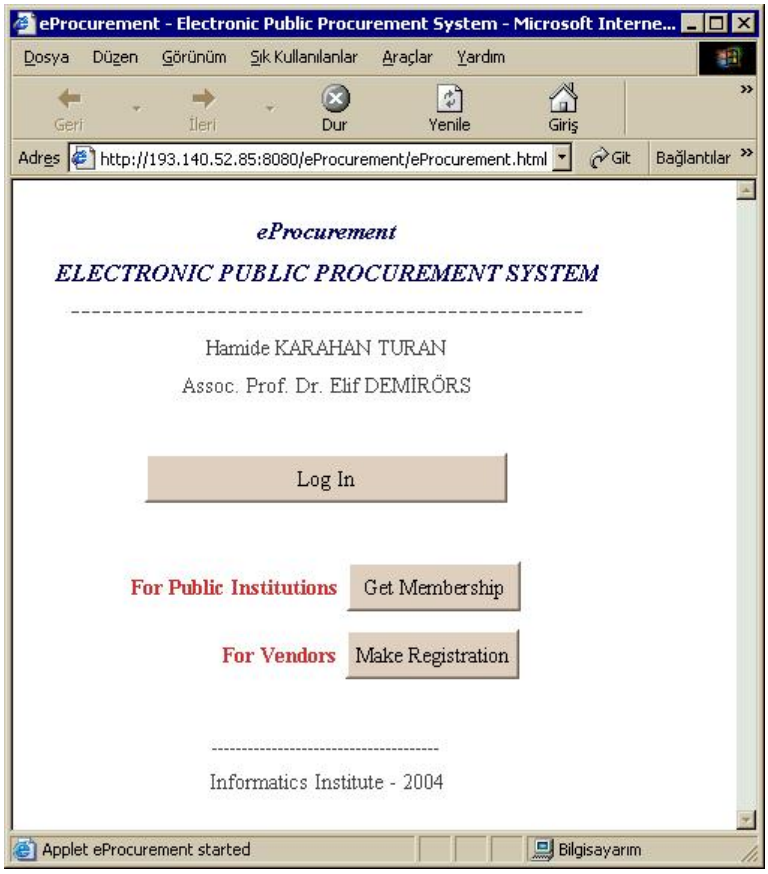


Figure 19: eTS Main Screen

Figure 20: Login Screen

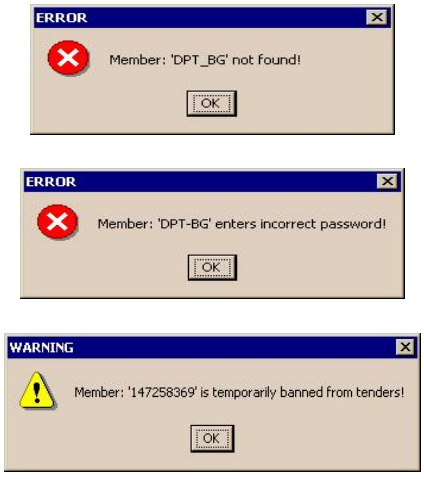


Figure 21: Login Screen Messages

Figure-20 is the "Log In Screen" of eTS. The public institutions and vendors enter MemberID and Password through this screen. If an invalid MemberID or password is entered, the appropriate error messages, shown in the Figure-21, will be displayed. If the user is of the type of vendor and banned from participating in tenders, the system gives a warning message to this vendor to try after this penalty is removed.

Figure 22: Membership Screen

Figure 23: Membership Screen Messages

Figure-22 is the "Membership Screen" for public institutions to get membership. After providing the required information correctly, public institutions are sent MemberID and Password via e-Mail by the system administrator. This ensures that the entities other than public institutions cannot be registered to the system with wrong information. If a public institution got membership before, the appropriate error message, shown in the Figure-23, will be displayed.

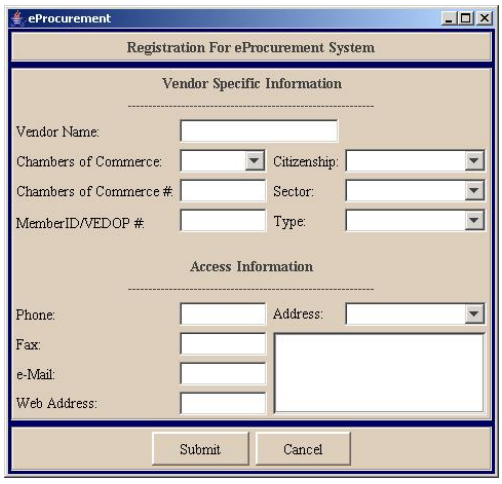


Figure 24: Registration Screen

Figure 25: Registration Screen Messages

Figure-24 is the “Registration Screen” for vendors to register to the system. During registration, the information provided by vendors is verified against the “VEDOP: e-Tax Filing System”. By doing so, it is aimed to confirm the identification and contact information of vendors. Moreover, this enables to access penalties and prohibitions for vendors.

After registration is completed successfully, the registered vendor can enter the system by using VEDOP number as MemberID and Password that is randomly generated by the system and sent via e-Mail. The vendors who make successful registration to the system are called “Approved Vendor”. If a vendor does not have a VEDOP number, the appropriate error message, shown in the Figure-25, will be displayed.

Since the public procurement process has different flows for public institutions and vendors, the eTS has different interfaces for each type of users namely the Bidding Group and the Approved Vendor. The user type and corresponding permission are identified at the Login Screen.

4.8.1 Bidding Group Interfaces

Through the “Bidding Group Screen”, the functions that can be performed by the “Bidding Group” are offered to public institutions. These functions are classified in three groups namely: Handle profile information, manage vendor profile and manage tender. These groups are accessed through menu items respectively PROFILE, VENDOR and TENDER.

Bidding Group Profile Management Interface

The Figure-26 displays the example views of the “Bidding Group Profile Screen”. This screen provides the Bidding Group to:

- Change password
- View staff profile
- View public profile
- Update staff profile

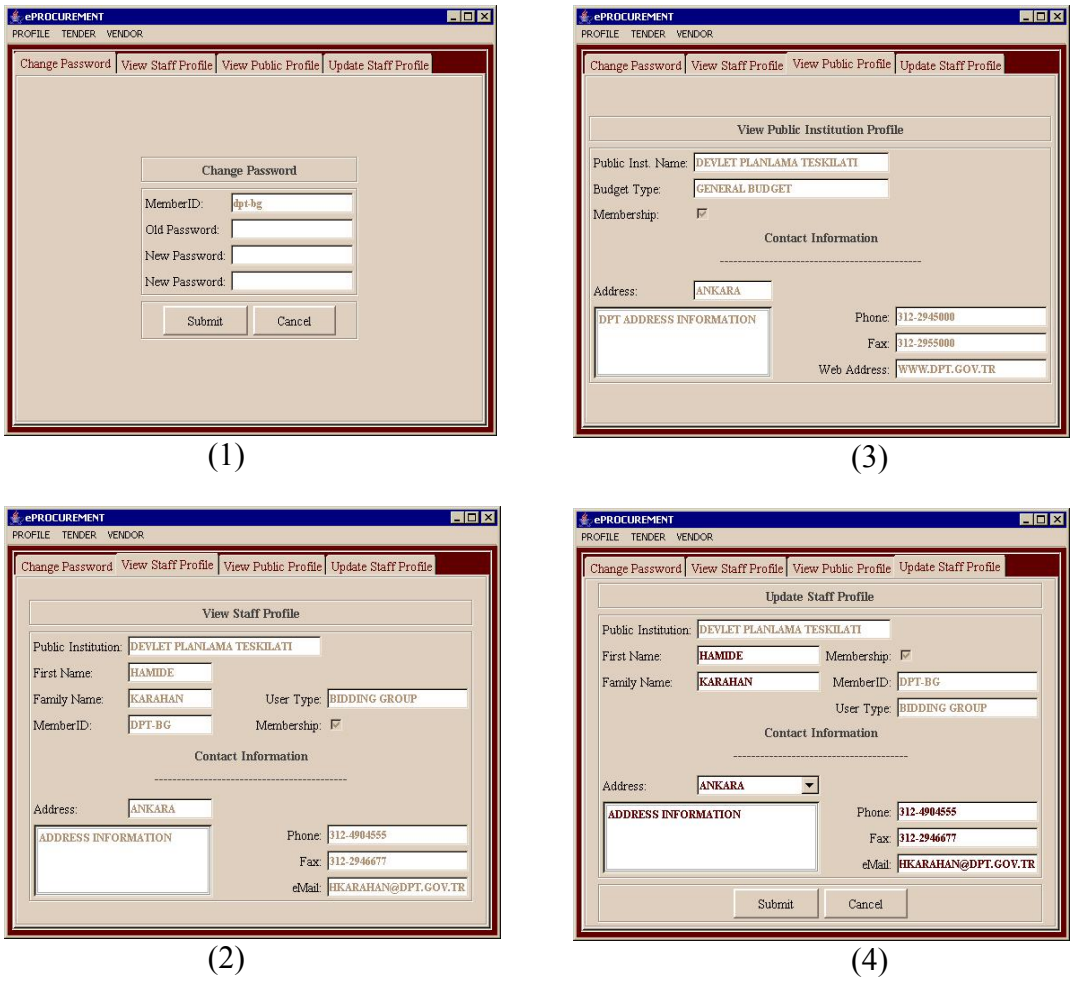


Figure 26: Bidding Group Screen - PROFILE

Public institutions can have more than one member in their bidding groups. Therefore, in eTS, each user has separate MemberID. Each of them can change their password and profile information. Also they can view the information of their institutions.

Bidding Group Vendor Management Interface

The Figure-27 displays the example view of the "Bidding Group Vendor Screen". This screen provides the Bidding Group to:

- View vendor profile
- View vendor's technical capacity
- Give opinion about vendor

By using this screen, each public institution can rate approved vendors to share information about vendors with other public institutions.

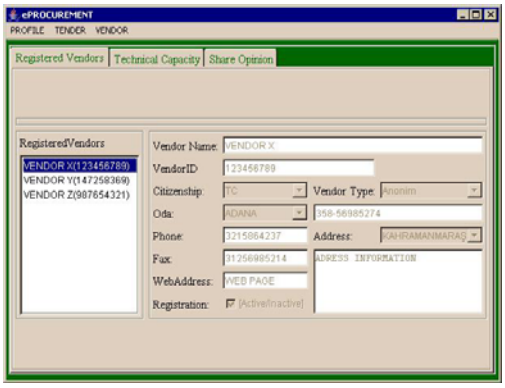


Figure 27: Bidding Group Screen - VENDOR

Bidding Group Tender Management Interface

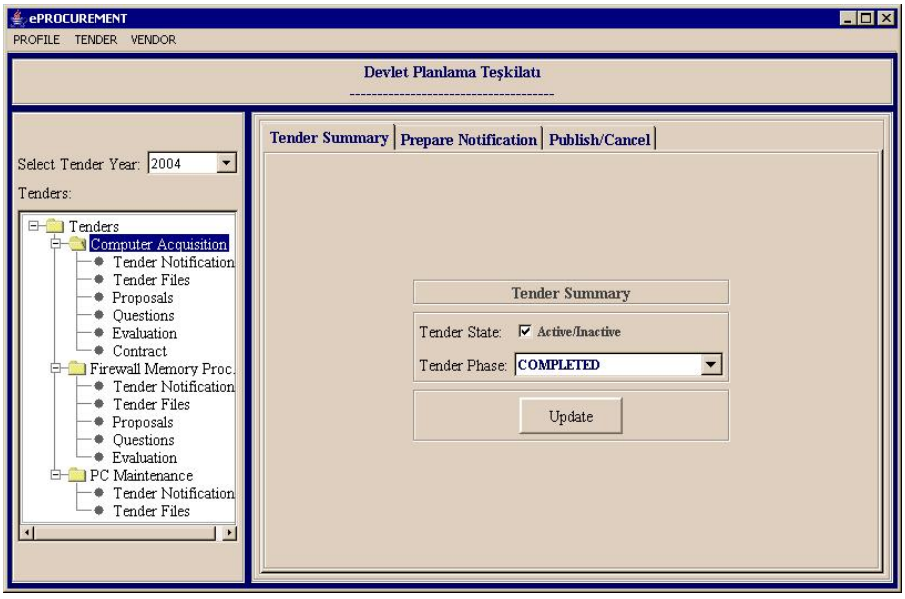


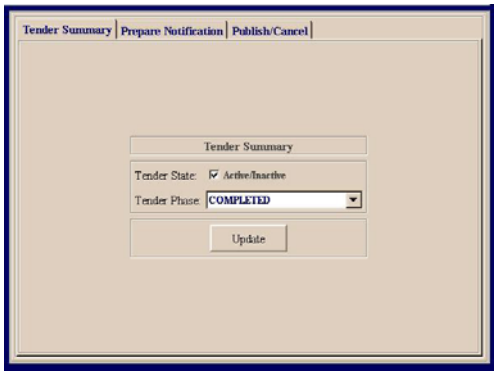
Figure 28: Bidding Group Screen - TENDER

The Figure-28 displays example view of the "Bidding Group Tender Screen". In this screen the following activities are provided to Bidding Group:

- View tender summary
- Prepare tender notification
- Publish tender notification
- Cancel tender notification
- Upload tender files
- Delete tender files
- Answer questions
- Download proposals
- Evaluate proposals
- Call for meeting
- Call for contract

Bidding Group Tender screen is a starting point for public procurement process. The left-hand-side panel lists the tenders of the public institution that is currently logged in to the system. In this panel, the tenders are displayed in a tree-view structure. It is possible to view previous tenders by selecting a year. Also, by left-clicking the mouse on the tender list, a new tender can be created.

The right-hand-side panel includes sub-screens to handle the required functionality in each phase of the public procurement process. These sub-screens are "Tender Notification", "Tender Files", "Proposals", "Questions", "Evaluation" and "Contract".



(1)

(3)

(2)

Figure 29: Tender Notification Sub-screen

Tender Notification phase is managed from the "Tender Notification sub-screen" shown in the Figure-29. This screen provides Bidding Group to specify tender state and tender phase, to prepare tender notification and to publish or cancel tender notification. In eTS, there are seven phases namely Tender Notification, Registration, Tender File Submission, Proposal Submission, Proposal Evaluation, Contract,

Completed. According to the value of tender state and tender phase, activities, found under the tender name in the left-hand-side panel, are added or made active/passive.

When the tender notification is published or cancelled, the message prepared by the Bidding Group is sent to all registered vendors via e-mail. This notification can also be accessed through the system. Tender notification is published only when the tender is in the Tender Notification phase and tender state is marked as active. With the publication of tender notification, public procurement process is initiated.

If tender notification is published before, the system will not allow publishing it again. Also, the tender can only be cancelled if it is in the Tender Notification phase. In these cases, corresponding warning message is shown to the user.

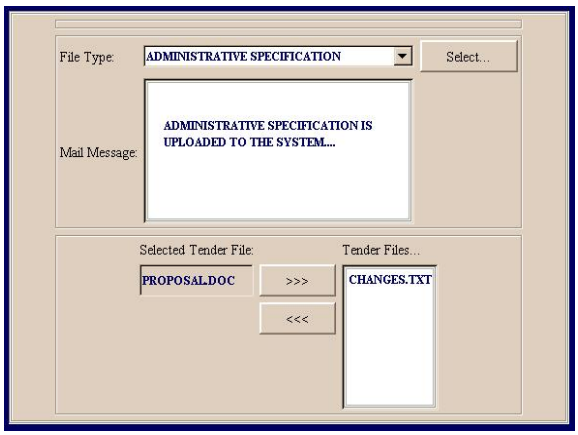


Figure 30: Tender Files Sub-screen

In the Figure-30, the "Tender Files sub-screen" is displayed. When the tender is in the "Tender File Submission" state, Bidding Group can find, select and upload tender files to the system by using the file chooser facility. When uploading a tender file to the system, it is required to specify its type like administrative specification, technical specification, additional explanation, etc. Also, it is possible to delete previously uploaded tender files. Each time a tender file is uploaded to or deleted from the system; the system sends a message to the vendors who registered to this tender. Like tender notification message, the Bidding Group prepares this message, too.

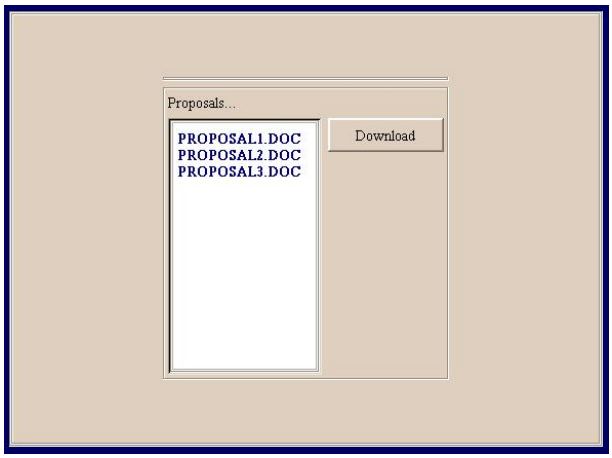


Figure 31: Proposals Sub-screen

The Figure-31 is the "Proposals sub-screen". When the tender is in the Proposal Submission phase, this screen is activated automatically. In this screen, the proposals uploaded to the system by the registered vendors are listed. Bidding Group can download proposals without considering the phase in which the tender is. That's, proposals are accessed always once available in the system. As in the tender files, whenever a proposal is uploaded to the system, a message, generated by the vendor who uploaded this proposal to the system, is sent to the corresponding Bidding Group via e-mail.

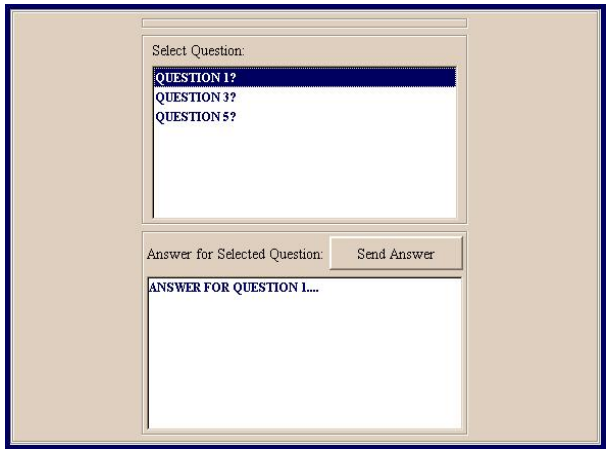


Figure 32: Questions Sub-screen

In the Figure-32, an example view of the "Questions sub-screen" is illustrated. This screen is always available after the tender notification is published. The questions submitted by the registered vendors to that tender are listed according to the submission order. As soon as a new question is asked, an automatically generated message is sent to the corresponding Bidding Group via e-mail. Bidding Group can

then answer the questions in any order by selecting from the list. The questions and answers to the questions are seen by the vendors who registered to that tender.

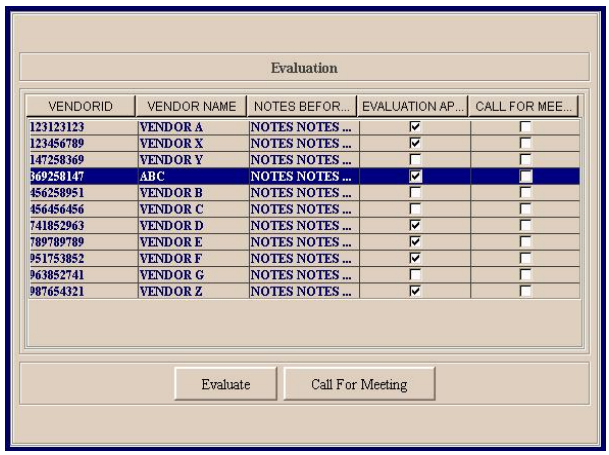


Figure 33: Evaluation Sub-screen

The Figure-33 displays the "Evaluation sub-screen". After the tender enters into the Evaluation phase, this facility is activated. This screen provides the list of vendors' ID and Name. The listed vendors are ones who make registration for that tender.

Evaluation phase of the public procurement process is performed offline. After the evaluation of submitted proposals is completed, the decision about each registered vendor is entered to the system through this screen. Each decision gives the reason for approval or disapproval of corresponding registered vendor.

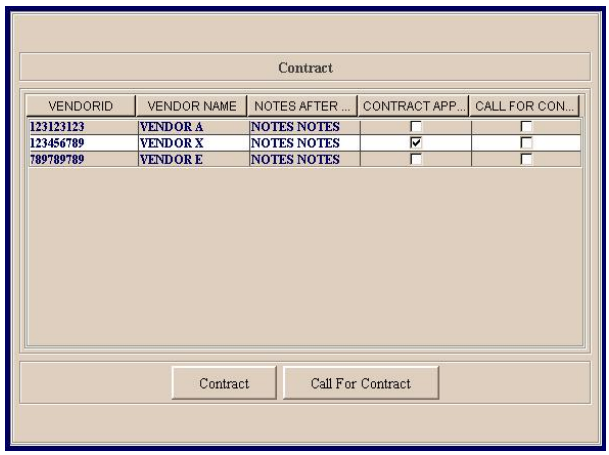


Figure 34: Contract Sub-section

The last step of the evaluation phase is to call the vendors for meeting which is conducted offline. Only the vendors who get approval in the evaluation are called to participate in this meeting. In addition to announcing evaluation results through the

system, these results are also sent to the related vendors via e-mail. After the selected vendors are called for meeting, there is no way to make evaluation.

After Evaluation phase comes the Contact phase managed through the “Contract sub-screen” shown in the Figure-34. As in the Evaluation sub-screen, this screen provides the list of vendors’ ID and Name. The listed vendors are ones who have been approved in the Evaluation phase.

After the meeting has been conducted, it is decided which vendor is awarded a contract. For some tenders, it is possible to select more than one vendor as winner. After the successful vendors are chosen, the reasons behind this decision are entered to the system. This explanation is also provided for each unsuccessful vendor.

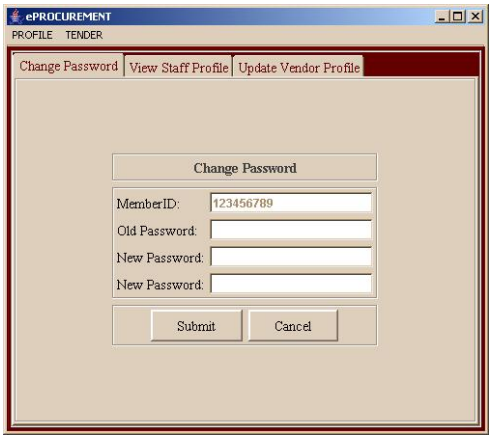
As a last step, successful vendors are called to sign the contract. This notification is made via e-mail. Sign of the contract by each successful vendor is performed offline. After this step is completed, the result of the tender is announced both through the system and via e-mail.

4.8.1 Approved Vendor Interfaces

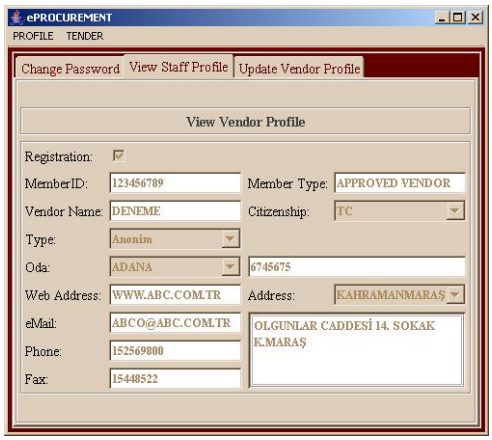
Through the “Approved Vendor Screen” shown in the following figures, the functions that can be performed by the “Approved Vendor” are offered to the vendors who registered to the system. These functions are classified in two groups namely: Handle profile information and manage tender. These groups are accessed through menu items respectively PROFILE and TENDER.

Approved Vendor Profile Management Interface

(1)



(3)



(2)

Figure 35: Approved Vendor Screen - PROFILE

This screen shown in Figure-35 provides the Approved Vendor to:

- Change password
- View vendor profile
- Update vendor profile

Each approved vendor can have more than one person participated in tendering activities. Therefore, in eTS, each user has separate MemberID. Each of them can change their password and profile information.

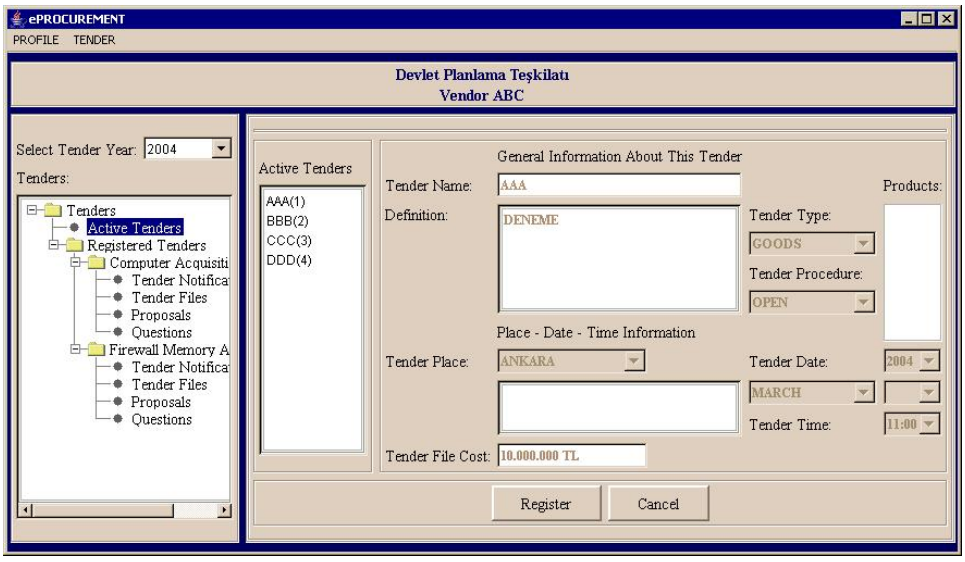


Figure 36: Approved Vendor Screen – TENDER

The Figure-36 displays an example view of the "Approved Vendor Tender Screen". In this screen the following activities are provided to Approved Vendor:

- View tender summary
- Register for a tender
- Cancel tender registration
- Download tender files
- Ask questions
- Upload proposals
- Delete proposals

This screen is an environment where all the tendering activities take place during public procurement process. In the left-hand-side panel, there are two sections namely "Active Tenders" where the active tenders of public institutions are listed and "Registered Tenders" where the registered tenders in which the corresponding vendor participated are listed. However, under the "Active Tenders" section, only the tenders that fall in the same sector in which the vendor makes business are displayed.

In this panel, the tenders are displayed in a tree-view structure. It is possible to view previous tenders by selecting a year. Also, by left-clicking the mouse on the registered tender list, selected tender registration can be cancelled.

The right-hand-side panel includes sub-screens to handle the required functionality in each phase of the public procurement process. These sub-screens are "Tender Notification", "Tender Files", "Proposals" and "Questions".

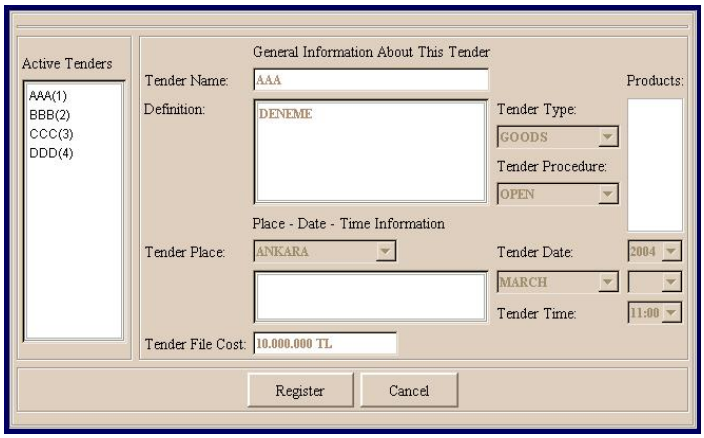


Figure 37: Tender Registration Sub-screen

The "Tender Registration sub-section" shown in the Figure-37 is for the Approved Vendors to view tender related information and to make registration for tenders. After the Bidding Group sets the phase of a tender, the Approved Vendors are allowed to register to this tender.

The Approved Vendor selects a tender from the list. After that, if Approved Vendor decides to register for this tender, s/he presses the "Register" button. Upon completion of the registration, this tender is added to the "Registered Tenders" section for Approved Vendor to manage it.

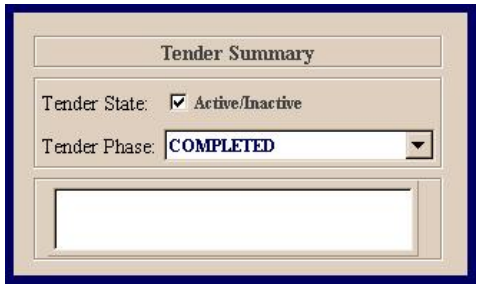


Figure 38: Tender Notification Sub-screen

Through the "Tender Notification sub-screen" shown in the Figure-38, registered vendors to this tender can get information about this tender like the state of this tender, reason for cancellation if cancelled, the phase of this tender, other tender related information, etc. Whenever the Bidding Group changes the state and phase of a tender, related activities are added and activated under the name of corresponding tender in the left-hand-side panel.

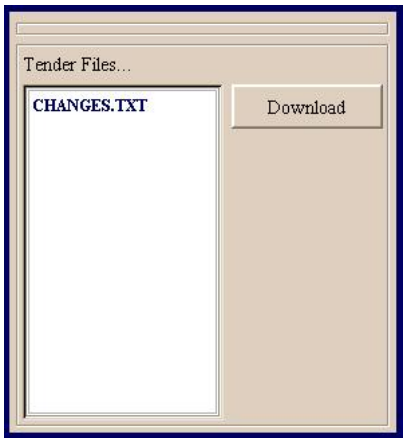


Figure 39: Tender Files Sub-screen

The Figure-39 is the "Tender Files sub-screen". When the tender is in the Tender File Submission phase, this screen is activated automatically. In this screen, the Tender Files uploaded to the system by corresponding Bidding Group are listed. Approved Vendors can download proposals if and only if the tender is in the "Tender File Submission" phase. Whenever a tender file is uploaded to the system, a message, generated by the Bidding Group who uploaded this tender file to the system, is sent to the registered vendors of this tender via e-mail.

Figure 40: Proposals Sub-screen

In the Figure-40, the "Proposals sub-screen" is displayed. When the tender is in the "Proposal Submission" state, Registered Vendors can find, select and upload their proposals to the system by using the file chooser facility. When uploading a proposal to the system, it is required to specify its type. Also, it is possible to delete previously uploaded proposals. As in the Tender Files sub-screen, each time a proposal is uploaded to or deleted from the system; the system sends a message to the Bidding Group who manages this tender. This message is prepared by the Registered Vendor.

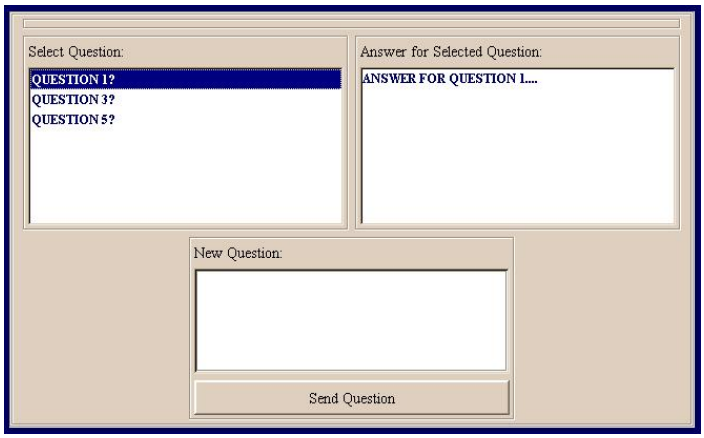


Figure 41: Questions Sub-screen

In the Figure-41, an example view of the "Questions sub-screen" is illustrated. This screen is always available after the tender notification is published. This screen provides the Registered Vendors with the following functionality:

- Asking a new question related with the tender
- Viewing answers submitted by the Bidding Group

The questions submitted by all registered vendors of this tender are listed according to the submission order. By selecting a question from this list, the answer for this selected question can be viewed. Each time a new question is submitted to the system, an automatically generated message is sent to the corresponding Bidding Group via e-mail. Also, each time Bidding Group answers and submits the answer for a question, an automatically generated message is sent to the Registered Vendors via e-mail.

As mentioned before, there are some differences in the functionalities provided for each type of user. These differences are summarized in the Table-8.

Table 8: The Matrix of Users and Functions of eTS

Use-Cases			Approved Vendor	Bidding Group
System Access	UC01-1	Logout	**X**	**X**
	UC01-2	Login	**X**	**X**
	UC01-3	Get Membership		**X**
	UC01-4	Make Registration	**X**	

Table 8: The Matrix of Users and Functions of eTS (cont.)

Managing Profile	UC02-1	View Profile		**X**
	UC02-2	Update Profile		**X**
	UC02-3	Change Password	**X**	**X**
	UC02-4	View Vendor Profile	**X**	**X**
	UC02-5	Update Vendor Profile	**X**	**X**
Managing Tender	UC03-1	Create a New Tender		**X**
	UC03-2	Manage Tender Summary		**X**
	UC03-3	Prepare Tender Notification		**X**
	UC03-4	Publish Tender Notification		**X**
	UC03-5	Cancel Tender Notification		**X**
	UC03-6	Ask Questions	**X**	
	UC03-7	Answer Questions		**X**
	UC03-8	Register For a Tender	**X**	
	UC03-9	Cancel Registration	**X**	
	UC03-10	Upload Tender File		**X**
	UC03-11	Download Tender File	**X**	
	UC03-12	Upload Proposal	**X**	
	UC03-13	Download Proposal		**X**
	UC03-14	Delete Tender File		**X**
	UC03-15	Delete Proposal	**X**	
	UC03-16	Evaluate Proposals		**X**
	UC03-17	Call For Meeting		**X**
Managing Contract	UC04-1	Manage Contract		**X**
	UC04-2	Call For Contract		**X**

CHAPTER 5

CASE STUDY OF ETS

In this chapter, the trial utilization of the eTS by 2 public institutions and 4 vendors is explained. Public institutions and vendors selected to participate, data collection instruments, data analysis used in the case study and findings are presented. This chapter also includes a discussion of the interviews.

5.1. Research Study

In this study, the evaluation of eTS was not performed in the real public procurement environment. eTS was evaluated by the potential users of electronic public procurement process. In this respect, it was used in one tendering activity of each selected public institutions. First experiment is performed in parallel with the existing procurement procedure and the other is applied to a nearly completed one.

Through these experiments, it is aimed to:

- Validate the objectives of eTS
- Contribute to understanding of effectiveness of eTS
- Investigate strengths and weaknesses of the system
- Explore further needs of public institutions that are not addressed by the eTS

The selected approaches used to address these evaluation questions and how data were analyzed are addressed below.

5.1.1 Method

For the utilization of eTS, mixed design of qualitative and quantitative methods were used to make clear the objectives set for this system and to investigate how and at what level these objectives are met.

Although mixed design was selected to use, qualitative research methods appear dominant methods in this study. Because, the most important advantage of the qualitative methods is their power that enables detailed data collection about the issue [Yıldırım and Şimşek, 1999, p.87]. Also, the qualitative approaches are becoming increasingly common in the Information Systems research because these are extremely useful in developing context-based, process-oriented descriptions and explanations of the issue [Myers, 1997].

Therefore, as the main method to collect data for this study, in-depth interviewing was used. Because of the nature of this approach, investigations are connected with participants' observation. Maykut and Morehouse (1994, p.46) state that, "*the data of qualitative inquiry is most often people's words and actions, and thus requires methods that allow the researcher to capture language and behavior. The most useful ways of gathering these forms of data are participant observation, in-depth interviews, group interviews, and the collection of relevant documents.*"

Moreover, in support of the results gathered from qualitative research, a simple quantitative analysis was also conducted.

5.1.2 Instruments

In this study, for the qualitative part, the "*general interview guide approach*" was selected among three basic approaches to conducting qualitative interviewing [Patton, 1987, p.113] to explore and analyze the participants' viewpoints relative to the six evaluation questions given in the Appendix-I.

In the general interview guide approach, the main purpose is to determine whether the statements of participants are consistent, to identify where the difference is and to discover the facts about the subject matter.

A general interview guide approach starts with a list of issues to be addressed by each participant, allowing for other topics to emerge, specific to each participant

[Patton, 1990]. This type of interview involves asking open-ended questions and probing wherever necessary to obtain data in order to "*minimize the imposition of predetermined responses when gathering data*" [Patton, 1990, p.295].

In the second part of this study, a structured questionnaire approach was utilized to measure the achievement of the objectives. The questionnaire prepared for this study is given in the Appendix-II. By using both approaches together, it is aimed to confirm and cross-validate the findings.

There are six questions in the qualitative part that cover the eTS. These questions also served as a base when designing the questionnaire.

The process that was followed involves the following steps:

- The set of questions are prepared
- The context of the system is presented to the participants
- The objectives of the system are explained to the participants
- Sample demonstration is made
- Specified time is given to the participants to allow them to use the system
- The prepared questions are asked to the participants for them to express opinions through discussion

5.1.3 Subjects

In this study, for the selection of subjects, criteria-based sampling [LeCompte et al, 1993, p.69] was used. Because, in this type of sampling, the participants are selected intentionally to gather useful information [Maxwell, 1996, p.71]. Also, this strategy makes it easy to reach information.

Therefore, two groups who could be enrolled in a tendering activity were selected. These are the bidding groups of the selected public institutions and the vendors from private sector. Potential participants of this study from private sector are selected from the voluntarily participated vendors who are identified according to the criteria specified below. Therefore, the number of the participants remains limited. However, their contribution to this research is great because of their willingness and the amount of time they spent using the system.

Two public institutions are selected randomly. There are 8 participants from these institutions. These participants have the knowledge and experience on the manual public procurement process. All of them participated in several tendering activities. Moreover, all of them were aware of the problems encountered during a tendering activity.

The participants from private sector were selected from the pool of vendors, which have a relationship with public institutions and are awarded a contract at least one time.

The participants from private sector in this study were predominantly manager with the exception of one who worked as a system support engineer. Participants' educational background was very heterogeneous. However, all of them have the knowledge and experience on proposal preparation and manual public procurement process. Moreover, the majority (3 of them) had a significant experience in IT sector. All of them knew English.

5.1.4 Data Collection

In this study, qualitative data were gathered through individual interviews with 4 vendors and 2 procurement officials who worked as a member of the bidding group of public institution. When it comes to the quantitative data, they were collected from the answers of bidding groups of selected public institutions to the predetermined set of choices included in the questionnaire.

For the utilization of eTS, a separate scenario of eTS was performed with each participant. Before participants started to use the eTS, introductory information about the system was given. The objectives set for the eTS were explained. Also, to show functionality of the system, a sample demonstration was made. Lastly, 1 week was given to the participants to familiarize with the eTS and to use it. During that week, eight separate experiments were performed. Each application was done with two participants including one public institution and one vendor.

At the end of that time, interviews and questionnaires were conducted with the participants. The participants from selected public institutions filled in questionnaire so that the comparison of the results gathered from qualitative and quantitative approaches could be done more effectively.

Since most of the participants from private sector were settled in İstanbul, they were contacted mostly via e-mail and sometimes by telephone for further discussion of the evaluation questions. Also, participants received the interview text for further verification and revision via e-mail. However, all interviews with public institutions were conducted face-to-face.

During the interviews, the effectiveness, strengths and weaknesses of eTS and the challenges encountered during the usage of the system were questioned. One question was designed to collect data on the participants' recommendations for further improvements of the system. The participants were also asked to define their needs in the area of electronic public procurement, as well as what they would have wanted to happen differently.

In the course of each interview, new questions emerged for further exploration of participants' viewpoints. Also follow-up interviews were requested after review of the interview text for the information confirmation.

The structured questionnaire was applied for the participants to rate the eTS on a scale of one to five on the overall success of the system to meet the objectives.

The interviews lasted for 40-45 minutes and the questionnaire was applied in approximately 20 minutes. After the interviews, an interview text was written and sent to the corresponding participant who confirmed the information collected.

5.1.5 Data Analysis

The common trend in data analysis in qualitative research is concerned primarily with textual analysis. This analysis is an ongoing and iterative process. Also, it is an inductive process in which categories and patterns emerge from the data rather than being imposed on data prior to data collection [McMillan et al, 1997].

Analysis of data involves describing and summarizing the mass of data collected and then presenting the results in a way that communicates the most important features. The aim is to discover the big picture. It requires discovering relationships between various issues. The basic and common process of analyzing qualitative data is given below [Powell, 2003].

- **Constitution of interview text:** The interview text is written.
- **Labeling or Coding:** All data are coded to recognize differences and similarities. Therefore, it is required to develop a method of identifying items that appear in the interview text so that data collected from all participants can be compared with each other.
- **Categorizing:** This means classification of interview text in a way that describes what it is about. The basic idea is to identify from interview text the information that is informative in some way or has important message in it.
- **Identifying connection between categories:** After organizing data into categories, the relationship among them is explored. This means that the consistencies occurred are discovered.

5.1.6 Findings

The starting point for this analysis had been the answers given in the interviews as well as the data collected from the questionnaire.

Interviews

Below, interviews are analyzed and discussed with focus on the questions given in the Appendix-I.

Question: *How do participants perceive the potential effectiveness of the eTS?*

According to the results of the analysis of the responses, all of the participants believed that e-Procurement system could provide support for both public institutions and vendors during the public procurement process. They emphasized that e-Procurement system enables transparency and makes management of procurement information easier. Also, they pointed out that eTS helps the users to understand phases of public procurement process. Although the participants stated some difficulties encountered during the application of the system and some weaknesses, they believed that it could promote effective online public procurement process.

The responses of the participants show that they compare eTS with manual existing public procurement process. Most of the participants especially from private sector

believed that eTS would make it easy to communicate with public institutions during public procurement process and to participate in tendering activities. On the other hand, the participants from public institutions argued that in online public procurement system, it is necessary to ensure that a vendor actually exists and is who s/he says s/he is. However, all of them shared the common opinion that electronic public procurement process starts to become necessary and therefore, there is a need for a system like eTS.

Question: *What are the strengths of the eTS?*

According to the results of the analysis of the responses, eTS has some powerful features for promoting electronic public procurement. The strengths of eTS are as follow:

- Use of simple interfaces can help the system to become widespread
- Getting immediate feedback/response
- Use of e-mail for communication
- Providing access to the data of old tenders
- Verification of vendor related data such as identification and contact information against VEDOP
- Use of product classification codes
- Enabling sharing of experiences with and comments about vendors among public institutions
- Having educational aspect to teach public procurement process
- Enabling access to more vendors

Question: *What are the weaknesses of the eTS?*

It was also asked to obtain the perceptions of the participants on the weaknesses of eTS. According to the responses of the participants, the weaknesses of eTS can be summarized as follows:

- During the question-answer phase, vendors had better have a feeling as if they get in touch with a real person in face-to-face environment.

- There is a need for user manual since the users of eTS have different backgrounds.
- The potential effectiveness of eTS is highly dependent on the number of vendors that make registration to the system.
- Negative responses can be sent to the users via e-mail.
- It can be provided for vendors to download their proposals, which they uploaded to the system before. Also, it can be provided for bidding groups to download corresponding tender files, which are uploaded to the system before.

Question: *Which parts do participants want to be implemented differently?*

According to the findings, most of the participants state that the evaluation phase and the contract phase are among the important parts of the eTS because of their contribution to transparency. They strongly emphasized the importance of the report, which includes the evaluation/contract award decision about vendors. They said that it would be better to upload a detailed report as an alternative to enter a short summary.

Also, as mentioned above, one of the weaknesses of the eTS is that the potential effectiveness of eTS is highly dependent on the number of vendors that make registration to the system. This means that the more vendors are accessed, the more benefits are gained. As related, it is suggested that vendors are contacted using the contact information in VEDOP to send the advertisement about the system instead of waiting for them to make registration.

Question: *How do participants perceive the difficulties they face in using the eTS?*

One of the participants said that the system is not suitable to work with keyboard.

Question: *How can eTS be improved to achieve more efficiency and effectiveness?*

In this study, data on the participants' recommendations for further improvements of eTS are also collected. The recommendations mainly focus on the following issues:

- Online synchronous meeting
- Providing statistical reports

- Displaying the content of the tender files and proposals

The findings indicate that it will be helpful for vendors located in a distant place if eTS enables the participation to the meeting at least through video-conferencing. However, some of the participants especially from private sector said that it would be better to perform meetings in an online synchronous environment.

In addition, according to the results of the analysis of the participants' responses, it is found that it might be good idea to extend the features of the eTS by adding reporting facilities. The findings indicate that statistical reporting might also enable effective decision support system for the management of public procurement and public investments.

Moreover, it was also recommended to provide environment for viewing the content of the documents. One of the participants said that it would be useful to be able to take notes on these documents for sharing comments among the members of the bidding group.

Questionnaire

The questionnaire was prepared based on the objectives of eTS. The selected participants have been requested to grade these questions between one and five (where 1: strongly disagree and 5: strongly agree).

Table 9: Summary of Results of Questionnaire

Objectives	Questions	Strongly Agree (# of person)	Agree (# of person)
Transparency	Q1	5	3
	Q2	5	3
	Q3	6	2
User Friendly	Q1	4	4
	Q2	5	3
Information Management	Q1	6	2
Vendor Management	Q1	4	4
	Q2	5	3

The result of the questionnaire was satisfactory. According to the results shown in Table-9, all objectives set for eTS were met. More than %50 of the answers was 5 (strongly agree), and the remaining was 4 (agree).

5.1.7 Discussion

During the case study, some of the questions asked have received very similar answers and a lot of the ideas from the different persons are the same. However, some questions have been answered completely different. This is depending on the type of sector (public or private) to which participants belong. Besides, it is possible to say that different priorities given to the same system functionalities lead to answers that are differing from each other.

Also, some differences among participants from the public institutions and from the private sector were observed. Participants from the public sector suggested more realistic solutions, whereas the majority from the private sector suggested practically infeasible solutions. This difference is said to be related to the experience in the public procurement activities and the amount of awareness of the bureaucracy in such a way that the more experienced the person is, the more detailed solutions are provided and the more the person is aware of the bureaucracy, the more realistic thinking is added to ideas.

CHAPTER 6

CONCLUSION AND FUTURE WORK

In this chapter, the findings of the study are discussed and recommendations for further studies are indicated.

6.1. Conclusion

Electronic public procurement, as one of the e-Government initiative, is perceived to be an alternative that leads to better and more effective public procurement management by overcoming many traditional paper-based problems. e-Procurement process brings essential benefits for both the government and the private sector. It provides an open purchasing environment that facilitates interoperability between them in order to conduct public procurement activities. In Turkey, there are some initiatives in the area of e-Procurement namely e-Sale system of DMO and Tendering Information System of KIK. However, there are some drawbacks of these initiatives such as lack of standard common definitions for goods and services, lack of integration with other e-Government applications and lack of reliable identification of vendors and public institutions. In this respect, this study may contribute to e-Procurement studies in Turkey by means of developing a web-based prototype system that support the tendering activities of public institutions.

In this study, detailed description of electronic public procurement process regarding e-Tendering, e-Purchasing and auditing components has been provided. Among these components only the e-Tendering component has been implemented. The resulting system is a web-based Tendering system designed to connect public institutions as

buyers and businesses as sellers. Through this system it is aimed to support two tendering procedures, namely open procedure and restricted procedure, which are regulated by law.

Among the most important functionalities of the system are providing immediate responses through e-mail communication, verification of vendors against VEDOP and usage of product classification codes.

In addition, this system offers the potential for significant savings such as decrease in costs associated with publishing and getting information, increase in competition, improvements in transparency in public administration and enhancements in the overall quality of public procurement management throughout savings in terms of cost and time.

However, electronic transformation of public procurement process brings not only lots of opportunities but also some challenges facing both public and private sector. The central issue is to resolve the issues of interoperability and to seek a way to optimize existing public procurement process. However, these issues have not been adequately recognized by the e-Procurement implementing institutions.

Lack of standardization is a major obstacle to e-Procurement initiative. It is required to develop common standards for classification of goods and services, web-based tendering and verification of vendors and public institutions. In addition, managing e-Procurement demands more comprehensive skills because it is linked to accounting, budgeting, inventory management and public investments. Therefore, standardization and interoperability remains important as better and more effective e-Procurement solutions are pursued.

Regarding eTS, all of the participants in the case study believe that eTS promotes an effective online public procurement process. They argued that it enables transparency and makes management of the procurement information easier and more effective.

Furthermore, through the case study some recommendations for the further improvements of eTS are provided such as providing statistical reports, displaying the content of the tender files and proposals, performing online synchronous meeting and providing opportunity to use keyboard while using the system.

The findings of the case study provide some strengths of eTS. Many of the participants agree that the most important features of the system are usage of product classification codes, providing immediate feedback through e-mail and integration with VEDOP. Since these features are among the factors for the success of electronic public procurement process, it can be concluded that eTS satisfies the conditions to achieve effective online public procurement process.

On the other hand, in the findings there are some weaknesses of eTS reported. The most important weakness of eTS is dependency to the number of approved vendors that make registration to the system. However, this is not the problem only with eTS but also with all e-Government services. To overcome this problem, it is required to increase computer literacy in both public and private sector.

To summarize, eTS is well designed as a prototype public procurement system. According to the findings of the case study, it can be concluded that eTS is capable of promoting transparency in public procurement process. Based on the requirements defined in this study, the other components, namely e-Purchasing and auditing, can be developed and used.

6.2. Recommendations For Future Work

One of the recommendations for the future work is to improve eTS according to the recommendations given by the participants in the case study. In this respect, the following issues might be considered:

- In Turkey, there is no synchronous eTS. The further research that examines such environments and designs a tool addressing e-Tendering functionality may be useful.
- The creation of XML schemas and making integration to other e-Government services will be a good idea.

Also, the development of standard common product classification and definition schema will contribute to the existing process. In the eTS, a simple product classification code is defined and used. Therefore, it is easy to integrate a newly developed and more comprehensive product classification standard to the system.

The other alternative is to further investigate the effectiveness of eTS with more participants in order to make statistical analysis of the success factors. Moreover, it can be a good idea to examine the economic and social benefits of e- Tendering process comparing existing and electronic form of it and then to find out the impact of e- Tendering on the success of public IT projects.

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APPENDICES

I: INTERVIEW GUIDE FOR E- TENDERING

Date:

Name of Interviewee:

Organization of the Interviewee:

INTRODUCTION

Good afternoon. I am Hamide Karahan Turan. I am working on electronic public procurement. In this context, I have prepared a web-based public procurement system. In this interview, I want to get your opinions about the implementation of eTS that you have been involved in. I am especially interested in the most challenging aspects of the system, strengths and weaknesses of the system, any problems you have faced, and recommendations about the functionality.

Before beginning, I want to make clear some important issues. I assure you that all your comments will remain confidential. I will be preparing a report that will contain all comments without any reference to individuals.

Please feel free, if you need to get information and ask questions.

QUESTIONS

- How do participants perceive the potential effectiveness of eTS?
- What are the strengths and weaknesses of the eTS?
- Which parts do participants want to be implemented differently?
- How do participants perceive the difficulties they face in using the eTS? (Probe to get any suggestions on how to minimize these problems)
- How can eTS be improved to achieve more efficiency and effectiveness?

II: E- TENDERING QUESTIONNAIRE

This section provides the questions included in the e- Tendering Questionnaire used for the utilization of the eTS.

Objective	Question	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
Transparency	That all tender notifications are accessed through eTS contributes transparency.	☐	☐	☐	☐	☐
	That all tender notifications are sent to the registered vendors via e-Mail improves transparency.	☐	☐	☐	☐	☐
	That the contract awards are accessed through eTS contributes transparency.	☐	☐	☐	☐	☐
User Friendly	That the registered vendors can access only the tenders related with their sectors simplifies the utilization of the eTS.	☐	☐	☐	☐	☐
	The system is easy to use.	☐	☐	☐	☐	☐
Information Management	Making use of common product classification codes makes the management of public procurement information easier and more effective.	☐	☐	☐	☐	☐
Vendor Management	That the integration with VEDOP enables the government to monitor the registered vendors effectively.	☐	☐	☐	☐	☐
	The information sharing about approved vendors is helpful	☐	☐	☐	☐	☐

III: GLOSSARY

This section provides the glossary for commonly used terms in this thesis.

Buyers or Procurement Officers	The Procurement Department individuals who responsible for receiving and carrying out an action in behalf of their institutions. Buyers are divided into four categories: Bidding Authority, Bidding Group, Purchasing Authority, Purchasing Group. In public institutions Bidding Authority and Purchasing Authority can be the same. Similarly, Bidding Group and Purchasing Group can be the same. Bidding Group and Purchasing Group report directly to the Bidding Authority and Purchasing Authority respectively.
Contract	A legally binding promise, usually exchanging goods or services for money or other considerations. Contracts require an approval. Both parties must sign the contract and standard terms and conditions may be altered from initial contract to payment.
Open Standard	Non-proprietary and available for use by any organization.
Procurement	It means purchasing, or otherwise acquiring any supplies, services, or construction. Also it comprises all functions that pertain to the acquisition that includes description of requirements, selection and solicitation of sources, preparation and award of contract, and all phases of contract administration.
Purchase Order	Buyer's online document to a vendor. It does not require a vendor signature.
Sellers or Vendors	Firms that would like to conduct business with the government.
Successful Bidder	Any vendor who receives a bid in connection with procurement.