Implementation of E-procurement and its performance effect on ship management companies

Case study of IRISL

Mohammad Reza Damavandi

Master of Science in Business and Economics
Business Administration

Luleå University of Technology
Department of Business Administration, Technology and Social Sciences
MASTER'S THESIS IN E-COMMERCE

Implementation of E-procurement and its performance effect on ship management companies (case study of IRISL)

Supervisor:
Dr. Mehrdad Alipour

Advisor:
Dr. Moez Limayem

Prepared by:
Mohammad Reza Damavandi

Lulea University of Technology
Master Thesis, Continuation Courses
E-commerce
Department of Business Administration and Social Sciences
Division of Industrial marketing and e-commerce

2011
Abstract

The rapid growth of competition in the market and the consequent changes in economic conditions impose organizations and firms to implement new technologies to stay competitive. Those firms which have not implemented technology at the proper time are at the risk of losing customers or suppliers. Transportation industry in general and maritime transportation industry in particular are not exception in this regard. Customers, partners, agents, collaborators, shippers, port operators, suppliers and service agencies are involved in the ship transport industry supply chain, and one of the major requirements in such a supply chain in which all concerned parties are scattered all over the world, is the high speed transferring of data between them. In maritime transportation procurement process plays an essential role. Ships usually purchase a large quantity of supplies for maintaining daily operations. The procurement process in maritime industry should be organized in a way that enables efficient transfer of goods and services into vessels. Today, a major goal of a maritime’s supply chain management is to apply information technology to their procurement systems efficiently and cost effectively. Moving away from traditional and paper based offline purchase processing to online procurement enables shipping lines to gain better procurement practices in terms of cost efficiency.

In this study based on the literature review, seven most frequently mentioned factors found. These performance factors were: Cost, visibility of supply chain, cycle time, procurement control, inventory management and purchasing errors which were influenced by implementing E-procurement. An attempt has been made in this research to find the performance effect of e-procurement implementation in ship management companies. The qualitative research was chosen and case study was conducted in IRISL in this paper. The source of data for this study was personal interview.

The result of the present study illustrates that the in overall implementation of electronic procurement has enhanced performance in the Islamic Republic Shipping Company. Generally, e-procurement is found effective in increasing performance and it can be utilized as a beneficial tool, especially during economic crises in shipping companies.

Keywords: E-commerce; E-procurement; Ship management companies;
ACKNOWLEDGEMENT

Firstly, I would like to appreciate and express my most gratitude to my supervisors, Dr. Moez limayem and Dr. Mehrdad Alipour Who have encouraged, supported and given me feedback throughout this thesis writing. Without their continuous encouragement and support, it would not have been possible for the completion.

Additionally I would like to appreciate Professor Esmail Salehi-Sangari for establishing of MSc e-commerce program in Iran.

Also, great thanks are directed to my family. Being loved and supported by them makes me believe that I can do anything well when I set my mind on.

Tehran, March 2011
Mohammadreza Damavandi
Contents:

Chapter 1: introduction

1.1. Introduction .........................................................................................................................1
1.1.1. Internet and e-commerce ...............................................................................................2
1.1.2. Procurement and E-procurement ....................................................................................3
1.1.3. Ship Management Company ............................................................................................5
1.1.4. E-procurement in ship management companies ..............................................................5
1.1.5. E-procurement in IRISL ....................................................................................................6
1.2. Problem discussion .............................................................................................................7

Chapter 2: Literature Review

2.1. Procurement .......................................................................................................................9
2.2. Internet and E-commerce ....................................................................................................10
2.3. E-procurement ..................................................................................................................11
2.3.1 E-procurement Definition ...............................................................................................11
2.3.2 E-procurement Benefits ..................................................................................................12
2.4. Internet and e-commerce in maritime industry .................................................................16
2.4.1 Maritime e-commerce .....................................................................................................16
2.4.2 E-procurement in maritime industry and ship management companies .......................18

Chapter 3: Conceptualization and frame of reference

3.1. Conceptualization ...............................................................................................................20
3.1.1. Cost reduction ...............................................................................................................21
3.1.2. Reducing cycle time .....................................................................................................22
3.1.3. Increasing efficiency .....................................................................................................22
3.1.4. Increasing visibility of supply chain ..............................................................................23
3.1.5. Better control/reporting ...............................................................................................23
3.1.6. Better inventory control ...............................................................................................23
3.1.7. Supply error minimizing ......................................................... 24
3.2. Frame of reference of the study ................................................. 24

Chapter 4: Methodology

4.1. Research purpose ................................................................. 25
4.2. Research approach ................................................................ 26
4.3. Research strategy ................................................................. 28
4.3.1. Case study research ........................................................ 29
4.4. Data collection method ......................................................... 30
4.5. Sample selection ................................................................. 31
4.6. Data analysis ....................................................................... 33
4.6.1. Analyzing case study evidences ........................................ 35
4.7. Quality standards ............................................................... 35
4.7.1. Validity ........................................................................... 35
4.7.1.1. Internal validation method .......................................... 36
4.7.1.2. External validation method ......................................... 36
4.7.2. Reliability ..................................................................... 37
4.7.3. The Quality of case study research ................................... 38

Chapter 5: Empirical data

5.1. IRISL Group ........................................................................ 39
5.2. Interviewee 1 Mr. Bahrampour ............................................ 40
5.3. Interviewee 2 Mr. Farahani .................................................. 42
5.4. Interviewee 3 Mr. Majid ....................................................... 43
5.5. Interviewee 4 Mr. Jamshidi .................................................. 44
5.6. Interviewee 5 Mr. Sohanian ................................................ 46
5.7. Interviewee 6 Mr. Rostami ................................................... 47
5.8. Interviewee 7 Mr. Zamanian ............................................... 48
5.9. Interviewee 8 Mr. Vafaei ...................................................... 50
5.10. Interviewee 9 Mr. Samimi .................................................. 51
List of tables:

Table 3.1: The summarized benefits of e-procurement ................................................................. 21
Table 4.1: Relevant situation for research strategies ........................................................................ 28
Table 4.2: Selected departments and persons for sampling ............................................................ 33
Table 6.1: Explanation of coding .................................................................................................. 57
Table 6.2: Coded data based on research theory ............................................................................ 57
Table 6.3: Display of collected data on cost reduction question .................................................... 58
Table 6.4: Display of collected data on cycle time reduction ......................................................... 59
Table 6.5: Barriers for increasing efficiency in IRISL ................................................................. 60
Table 6.6: Reduced data on question NO.4 ................................................................................. 61
Table 6.7: Reduced data on control enhancement factors ............................................................ 61
Table 6.8: Barriers for improving inventory management in IRISL ............................................. 62
Table 6.9: Reduced data of the e-procurement error minimizing effect in IRISL ....................... 63
List of figures:

Figure 1.1: IRISL procurement cycle.................................................................7
Figure 2.1: The network of shipping lines with shipping community over the internet........17
Figure 2.2: Database integration among internal and external parties in shipping companies.....18
Figure 3.1: Frame of reference........................................................................24
Chapter 1

1.1. Introduction

The introduction chapter presents background and different aspects of e-procurement. It starts with brief description of e-procurement within industries and shipping industries and at the end it moves toward the statement of the problem of this research.

The rapid growth of competition in the market and the consequent changes in economic conditions impose organizations and firms to implement new technologies to stay competitive. Those firms which have not implemented technology at the proper time are at the risk of losing customers or suppliers. (Jason R. Eaton 2003). Transportation industry in general and maritime transportation industry in particular are not exception in this regard. Operation in a very competitive market is the character of maritime transportation industry and the main driving factor toward implementing of technology in maritime transportation industry is continuous pressure for reducing overheads, costs and increasing efficiency and security (J.R.Kuehmayer 2002).

Customers, partners, agents, collaborators, shippers, port operators, suppliers and service agencies are involved in the ship transport industry supply chain, and one of the major requirements in such a supply chain in which all concerned parties are scattered all over the world, is the high speed transferring of data between them. In order to achieve competitive advantage over the rivals, the e-commerce and e-business with their attributes are focal points for ship owners and other stakeholders(YÜRÜYEN 2002).
Introduction

Internet has had a great impact on the organizations and firms in the recent years and as a technological innovation, it facilitated the communications between different parties in business-to-business transactions, commonly called E-commerce. The incredible growth of Internet has changed the business conducting methods. It has offered a wide range of opportunities to perform and conduct business. One of the main categories of business which has been influenced by internet is procurement. According to (Judith Gebauer & Arie Segav 2001) procurement is defined as “all of the activities involved in obtaining material and services and managing their inflow into an organization toward the end user. It includes obtaining manufacturing supplies for an assembly line as well as obtaining paper and pencils for a bank.” At least one third of organization’s income is being spent on purchasing goods and services, which shows that procurement has a significant business value and vital role in an organization. Organizations normally pay no attention to this valuable role.

Traditionally, the procurement process has consisted of excessive paperwork and a time-consuming process. The use of IT has changed the procurement process. E-procurement or electronic procurement means purchasing goods and services by using the internet as the communication media between different parties in the procurement process.

In maritime transportation procurement process plays an essential role. Ships usually purchase a large quantity of supplies for maintaining daily operations. The procurement process in maritime industry should be organized in a way that enables efficient transfer of goods and services into vessels.

Today, a major goal of a maritime’s supply chain management is to apply information technology to their procurement systems efficiently and cost effectively. Moving away from traditional and paper based offline purchase processing to online procurement enables shipping lines to gain better procurement practices in terms of cost efficiency (YÜRÜYEN 2002).

1.1.2 Internet and e-commerce

On June 2009, about 1.67 billion people worldwide had access to internet (Mini Watts Marketing Group). The figure shows the extent usage of Internet and its related applications by individuals and organizations.

Kim and Ramkaran (2004) cited in (Afshin afsharipour etal 2005) stated that like a desktop computer in the 1980s and the 1990s which had performed as a catalyst in re-engineering movement, the internet and WWW can be taken into account as a catalyst to radically change business process point of view.

The inconceivable rise of Internet and information technology has changed the way of conducting business. Today most of organization and firms adopt Internet and information technology into their business processes. Internet and information technology provide new
methods for firms to perform their business and improve their efficiency (Chun Wang-Zheng Wang 2006).

According to Jelassi and Endres (2004) cited in (Chun Wang-Zheng Wang 2006) e-commerce deals with the online transactions such as selling products and services.

Turban et al (2004) described e-commerce as the buying, selling, transferring or exchanging products, services and information through computer networks such as Internet (Chun Wang-Zheng Wang 2006). The main communication medium in e-commerce is Internet, which is being widely used by different suppliers, Buyers, firms and organizations.

Backer (2001) cited at (Afshin afsharipour et al 2005) defines e-business as the support of the several distinct phases of business transactions through information technology. Nowadays, e-business and e-commerce plays a vital role in most of the firms and organizations, which operates in various parts of industries.

(D.Ramasubramanian 2005), project manager at Wipro Technologies (2005), stated that now using internet and e-commerce in the field of marine business, Sales activities is more and more routine. Today, cargo booking sites, scheduling portals and auction sites have become important e-selling channels for ship management companies and this has decreased the cost of marketing and distribution. He also stated that e-B/L (Electronic Bill of Lading) is very important constituent of the whole shipping documentation processes that contains the proof of copies, which can be examined before issuing the original Bill of Lading. It reduces re-processing time as well as using paper format and eliminates fax affairs. All of the mentioned issues pull down the expenses and processing time between the carriers and shippers when changes occur.

The networks between shipping companies and their representatives allow both sides to monitor the bookings at online and offline marketing efforts in a single database. Bookings can be done directly into the systems, sent to centralized databases and then collected. It will provide shipping companies and their regional sales forces possibilities to operate efficiently (ibid).

1.1.3. Procurement and E-procurement

(Judith Gebauer-Carrie Beam and Arie Segev 1998), in their paper, define procurement as “all of the activities involved in obtaining material and services and managing their inflow into an organization toward the end user. It includes obtaining manufacturing supplies for an assembly line as well as obtaining paper and pencils for a bank.” Procurement always consists of paperwork and bureaucracy in both private and public sectors.

Procurement is the process of acquisition of appropriate material, goods or services and it contains a complete cycle of obtaining these items from ordering, processing, approval and receipt to payment approval (Sara Faraji Jalal 2007).
Introduction

Most of organizations and firms spend about one third of their income for purchase services and goods, (Judith Gebauer & Arie Segav 2001). Even some researchers as Kalakota and Robinson (1999) cited at (Sara Faraji Jalal 2007) stated that 50 to 60 percent of total revenue is being spent on purchasing goods and services.

The way of thinking about competitive advantage has been affected by economic environment, uninterrupted pressure for reducing cost and overheads enforce companies to change the way of conducting business (Jason R. Eaton 2003).

Nowadays, Most of the companies spend a large portion of their income on procurement thus efficient transfer of goods, services and information is being focused by firms as an essential issue. Today companies tend to implement information technology to improve productivity and operational efficiency and decrease costs. The computer-enabled procurement system or e-procurement is a subset of e-business process of a firm (David M. Doe 2002).

Podlogar (2006) cited at (Sara Faraji Jalal 2007) defines e-procurement as the automated requisition, approval, purchase order management and accounting process by using internet and any other computer networks the communication channel.

E-procurement is purchasing of goods and services through internet or other information network, (Malcom H. Morrison 2009). Organizations that automate their procurement system and control inventories could gain efficiency, reduce purchasing cost and improve delivery schedule. He also mentioned that there are three major types of E-procurement; ERP or enterprise resource planning which is used to create and approve purchasing using web technologies; e-sourcing which identifies suppliers by using information technology and web technology and finally e-tendering which sends information and pricing request to suppliers using internet technology.

E-procurement is the result of utilizing e-commerce technology in the organization purchasing activities (M. Jose Garrido-Saminiego et al 2010).

Knudsen (2001) cited at (Sara Faraji Jalal 2007) believes that e-procurement implementation creates greater saving than online retailing and ERP systems.

By decreasing cycle time and amount of paperwork in procurement transactions, necessary time for marketing on new products, production lead time and quality can be improved by suppliers (Pricehousecoopers, n.d.). Full implementation of electronic procurement strategy can lead to a greater level of saving achievements by global firms, Prime consulting Group (2002)

1.1.4. Ship Management Company

Ship management companies are vessel management companies which manage, maintain and deal with ship’s routine operations, maintenance and regulatory issues of the vessels. The ship
management refers to crew recruitment, commercial and technical management with related task of operation, service and maintenance along with purchase and supply of required equipment, spares, stores and logistic. The above task is performed by vessel owners or performed by an approved ship management company (operator), selected, deployed and authorized by the owner. Nowadays, managing ships is very complex business; vessel management should be done properly to ensure cost control so that the procedure being observed and economic estimation being covered. Vessels should be well equipped and correctly maintained to conduct their operation while maintaining the minimum downtime. It is essential that ship’s operators meet the mission requirement at all times and ensure that effective communication link can be established among operators, vessels and their owners (IRISL documents).

1.1.5. E-procurement in ship management companies

Procurement is an important process which plays a vital role in maritime industry, because ships usually purchase a large quantity of supplies for maintaining daily operations. Today, a major goal of a maritime’s supply chain management is to apply efficiently and cost effectively information technology to their procurement systems. The flow of goods, services, and information in maritime industry, should be planned in such a way that enables efficient transfer of these items into vessels. Moving away from traditional offline and paper-based purchase processing to online procurement presents significant savings, improved productivity and enhanced operational efficiencies.

(Donald Staffin 2006) the vice president, business strategy and development, iShipExchang, claimed that often at the beginning of purchase technology implementation there are some difficulties not because of technology itself, in current situation if we disregard the technology, we will never obtain something finished or completed, he claimed. But if you continue on in spite of difficulties you are going to face resistance by people who are not realistic. Expectation about the system ability and performance can produce many problems in utilizing the proper tools, searching for continuous improvement and ask people to think in this way, he claimed.

(Andrew Craig-Bennett 2005), Wallem Ship management believes that 30-35 percent of total Ship management expenses is purchase expense whereas in the ship yard where the ships are built and repaired 70 percent of total costs is purchasing. He has also indicated that manpower is about 50 percent of ship’s functioning expenses and guarantee contracts and moving a boat ashore are not purchased over e-purchase systems. Hence e-purchase is more crucial in constructing a ship than transporting by a ship.

(Terry Kearney 2005) director of operations and marketing, Sea supplier, said that the viewpoint of the ship management firms towards implementing of e-procurement has become different or altered, but still there are some contests. The purchase is being supervised by e-mail or paper in 62 percent of freight firms and 20 percent have utilized computers and networks on purchase
system which has been built internally. While other 18 percent utilize business e-purchase systems.

(Paul Ostergaard 2005) CEO of e-purchase firm, ShipServ (a “ship supply supervising firm) claimed that they deal in more than 5000 business transaction per month with 175 purchasers. He also reminded that the main profit of ShipServ’s is offering the providers is helping them to trade on their products that they dispatch for the owners and it avoids the cost of face-to-face meetings or confront meetings. “I think one day all software systems will be MTML acquiescent,” explained Paul Ostergaard, “20 percent of this system goes forward by means of technology and 80 percent of it alters the act of management”.

"The marine industry is a global market worth over $150bn and speed and efficiency are so crucial in it. Recently, e-procurement has emerged as an important tool that can give operators and oil companies a competitive edge", (D.Ramasubramanian 2005)n, the project manager at Wipro Technologies, reports.

He also indicated that the whole process for purchasing of stores and services to offshore oil rigs can be automated using the e-commerce, web services and integration between oil platform owners, buyers, oil rig officers, salesman and any other intermediates. The reliability, scalability, ease of use and administration, and cost-effectiveness of this kind of web-based platform, in terms of supporting process-intensive business operations such as global procurement from a single window, are well documented, and have helped oil rig owners realize tremendous savings through efficient paper-less work management with trading partners

In maritime e-procurements system like other procurement system, the major issue is data quality, seafarers should correctly ask their purchasing requirements, in the other hand suppliers should recognize completely what the vessels are asking for.

Improving data quality is something everybody needs to work towards. "If suppliers don't give the correct information electronically, they can expect badly prepared orders," commented Paul (Paul Ashton 2005) Ashton, VP of innovation with Xantic.

1.1.6. E-procurement in IRISL
IRISL (Islamic Republic of Iran Shipping Lines) has started applying electronic tools on its procurement processes since 1999; the software was developed by IRISL telecom department, during the past 11 years, there have been a lot of change in the software structure but the method of procurement and procurement cycle has not been changed.

Figure 1.1 illustrates the procurement cycle in IRISL:
As can be seen in figure 1.1 the request for an item or service from ships will be sent to IRISL through e-procurement software, after superintendent approval based on type of information and vessel position, a request will be send to suppliers. If the supplier software is integrated with ship management company software, system will automatically send the order; otherwise an order will be generated by the software normally on a common format such as text and after attaching, the email will be sent to the supplier. Whenever the ship receives the item or service, the request status will be updated and the payment to supplier will be carried out (source IRISL Documents).

1.2 Problem discussion

In the maritime competitive industry, cost reduction and increasing efficiency are important factors. As a result, ship management companies have implemented e-commerce to make more efficient business. Different parties in maritime supply chain such as customers, partners, agents, shippers, port operators spread geographically all over the world, ships are moving from a port to the other, they do need support in various places. Today one of the main necessities in ship management is facilitating the high speed data transferring between different parties in value chain activities to stay competitive. In this regard, information technology and e-commerce are
as a notable tool for ship management companies to increase their efficiency and reduce costs (YÜRÜYEN 2002).

(Judith Gebauer-Carrie Beam and Arie Segev 1998) in their paper define procurement as “all of the activities involved in obtaining material and services and managing their inflow into an organization toward the end user. It includes obtaining manufacturing supplies for an assembly line as well as obtaining paper and pencils for a bank.” Procurement always consists of paperwork and administration in both private and public sectors. In most of organizations, more than 30 percent of total revenue is being spent on the process of acquisition of goods and services or procurement.

The incredible rise of Internet and information technology has changed the way of conducting business. Today most of organization and firms adopt Internet and information technology into their business process. Internet and information technology provide new methods for firms to perform their businesses and improve their effectiveness (Chun Wang-Zheng Wang 2006).

Procurement technology plays a vital role in maritime industry, because ships usually purchase a large quantity of supplies for maintaining daily operations. The flow of goods, services, and information in maritime industry should be planned in a way that enables efficient transfer of these items into vessels. Today, a major goal of a maritime’s supply chain management is to apply efficiently and cost effectively information technology to their procurement systems. Moving away from traditional offline purchase processing to online procurement presents significant savings, improved productivity and enhanced operational efficiencies.

Recently many ship management companies have used e-procurement solution in their procurement process. This e-procurement systems comparing to offline purchasing system heavily affected the companies buying center and total process of procurement.

Based on the discussion above, the purpose of this study is to gain insight in the procurement in ship management companies (IRISL) and the impact of e-procurement on ship management companies, thus the research problem is as follow:

To achieve the impact of e-procurement on performance of ship management companies
Chapter 2

Literature Review

Theories about E-procurement will be presented in literature chapter based on the research problem which has been presented in chapter one, It will begin by with presenting of procurement and E-procurement and the followed by E-procurement in maritime industry.

2.1. Procurement

(Judith Gebauer & Arie Segav 2001) defined procurement as “All of the activities involved in obtaining material and services and managing their inflow into an organization toward the end user. It includes obtaining manufacturing supplies for an assembly line as well as obtaining paper and pencils for a bank”.

Most of organizations and firms spend about one third of their income for purchase services and goods (Judith Gebauer & Arie Segav 2001). Even some researchers as kalakota and robinson (1999) cited at (David Caffey 2009)stated that 50 to 60 percent of total revenue is being spent on purchasing goods and services.

(David Caffey 2009) believes that in addition to purchasing goods and services from suppliers, procurement includes inbound logistics, warehousing and inventory management.
Procurement includes actions related to acquisition of services and goods and managing its flow toward the consumer (Judith Gebauer & Arie Segav 2001). Procurement ranges from purchasing stationery for a bank to acquiring MRO products for an assembly line (ibid).

(Judith Gebauer & Arie Segav 2001) Three steps of purchasing materials and services are information, negotiation, and settlement:

- Information: it consists of demand recognition, source evaluation and collecting data about vendors, products and market situation.
- Negotiation: it means communicating with suppliers and asking for quotation and availability for required materials, services and final contract
- Settlement: settlement means completion of contract; it is achieved when services and capital have been exchanged.

Due to the fact that most of organizations spend more than 30% of their revenue for purchasing materials and services, procurement has great business value; nevertheless this process is mostly very inefficient because of bureaucracy and complicated workflow which is time consuming and expensive (ibid).

Due to the fact that purchasing goods and services is at least one third of total expenses in most organizations, procurement has an important business value which is mostly being overlooked. The costly, time consuming and complicated paper based procurement processes are very inefficient (Judith Gebauer & Arie Segav 2001).

2.2. Internet and E-commerce

Backer (2001) cited in (Afshin afsharipour etal 2005) defines e-business as the support of the several distinct phases of business transactions by using information technology. Nowadays, e-business and e-commerce plays a vital role in most of the firms and organizations, which operates in various parts of industries.


Obtaining unforeseen necessities is now easier through internet search engines. Furthermore with utilizing internet-based catalogs, searching, browsing and online ordering are more practicable(Judith Gebauer & Arie Segav 2001).

(Jason R. Eaton 2003) Global business is rapidly changing persuading organizations to take quick decisions when thinking about innovative technology. Firms which are not capable of
Literature review

identifying the significance of new technological development and its implementation at the right time are at the risk of losing customers or suppliers.

Employing internet power which allows complicated B2B transactions has great impact on organizations. Organizations and companies have been compelled by globalization and innovative technologies to change their business structure to stay competitive (ibid).

Moving from traditional business processes to electronic environment (commonly called e-business) is one of the main angles of restructuring organizations (Jason R. Eaton 2003).

(Judith Gebauer & Arie Segav 2001) stated in their paper that organizing and collaborating have been modified by innovative information systems such as internet. Business opportunities have been enhanced by globalization of resources and market, however simultaneously competition has been increased. To acquire flexibility and responsiveness which leads to gain higher business value, innovative information systems like internet are being more reliable in companies and firms. “The Use of information technology frequently plays a crucial role in determining the participants on a project basis, in maintaining the relationship between the nodes of the network, and in supporting the collaboration of the participants over geographical distance and across different time zones” (ibid).

2.3. E-procurement

2.3.1 E-procurement Definition

(David Caffey 2009) defines e-procurement as incorporating all purchasing activities such as purchaser request, authorization, ordering, delivery and payment by utilizing electronic means such as internet, web technology and e-commerce. Electronic procurement system (EPS) is a system which automates all activities in procurement process such as storing requests, approval management, authorization and interfacing with company financial system (ibid).

(M.Jose garrido-saminiego et al 2010) states that internet and information technology has been applied to business strategy of most organizations. One of the areas which have been widely influenced by information technology is procurement. E-procurement is the outcome of applying e-commerce to organization purchasing activities.

(Lindija Pulevska-Ivanovska 2004) : The action of conducting procurement operation electronically and paper-free is called e-procurement which consists of whole operation of procurement such as requisition, approval, shipping, etc. and not just buying process. E-procurement encompasses “requisitioning, purchasing, transportation and in-bound receiving process”. It starts with requisition for an item and ends with invoice payment (ibid)

E-procurement is defined as purchasing through internet and other information networks (Malcom H.Morrison 2009).E-procurement sites can be employed to purchase goods and
services, e-procurement software automates purchasing processes, controls inventory, reduces purchasing costs and increases efficiency.

There are three types of e-procurements:

- **ERP** which includes requesting and approval of purchasing process by utilizing internet technology
- **E-tendering** which is the request of information and price from suppliers and receiving feedback electronically
- **E-sourcing** which is the discovering and accessing new suppliers through internet and web technology (ibid).

Dolmetsch et al 2000; cited in (Thomas puschmann and Rainer alt 2005) defines e-procurement as the indirect goods supply chain management by using e-Markets and information technology.

(Jason R. Eaton 2003) stated that e-procurement as one of the specific areas which deals with external transactions enables improvement on activities such as purchasing raw material and services by using internet and web technology

### 2.3.2 E-procurement Benefits

(David Caffey 2009) believes that the significance of procurement process as a strategic matter highlighted by introducing e-commerce and e-procurement which influences customer and companies by its significant cost saving.

With the advent of internet most of the organizations adopt techniques to streamline their indirect material supply chain, implementing e-procurement will result to substantial improved potential compared with paper-based procurement systems (Thomas puschmann and Rainer alt 2005).

Aberdeen et al 2001 cited at (Thomas puschmann and Rainer alt 2005) believes that by implementing e-procurement, operational process will be decentralized whereas strategic procurement process will be centralized which results in higher supply chain transparency.

(David Caffey 2009), e-procurement benefits falls into two categories:

- **Direct cost reduction** which is achieved by firstly increasing efficiency in procurement process. Process efficiency is defined as less employee time spending on searching, authorizing, approval and ordering; secondly enables to reduce number of staff which process each order by automatic validation of pre-approved budget for each person and each department and thirdly by decreasing printing cost and paper cost of order forms and invoices.
Indirect benefits of e-procurement such as decreasing cycle time between order and delivery and enabling greater flexibility for supplier selection according to the best value.

Kalakota and Robinson (2000) cited at (David Caffey 2009) concluded that e-procurement is being considered as a strategic issue due to its great saving and cost reduction.

Quality, flexibility, cost efficiency and speed in procurement processes can be improved by utilizing new technologies such as internet and World Wide Web (Judith Gebauer & Arie Segav 2001).

(David Caffey 2009): e-procurement enables buyers to spend more time on value-added activities by reducing his/her administrative tasks such as ordering and resolving difference between delivery and orders.

Turban et al (2000) cited at (David Caffey 2009) Listed the benefits of e-procurement as follows:

- Reduction in cost and procurement cycle time
- More effective budget control by limiting the expenditures and enhanced reporting
- Minimizing ordering and administrative errors
- Enabling originator to concentrate on strategic aspect of purchasing
- Decreasing the product price
- Enhanced information management
- Better payment process (if it is integrated with e-procurement)

Giunipero and Sawchak 2000 cited at (Thomas Puschmann and Rainer alt 2005) stated that the main purpose of implementing e-procurement is to expedite the operational procurement process by bypassing purchasing department by permitting and entrusting more strategically task to requester. In e-procurement, the requester is able to search and select the product in approved electronic catalogs

Reducing inventory and staff time by implementing e-procurement will result to reduce the purchasing cycle time and cost (David Caffey 2009).

One of the important advantages of e-procurement is to reduce workload of purchasing company by decentralizing the operational procurement process (Thomas Puschmann and Rainer alt 2005).

In traditional procurement processes many authorization stages were involved, these stages were reducing the speed and efficiency of procurement cycle by placing objection on request. To
achieve faster and more convenient procurement process number of authorization stages should be decreased (ibid).

Atkinson 2001 cited at (Jason R. Eaton 2003) announced that e-procurement advantages are precise and on time business intelligence, on time payment, better cash flow management, reduced administration cost and reduced overhead cost.

The first advantage of e-procurement is providing online catalog which opens a wide spectrum of different prices from different companies to purchaser. Faster and cheaper process by nullifying printing many copies and reducing time cycle with providing electronic approval cycle is the second advantage(Jason R. Eaton 2003).

Many profits can be obtained with proper implementation of e-procurement; e-procurement helps organizations to control their procurement process during economic crisis by providing better visibility on procurement process (ibid).

McKie 2001 cited in (Jason R. Eaton 2003) stated that e-procurement is an employee-centered business process which negates the need for purchasing professional to make sure proper execution of regulations is being met. E-procurement prevents employees to break company rules by integrating companies purchasing regulations inside the system. Finally e-procurement should prevent company’s purchasing department to act like a bottleneck in purchasing process.

Nowadays industries should increase their quality while reducing product price. Group purchasing was used previously as a method for cost reduction while today e-procurement helps to control and manage purchasing process and it also enhances purchasing standard and efficiency (Malcom H.Morrison 2009).

(Lindija Pulevska-Ivanovska 2004) in her research stated that e-procurement can assist hotels a great deal, as it offers new opportunity to reduce the cost. Effective conversion of raw materials to final products and services with value can be obtained by proper planning in flow of services, goods and information in the hotel industry. To maintain daily operation and quality in hotels, normally these firms purchase considerable amount of goods and services, hence procurement is a key function of hotel management. Effective implementation of e-commerce and information technology to the procurement process is one of the main objectives in hotel supply chain management.

(Malcom H.Morrison 2009) believes that Procurement software which automates purchasing cycle reduces the bureaucracy and paper work and reduces purchasing cost. The benefits of e-procurement are:

- Significant saving from group purchasing
- Increasing efficiency
Literature review

- Faster turnover
- Standardized shipments

(Lindija Pulevska-Ivanovska 2004) stated that implementing e-procurement technology in an organization results in obtaining following benefits:

- Purchasing process can be contributed to all employees due to easy operation and self-service of e-procurement system; everybody can access procurement process with just a web browser.

- Providing more efficient process in e-procurement and decreasing the cost of order-processing and cycle time.

- It draws attention to the procurement function and significance of cost saving

- E-procurement prevents maverick buying practices

Operational cost control is the main viewpoint of firms’ e-procurement strategy. Ineffective purchasing wastes billion of dollars annually. Procurement management is coordination between relevant parties and activities in purchasing goods and services which fulfill company’s mission. E-procurement provides real-time information which enhances effectiveness of supply chain (ibid).

(Lindija Pulevska-Ivanovska 2004) in her research concluded that as an important management tool e-procurement system improves the performance in the supply chain. By substituting traditional paper-based purchasing process with new online process, great saving, improved operational efficiency and enhanced productivity can be obtained. Online purchasing provides better price offerings for hotel customers by establishing higher quality communication links between hotel and its suppliers.

(Judith Gebauer & Arie Segav 2001) concluded that organizational point of view toward e-commerce and internet is positive despite the fact of low current use. Organization with paper-based procurement system conceives that technology has enough potential to support their purchasing process. Their analysis proves that small companies are wishing to establish electronic link with their suppliers to support their procurement process and internet has a great potential to support procurement process.

Beer de, Harink & Heij Boer 2000 Cited in (M. Jose Garrido-Saminiego et al 2010) believes that in addition to reducing the cost, e-procurement affects processes, organizational structure and boundaries and buying center structure.

(M. Jose Garrido-Saminiego et al 2010) defines buying center as an unofficial part of company which composed of different peoples in different departments who are involved in purchasing
process. It is composed of requesters, users, purchasers and managers. Utilizing internet can affect all phases of purchasing by influencing the data interchange method which will directly affect buying center structure.

With implementing internet in purchasing processes the amount of information about product and number of departments involved will be increased while cycle time will be decreased (M. Jose Garrido Saminiego et al 2010).

Capacity of internet can expand to collaboration in both internal activities and external activities. By applying e-procurement, cooperation between different parties in buying center as well as the number of departments involved in purchasing will be increased (ibid).

Innovative information technology and internet present solutions to companies which influence their procurement strategies. The benefits of applying e-procurement to procurement process in a company are; reducing time for searching a product or service, reducing administration cost for purchasing, decreasing procurement cycle time and limiting number of suppliers to approved suppliers which confirm quality (Afshin Afsharipur et al 2005).

2.4. Internet and e-commerce in maritime industry

2.4.1 Maritime e-commerce

Maritime e-commerce commenced at 1999 coincident with beginning of e-commerce on other B2B industries. E-commerce has positive and significant impact on the maritime industry. Shipping companies have realized the importance of IT and e-commerce on cost reduction and efficiency enhancement (J.R. Kuehmayer 2002).

High tension in competition in shipping industry, permanent force for cost reduction and reducing overheads are the main motive towards e-commerce implementation in maritime industry (ibid).

(D. Ramasubramanian 2005) stated that nowadays using internet and e-commerce in maritime business sales activities are more common, shipping companies can use cargo booking sites, auction sites and scheduling portals to increase efficiency with decreasing marketing and distribution costs.

All parts of daily operation in marine business can be improved by using web based tool. Embracing web will increase visibility in supply chain by movement of the ship data through the whole supply chain (ibid).

E-enabling of business operation by using internet has improved productivity, increased collaboration between partners, upgraded customer service and reduced purchasing cost and time cycle (D. Ramasubramanian 2005).
Today shipping companies are able to collaborate with their virtual and physical value chain by installing networks in their companies over internet among their external value chain participants and internal department; this will create value for customers, partners and shipping companies (YÜRÜYEN 2002). Figure 2.1 illustrate the internal and external participants connected and interacting by a shipping company (carrier).

![Diagram of Network Relationships of Shipping lines with shipping community over the Internet (YÜRÜYEN 2002)](image)

Operating in a Competitive market is the nature of shipping industry, e-commerce with its unique attributes can assist companies to decrease their cost and make more efficient market (J.R.Kuehmayer 2002). Maritime e-procurement supplies a complete solution for shipping industries to purchase goods and services electronically (ibid).

(YÜRÜYEN 2002) believes that E-commerce affected international shipping lines business in two areas:

1) Commercial area such as e-marketing, e-selling, e-procurement...

2) Technical area such as electronic charts, communication over internet, Inmarsat…
Today e-commerce in ship management companies covers all area of activities range from e-procurement to e-customer service which takes place in an integrated method that facilitates accurate information access in both internal department and external parties (YÜRÜYEN 2002).

Effective ERP has been enabled by integrating all activities in value chain using e-commerce. Beside the successful ERP systems some dotcoms companies play an important role by sharing information. The whole shipping activities such as E-procurement, E-operation, E-fulfillment and E-marketing are accessible to monitor by different parties using a synchronized data base (ibid).

Figure 2.2 shows database integration among internal and external parties in liner shipping companies and sales processes(YÜRÜYEN 2002).

Enhanced workflow has been created by utilizing e-commerce tools between shipping companies agents, vessels and physical shipping operation in ports and at sea (YÜRÜYEN 2002).

**2.4.2 E-procurement in maritime industry and ship management companies**
(D.Ramasubramanian 2005) in his paper stated that from 2003 major marine operators are spending on e-procurement as a business tool not just a faddish curiosity. Offshore oilrig procurement process can be automated by using internet and web services to incorporate oilrig owners, buyers, oilrig officers and vendors.

Oilrig owners gain great saving by implementing paper-less and automated procurement process with their partners. The internet and web-based platform is reliable, easy to use and cost effective which with these attributes can support business process, such as procurement (ibid).

(Mark Haslett 2005) procurement manager of Wallem ship management stated that they have recognized the real profits of employing e-commerce into purchasing activities. He also mentioned that procurement activities can perform faster and more controllable with applying e-procurement system. It also facilitates access to information for all users and mangers in the supply chain.

By implementing e-procurement Wallem has an automated, secure and extremely efficient supply chain which is a real competitive advantage (ibid).

(Hansen 2005) purchasing manager of Redri AS Stated that e-procurement has reduced paperwork and cycle time and also it allows fast reply to RFQ’s and order confirmation. He also mentioned that the main obstacle in implementing e-procurement in marine industry is the lack of standardization for parts and ordering system between different parties in supply chain.

Sending RFQ’ is easier with e-procurement and transactions are more visible. It decreases number of employees in purchasing department by reducing the time for request verification and approval (ibid).

(Piet Jan ten Thije 2006), the general manager of e-commerce strategy with P&O Nedloyd believes that e-procurement in marine industry is not used to reduce the product price, it is utilized to decrease the process cost. It offers good opportunity to reduce transaction costs and increases control on purchasing process.

Diana Matta CEO of e-procurement company Seavantage cited (Donlad Staffin 2006) stated that the best opportunity of e-procurement is the reduced process cost.

(Donlad Staffin 2006)Donlad Staffin executive vice president of e-procurement company iShipExchange believes that e-procurement has focused on process cost reduction, process time reduction, controlling purchasing process and linking the system to accounting department.

The purchasing department in a shipping company has a wide range of activities ranging from buying spare parts, stores, fuels and chemicals, provisions to exchanging containers (YÜRÜYEN 2002).
By implementing e-procurement the total purchasing activities from purchase request, quotation to invoicing and delivery has been improved causing ship management companies to achieve better purchasing practices in term of cost efficiency (ibid).
Chapter 3
Conceptualization and frame of reference

3.1. Conceptualization

(Miles M.B. and Huberman 1994) stated that explaining the main area of research either graphically or in narrative form is the role of conceptualization. This study concerns e-procurement in ship management companies and its effects on their performance.

Based on the literature review in chapter two, eight dimensions are found which have been mentioned most frequently as the benefits of implementing e-procurement that affecting the performance of companies.

According to the selected theories which has been summarized in table 3.1, e-procurement implementation has the following benefits:

- Reducing administrative and operational cost
- Shortening procurement cycle time
- Increasing efficiency
- Increasing visibility of supply chain
- Better control on procurement process by better reporting
- Better inventory control
- Minimizing errors in procurement process
The reviewed benefits of e-procurement are summarized in table 3.1

<table>
<thead>
<tr>
<th>Authors</th>
<th>Benefits</th>
<th>Cost reduction</th>
<th>Reducing cycle time</th>
<th>Increasing Efficiency</th>
<th>Increasing visibility of supply chain</th>
<th>Better control/Reporting</th>
<th>Better inventory control</th>
<th>Errors minimizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Thomas Puschmann and Rainer Alt 2005)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(M.Jose Garrido-Saminiego et al 2010)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Yuruyen 2002)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atkinson 2001</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Jason R. Eaton 2003)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Mark Haslett 2005)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Lidija Pulevska-Ivanovska 2004)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(M.Jose Garrido-Saminiego et al 2010)</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Malcom H. Morrison 2009)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(David Caffey 2009)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Donald Staffin 2006)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Hansen 2005)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(J.R. Kuehmayer 2002)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Afshin Afsharipour et al 2005)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Judith Gebauer &amp; Arie Segav 2001)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(D. Ramasubramanian 2005)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knudsen 2001</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kalakota and robinson (1999)</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turban et al. 2004</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Sara Faraji Jalal 2007)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.1

### 3.1.1 Cost reduction

(Judith Gebauer & Arie Segav 2001) stated that the paper based procurement is costly. (David Caffey 2009) believes that decreasing printing cost and paper cost of order forms and invoices is one of the benefits of e-procurement implementation. He also mentioned that e-procurement will result in cost reduction by reducing inventory. (Malcom H. Morrison 2009) believes that by implementing e-procurement purchasing cost will be decreased by reduced bureaucracy and paper work. (Lidija Pulevska-Ivanovska 2004) concluded in her paper that utilizing e-procurement decreases the cost of order processing. (Piet Jan ten Thije 2006) stated that the main purpose of implementing of e-procurement in shipping companies is to reduce the process and transaction costs.
As cost reduction is one of the most important and most frequently mentioned benefit of implementing e-procurement as seen in table 3.1 the first research question of this study is:

**RQ1: How does the implementation of e-procurement impacts administrative cost in ship management companies?**

### 3.1.2 Reducing cycle time

Time for marketing on new product, production lead time and quality can be improved by decreasing cycle time and amount of paperwork in procurement transactions (Pricehousecoopers, n.d.)

(David Caffey 2009) stated that one of the indirect benefits of e-procurement is decreasing cycle time between order and delivery and enabling greater flexibility for supplier, selection according to the best value.

(Lindija Pulevska-Ivanovska 2004) believes that e-procurement provides more efficient process and decreases the cycle time.

(Hansen 2005) purchasing manager of Redri AS Stated that e-procurement has reduced paper work and cycle time and also it allows fast reply to RFQ’s and order confirmation.

As it can be seen in most of the researches reducing of cycle time is one of the factors which have been mentioned most frequently as the benefits of e-procurement the second research question is:

**RQ2: How does implementation of e-procurement affect cycle time in ship management companies?**

### 3.1.3 Increasing Efficiency

(David Caffey 2009) defies process efficiency as less employee time spending on searching, authorizing, approving and ordering.

As it can be seen in literature review chapter many authors believe that Procurement software which automates purchasing increases the efficiency, based on this the third research question will be:
3.1.4 Increasing visibility of supply chain

(D. Ramasubramanian 2005) stated in his paper that all parts of daily operation in marine business can be improved by using web based tool. Embracing web will increase visibility in supply chain by movement of the ship data through the whole supply chain.

(Thomas Puschmann and Rainer Alt 2005), (Mark Haslett 2005), (Hansen 2005) and (Sara Faraji Jalal 2007) also believe that implementing e-procurement will increase the visibility of supply chain. Based on this, the forth research question of this study is:

RQ4: How does implementation of e-procurement influence transparency of supply chain in ship management companies?

3.1.5 Better control/Reporting

(Turban et al 2000) stated that implementing e-procurement enables more effective budget control by limiting the expenditures and enhanced reporting.

(Jason R. Eaton 2003) believes that e-procurement helps organizations to control their procurement process during economic crisis by providing better visibility and better reporting on procurement process.

Since better control on procurement process by better reporting is frequently mentioned by several authors (e.g., Mark Haslett 2005; (Malcom H. Morrison 2009); (Donald Staffin 2006); (Afshin Afsharipour et al 2005) and (Sara Faraji Jalal 2007)), the fifth research question is:

RQ5: How does implementation of e-procurement affect control of procurement process in ship management companies?

3.1.6 Better inventory control
Frame of reference

(David Caffey 2009) is of the opinion that in addition to purchasing goods and services from suppliers procurement includes inbound logistic, warehousing and inventory management.

(Malcom H.Morrison 2009) believes that e-procurement software controls inventory. Since inventory management on ships is an important factor in ship management companies the sixth research question is:

**RQ6: How does e-procurement affect inventory management in ship management companies?**

**3.1.7 Error minimizing**

(Turban et al 2000) stated that utilizing e-procurement software will result in minimizing error on procurement process. Wrong supply due to wrong ordering is one of the main problems in ship management companies based on this theory the last research question is:

**RQ7: How does e-procurement impact purchasing and supply errors in ship management companies?**

**3.2 Frame of reference of the study**

In order to gain a better idea of how e-procurement affects performance on ship management companies, seven research questions have been developed, each question focuses on one of the theoretical concepts i.e. cost, cycle time, efficiency, supply chain visibility, purchasing control, inventory control and errors. Based on this, seven factors are chosen as the variables in the frame of reference of this study.
Figure 3.1: Frame of reference
Chapter 4

Methodology

The term methodology refers to the theory of manner for undertaking a research, it contains research’s theoretical and philosophical assumption and guidance of these items for the methods adopted (Saunders et al 2009). In this chapter the researcher illustrates the method used besides how the thesis is created.

4.1 Research Purpose

Classifying business research on the basis of purpose allows us to understand how the nature of the problem influences the choice of research strategies. Referring to Zikmund (2000) cited in (Afshin afsharipour et al 2005) there are three research purposes; exploratory, descriptive and explanatory or casual. The nature of the problem is determining the research purpose.

(Saunders et al 2009) defines the exploratory research as a useful means in exploring what is happening; seeking new insight; asking questions and assessing phenomena in a new light. This type of research purpose is especially functional if the investigators wish to clear their understanding of the problem such as exploring the nature of the problem. There are three ways for conducting exploratory research:

I. Literature research
Methodology

II. Expert interviewing
III. Focus group interviewing

(Robert K. Yin 2003) states that when the research problem is well structured furthermore the aim is not investigating cause/effect relationship descriptive research is used. (Saunders et al. 2009) the purpose of descriptive research is to depict a precise figure of individuals, events or situations. One of the necessities on this type of research is having clear picture of the phenomena under study before collecting data. (Robert K. Yin 2003) stated that analyzing cause-effect relationship is the aim of the explanatory research. (Saunders et al. 2009) termed explanatory research as the studies which set up casual relationship between variables.

This study, according to research question moreover based on the fact that the researcher is trying to investigate the differences and similarities of the research findings with frame of reference, called descriptive study.

4.2 Research approach

(Flick 2009) There are two categories of research approach; quantitative and qualitative. Selecting any of these research approaches depends on the research problems and research questions.

(Houman 2006) believes that in quantitative research approach, a theory is tested by using methods, which measures, and analyses research variables. In this approach, findings are spread and extendable.

The limitations of quantitative approach are:

- Manipulation
- Reliance on measurement
- Variable control
- reductionism

(Ritchie 2003) Contrary to quantitative approach, the qualitative approach demonstrates detailed description and qualitative analysis of reality. In the other word, qualitative research represents a realistic explanation and approach. It means that a qualitative research is a study on realities in the naturalistic environment, it tries to interpret realities in addition to generate context in models and words that are defined by individuals.

Gall, Borg cited in (Houman 2008) defined qualitative research as a kind of explanation which is based on realities which is made by individuals that depends on conditions and situations.
Methodology

Research methodology of a qualitative research is discovering contexts then explanations in a naturalistic environment, which is based on the induction analysis.

(John W. Creswell 2007) believes that qualitative research is a process of perception examination, which is based on special methods that discovers a social problem. Qualitative research develops a complex picture, which is composed of reporting of individual’s perspective. It transforms the words and identifying factors, which are involved in the situations conducting the study to natural environment.

Reasons for conducting a qualitative research are:

I. Theory development by exploring new issues

II. To understand a complex detailed of the issue (it can be achieved by talking directly to the peoples, and letting them to tell the story)

III. To write a literary, story without the restriction of formal academies frames for writing

IV. To understand a context which is being addressed by participants

V. Quantitative measures do not fit the problem (ibid)

(John W. Creswell 2007) The characteristic of qualitative research are:

I. Natural setting: it tends to collect data in the field where participants practice the issue which is under study

II. Researcher as key instrument: in the qualitative research the researcher is the one who actually collects the information

III. Multiple source of information: normally there are multiple form of data such as interviews, documents and observations rather than a single data source

IV. Inductive data analysis: researchers in qualitative method build their patterns and themes

V. Participants meaning: it focus on the meanings that participants know about the problem or issue

VI. Emergent design: the plan for the research can be changed or shifted after researcher enters to the field

VII. Interpretive inquiry: researcher makes interpretation of what has been seen in the field

VIII. Holistic account: qualitative research tries to develop a complex picture of the problem under study

(Houman 2007) states that there are five methods for data collection in qualitative research:
Methodology

I. Observation

II. In-depth Interview

III. Focus group

IV. Narrative story telling

V. Documents

Based on the research questions and purpose; qualitative approach found to be more suitable for this research, as the research purpose is to understand how e-procurement affect performance in ship management companies (case study of IRISL). To find the answer, a close contact with the subject is required beside generalization. To find complete and detailed information regarding the problem under study the qualitative approach will be use for selecting of samples, collecting data, analysis, and conclusion and answering to research questions.

4.3 Research strategy

According to Marshall and Rossman cited in (Afshin afsharipour etal 2005) “The strategy is a road map, an overall plan for undertaking a systematic exploration of the phenomenon of interest”. (Robert K.yin 2003) has pinpoint five strategies; experiments, survey, histories, Archival analysis, and case studies. Each strategy has a different way data gathering and analysis.

Each strategy can be used for all research purposes, explanatory, exploratory and descriptive. There are case studies in explanatory, exploratory and descriptive purposes. There are three conditions which distinguishes the strategy:

I. The type of research questions posed
II. The extent of control an investigator has over actual behavioral events
III. The degree of focus on contemporary as opposed to historical events

Table 4.1 illustrates the research strategy based on the above conditions:

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Form of research questions</th>
<th>Required control over Behavioral events</th>
<th>Focuses on contemporarily events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiments</td>
<td>How, Why</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey</td>
<td>Who, what, where, how many, how much?</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Methodology

| Archival Analysis | Who, What, Where \n|                 | How Many, How Much | No | Yes/No |
|-------------------|--------------------|----|--------|
| History           | How, Why?          | No | No     |
| Case Study        | How, Why?          | No | Yes    |

Table 4.1 Relevant Situation for research strategies Source: (Robert K.yin 2003) Page 5

(Robert K.yin 2003) When the event behavior cannot be manipulated and the researcher is examining contemporary events the case study method is selected. The case study techniques are the same as history research in spite of method used for data collection like direct observation and interviews.

Case study will be used when:
I. Why or how question is being asked, how an event happened and acts
II. Investigator has little or no control on the event
III. Boundaries between phenomenon and context cannot be clearly distinguished.
IV. phenomenon is a real-life context (ibid)

Considering above situations; research questions which are based on “how” questions, No control over behavioral events and focusing on contemporary events by investigator and real-life context of the event under study, the case study is best choice for carrying out this study.

4.3.1 Case study research

(Safiri 2009) Case study methods are organized collecting of data regarding a person, a social situation, an incident or a group, which allows the researcher to perceive their function efficiently. In fact, case study is not a technique for collecting data; it is a research approach, which contains number of data collecting methods and focuses on documents, in-depth interview and participant’s observations.

(Robert K.yin 2003) The case study method is a suitable research method for investigators to obtain a holistic and valid characteristic of real-world events like, individual lifetimes, managerial and organizational processes and international relations.

states that there are three levels of case study, individual, organization and (Bruce L. Berg 2001) communities:

I. Case study of individuals: In individual case study, researcher is looking for different aspect of individual social life, the research questions answers can be found by interview, multiple interviews, field notes and documents.
II. Case study of organization: This is the method for collecting data from organization to get insight about that organization; in fact, the case study is very useful to find behaviors, motives, ideas and challenges in organizations.

III. Case study of communities: this is a method for collecting data about specific community to perceive their behavior about particular aspect of that community.

He also mentioned that based on the objective, a case study is categorized into three main areas:

I. Intrinsic case studies: When a researcher wishes to have better understanding of a particular case this type of case study is taken in charge. In intrinsic case study the role of researcher is to find intrinsic aspect of the particular case not testing and developing theory.

II. Instrumental case studies: the instrumental case study allows refining or issuing a theoretical explanation.

III. Collective case studies: this is the extended study which includes several instrumental cases.

4.4 Data collection method

(susan k. 1997) believes that data collecting process is the key strength of the case study method, which uses multiple sources and techniques. The researcher decides ahead about evidence to gather and analysis techniques to use with the collected data to find answers of research questions. Data gathering method is normally qualitative, yet in some cases can be quantitative. Surveys, interviews, documentation review, observation, and even the collection of physical artifacts are different methods for collecting data in a qualitative research.

(Ritchie and Lewis 2003) One of the basic considerations in data collection is type of data. There are two types of data in qualitative research, naturally occurring data and generated data. The main data gathering method in naturally occurring data are observation, documents analysis and interview analysis while the main methods in generated data are group interview and in-depth interview.

According to (Robert K.yin 2003) there are six common sources of evidence in case studies:

I. Documents (e.g., reports, newspaper articles)
II. Archival records
III. Interviews
IV. Direct Observations
V. Participant-Observation
VI. Physical Artifacts
Interview is one of the important sources of evidence; it plays an important role in case study research data collection (ibid). Based on the research questions in this study, which are generated data, the data collection method discussion will be limited to the documents and in-depth interview in this study.

**4.4.1 In-depth interview**

(Marvasti 2004) stated that there are two types of the unstructured interview formats; the in-depth interview and ethnographic interview. This type of interviews mentioned as open-ended interviews, in in-depth interview there is more fluid interaction between the researcher and the respondent. In this type of interview, instead of selecting pre-determined answers, responders reply the questions based on their experiences.

(Mack et al. 2005) believes that a method to obtain a clear picture of the participant’s perspective on the research topic is the in-depth interview. In an in-depth interview, the interviewed person is considered as the expert and the interviewer being considered as the student. In-depth interviews are used when we need to know about the perspectives of individual or a group of people about the research topic. In the qualitative research, one of the effective techniques to know about people’s feeling, experiences and opinions is the in-depth interview. According to (Ritchie and Lewis 2003), the in-depth interview is an important method for collecting qualitative data. It is often mention as the conversation with purpose, on the other hand some noticeable differences between normal conversation and in-depth interviews exist.

(Yvonne Darlington and Dorothy Scott 2002) the characteristic of in-depth interview are:

- It embraces the advantages of face to face interviewing
- In-depth interviews are useful when direct observation of the phenomena under investigation is not practicable
- Observation is the only method for finding what is actually happening, interviews allow access to people’s statements and not on what they do.

(Ritchie and Lewis 2003) noted that the in-depth interviews have the following key characteristic:

- Combing the structure with flexibility is the purpose of in-depth interview
- During the in-depth the interviewee's answers determines the next question
- In the in-depth interview the researcher uses a range of techniques to find depth of the answers in term of exploration, penetration and explanation.

**4.5. Sample selection**

(Saunders et al. 2009) divided sampling techniques into two main categories:

I. Probability or representative sampling
II. Non-probability or judgment sampling

In probability sampling the probability of each sample selection is equal for all population, while in non-probability sampling, the probability of each case which is selected from total population is unknown. The generalization from non-probability samples about population is possible but not on statistical ground.

(Mack et al 2005) believes that to gain valid finding in qualitative research it is not obligatory to collect data from all population and only a sample which is subset of total population is sufficient. Factors for determining sample selection within population are the research objectives, size and diversity of study population.

There are three common methods for sampling in qualitative research: purposive sampling, quota sampling, and snowball sampling.

I. Purposive sampling: One of the most typical sampling strategies is the purposive sampling; based on the criteria relevant to a particular research questions the participants are selected. Sample sizes are not fixed before data collection. Purposive sample size uses the theoretical saturation; theoretical saturation is the point where there is no new insight to the research question or when the answers are theoretically saturated.

II. Quota sampling: It is sometimes considered as a type of purposive sampling. In this sampling method the researcher decides the size and characteristics of samples during designing the study.

III. Snowball sampling: the snowball or chain referral sampling in the same way sometimes considered as a type of purposive sampling. This method is used when it is difficult to identify samples in the population; in this method, participants guide the researcher to other people who could potentially participate in or participate to the study. This method is in addition used to find hidden people which are not accessible through other sampling strategies (ibid).

As it was mentioned in qualitative research the researcher can choose one of the three sampling methods, based on this fact that the researcher of this study is working in the same company which is under study and has enough knowledge about the company and its e-procurement system, the sample selection method is purposive and to clarify the size of the sample theoretical saturation will be used.

IRISL Ship Management Company is subdivided to the following departments:

- Ship Management Department NO.1
Methodology

- Ship Management Department NO.2
- Ship Management Department NO.3
- Ship Management Department NO.4
- Ship Management Department NO.5
- Purchasing Department
- Telecom Department
- Research and development Department
- Fleet personnel Department

Each ship management department is managing about twenty vessels and almost about five superintendents are managing their vessels under supervision of deputy general manager and general manager. A dedicated purchasing officer also fulfills the purchasing activities of each ship management department. Telecom department is in charge of software support. Based on above explanation the following persons from different departments can be interviewed:

<table>
<thead>
<tr>
<th>Division</th>
<th>Interviewee (participant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship Management No.1</td>
<td>- General manager</td>
</tr>
<tr>
<td></td>
<td>- Deputy general manager</td>
</tr>
<tr>
<td></td>
<td>- Telecom &amp; IT superintendent</td>
</tr>
<tr>
<td></td>
<td>- Superintendents</td>
</tr>
<tr>
<td>Ship Management No.2</td>
<td>- General manager</td>
</tr>
<tr>
<td></td>
<td>- Deputy general manager</td>
</tr>
<tr>
<td></td>
<td>- Telecom &amp; IT superintendent</td>
</tr>
<tr>
<td></td>
<td>- Superintendents</td>
</tr>
<tr>
<td>Ship Management No.3</td>
<td>- General manager</td>
</tr>
<tr>
<td></td>
<td>- Deputy general manager</td>
</tr>
<tr>
<td></td>
<td>- Telecom &amp; IT superintendent</td>
</tr>
<tr>
<td></td>
<td>- Superintendents</td>
</tr>
<tr>
<td>Ship Management No.4</td>
<td>- General manager</td>
</tr>
<tr>
<td></td>
<td>- Deputy general manager</td>
</tr>
<tr>
<td></td>
<td>- Telecom &amp; IT superintendent</td>
</tr>
<tr>
<td></td>
<td>- Superintendents</td>
</tr>
<tr>
<td>Ship Management No.5</td>
<td>- General manager</td>
</tr>
<tr>
<td></td>
<td>- Deputy general manager</td>
</tr>
<tr>
<td></td>
<td>- Telecom &amp; IT superintendent</td>
</tr>
<tr>
<td></td>
<td>- Superintendents</td>
</tr>
<tr>
<td>Telecom Department</td>
<td>- General manager</td>
</tr>
<tr>
<td></td>
<td>- IT experts</td>
</tr>
<tr>
<td>Purchasing Department</td>
<td>- General manager</td>
</tr>
<tr>
<td></td>
<td>- Deputy general manager</td>
</tr>
<tr>
<td></td>
<td>- Purchasing experts (officers)</td>
</tr>
</tbody>
</table>

Table 4.2 Selected Department and persons for sampling

To find the performance effect of e-procurement on IRISL based on frame of reference and also to increase the reliability and validity of the research, the interview will be conducted with all
related department which are engaged in procurement activities. The selected departments are shown in table 4-2. The size and number of sample is unknown and the research will use theoretical saturation method.

4.6. Data analysis

(Saunders et al 2009) there are two approaches in analyzing qualitative data:

I. Deductive approach: the researcher uses existing theory to test the research questions or hypothesis

II. Inductive approach: a theory builds up by the researcher from collected data.

(Houman 2008) defined data analysis as the process of edit, adjustment, classification, summarization and expression of concept or meaning of data.

(Darlington Yvonne - Scott Dorothy 2002) stated that there are many ways for carrying out a qualitative research, till now over twenty methods has been known, which all nearly having the same process. The main factor in choosing the data analysis approach are the research purpose and questions.

(Houman 2006) believes that in qualitative research data collecting, analysis and interpreting will result in new theory, new model or theory generalization. In this way there are two general approaches in data analysis for qualitative research:

I. Analysis in the field

II. Analysis after data collection

Analyzing in the field is based on the methods which result in theory production, such as grounded theory.

Analyzing after collection of data is the approach which is based on theory generalization, this is based on literature and frame of reference (ibid).

(Marvasti 2004) believes that the analytic process is referred to the process of concluding research finding from collected data. There are three steps of activity in the analytic process:

I. Data management: the process of data reviewing, labeling, sorting and synthesizing

II. Descriptive accounts: the process of identifying key dimensions, mapping the range and diversity of each phenomenon and developing classifications and typologies

III. Explanatory accounts: is the process of building explanations about found data

Miles and Huberman cited in (Marvasti 2004) has defined three main stages for qualitative data analysis:

I. Data reduction: During data collection and documentation process researcher will face a mass of data, which has to be organized and somehow meaningfully reduced or
reconfigured. "Data reduction refers to the process of selecting, focusing, simplifying, abstracting, and transforming the data that appear in written up field notes or transcriptions." To control and manage data researcher should ignore less important data

II. Data display: data display is defined as textual representation of data to select segments which can more illustrate the concept under study.

III. Conclusions and Verification: The last step in analysis activity is conclusion drawing and verification.

Based on the research purpose and questions, second approach “analysis after data collection” will be utilized on this study; in the other word data will be gathered from different samples then documentation, coding and analysis will be carried out then in the end, based on the frame of the reference, data will be analyzed.

4.6.1 Analyzing case study evidences

(Robert K. yin 2003) stated that there are three strategies case study analysis:

I. Relying on theoretical propositions: in this method prior to data collection a theoretical proposition is develop, which is based on research question and literature, it also shapes the data collection plan.

I. Thinking about rival explanation: this analytic strategy tries to define and test rival explanation.

II. Developing a case description: this strategy try to organize the case study by developing a descriptive framework.

(Saunders etal 2009) defines two methods on deductive base qualitative research analysis:

I. Pattern matching: based on theoretical proposition the researcher predicts a pattern of outcomes to forecast the research findings. In this method, a conceptual framework is developed by using existing theory, and then the research data adequacy will be tested against existing theory.

II. Explanation building: in this analytic method the investigator attempt to build an explanation and analyzing them during data collection.

Based on the research type, which is a case study, the deductive method will be used and data will be analyzed using theoretical proposition strategy and pattern matching method.

4.7. Quality Standards
The quality assessment is one of the requirements in every research; validity assessment and reliability assessment are important dimensions of finding quality assessment.

4.7.1 Validity
(Ritchie and Lewis 2003) Traditionally validity of study findings and data was referred to the 'correctness' or 'precision' of a research reading. This concept is often explained into two discrete areas, internal validity and external validity. Internal validity concerned with whether the researcher is investigating what he/she claims to or not. External validity is concerned with the amount of applicability of research results to the other groups in the population or to other context or setting.

There are different methods for validating qualitative data number. Generally these methods are divided into two main categories, the first concerned with internal validity and the secondly is concerned with external validity (ibid).

4.7.1.1 Internal validation methods
(Ritchie and Lewis 2003) two methods for testing internal validity are:

- **Constant comparative method**: in this method the involved deriving hypotheses of one part data will be tested in another part of data by constant comparing and checking across different times, cases, individuals and etc.

- **Deviant case analysis**: in this method researcher analyzes deviant cases or outliers for assisting on theory development

4.7.1.2 External validation methods
(Ritchie and Lewis 2003) two methods for testing External validity are:

1. **Triangulation**: triangulation is a method which tries to confirm and improve the precision of the research data by using multiple source of information. It is not only useful in checking the validity of data but also it is more useful in widening or deepening understanding of a subject through the mixing of multiple datas. Based on a conceptualization, there are different forms of triangulation:

   I. **Methods triangulation**: in the method of triangulation the researcher compares data which is produced by different research methods (e.g. qualitative and quantitative)

   II. **Triangulation of sources**: in the method of triangulation the researcher compares data which is produced by different qualitative methods (e.g. observations, interviews, documented accounts)
III. Triangulation through multiple analysis: in the method of triangulation the researcher compares data which is produced by different observers, interviewers, analysts.

IV. Theory triangulation: in this method of triangulation the researcher compares data which is produced by different theoretical perspectives.

2. Member or respondent validation: in this method the researcher confirms research evidence by taking back to the research participants to check if the meaning or interpretation assigned is confirmed by the people who contributed to it or not (ibid).

Based on the study which is a case study with interview data collection method, constant comparative method utilize to check the internal validity, furthermore to check the external validity, the respondents validation will be used.

4.7.2 Reliability

(Ritchie and Lewis 2003) Reliability is defined as the replicability of research findings, replicability of research finding means if another study with the same research method utilized, same findings repeated. In above definition reliability means replication for those who accept qualitative research as a dynamic research which can only be carried out effectively in a responsive manner and argue that studies cannot and should not be repeated. Due to this fact in qualitative research seeking reliability is often avoided. Instead, in qualitative research writers use other similar issues like ‘confirmability’ or ‘trustworthiness’.

(Mohammadi 2008) Reliability in qualitative research means that the researcher must indicates the data collecting method, assure that data are not simulated, data collecting has been done accurately and if another researcher using the same method to collect the data, almost same or similar findings will be achieved. In the qualitative research, the researcher finally uses a subjective interpretation to analyse collected data, to increase the reliability in such researches the interpretation method should be mentioned.

(Ritchie and Lewis 2003) There are some crucial points, which have to consider during research:

- Bias in the sample design/selection, selected sample symbol should represents target population include all known constituencies.
Methodology

- The fieldwork should be carried out consistently, the researcher should give enough opportunity to respondents for expressing their ideas and covering the research subject

- The analysis has to be performing systematically and comprehensively and the classification and typologies has to be confirming by multiple assessment.

- The interpretation should be well support by the evidence

- The design and conduct should give equal opportunity for all perspectives.

4.7.3 The quality of research design in case study

(Robert K. yin 2003) introduced four tests for judging about a research design:

I. Construct validity: creating proper operational measures for the concept under study.
II. Internal validity: this test is only for explanatory or casual research not for descriptive and exploratory research, to increase the internal validity of research design a casual relationship should be established where some conditions are shown to lead to other condition.
III. External validity: this test is to generalize research finding by creating a domain.
IV. Reliability: Demonstrating that if the operations of the research are repeated, same result will be achieved.
Chapter 5
Empirical Data

In this chapter, the empirical data collected from IRISL will be presented. This chapter is divided into two sections, introducing IRISL. Afterwards each case data with interviews will be posed. The data has been collected based on two sources: the interviews with the concerned people and the available information at the company.

5.1 IRISL GROUP

Islamic Republic of Iran Shipping Lines (IRISL) commenced its shipping activities in 1967. Today, after elapsing of nearly 43 years of its gradual performance achievement, IRISL GROUP has been qualified to address itself as a GLOBAL PARTNER, based on trust earned from its honored and meritorious customers. IRISL GROUP has provided its valuable customers with new services by expanding its activities in the international sphere. According to ranking of prominent international shipping companies of the world, IRISL GROUP has been nominated as the largest shipping fleet in the Middle East, and one of the major fleets in the world (IRISL Documents).

The GROUP has established 18 subsidiary companies within the country and four regional offices in Europe, Middle East, South East Asia, and China. IRISL GROUP has also appointed over 180 worldwide agencies to take care of its expanding shipping activities. Thus, it is empowered to provide its customers with the best quality services. Present fleet of IRISL Group consists of 160 different vessels of various types with total carrying capacity of over 5/6 million Dwt. To provide quality and professional services to customers in Iran and worldwide, IRISL International network is capable of offering total solution approach to its customer. IRISL is divided to two main
Empirical Data

departments, commercial and ship management department. Commercial department is in charge of commercial aspect of the company’s vessels such as cargo booking, chartering, supervision on loading and discharging and fixture the contract of carriage. Ship management department is in charge of technical and operation of the vessels

IRISL Ship Management Company is subdivided into the following departments:

- Ship Management Department NO.1
- Ship Management Department NO.2
- Ship Management Department NO.3
- Ship Management Department NO.4
- Ship Management Department NO.5
- Purchasing Department
- Telecom Department
- Research and development Department
- Fleet personnel Department

Each ship management department is managing about twenty vessels and almost about five superintendents are managing their vessels under supervision of deputy general manager and general manager. A dedicated purchasing officer also fulfills the purchasing activities of each ship management department. Telecom department is in charge of software support. Based on above explanation following peoples from different departments have been be interviewed:

5.2 Interviewee 1 Mr. Bahrampour

He is telecom superintendent of Ship management NO.4 which is in charge of radio, navigation and IT affairs. He has worked as a radio/electronic officer on IRISL vessels.

RQ1: how does the implementation of e-procurement impact administrative costs in IRISL?

From one aspect it has decreased the costs due to:

- Cycle time reduction comparing to the traditional mail-based procurement system; decreasing the cycle time in ship management means cost saving
- Reduction of traditional procurement costs such as mailing, paper and printing costs.

On the other hand implementation of e-procurement system has increased the number of requests and consequently the cost. Number of requests were considerably low in traditional procurement system; ships were sending their indents at the end of each voyage, due to difficulty of order typing and numbering ship’s crew were trying to collect their requests in one order form, while today with ease of use in electronic purchasing system each indent is submitted in a new request form; as a result the managing/handling many requests is very difficult, time consuming and expensive. In general, by considering both aspects implementation of e-procurement system has decreased the cost in IRISL.
**Empirical Data**

**RQ2: How does implementation of e-procurement affect cycle time in IRISL?**

Applying electronic commerce to procurement activities has increased the purchasing speed intensively. In the traditional purchasing method purchasing requests were sent by mail to the head office and this was time consuming while today the purchasing request process is being done electronically, except accounting (due to absent of digital signature) all other processes such as order approval, tendering are in electronic form and as a result it has decreased the procurement cycle time. Increasing speed will result in cost reduction in ship management.

**RQ3: How does implementation of e-procurement affect efficiency in ship IRISL?**

The efficiency in IRISL has not been improved by implementing e-procurement because the number of indents and orders has been increased due to ease of use of this system. E-procurement has increased the number of orders and at the same time has decreased the time spend on each order; I think it has not affected the efficiency.

**RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?**

Checking the order status is very convenient today. Purchasing process status and activities can be monitored on new procurement system, regarding this point the system has extremely improved.

**RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?**

Procurement control has increased, now director of each department has the ability to check the purchasing requests status (pending, supply and ...) , he has also the capability of checking the cost for each item and to monitoring the amount of budget spent and the amount of remaining budget for each vessel.

**RQ6: How does e-procurement affect inventory management in IRISL?**

Inventory management capability has been provided by the e-procurement software, but unfortunately there is negligence in system updating by ship’s stuff which can be due to high job pressure in vessels, normally the system is not up-to-date and is not reliable. On this case the system has not been improved.

**RQ7: How does e-procurement impact purchasing and supply errors in IRISL?**

Yes, regarding supply errors there is a positive impact. The supply errors have been decreased by better control on purchasing processes. A confirmation will be taken from vessels to minimize the purchasing errors before supply.
Empirical Data

5.3 Interviewee 2 Mr. Farahani

He is telecom superintendent of Ship management NO.3 which is in charge of radio, navigation and IT affairs. He has worked as a radio/electronic officer on IRISL vessels.

RQ1: how does the implementation of e-procurement impact administrative costs in IRISL?

First, the traditional procurement system used to use mails to send the procurement requests which was time-consuming. Nowadays, head office receives vessel’s purchasing requests at much faster than before; this is providing better opportunities to select the supplier and place of supply. In this way the most cost-effective supplier and place can be selected. Secondly, the implementing of e-procurement system has reduced the communication costs (mail, DHL, telex...).

RQ2: How does implementation of e-procurement affect cycle time in IRISL?

In the previous system there was a great delay on receiving the procurement requests from vessels, today with utilizing electronic tools this time has been reduced to few minutes and as a result the purchasing process can commence by responsible person faster than before. The presence of this system has enabled the company to process the emergency cases at minimum time and accordingly to increase safety of the vessels.

RQ3: How does implementation of e-procurement affect efficiency in ship IRISL?

Tangible changes in efficiency have not been happened due to increase in the number of procurement orders. The increase of the orders is the result of two problems:

- Grouping different orders is not possible due to classification of items by software
- Ease of use in issuing procurement request

RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?

In new system authorized persons have access to the entire purchasing process and comprehensive information is available to them. Whole purchasing process range from vessel request, ship management office approval, requests for quotation, quotation receiving, approval, purchase order, supplier ready to send to delivery is available on the system at the moment.

RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?

Yes, today better control on purchasing activities has been achieved by implementing e-procurement. The decision making has been improved by having comprehensive and real-time
Empirical Data

data which is available on new system. With new system all procurement stages ranging from purchase requests to forwarding goods or services to vessels are controllable by authorized persons.

RQ6: How does e-procurement affect inventory management in IRISL?

The inventory management is available as a part of e-procurement software on the ships, but the software operators have very important roles in managing of this section. Due to difficulty in inventory management ship personnel refusing to do it or sometimes it is being done incompletely. The data of this section is not being updated regularly. Totally it has been improved less than system capability and expectation.

RQ7: How does e-procurement impact purchasing and supply errors in IRISL?

During different stages in procurement process the information cannot be influenced by operators, if the purchasing requests from vessels are without error in the subsequent processes cannot change. System has reduced errors in purchasing process.

5.4 Interviewee 3 Mr. Majid

He is telecom superintendent of Ship management NO.1 which is in charge of radio, navigation and IT affairs. He has worked as a radio/electronic officer on IRISL vessels.

RQ1: how does the implementation of e-procurement impact administrative costs in IRISL?

If we believe in this principle that the time is valuable, with increasing the communication speed e-procurement will decrease the time to procure an item, resulting cost saving. More information about an item is achieved by using electronic purchasing, it provides more variety hence we can make a purchase with the best cost provider from the best supplier. In traditional purchasing system due to low speed of communications there was not enough time for procurement process and decision making therefore the procurement was done from local suppliers under compelling circumstances. Secondly the implementation of e-procurement has definitely reduced the communication costs and the paper and printing cost.

RQ2: How does implementation of e-procurement affect cycle time in ship IRISL?

The speed has been increased and the cycle time decreased, the cost is reduced and accuracy improved, the purchase order volume that can be handled by each employee has been increased.

RQ3: How does implementation of e-procurement affect efficiency in IRISL?

It could decrease the number of staff by increasing efficiency, but the number of orders per person in each day has been increased by system and this is intricate. In traditional system the
limitation of the system forces the vessels to send their essential requirements and also to send the indents in fewer forms.

**RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?**

Certainly it has been affected, because of higher speed in accessing information and real-time information; at every instant the current state of purchasing process is accessible.

**RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?**

Electronic procurement performs better access to information. The archived data can be used for statistical and estimating purposes. The purchasing control has increased extremely; Directors can access the information online to see the status of the orders and even the price for the items. They are also capable of checking the budget status for each vessel.

**RQ6: How does e-procurement affect inventory management in IRISL?**

In this case in spite of system capability for inventory management we’re a little weak. First, there is too much workload on ship stuffs, also there is a resistance against electronic inventory management. The second debate is that proper tools such as barcode scanners for such a big warehousing with tiny items has not been provided. These are our problems and not the system’s.

**RQ7: How does e-procurement impact purchasing and supply errors in IRISL?**

If the system performs in its best condition it will definitely reduce errors even to zero. E-procurement with useful components such as electronic records and spare checking modules has reduced the number of errors.

### 5.5 Interviewee 4 Mr. Jamshidi

Mr. Jamshidi is the director of ship management NO.3; he has worked as the chief engineer on IRISL vessels and superintendent in IRISL office.

**RQ1: how does the implementation of e-procurement impact administrative costs in IRISL?**

Today the entire procurement communication in IRISL is in electronic form, we have tried to apply this kind of management to increase the speed; today even emergency purchases are being carried out within 12 hours. In ship management time is an important factor, even if we purchase an item more expensive than usual, we will gain benefits by delivering that item at the right time which accelerates the operation of ships. The other cost reduction has happened in decreasing the costs of printing and paper and communication such as mail and telex.
RQ2: How does implementation of e-procurement affect cycle time in ship IRISL?

It has reduced cycle time extremely, if there was not such a tool available to us to make a call or communication, or any response from the suppliers or other procurement requirements we would have to spend too much time and this problem could have stopped the proper management of the vessels.

RQ3: How does implementation of e-procurement affect efficiency in IRISL?

Ship management is a very complicated process, especially in areas related to procurement and purchasing, you will realized that it is not as simple as it appears. Indeed, when the electronic procurement utilized for purchasing purposes the number of stuffs should decrease, but complexity of the purchasing and complexity in today's world management increases the number of orders. So efficiency has been increased, but the number has not reduced and the same numbers of people are doing more work than they used to do in the traditional purchasing system.

RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?

It has increased the transparency of supply chain, today all communication between ships, ship management companies and suppliers is on e-procurement webpage, and at any moment the status of each purchase or supply of goods or services are accessible on the real-time basis in our system.

RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?

Great, it is very helpful. By using this system we have access to a series of very comprehensive information for each ship on real-time basis, or for a specific period of time this will help us to control the budget and for budget planning for next year.

RQ6: How does e-procurement affect inventory management in IRISL?

Inventory management is currently done electronically, but it is very time consuming for ship stuffs to keep it updated. But entirely, we can say e-procurement has helped us to have a better inventory control than before.

RQ7: How does e-procurement impact purchasing and supply errors in IRISL?

It has decreased the purchasing errors, because the system is dynamic and all the purchasing process is being monitored by superintendents, ship management director, purchasing department managers and deputy directors. Controlling the purchasing process by more peoples decreases the number of supply errors.
5.6 Interviewee 5 Mr. Sohanian

He is telecom superintendent of Ship management NO.2 which is in charge of radio, navigation and IT affairs. He has worked as a radio/electronic officer on IRISL vessels.

RQ1: how does the implementation of e-procurement impact administrative costs in IRISL?

Generally, this method of purchasing definitely has decreased the costs in IRISL. There are two perspectives in cost reduction; first it has reduced the communication costs, printing and paper costs. Today, all purchasing activities are in electronic base, there is no need to print the requests and orders today, Secondly in the old purchasing system telex was the communication media for sending requests to suppliers and due to high cost of communication we were trying to limit the number of suppliers while today with minimal costs of communication it is possible to have a better choice with a cheaper price and consequently to send the inquiries to more suppliers.

RQ2: How does implementation of e-procurement affect cycle time in ship IRISL?

Procurement cycle time is much faster than before. Reducing cycle time is one of the goals of applying electronics procurement in the IRISL, time is gold, beside the financial benefits of e-procurement, the main objective in implementation of electronic system is to avoid time loss and delay in the vessel’s activities, because vessels delay is very expensive.

RQ3: How does implementation of e-procurement affect efficiency in IRISL?

We cannot say that the number of employees has been decreased, but simultaneously number of purchasing orders has been increased, Staff has to do additional workload due to the increased numbers of purchases. We can say that the efficiency has been increased but the number of employees is the same. Still there is the possibility of decreasing the number of personnel. One of the main reasons for increasing the number of purchasing request is the ease of the use of electronic procurement systems.

RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?

Today, with online e-procurement purchasing method precisely tracking of purchasing process is practicable. For instance it is possible to check whether the order status is at inquiry stage, purchase orders or sending, so the whole procurement process is track-able today.

RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?

Yes, control on purchasing process has been increased. Better budget control is possible with online and real-time reporting system; it provides the possibility to check the amount spent on a
Empirical Data

fixed period of time and the remaining budget. With utilizing of this system it is easily possible to estimate and plan next purchase orders.

**RQ6: How does e-procurement affect inventory management in IRISL?**

The ability of inventory management has been provided in software but unfortunately it is not being well managed because it is not updated regularly and it requires cooperation of ships staff which due to lack of time in ships the system is not up to date and reliable.

**RQ7: How does e-procurement impact purchasing and supply errors in IRISL?**

It has decreased typing errors which have been more likely in the in old system but with new system the request will not be changed during the purchasing process.

5.7 **Interviewee 6 Mr. Rostami**

Mr. Rostami is the director of ship management NO.2; he has worked as the chief engineer on IRISL vessels, IRISL Germany technical manager, Plan maintenance manager, Ship management deputy manager, and superintendent in IRISL office.

**RQ1: how does the implementation of e-procurement impact administrative costs in IRISL?**

It has great impact in facilitating the workflow. It has strongly reduced procurement cycle time and communication costs, but item prices have not been affected on about 90% of items. The paper and printing costs are also reduced in ship side, in ship management office still we have to keep papers as purchasing evidence due to the lack of electronic signature in the system.

**RQ2: How does implementation of e-procurement affect cycle time in ship IRISL?**

Definitely it has reduced purchasing cycle time, everything is done instantly and there is not that much delay between purchasing processes, today it is possible to quickly receive quotation from suppliers.

**RQ3: How does implementation of e-procurement affect efficiency in IRISL?**

First, IRISL is a government company and there are some considerations about employees which prevent us from reducing the number of personnel but the system has the capabilities of reducing the number of staff. There is also the possibility of reducing the number of staff by changing purchasing procedures and regulations. Secondly the efficiency has not been increased because the number of inquiries has been increased due to an easier e-procurement system compare with the traditional purchasing system.
RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?

The accuracy of purchasing has been increased by implementing Electronic procurement. Since the system is online the transparency has been increased. Today information is accessible with higher speed and all the purchasing status from preparation to delivery with a higher speed is available; therefore, supply chain transparency has been improved.

RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?

The workload for manager has been increased because the purchasing amount has been increased. But on the other hand budget control management has been enhanced and better control has been available on purchasing process. Today information such as spend budget and remaining budget are easily available to managers.

RQ6: How does e-procurement affect inventory management in IRISL?

In other ship management companies, other than the IRISL inventory management is much better, because their system is very accurate and storage systems is connected to the maintenance system, but in our company having two separate software for purchasing and maintenance is one of the reasons for absence of up-to-dated inventory system and the information of inventory section is not reliable.

RQ7: How does e-procurement impact purchasing and supply errors in IRISL?

Certainly it has reduced purchasing errors because the orders are not exposed to change in e-procurement system and information is more comprehensive than before, it has also reduces typing errors, in traditional purchasing system cost of communication was too high and there was limitation in sending comprehensive information.

5.8 Interviewee 7 Mr. Zamanian

Mr. Zamanian is the Deputy Manager of ship management NO.4; he has worked as the chief engineer on IRISL vessels, and superintendent in IRISL office.

RQ1: how does the implementation of e-procurement impact administrative costs in IRISL?

Increase in speed in ship management is cost saving. Clearly it is not comparable with previous condition in the past, reduced cost has happened in two dimensions; first reduction in communication cost and secondly workflow speed enhancement. Electronic purchasing system is incomparable with the traditional system.
RQ2: How does implementation of e-procurement affect cycle time in ship IRISL?

Cycle time has been reduced, but employees have important role in reducing the role on reducing the cycle time. Generally due to an easy access to real-time information an order can be processed with higher speed in e-procurement system.

RQ3: How does implementation of e-procurement affect efficiency in IRISL?

It could increase efficiency but it has not been achieved because the purchasing cycle is much duplicated and multiplicity of purchasing orders and a variety of goods are high. These days ships do not travel to home ports and normally the purchasing is being done partly in different ports. These factors have increased the workload to superintendents and purchasing officers, e-procurement also by itself has increased the number of orders due to ease of use, but this can be controlled by good management.

RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?

It has improved, but the degree of improvement depends on the speed of updating which is done by operators. Initially at implementation stage I was not sure about the ability of system but finally I realized the improvement of purchasing process with implementing of e-procurement. Generally workload will affect the updating speed and hence supply chain transparency. Today, we are very comfortable; today if we update the correct information, the status of all current and previous purchases will be accessible.

RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?

Better control has been achieved by implementing e-procurement, but the degree of control depends on system operators and their efforts in entering more comprehensive information about orders. Generally it has increased the amount of control on the procurement process and in compare with old system it is much better. Cost control also has improved and the cost of vessel can be controlled at the moment.

RQ6: How does e-procurement affect inventory management in IRISL?

This depends on the ship’s updating, the update also depends on the vessel’s superintendent follow up. Generally the system has this capability of inventory management, usually ships resist updating the system and it is up to us how to pursue this issue.
Empirical Data

RQ7: How does e-procurement impact purchasing and supply errors in IRISL?

Certainly less error is seen in the system yet the system still does not have enough intelligence necessary to reduce the amount the errors. Today, more people are checking the information simultaneously, and this reduces the amount of errors.

5.9 Interviewee 8 Mr. Vafaei

Mr. Vafaei is Ship management No.5 superintendent with over 20 years of experience.

RQ1: how does the implementation of e-procurement impact administrative costs in IRISL?

It has positive impact on cost reduction. Communication cost has definitely been reduced by this system; printing and paper cost also are reduced as well.

RQ2: How does implementation of e-procurement affect cycle time in ship IRISL?

High speed in data transferring in one of the major attributes of electronic procurement, today we can receive order, process, make inquiry and procure in much higher speed.

RQ3: How does implementation of e-procurement affect efficiency in IRISL?

It has not affected the administrative system because of two reasons first bureaucracy and workflow has not changed (due to rules) and secondly increase in workload prevents us from obtaining efficiency increase. Today with easiness of the system in raising orders the multiplicity of orders has been increased and this is considered as a negative point for the electronic system.

RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?

The transparency has been enhanced; the system has the capability for status tracking of each request. The entire order process status such as booking, dispatches and different stages of the process can be monitored easily on the system.

RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?

Better control, specifically cost control has been achieved by utilizing electronic tools in purchasing processes. The system created the ability to automatically have budgetary control if the correct information is inserted. The system has the feature to check the cost for a period of time; and this information can be used for estimating next year budget.
Empirical Data

RQ6: How does e-procurement affect inventory management in IRISL?

It is much better comparing with the old system. Of course, this depends on how that ship personnel system updates the system. I have good control on inventory updating of my vessels and the system has been improved.

RQ7: How does e-procurement impact purchasing and supply errors in IRISL?

Yes, it has reduced the purchasing errors, all errors such as typing errors, ordering errors, and supply errors have been lessened.

5.10. Interviewee 9 Mr. Samimi

Mr. Samimi is the director of ship management NO.5; he has worked as the chief engineer on IRISL vessels and superintendent in IRISL office.

RQ1: How does the implementation of e-procurement impact administrative costs in IRISL?

E-procurement has reduced the costs in two areas, first communication costs and secondly the costs of printing and paper.

RQ2: How does implementation of e-procurement affect cycle time in ship IRISL?

It has a great impact on store supply cycle time. Regarding spare parts it depends on the availability of parts, some parts require manufacturing, generally the cycle time is reduced.

RQ3: How does implementation of e-procurement affect efficiency in IRISL?

In ideal conditions it can reduce the number of personnel and increase efficiency, but due to complicated internal organization rules and necessity for paper documentation it failed to increase the efficiency.

RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?

Tracking and follow up has improved, the issuance of the request, receiving request, verification inquiry, delivery orders, delivery time, method of delivery, all this can be monitored online.

RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?

The e-procurement software provides this option to us that as soon as the order is issued we can estimate the cost and we can check the remaining budget. Today, managers can control the process of purchasing much better than before.
Empirical Data

RQ6: How does e-procurement affect inventory management in IRISL?

Unfortunately, due to various reasons still warehousing system is not well used in this system, if both purchasing and maintenance software were connected together obviously the software could be effective in terms of inventory management and prediction. Members and staff also have considerable impact on system updates.

RQ7: How does e-procurement impact purchasing and supply errors in IRISL?

In my opinion, it has no effect on the amount of errors.

5.11 Interviewee 10 Mr. Farhoush

Mr. Farhoush is deputy Purchasing director; he has worked about 17 years in IRISL.

RQ1: How does the implementation of e-procurement impact administrative costs in IRISL?

Previously in the traditional systems, requests were sent by telex or mail both system were costly; using e-procurement has reduced these expenses. Costs of printing and copying at the traditional system in which four copies of each request were sent to head office have been reduced to only one page.

RQ2: How does implementation of e-procurement affect cycle time in ship IRISL?

Today the requests from ships reaches the head office much faster and this has reduced the cycle time. It has reduced the working process in purchasing department but the number of requests has been increased in comparison with traditional system.

RQ3: How does implementation of e-procurement affect efficiency in IRISL?

If you mean the number of people there is no change, because the workload has not come down. This system has result in increased number of requests, in the traditional system 5 requests contains 50 items while today sometimes every item comes in one request.

RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?

It is much better than before in terms of stats, today we can check what items vessel are receiving and what is going to be supplied, also the status of each purchase is available online (subject to correct information input by operators).
RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?

To superintendents it is better than before for controlling the vessel’s purchasing but it did not affect our work much because we are not concern on controlling vessel’s purchasing.

RQ6: How does e-procurement affect inventory management in IRISL?

Inventory management has affected by e-procurement implementation but not much because the inventory system is not connected to maintenance system yet. I believe that ship personnel will update this system if the mentioned problem solved. It also depends on superintendent management.

RQ7: How does e-procurement impact purchasing and supply errors in IRISL?

It has lowered errors, in three main areas, in correspondence, user errors, and typing errors.

5.12 Interviewee 11 Mr. Baratali

Mr. Baratali is Telecom Department director, the E-procurement software has been developed in the telecom department and all the stages has been carried out under his direct supervision.

RQ1: How does the implementation of e-procurement impact administrative costs in IRISL?

In traditional system purchase Order was dispatch by telex or mail which spending too much time. Numerous Copies increases in expenses. With e-procurement system the cost of mailing, paper and printing, communication, time and human cost has been decreased.

RQ2: How does implementation of e-procurement affect cycle time in ship IRISL?

Today, the ship’s request is being received immediately. In traditional system everything was operated manually and this was slowing down the purchasing process. Today, e-procurement has reduced the purchasing cycle time.

RQ3: How does implementation of e-procurement affect efficiency in IRISL?

Yes, in my opinion it has increased the efficiency, with old procurement system there was about 10 persons in head office for each vessel while today the number of employees has been reduced to 8.5 and this is the effect of utilizing electronic tools in procurement process.

RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?
In traditional purchasing system every person owns a control book and this book was only interpretable by him. Today managers, deputies, purchasing manager, communications director, technical deputy and other authorize persons can easily check the situation of each order.

**RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?**

Definitely the control has been increased. In paper-based system there was virtually little control over purchasing process while today every purchase cost will be deducted automatically from budget simultaneously. System and individual control has been improved. Today managers have complete control on the process of purchasing.

**RQ6: How does e-procurement affect inventory management in IRISL?**

The system exists already. Discontinuity of purchasing system with maintenance system causing problem on system updating, the system is not completed.

**RQ7: How does e-procurement impact purchasing and supply errors in IRISL?**

The requests are not subject to change during purchasing process, if the vessels issue a request without error it will not be affected during purchasing process and this has reduced purchasing and supply errors in IRISL.

### 5.13 Interviewee 12 Mrs. Chizari

Mrs. Chizari is Purchasing Department Senior expert, who is supervising the purchasing processes in ship Management Company.

**RQ1: how does the implementation of e-procurement impact administrative costs in IRISL?**

I cannot tell the exact figure of cost saving but the cost of communication is reduced.

**RQ2: How does implementation of e-procurement affect cycle time in ship IRISL?**

Interval between vessel’s requests to delivery to ship has been reduced extremely by using e-procurement, today from request to delivery of parts takes about one month while in previous system the time for reaching request from vessels to head office was about three months and entire buying process of spare parts was between six months to one year.

**RQ3: How does implementation of e-procurement affect efficiency in IRISL?**

Due to increase in frequency of orders, number of employees remains unchanged. Today ease of use and ease of ordering increased the frequency of orders. Sometimes the requested part is available in ship’s warehouse and because it is very easy to issue a requests, ship stuff issue the request without checking the warehouse.
RQ4: How does implementation of e-procurement influence transparency of supply chain in IRISL?

Definitely the supply chain transparency has improved. Many of purchasing steps in the electronic system is performed automatically and information is up to dated. In old system each purchasing officer had its own control book; the content of this book was only interpretable by the purchasing officer itself. The new system is very transparent.

RQ5: How does implementation of e-procurement affect control of procurement process in IRISL?

Since the remaining budget is available on the system at each moment it has improved the purchasing and budget control.

RQ6: How does e-procurement affect inventory management in IRISL?

Practically vessels do not update the inventory system; because it is very difficult and due to the large volume of work on the ships it is not performed correctly. In the case of correct updating the system has the possibility to eliminate unnecessary purchases. Up to now there has been no progress on this item.

RQ7: How does e-procurement impact purchasing and supply errors in IRISL?

There are two reason in wrong supplying first one is due to mistake in ordering and secondly is in the process of purchase which requests has been manipulated. In the first case there has been no change but the second one has reduced very much.
Chapter 6
Data analysis

In this chapter, the empirical data collected from IRISL will be presented. The empirical data is achieved by personal interview with superintendents, managers, deputy managers and purchasing officers in IRISL. Documents in IRISL are also used as the secondary source of data.

(Houman 2008) defined data analysis as the process of edit, adjustment, classification, summerization and expression of concept or meaning of data. (Marvasti 2004) believes that the analytic process is referred to the process of concluding research finding from the collected data. There are three steps of activities in the analytic process:

IV. Data management: the process of data reviewing, labeling, sorting and synthesizing.

V. Descriptive accounts: the process of identifying key dimensions, mapping the range and diversity of each phenomenon and developing classifications and typologies.

VI. Explanatory accounts: is the process of building explanations about the data obtained.

Miles and Huberman cited in (Marvasti 2004) have defined three main stages for qualitative data analysis:

IV. Data reduction: "Data reduction refers to the process of selecting, focusing, simplifying, abstracting, and transforming the data that appear in written up field notes or transcriptions."

V. Data display: data display is defined as textual representation of data to select segments which can more illustrate the concept under study.
VI. Conclusions and Verification: The last step in analysis activity is conclusion drawing and verification.

Based on the research theoretical framework following codes have been defined:

<table>
<thead>
<tr>
<th>+</th>
<th>Supports the theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Doesn’t Support the theory</td>
</tr>
<tr>
<td>-+</td>
<td>Partially Supports the theory</td>
</tr>
</tbody>
</table>

Table 6.1: explanation of coding

The sign (+) indicates that the theory is supported by the collected data from IRISL, the sign (-) indicates that the theory is not supported by the data collected and finally the sign (+\-) Implies that the theory has been partially supported by the collected data.

Coded data based on research theory:

<table>
<thead>
<tr>
<th>Cases</th>
<th>Theories</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
<th>Case 8</th>
<th>Case 9</th>
<th>Case 10</th>
<th>Case 11</th>
<th>Case 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost reduction</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Reducing cycle</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Efficiency</td>
<td>-</td>
<td>-</td>
<td>-+</td>
<td>-+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Increasing</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Visibility of</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Better control/</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Better inventory</td>
<td>-</td>
<td>-</td>
<td>-+</td>
<td>-</td>
<td>-+</td>
<td>-+</td>
<td>-</td>
<td>-+</td>
<td>-</td>
<td>-+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Error minimizing</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 6.2: Coded data based on research theory

**6.1 Cost reduction**

(David Caffey 2009) believes that decreasing printing and paper cost of order forms and invoices is one of the benefits of e-procurement implementation. He also mentioned that E-procurement will result in cost reduction by reducing inventory.

(Piet Jan ten Thije 2006) stated that the main purpose of implementing the e-procurement in
Data analysis

shipping companies is to reduce the process and transaction costs.

Within all cases the cost saving has been recognized in accordance to the theory presented by the different authors. Three factors have been mentioned in the interviews, time reduction, communication cost reduction and printing/paper cost reduction which all helps to reduce the costs in IRISL ship management.

Cases 1, 3,4,6,7 and 11 stated that the implementation of e-procurement in IRISL has reduced the cost due to the reduction of procurement time; time is a very valuable factor in ship management because the cost of vessel’s delay is too high.

Cases 2, 3 and 5 believe that implementation of electronic procurement system results in decreasing time for receiving orders from vessels hence creating better opportunity for decision making by selecting better products with best price from best suppliers.

All of the cases except for case 12 (which has not mentioned any factor) believe that utilizing electronic procurement has reduced the communication cost in compared with the old procurement system. The old communication media such as costly mail and telex has been replaced by cheap internet and e-commerce communication media.

Cases 1, 3, 4,5,6,8,9,10 and 11 manifest that e-procurement has decreased the administrative cost by reducing the paper and printing cost.

The reduced data has been displayed in table 6.3, the sign “✓” means that it has been mentioned by interviewee and sign “x” means it has not been mentioned by them.

<table>
<thead>
<tr>
<th>Cases</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
<th>Case 8</th>
<th>Case 9</th>
<th>Case 10</th>
<th>Case 11</th>
<th>Case 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreasing procurement time (time is valuable in ship management)</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>Decreasing procurement time (creating better opportunity for procurement)</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Decreasing communication cost</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>Decreasing paper and printing cost</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
</tbody>
</table>

Table 6. display of collected data on cost reduction question
6.2. Reducing procurement cycle time

Time for marketing on new product, production lead time and quality can be improved by decreasing procurement cycle time and amount of paperwork in procurement transactions (Pricehousecoopers, n.d.)

(David Chaffey 2009) states that one of the indirect benefits of e-procurement is decreasing cycle time between order and delivery and enabling greater flexibility for supplier selection according to the best value.

(Lindija Pulevska-Ivanovska 2004) believes that e-procurement provides more efficient process and it also decreases the cycle time.

Based on the data collected by interviews all cases believe that the implementations of e-procurement has decreased the procurement cycle time.

Cases 1, 2, 6, 8, 10, 11 and 12 participants mentioned that the implementation of e-procurement has reduced the time taken between issuing of orders by vessels till receiving it by head office.

Cases 1, 2, 3, 4, 6, 7, 8, 10, 11 and 12 believe that utilizing electronic tools in procurement processes has decreased the procurement process time in IRISL head office.

Participants 1, 4, 6, 8 and 12 refer that time taken for process between head office and suppliers have been reduced by e-procurement implementation.

Table 6.4 illustrates the reduced data collected from each participants, regarding the effect of e-procurement on procurement cycle time.

The sign “✔” means that it has been mentioned by interviewees and sign “x” means it has not been mentioned by them.

<table>
<thead>
<tr>
<th>Cases</th>
<th>Cycle time reduction mentioned stages</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
<th>Case 8</th>
<th>Case 9</th>
<th>Case 10</th>
<th>Case 11</th>
<th>Case 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time taken between ship’s order to receiving it at head office</td>
<td>✔</td>
<td>✔</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✔</td>
<td>x</td>
<td>✔</td>
<td>x</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td></td>
<td>Process stage at head office</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>x</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>x</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td></td>
<td>Time taken between head office and suppliers</td>
<td>✔</td>
<td>x</td>
<td>x</td>
<td>✔</td>
<td>x</td>
<td>✔</td>
<td>x</td>
<td>✔</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✔</td>
</tr>
</tbody>
</table>

Table 6.4: display of collected data on cycle time reduction question

6.3. Increasing efficiency

(David Chaffey 2009) defines process efficiency as less employee time spending on searching, authorizing, approving and ordering.

As it can be seen in the literature review chapter many authors believe that Procurement software
which automates purchasing increases the efficiency.
Cases 1, 2, 3, 6, 7, 8, 9 and 10 believe that implementation of e-procurement has not increased the efficiency; number of employees has not been reduced.
Participants 4 and 5 have this opinion that efficiency (the amount of workload that a person can do) has increased but at the same time number of orders has increased hence number of employees remains unchanged.
Interviewee 11 believes that implementation of e-procurement has decreased number of employees.
The participants who think that the efficiency has not been increased named the barriers for increasing efficiency as follow:
Cases 1, 2, 3, 5, 6, 7, 8, 10 and 12 stated that e-procurement with easy and fast operation has increased number of orders (not number of items). The time for processing every order has been decreased but at the same time the number of orders has increased therefore the number of employees remains unchanged.
Participants 2, 4, 6, 7, 8 and 9 describe that the purchasing process has not been changed by using e-procurement and same traditional process is being carried out to procure an order, complexity and bureaucracy of the process causes barrier for gaining efficiency.
Interviewee 6 believes that there are some considerations about employees in IRISL and this is the reason for preventing efficiency enhancement. Table 6.5 illustrates the barriers for increasing efficiency in IRISL. The sign “✓” means that it has been mentioned by interviewee and sign “x” means it has not been mentioned by that case.

<table>
<thead>
<tr>
<th>Cases</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
<th>Case 8</th>
<th>Case 9</th>
<th>Case 10</th>
<th>Case 11</th>
<th>Case 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing number of orders by using e-procurement</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>Complexity of purchasing process and bureaucracy</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Consideration about employees</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

Table 6.5: Barriers for increasing efficiency in IRISL

6.4. Increasing visibility of supply chain
(D.Ramasubramanian 2005) stated in his paper that all parts of daily operation in marine business can be improved by using web-based tools. Embracing web will increase visibility in supply chain by movement of the ship data through the whole supply chain (Thomas pushmann and Rainer alt 2005), (Mark Haslett 2005), (Hansen 2005) and (Sara Faraji
Data analysis

Jalal (2007) also believe that implementing e-procurement increases the visibility of supply chain. Within all cases it has been found that employing electronic tools on procurement activities has increased the visibility of supply chain. Access to entire purchasing process with comprehensive information is available to authorized persons. Due to high speed of information real-time information flow is accessible in the system and tracking of order status is achievable. In traditional procurement system the purchasing officer control book was not meaningful to other people but today the information is interpretable to every authorized person. Table 6.6 illustrates reduced data on question NO.4

<table>
<thead>
<tr>
<th>Cases Theory</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
<th>Case 8</th>
<th>Case 9</th>
<th>Case 10</th>
<th>Case 11</th>
<th>Case 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing visibility of supply chain</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 6.6 reduced data on question NO.4

6.5. Better control and reporting

(Jason R. Eaton 2003) believes that e-procurement helps organizations to control their procurement process during economic crisis by providing better visibility and better reporting on procurement process. Better control on procurement process by better reporting is frequently mentioned by several authors (e.g., Mark Haslett 2005; (Malcom H. Morrison 2009); (Donald Staffin 2006); (Afshinafsharipour et al 2005) and (Sara Faraji Jalal 2007). All of the research participants believe that implementation of e-procurement has increased the control on purchasing process by providing better and faster reporting of procurement order status. They also mentioned with implementing of e-procurement, follow up of purchasing orders are more convenient, checking the cost of each item is practicable and also simultaneous budgetary control is available on the system. Table 6.7 illustrates factors for increasing control on purchasing process in IRISL; the sign “✓” means that it has been mentioned by interviewee and sign “x” means it has not been mentioned by that case.

<table>
<thead>
<tr>
<th>Cases Factors for Increasing Control and reporting</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
<th>Case 8</th>
<th>Case 9</th>
<th>Case 10</th>
<th>Case 11</th>
<th>Case 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing control and follow up on purchasing process</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>Controlling the cost of each item</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>Better budgetary control</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 6.7: reduced data on question no.5 “statements about control enhancement factors”
6.6. Better inventory management

(David Caffey 2009) is of the opinion that in addition to purchasing goods and services from suppliers; procurement includes inbound logistic, warehousing and inventory management. (Malcom H. Morrison 2009) believes that e-procurement software controls inventory and improves inventory management. Inventory management is an important item in ship management companies.

Cases 1, 2, 3, 5, 9 and 12 believe that the inventory management has not been improved due to problems on updating software by ship’s stuff. Negligence of ship’s stuff, difficulty of inventory management, high workload on ship’s stuff, absence of proper tools, resistance for updating and lack of time in ships are different problems that above mentioned interviewees named during interviews.

Cases 6, 9 and 11 also stated that there has been no improvement on inventory management due to isolation of maintenance software and procurement software. Cases 4, 7, 8 and 10 has mentioned that the system has improved but not so much due to lack of updating by ship’s stuff and absence of connectivity between maintenance software and procurement software. Table 6.8 illustrates barriers for improving of inventory management in IRISL; the sign “✓” means that it has been mentioned by interviewee and sigs “x” means it has not been mentioned by that case.

<table>
<thead>
<tr>
<th>Cases</th>
<th>Barriers to Improve inventory management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>Lack of updating by ship’s stuff due to various reasons</td>
</tr>
<tr>
<td>Case 2</td>
<td>Absence of connection between maintenance and procurement software</td>
</tr>
<tr>
<td>Case 3</td>
<td>✓</td>
</tr>
<tr>
<td>Case 4</td>
<td>✓</td>
</tr>
<tr>
<td>Case 5</td>
<td>✓</td>
</tr>
<tr>
<td>Case 6</td>
<td>✓</td>
</tr>
<tr>
<td>Case 7</td>
<td>✓</td>
</tr>
<tr>
<td>Case 8</td>
<td>✓</td>
</tr>
<tr>
<td>Case 9</td>
<td>✓</td>
</tr>
<tr>
<td>Case 10</td>
<td>✓</td>
</tr>
<tr>
<td>Case 11</td>
<td>✓</td>
</tr>
<tr>
<td>Case 12</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 6.8: barrier for improving inventory management on IRISL
6.7. Minimizing supply errors

Turban et al (2000) stated that utilizing e-procurement software will result in minimizing error in procurement process.

All participants except case 9 believe that e-procurement has minimized the procurement and supply errors in IRISL by better control on purchasing process, more persons checking orders, reducing typing errors and having comprehensive information about orders.

Table 6.9 illustrates reduced data of the e-procurement error minimizing effect in IRISL:

<table>
<thead>
<tr>
<th>Cases Theory</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
<th>Case 8</th>
<th>Case 9</th>
<th>Case 10</th>
<th>Case 11</th>
<th>Case 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error minimizing</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 6.9 Reduced data of the e-procurement error minimizing effect in IRISL
Chapter 7
Finding, Conclusion and Implication

According to the data analysis that conducted in the previous chapter, in this chapter the conclusions will be drawn. Consequently the managerial implication of this research will be presented. Furthermore, the recommendation for future research will be suggested.

7.1. Finding and conclusion on each research question

7.1.1. RQ1: How does implementation of e-procurement reduce administrative cost in IRISL?

Data collected from the organization under study confirms the effectiveness of e-procurement on cost reduction. According to the data collected through interviews, using electronic procurement systems reduce costs in the process of procurement directly and indirectly in IRISL. E-procurement direct cost reduction has been achieved into two areas, first of all reducing costs of communications such as mail, telex etc. in comparison with the traditional procurement and secondly reducing the cost of papers and printing. If we accept time is valuable in shipping industry due to high cost of vessel’s delay, the e-procurement application indirectly reduces costs by accelerating the procurement process in ship management companies. Another indirect cost reduction is also concerned with time reduction, with employing e-procurement, vessel’s procurement orders are being received faster which creates more opportunities to choose the most cost-effective goods, services and supplies in the best place.
7.1.2. RQ2: How implementation of e-procurement reduces cycle time in IRISL?

Collected data from the firm under study approved the effectiveness of electronic procurement on reducing cycle time. According to the data collected from the IRISL, with implementing of e-procurement all procurement processes including receiving orders, processing purchase requests, communicating with suppliers are done online and electronically; this is very effective in reducing the cycle time, and as it was mentioned, reduced cycle time leads ultimately to reduced costs.

7.1.3. RQ3: How does implementation of e-procurement affect efficiency in IRISL?

In accordance with the data collected from the case study, e-procurement is not found effective in increasing efficiency in this case study. Three reasons have been found according to the collected data as the barriers for increasing efficiency and reducing number of employees in IRISL:

I. Implementing of e-procurement has increased the number of orders firstly by classifying items (different items cannot be collected in one order form) and secondly by providing convenience in ordering (on previous system ship’s stuffs were trying to collect their orders in less forms due to difficulty of numbering and typing in paper-based forms). Therefore, in spite of reducing time for processing each order in e-procurement system, multiple requests have increased the volume of the work in the system.

II. Complexity of procurement process and bureaucracy also prevents from increasing efficiency. The procurement processes have not been changed and the same paper-based system and rules have been applied to new e-procurement system.

III. Consideration about employees: IRISL is a government company which has some considerations about its employee’s.

7.1.4. RQ4: How does implementation of e-procurement increase visibility of supply chain in IRISL?

Based on the collected data from the case study, the impact of electronic procurement system on increasing the visibility of procurement supply chain is approved. According to the information obtained during interviews conducted with samples, using electronic procurement has caused all procurement processes ranging from ship’s order to supply of goods and services to be performed online and be registered on the Web. Thus there is a possibility of tracking and controlling the entire process of procurement by managers, deputy directors, purchasing directors, purchasing officers and all other authorized persons. In the traditional purchasing system the entire process was controlled by the purchasing experts in purchasing department and all data was recorded in their control books which were not accessible by other persons. As a result, with implementing of e-procurement transparency, accuracy has been increased in procurement supply chain.
7.1.5. **RQ5: How e-procurement enable better control/reporting on procurement process in IRISL?**

The research indicates that; increasing control on purchasing process has been achieved by applying electronic procurement. Collected data proves that by using e-procurement the possibility of monitoring and controlling of entire procurement process has been provided to managers. Today, following up the procurement process, budget expenditure monitoring, cost monitoring and remaining budget monitoring has been provided by implementing e-procurement. The IRISL managers are able to easily and accurately plan for next year’s budget by better reporting of e-procurement system.

7.1.6. **RQ6: How does e-procurement affect inventory management in IRISL?**

According to the data collected from conducted interviews, inventory management has not improved by implementing e-procurement within the case study. In the other words; applying electronic procurement has not improved inventory management in IRISL. Two problems are stated by the participants as the barriers of improving inventory management in IRISL:

I. Problems concerning updating systems by ship’s stuff due to various reasons such as negligence of ship’s stuffs, difficulty of inventory management, high workload on ship’s stuffs, lack of proper tools, resistance to updating

II. Problem concerning the interconnection between maintenance software and procurement software.

7.1.7. **RQ7: Does e-procurement minimized purchasing and supply errors in IRISL?**

According to the data gathered from the samples, the effectiveness of e-procurement on error reduction in organization under study is approved. Based on the collected data utilizing electronic procurement has reduced the amount of supply errors in the IRISL. Three factors have been outlined by the interviewees as the error reduction factors:

I. E-procurement has been mentioned as a dynamic system which allows several persons such as managers, deputy managers and superintendents to control the procurement process simultaneously; this will minimize the wrong supplies.

II. Nowadays, the information from vessels is more comprehensive and accurate than before due to low cost of communication and ease of system.

III. After issuing orders by ship stuffs, the information is not subject to change by other persons in the procurement cycle which consequently reduces the possibility of supply error.
7.2. Overall conclusion

In this section, the research purpose and problem of the thesis will be addressed and an overview of findings will be outlined. The purpose of the research was to provide better understanding of the impact of e-procurement in performance of ship management companies. The research result indicates that in overall implementation of electronic procurement has enhanced performance in the Islamic Republic Shipping Company. In five of the seven research questions, interviewees have confirmed that the performance has increased dramatically. In the other two research questions, lack of performance improvement was not related to the electronic procurement system and it was mostly due to the managerial and systematic problems. Generally, e-procurement is found effective in increasing performance and it can be utilized as a beneficial tool, especially during economic crises in shipping companies.

7.3. Implications for Management

Based on our research findings and the above conclusion, the following implications for management can be drawn:

- Concerning the efficiency improvement, it is recommended to control the number of procurement requests issuing by vessels, this will minimize the workload on the system. It can be done either by software limitation or applying special organization rules on order issuing.
- Reengineering of procurement process in IRISL should be carried out to minimize the complexity and bureaucracy and increase the system efficiency.
- On the subject of inventory management, one of the main problems is vessel’s updating, IRISL should find the solution for the mentioned problem. Encouraging ship stuff by financial allowances and providing proper tools for inventory management can be considered as the solutions for this problem.
- Concerning inventory management, IRISL should solve the problem of connectivity between maintenance and procurement software, in this way ship stuffs will only fill the information in one of these two softwares not both and this will reduce the workload on board of vessels.

7.4. Recommendations for further Research

Recommendations for further researches for those who would like to study in the field of impact of e-procurement in maritime industry and ship management companies:

- It is recommended that the researchers pay more attention to vessels inventory management to find whether the same problem can be identified in their research or not.
Concerning efficiency, researches are recommended to find out the barriers for the failure of the system (if failed) or success factors in case of efficiency improving.
References:

1. Afshin afsharipour et al (2005), e-orocurement in automotive supply chain of Iran, Master Thesis, Lulea University of technology


10. Robert K. yin (2003). Case study research; Design and methods, SAGE publication


71


32. Miles M. B. and Huberman (1994). "Qualitative Data Analysis."


40. Yvonne Darlington and Dorothy Scott (2002). Qualitative research in practice. Stories from the field.