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Original Citation

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Enhancing the efficiency of the supply chain documentation flow through the application of an e-business model: a case study of Alexandria Port

By

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A thesis submitted to the University of Huddersfield in partial fulfilment of the requirements for the degree of Doctor of Philosophy

The University of Huddersfield

December, 2012

DEDICATION

To my beloved family; my mother and brother, my husband, and my four children who have morally supported me with their unlimited love throughout my study at the University of Huddersfield, I dedicate this work.

DECLARATION

I certify that the material in this research that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

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(Date)

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Supervised by:

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ACKNOWLEDGEMENTS

ABSTRACT

Ports are key members in the supply chain, therefore they are expected to provide reliable and efficient services. It has been recognised that one way to improve this is by adopting e-business solutions. Nowadays, a large number of organisations are operating their documents electronically. This research aims to identify the relationship between supply chain operations and e-business models and how e-business facilities the documentation flow within a port context.

The research focuses on a case study of Alexandria Port in Egypt, with the emphasis is on its current documentation systems. The principal aim of this research is to evaluate the benefits of using e-business models in ports with respect to the documentation flow and with the purpose of automating the port documentation flow, reducing the process documentation steps and the associated time. It also aims to investigate the documentation flow using the current systems applied in Alexandria Port and to design a generic e-business model that can be applied to ports such as Alexandria to reduce the steps within the documentation flow. This is referred as the GEMA Model, namely, Generic E-Business Model for Alexandria Port.

The research investigates the barriers faced by Alexandria Port in operating efficient supply chain operations. It focuses on the barriers to the smooth flow of documentation and the need to transform it into an electronic flow. It addresses the importance of the application of an e-business documentation flow system as a tool to speed up the operational process and is therefore a time saving to the port. The research also evaluates the importance of enhancing the trust between all parties involved in electronic business transactions to create awareness and collaboration. The analysis starts by reviewing the manual documentation system in Alexandria Port through direct and participant observations, process mapping, structured and semi-structured interviews and modelling. This is followed by an analysis of the semi-automated e-business system introduced by the port after one year from the beginning of this research (using the same methods as the manual system and only automate the customs process) and highlights the strengths and weaknesses of these two current systems of the port.

Finally, it analyses and evaluates the effectiveness of this GEMA e-business model and discusses how it can affect the efficiency of the documentation flow in the port. The research evaluates the likely effectiveness of the original GEMA model with the focus on the documentation flow steps and time reduction using a before and after scenario. The research highlights the effectiveness of using e-business in ports and it can reduce the documentation flow time and related costs. The research methodology used is multiple methodological approaches including participant observation, process mapping, structured and semi-structured interviews and e-business modelling.

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LIST OF ABBREVIATIONS

BOT	Build, Operate and Transfer
MRCC	Maritime Research and Consultantation Centre
IT	Information Technology
GEMA	Global E-Business Model for Alexandria Port
GATT	General Agreement on Tariffs and Trade
WTO	World Trade Organisation
IMF	International Monetary Fund
EDI	Electronic Data Interchange
EMDB	Egyptian Maritime Data Bank
JIT	Just – In – Time
ROI	Return On Investment
ICT	Information and Communication Technology
XML	Extensible Mark-up Language
APA	Alexandria Port Authority
RO-RO	Roll-On Roll -Off
ACHC	Alexandria Container Handling Company
NAFTA	North American Free Trade Agreement
HPH	Hutchison Port Holdings
IMO	International Maritime Organisation
ISPS	International Ship and Port Facility Security
B/L	Bill of Lading
TEU	Twenty Equivalent Unit
UNCITRAL	United Nations Commission on International Trade Law
F.F.	Freight Forwarder
INCOTERM	International Commercial Terms
ITS	Information Technology Security
PP	Policies and Procedures

PSEP	Port Said East Port
SCP	Social and Cultural Practices
PA	Process Automation
LLC	Legislations and Legal Cover
GOEIC	General Organisation for Export and Import Control
MCDR	Misr for Central Clearing and Depository and Registry
ISO	International Organization of Standardization
QMS	Quality Management System
OHSAS	Occupational Health & Safety Assessment Series
ISFP	Integrated Solution for Ports Company
IEEE	Institute of Electrical and Electronics Engineers
ERP	Enterprise Resources Planning
APS	Advanced Planning and Scheduling System

Chapter 1

Introduction

Chapter 1 – Introduction

1.1   Introduction

In the last few years, companies have recognized that the efficiency of their global business is heavily dependent on the efficiency of their global supply chains.   It also depends on the degree of the collaboration and co-ordination between the parties involved among their global operations (Hieber, 2002).   Cerdan and Acosta (2005) stated that an e-business application can enhance efficiency and performance for organisations. Efficiency can be realized through cutting cost and reducing process time to a minimum.   These two factors might be (easily) achieved through transferring transactions from a paper based to an electronic based transaction. Cerdan and Acosta (2005) believe that e-business has three main domains. The first domain is *e-information* where the internet provides, through the corporate website, corporate and commercial information to customers and business partners. The second domain is the *e-communication* where the internet functions as a communication tool that offers a unique and integrated communication between all the business partners within the entire supply chain. The third domain is the *e-workflow* that means the automation of a business process where documents and information are passed from one participant in the supply chain to another for action.

Manual procedures are time consuming and accordingly create extra transaction expenses. In ports, with each step in the documentation cycle, a new cost is created in terms of fees whilst reduction within the documentation cycle means a reduction in the overall costs. A reduction of the direct interaction between the customers and services' providers is another factor that consumes time.

Applying the technology of e-business is one of the solutions to eliminate the weaknesses resulting from using the paper documentation form.   This is especially so when it is associated with a type of service that is sensitive to time as a factor. For example port operations handle lots of documents like the bill of lading, the manifest, the packing list and more which are required by each customer to finalise procedures. It also involves cargo inspection, cargo handling, cargo transportation, billing, fees, dues and duties and payment.

With regard to the application of full automation in business, figure 1.1 shows the extent of the application of IT for global supply chains operations.
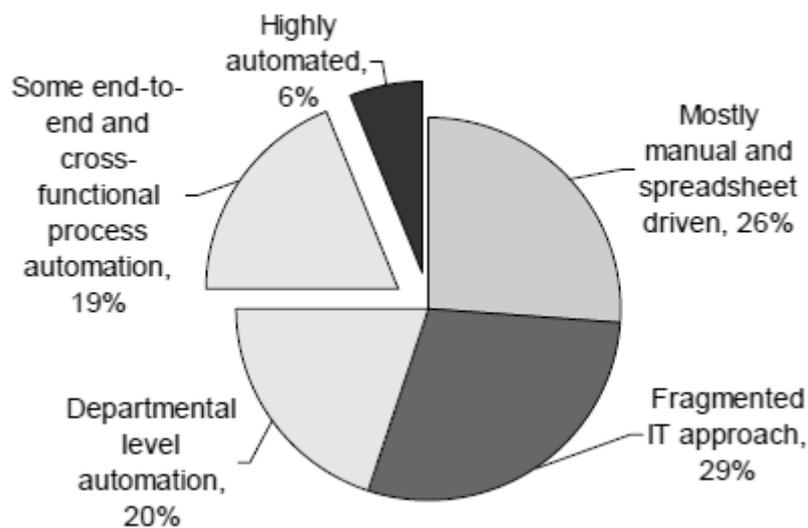
Figure 1.1 – The Application of IT for Global Supply Chains
Source: Aberdeen Group, Global Supply Chain Benchmark Report, 2006

As shown in figure 1.1 only 6% of companies are highly automated and 29% have an uncompleted approach to apply IT due to various difficulties. Meanwhile, 20% are only departmentally automated and 26% have a manual process which is considered a high percentage compared to the increasing rate of applying the e-business associated with globalisation and the need for the global supply chain to reduce the

related time. Finally, the 19% presents some end-to-end and cross-functional process automation. Alexandria port has a departmental level of automation as detailed in chapter 5.

Figure 1.2 shows the IT application of the global supply chain functions as analysed by the Flat World Knowledge (2008). It shows that 42% of the manufacturing processes are automated, while only 37% of warehousing and transportation functions are automated. Both procurement and returns and customer service automated functions are 34%. It also shows that the automated supply chain planning percentage is 26% and the least percentage is for the product development, i.e. 19%. The analysis did not pay much attention to the document flow automation which supports the model developed in this research.
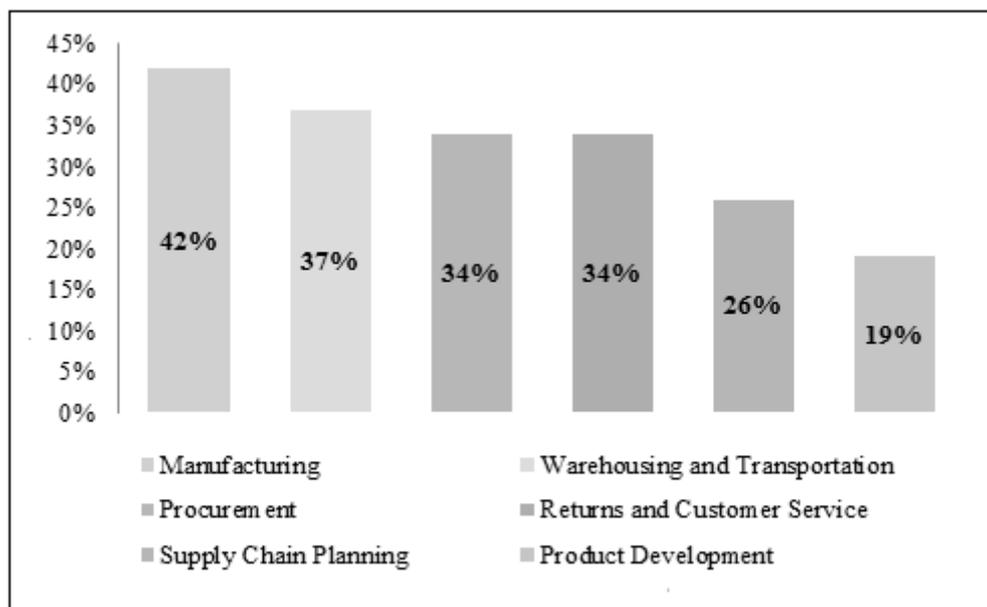
Figure 1.2 – Percentage of Global Supply Chain Automated Functions
Source: Flat World Knowledge, 2008

Alexandria is the second largest city and the principal maritime port in Egypt as regarding the volume of traffic. Approximately 60% of the foreign trade of Egypt is

handled through the port of Alexandria (Alexandria Port website – accessed 2006). Accordingly, reducing the paperwork and its associated costs is greatly needed to eliminate the massive bottlenecks that have occurred in the port.

The implementation of the technological based e-business model can aid the documentary transactions among the Alexandria Port Community. It is also the only port in Egypt that handles all types of cargo. Of all Egyptian ports, Alexandria Port achieved the following growth (MRCC report, 2006):

1. A growth rate of 12% that is considered the highest among the Egyptian ports when the number of ship calls increased from 3346 in 2004 to 3749 ships in 2005.

2. A growth rate of 15% that is also considered the highest, in the volume of cargoes handled when the number of tons handled has been increased from 35.4 million tons in 2004 to 40.7 million tons in 2005.

3. Alexandria Port realized the highest rate of handling general cargoes that represents 56.9 of the total volume.

4. It also handled the bigger portion of liquid bulk cargoes that represents 56.3% of the total volume of liquid bulk handled.

Alexandria Port also experienced a growth of 5.1% to 23.54 m. tonnes during 2009 (Egypt Shipping Report Q3 2010). Despite this growth and according to the Institute of Shipping Economics and Logistics (**2010**), the cargo handling based on tonnage of Alexandria Port ranked **91** among **125** of world ports.

Although, these activities reflect the relative importance of it among the Egyptian ports, the processing of the port's cargoes has always been a time-consuming

business. One factor in an efficient supply chain operation system is fast cross-border procedures; the second factor is a modern information and communication technology system. A team who are knowledgeable and skilled in international trade operations and document handling so that the transactions are kept to a minimum level is considered the third factor in running an efficient supply chain cross border (The World Bank Report, 2006). Unfortunately, the report also stated that Egypt ranked **165** (in both years of 2006 and 2007) out of **175** countries in terms of ease of doing business. Table 1.1 shows trading across borders and reflects the time-consuming business associated with export and import in Alexandria Port.

Table 1.1 – Trading Across Borders in Egypt

Nature of Export Procedures (2006)	Duration (days)	US$ Cost
Documents preparation	13	104
Inland transportation and handling	3	850
Customs clearance and technical control	1	10
Ports and terminal handling	3	50
Totals:	20	1,014

Nature of Import Procedures (2006)	Duration (days)	US$ Cost
Documents preparation	19	104
Customs clearance and technical control	2	10
Ports and terminal handling	2	185
Inland transportation and handling	2	750
Totals:	25	1,049

Source: The World Bank, 2007

This table shows a total duration of 20 days for the export procedures and duration of 25 days for the import procedures. These delays resulted in traffic congestion and delay in land transport inside the port (trucks) and congestion at berths that reduces the number of vessels calling at the port. It also resulted in reducing the port

productivity due to the time associated with finalizing the procedures (see chapter 2 for more updated tables).

In the light of the competitiveness of Alexandria Port and for enhancing operations and quality of delivered services, the potential role of e-business is to create improved supply chain efficiency through improved documentation flow. Little attention appears to have been paid to the importance of the use and the application of e-business in ports. Yet lots of ports around the world do not apply an e-business model. This gap in the application of e-business and the need for integrated systems confirms the need for greater depth of understanding and clarification of the role of e-business in a port's supply chain documentation. It also affirms the need for greater empirical research. This particular research seeks to investigate the importance of e-business in a port and the opportunity of using one integrated e-business model for Alexandria Port with the aim of reducing process time and cutting related costs through a reduced number of steps for each operation.

1.2 The Research Questions, Aims and Objectives

One of the key aims of this research is to develop a generic e-business model with the scope to reduce the documentation flow process within ports that have similar characteristics. It focusses on reducing the number of steps of the documentation process currently generated by the manual and the Web-Based systems in Alexandria Port. The model will theoretically be applied to a particular port such as Alexandria Port to study the opportunity to reduce the number of the steps within the documentation cycle.

E-business and information technology have impacted the way in which business is conducted through enhancing the efficiency of the supply chain's documentation flow. Efficient supply chain management reduces costs, decreases risks, and minimizes related time by cutting down the procedures and transferring the

document exchange from a paper based system to an electronic documentation system that can be achieved when applying e-business.

The research will investigate the documentation flow and will highlight the weaknesses captured from the current systems operating in the port of Alexandria. This investigation is also looking to propose a conceptual, generic and integrated model design for the supply chain documentation for Alexandria Port. The developed e-business model and the analysis of the current systems used within the port are essential to this research. However, the central theme of this research is finding efficiency by reducing the number of documentation steps required to complete any operation within the port.

The research starts with studying the strategic change and the strategic development needed for the implementation of e-business relating to the documentation flow in the Alexandria Port Community. The operational area covers customer service, e-business logistics, and supply chain information management. A review of the e-business model applied to similar situations has been undertaken. The research has also studied methods of improving efficiency at the service levels, and managing change in policies, strategies and procedures at the internal environmental level. An evaluation of the current systems of Alexandria Port related to the supply chain documentation flow is provided i.e., the manual documentation flow system and the semi-automated Web-Based system.

This has emphasized the need for a system change. According to the strengths and weaknesses extracted of using these two systems, a generic e-business model is subsequently proposed. The code name for this proposed model is **GEMA** i.e., **G**eneric **E**-Business **M**odel for **A**lexandria Port. The expected outcomes of the GEMA model are to enhance the efficiency of Alexandria Port and to increase its ability to compete globally by reducing the steps required in the documentation process which will have an effect on reducing the process time which in turn reduces

congestion in the port and increases its productivity. This will be demonstrated through a theoretical application of GEMA to Alexandria Port.

To realize this purpose, a number of research questions have to be addressed. These are:

- What is the relationship between e-business and supply chain documentation flow?

- How have port community systems affected the maritime ports documentation cycle time?

- How has the existing e-business model in other ports deal with e-documents?

- What are the weaknesses of the manual documentation flow system of Alexandria Port?

- What are the strengths and weaknesses of the semi-automated system of Alexandria Port?

- What are the expected outcomes of applying an integrated e-business system in Alexandria Port?

To answer these questions, the following aims and associated objectives were investigated:

Aims:

1. To evaluate the benefits of using e-business models in ports with respect to reducing the documentation flow.

2. To investigate the documentation flow using the current systems applied in Alexandria Port.

3. To design a generic e-business model that can be applied to ports such as Alexandria to reduce the steps within the documentation flow.

Objectives:

1. To explain the relationship between e-business models and the supply chain documentation flow.

2. To examine the effects of the port community systems on maritime ports' documentation cycle time.

3. To analyse the present situation of the chosen case study of Alexandria Port of Egypt.

4. To analyse the current supply chain documentation flow in Alexandria Port using the two available systems and to describe how the port provides this service.

5. To design a generic e-business model for Alexandria Port that can potentially reduce the steps in the documentation flow process.

6. To validate the GEMA model's effects on the documentation steps and flow in Alexandria Port.

1.3 Research Methodology

A number of techniques and approaches to research methodology have been used to achieve the desired aims and objectives. The research methodology is detailed in chapter 4; the following section discusses an overview of this methodology.

The following research methods have been employed:

- **Literature review:** A comprehensive literature review has been carried out to examine the following research areas:

- Literature that discusses the relationship between e-business and the supply chain documentation flow.
- Literature that explores the importance of e-business in relation to the port's supply chain in general and the documentation flow in particular.
- Literature that investigates the existing and applied e-business model in different sectors and contributes to reducing documentation flow time.
- Literature that studies port community systems and evaluate their effects on documentation cycle times.

The rationale for using the literature review is that a good literature review presents a clear context for the research and prepares for what is to follow. Any meaningful research cannot start without a literature review as the relationship between the previous work and the research rationale impacts the structure of the literature review (Warburton, 1996).

- **The Case Study:** The case study gives the opportunity of using a variety of research methods to produce a full true picture of an identified subject. It offers a chance to focus on topics relevant to the researchers' field and education background. A case study as a research strategy is appropriate for this research, particularly with its emphasis on study in context. This type of research tool is appropriate for such research which is based on studying an actual situation as a step towards comparing the actual condition with the desired optimal condition. It enables the researcher to determine the missing parts which, when realized, change the actual condition into an optimal condition. A case study approach is appropriate since it is a research strategy focusing on understanding the dynamic present within single settings (Wu, 2007). The case study approach is also appropriate when a holistic and in-depth investigation is needed (Tellis, 1997). A case study is known as a

triangulated research strategy that is needed to confirm the validity of the processes (Stake, 1995). Yin, (1994) stated that in a case study this could be done by using multiple sources of data. Given its significant geographical location, Alexandria Port of Egypt was chosen due to it being the largest port in Egypt and the only port that handles all types of cargo (see chapters 3 and 4). The advantages of using a case study approach in this research are that it:

  o *Develops problem solving:* by developing an integrated and generic e-business model for the case of Alexandria Port it has the opportunity to reduce the documentation flow steps and time.

  o *Allows exploring solutions for complex issues:* by introducing this e-business model to overcome one of the main obstacles of the international trade in the port and the supply chain operations, namely the documentation flow time consumed.

  o *Allows applying new knowledge and skills:* by applying an integrated e-business model to achieving the expected outcomes of eliminating the time related to the documentation flow that requires new knowledge and skills.

- **Action Research:** is that type of methodology used when a situation is studied with a view to improving the quality within this situation (Steketee, C. 2004). It enhances the professional development and the knowledge production. It is the contribution between the practical concerns and a problematic situation. Action research methods study a system while collaborating with the people involved in changing it in a desirable way (O'Brien, R. 2001). Figure 1.3 shows the detailed processes of action research:
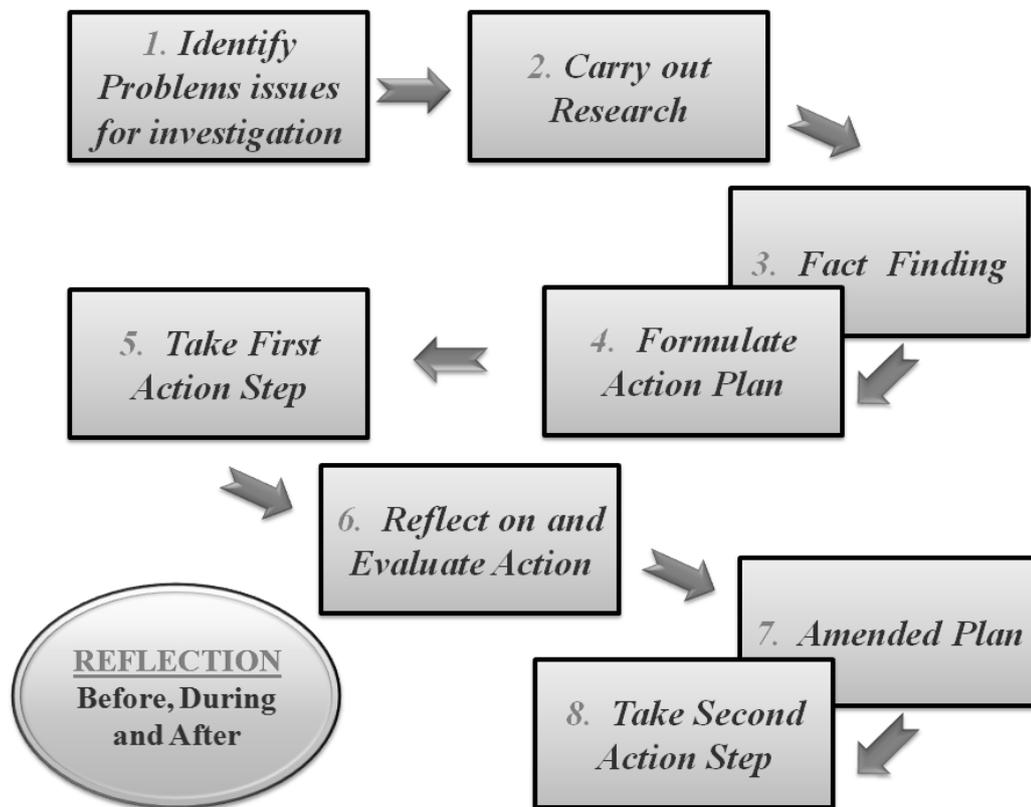
Figure 1.3 – The Detailed processes of the Action Research

Source: (Based on) Smith (2001) and Allen (2001)

This type of research methodology is appropriate when there is a need to assess the two current systems in Alexandria Port. This requires observation, analysis and a contribution between the researcher and the stakeholders. This research project starts by identifying the problem of the documentation flow in Alexandria Port as a problem that is a time consuming (see chapter 4 for the other type of research methods).

- **Direct observation/participant observation** is another methodological technique used in this research through several visits to Alexandria Port, the **case study.** The visits were for almost nine months; some involved attendance at the port for more than three times a week with daily visits for some other weeks. This approach is contextual, reliable and covers the

events in real time. For the researcher, this was not an easy task to achieve as people in the port were not always co-operative or want to participate in this research (see chapter 4 for more details). Representatives of the shipping lines and the representatives of the port client (exporters and importers) sometimes did not have the enough time or they did not allow the researcher to observe their work.   Direct observation was one of the basic tools of this research, when the researcher paid many visits to Alexandria Port in order to observe the operations of both exports and imports in the port focusing on the documentation flow as a barrier to the port's supply chain efficiency. It involves watching and noting of phenomena in an accurate way. However, direct observation is a time consuming source of data but reliable, purposeful and a selective way of data gathering (Achasoso, 2003).   As discussed in chapter 4, the researcher participated in some of these observations to give the port employees the chance to act freely. This type of research tool is appropriate for such research since it involves studying the actual procedures of the two systems used in the port. This enabled the researcher to determine weaknesses and obstacles and how to overcome them when theoretically applying the GEMA Model.

- **Process Mapping:** this technique helps to present a documentation flow in a virtual way. It has been applied successfully to a number of document flow studies in almost every industry. It is the upfront analysis of the information being used afterwards to improve procedures in terms of reducing time and costs savings (O'Brien, 2001).   In this research, it helps visualize the documentation flow in the case study of Alexandria Port. When there is a complex situation like using the two systems at the port, it helps to fully understand the systems and facilitates the communication with the stakeholders.   It also assists the researcher to study the flow of the whole procedures.   Additionally, this tool highlights that the procedures in consideration can be improved and rearranged in a more efficient way. As

Hines and Rich (2007) stated, process mapping enhances the study of whether all the procedures being done are really necessary.

- **Modelling:** Modelling is used as a problem-solving technique and developing the e-business model for the Alexandria Port, the GEMA Model included the following elements and is discussed in detail in chapter 6:
  - o Infrastructure and related costs.
  - o E-Security.
  - o Local strategies and Policies.
  - o Local culture
  - o Logistics and ICT Skills.
  - o Local Regulations.
  - o External customers.
  - o Internal customers.
  - o Customer relationship.
  - o E-document exchange.

The GEMA Model is expected to overcome environmental peculiarities. Developing the GEMA model seeks to eliminate time consumed in relation to Alexandria Port's supply chain documentation flow by reducing the number of paper documents and related steps that currently required by the two systems applied in the port. The GEMA Model accordingly minimizes the paper document costs as certain fees are required by the port authority with each document process. The expected outcome of the GEMA model is a more efficient supply chain documentation flow.

- **Structured and semi-structured interviews** have been conducted to analyse the two current systems of Alexandria Port. A combination of qualitative and quantitative approaches is used to measure the efficiency of the supply chain documentation flow using the current two systems. This research investigates

the manual documentation flow system in Alexandria Port and the Web-Based semi-automated system applied recently to evaluate the effectiveness and the usefulness of them and to suggest the requirements for change. Two structured interviews were designed; the first one was to identify the critical issues and weaknesses in the manual documentation system of Alexandria Port. The second structured interview was to assess the actual processes of the new semi-automated Web-Based system.

Two further semi-structured interviews were conducted; the first was to evaluate the usefulness of the Web-Based system and to verify the GEMA model elements. The second semi-structured interview was carried out to validate the GEMA model and to confirm its effectiveness and usefulness for Alexandria Port as one generic, integrated system.

A comparison between the applied e-business models in the advanced ports and in different business sectors and the GEMA model has been carried out to guarantee the originality of its elements. Another comparison has been carried out between the GEMA Model's expected outcomes and the port community systems that are currently and successfully applied in some Arab and European ports. The e-business model proposed therefore is validated as one integrated system that has some local environmental considerations to be more convenient for the local environment of Alexandria Port Community.

- **Triangulation of Evidence:** it involves the use of different sources of data in qualitative research; triangulation is a method used to check and establish validity in the study (Guion, 2002). This research has applied different sources of data like direct and participant observations, interviews (semi-structured and structured), case study, process mapping and modelling. (See chapter 4 for more details).

It merits mentioning that when this research started, Alexandria Port was using a manual documentation system. After a year, the port applied a new semi-automated system that required more interviews that only concentrated on customs automation. This imposed another semi-structured interview to evaluate the usefulness of the newly introduced system in Alexandria Port.

1.4 Structure of the Research

The dissertation contains eight chapters as follows:

Chapter 1 – Introduction: Starts by identifying the research topic, sets out the research aims and objectives, outlines the methodology used and highlights the research problem.

Chapter 2 – The importance of E-Business in Relation to the Supply Chain Documentation Flows: Discusses the relationship between e-business and supply chain documentation flows and highlights how it affects efficiency of the supply chain operations. It defines the role of ports in the supply chain. It also discusses the IT application in the Egyptian ports. It analyses the effects of e-business on the documentation flow and reviews the ICT in the port community. It also explains some of the existing e-business models in different business sectors.

Chapter 3 – The Case Study of Alexandria Port: Introduces the significance of Alexandria Port; the geographical location, the historical data, general information and the main terminals followed by a discussion of the trade barriers in Egypt. It gives the structural features of Alexandria Port. It also focuses on the trade volume that reflects the importance of enhancing the performance efficiency in the port.

Chapter 4 – The Research Methodology: discusses the research methodologies and strategies. It also describes the research data collection methods.

Chapter 5 – Flows of Documentation within Alexandria Port: the Manual System and the Web-Based System: focuses on explaining the current two documentation systems applied in Alexandria Port. It analyses the data collected and responses from observations and interviews in relation to these two systems.

Chapter 6 – The Development of a Generic E-Business Model (GEMA Model): Introduces the GEMA model and identifies its general elements and the other local customised elements. It discusses the model process and analyses the responses related to the application of an integrated e-business model and other responses related to the expected outcome of the GEMA Model.

Chapter 7 – Testing the Generic E-Business Model (GEMA): focuses on GEMA Model validation through the theoretical application on one of the operations that uses Alexandria Container Cargo Handling Company terminal. It discusses an overview of the company followed by the operational procedures using the two current systems. It focuses on how the GEMA Model overcomes the drawbacks of the Web-Based System. It illustrates some of the operations after the application of the GEMA Model and discusses some other alternative scenarios. It also presents a comparison between the applied port community systems and the existing e-business models in other sectors and the GEMA Model.

Chapter 8 – Discussion and Conclusions: Presents the different parts of the research. It highlights the main findings and evaluates how the stated aims have been achieved. It also discusses the limitations of the research and suggests areas for further work and future development.

Figure 1.4 illustrates the outline of the research described above.
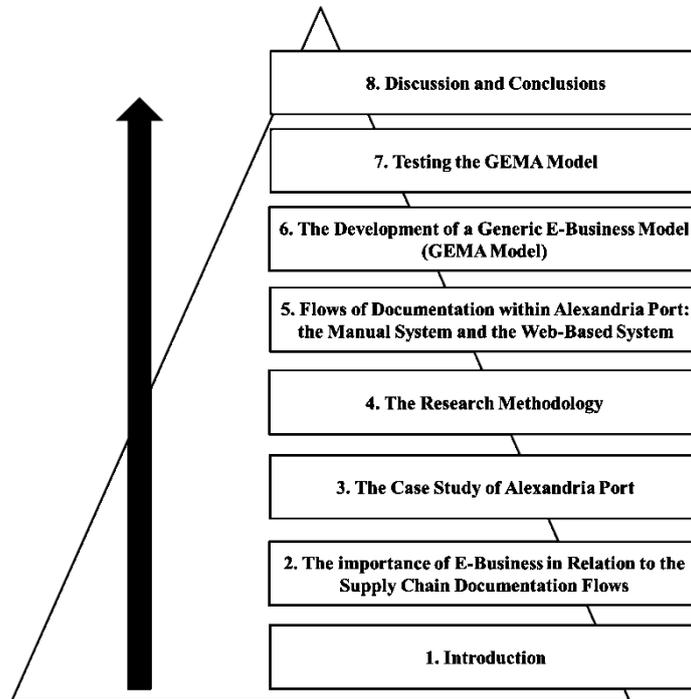
Figure 1.4 – Outline of the research

1.5 The Relationship between the Research Processes, Research Methods and the Structure of the Research

Table 1.2 indicates how the research processes are organized and developed in relation to the methodology used.

Table 1.2 The Research Aims, the Methods used and the Structure of the Research

Research Aims	Research Process	Research Methodology	Chapter(s)
1. To evaluate the benefits of using e-business models in ports with respect to the documentation flow.	To identify the relationship between e-business and supply chain documentation flows and to determine the importance of e-business. To explore the required changes to adopt e-business and to review the existing e-business models and the applied port community systems. Also to define some of port community systems	Literature review	2, 3 and 4

	applications in ports from the Arab region and in some international ports.		
2. To investigate the documentation flow using the current systems applied in Alexandria Port.	To observe, review and evaluate the current systems of Alexandria Port i.e. the manual documentation and the Web Based systems of Alexandria Port. Also to analyse the obstacles created by each system. To survey and collect data to justify the need for a system change and to explain how these observations match the stakeholders' responses.	Literature review, case study, observations, mapping process and interviews	2, 3 and 5
3. To design a generic e-business model that can be applied to ports such as Alexandria to reduce the steps within the documentation flow.	To design a generic e-business model for Alexandria Port including both general and local customised elements to overcome the Egyptian environmental peculiarities. Also to discuss the required changes of the application of e-business. And to explore the benefits of using one integrated e-business system for the reduction of the documentation flows.	Literature review, case study, observations, interviews and modelling	2, 3, 5, 6 and 7

1.6   Conclusions

This chapter has provided an introduction to the research topic and the research problem. The main aim of this research is to develop a generic e-business model for the case study of Alexandria Port with the scope to reduce the documentation flow, the number of steps in each operation and the related time. The developed GEMA Model has some customised elements to suit the Egyptian environment. The research also aims to analyse the two current documentation systems applied in Alexandria Port as a case study, in the sense to highlight the weaknesses of these systems in the port and to extract the necessity for a change.

This research involves a case study of Alexandria Port, the largest port in Egypt. Primary data is collected using face-to-face structured and semi-structured interviews. Multiple data sources were used such as observations, process mapping, documentation, modelling, surveys and literature reviews and archival records. A

triangulation of evidence was used in collecting the primary data. The interviews were with experienced stakeholders involved in the global business and supply chain operations, such as shipping lines, shipping and customs agents and freight forwarders who deal with Alexandria Port as a link in their transportation chain. Full details of these observations and interviews as well as the data analysis will be discussed in chapters 5, 6 and 7.

This chapter has also given an outline account of the research methodology used throughout the research. It is discussed in depth and detailed in chapter 4. Triangulation of evidence has also been discussed. And, finally the relationship between aims, methodology, and the research process has been demonstrated.

Chapter 2

The Importance of E-Business in Relation to the Supply Chain Documentation Flow

2 - The Importance of E-Business in Relation to the Supply Chain Documentation Flow

2.1   Introduction

This chapter aims to discuss the importance and the role of ports within the supply chain. It focuses on the use of the ICT in ports and highlights the port community systems applied in different ports; in Egypt, in the Arab region and other international ports around the world. It also highlights the effects of electronic documentation system in ports. The chapter is divided into seven sections and represents the literature review. Section 2.2 defines the role of ports in the supply chain. It assesses the importance of the role logistics has in port operations and discusses the general business of ports as well as the implementation of ICT within the supply chain. Section 2.3 focuses on the relationship between e-business and transportation on the one hand and e-business and documentation flows on the other hand. It discusses how the electronic information exchange affects the delivery of a product or a service and accordingly how the entire processes are affected. It presents a comparison between the electronic document and the paper document. It also analyses the e-business effects on documentation flows. It discusses the electronic documentation usage and the paperless trade in ports. Information security and its role in e-business and documentation flows are presented in section 2.4. Section 2.5 presents the documentation flow systems used in the Egyptian Ports and some ports in the Arab Region as well as others in Europe. This is followed by a literature review of the existing e-business models in other different business sectors (section 2.6). A checklist of the components of these e-business models is presented at the end of this chapter. The chapter also concludes that electronic documentation flows system affect the sea ports productivity and efficiency.

2.2 The Role of Ports in the Supply Chain

Ports have been playing an essential role in order to transfer goods from one mode of transport to another. They have provided the link between maritime and inland transport, and the interface between the sea and rivers on the one hand, and roads and railways on the other (Lambert, 2001).

Ports are complex entities supporting the procurement of raw materials and the manufacturing and distribution of goods (Carbone and DeMartino, 2003). They are theoretically members of many supply chains. Port competitiveness is becoming increasingly dependent on external co-ordination, management and control of the whole supply chain (Huybrechts et al. 2002). Ports are widening their role moving from a traditional interface with the ship to a more logistical orientation of their activities. Ports cannot achieve this goal without highly qualified personnel and the application of information technology (Sweeney and Evangelista, 2005).

A port is not recognized as a simple place for cargo handling; it is becoming more complex in nature. It is also a functional element in the supply chain that contains goods, people, business related companies and information flow (Lalwani et al. 2007).

At present, ports also play an important part in the management and harmonization of material and information flows, as transport is an integral part of the entire supply chain. Accordingly, the requirements of sea port services are growing. The objectives thus become to create collaborations, converging interests between the players of the port community in order to guarantee reliability, continuous services and a good productivity level (Lewis and David, 2001).

The development of ports as a logistics platform requires simultaneously working in several directions by taking into account the needs of the senders and receivers of goods and considering them their business partners. In addition to considering the senders and the receivers as the port business partners, there are the traditional partners like; the shipping companies, freight forwarding companies and terminal operators.

The physical accessibility from land and the systematic organization of information flow as well as a quick documentation flow system are decisive factors for the industry within regard to the choice of sea port (Maiti and Marjit, 2008).

The competitive position of a port is determined not only by its internal strengths like, efficient cargo handling, proper storage area, value added services, and hinterland connections but it is also determined by its links in a given supply chain. As a consequence, the risk of losing customers can derive not only from deficiencies related to one or more of those activities but also from the customer's service network management (Narula and Sadowski, 2002).

Consignors and consignees requirements and needs are increasing over time which places a pressure on ports to provide seamless operations and services to meet these needs. The active integrated port system is required to offer better services at lower costs but, it is merit mentioning that the customer is becoming very demanding and looking for a speedy and reliable product delivery rather than only looking for price and quality as it used to be (Mangan and Lalwani, 2007). Bolduc (2009) stated in his report of intelligent transportation systems that there is a shift in the role of ports; from offering stand-alone basic services, to serving as a key node in an integrated value-driven supply chain.

In addition, ports contribute to competitiveness of integrated supply chains as in today's global environment; competition is not between ports and port terminal as between supply chain of which the port and the port terminal is a part (Kevin, 2008).

Figure 2.1 shows typical port community participants. The figure indicates that port community members like; shipping lines, terminal operators, freight forwarders and others must interact with a wide range of organizations in the wider supply chain.
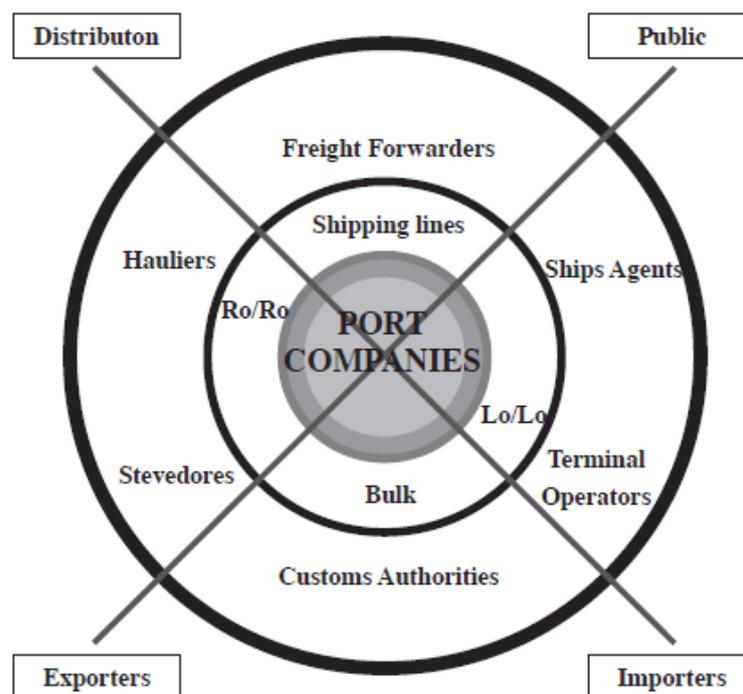
Figure 2.1 – Typical Port Community Participants

Source: Sweeney and Evangelista, 2005

The figure shows that all involved parties should interact together and exchange information to facilitate and accelerate the business process. It merits mentioning that the figure 2.1 focuses on the integration between the internal and the external parties participating in the port community. However, the integration is needed at three levels (Sweeney and Evangelista, 2005):

1. Within individual companies that comprise port communities (internal integration),

2. Between companies that comprise port communities (port communities integration) and

3. Between the port community and external organizations (external integration).

Recent developments in ICT have enhanced and facilitated these integration processes. ICT can be considered an essential enabler of integration at all three levels (Sweeney and Evangelista, 2005).

As for Egypt, the Egyptian Maritime Data bank (EMDB) recently is playing a noticeable part in enhancing the Egyptian economy by developing the maritime sector; maximizing and globalizing it's role through the application of IT in its ports (Minister of Transport report, 2008).

2.2.1 The General Business of Ports

The general purposes of the port are to facilitate the shipment loading/unloading and act as a platform for shipment transportation. The port's functions are performed by different departments, which need to work in compliance to one another (Wang et al. 2007). The current priority for ports is the involvement in the supply chain. Internal integration of the port's departments and external integration with different parties in the supply chain have become important (as mentioned in the above section).

'Fourth generation' ports were defined as those adopting a new logistics approach that is more responsive through adopting the e-business. Ports however have a complex organisational structure which presents an obstacle to creating a general framework for the management of a port's processes (White, 2004).

This complexity is considered the natural outcome of the various types of companies involved. Analysis of a port's processes might lead the way to a simplification of structure (see chapters 5 and 6).

Integration of material and information flow with better external co-ordination through such roles as shipping agents could lead to improvements in the supply chain but it requires an integrated port community system (Wang et al. 2007).

Ports require precise and accurate information about shipments to improve shipment management and support planning and decision making. The introduction of electronic document can assist the passage of secure information to and from ports and shorten the process time among the supply chain. By improving the information and reducing the process time, ports could also be able to provide a value-added service. Accuracy in information is however limited by the difficulty of comparing traffic totals when so many different types of commodities are handled and there is no standard computational format for handling (Ould, 2005).

The popular method of containerization leads to lower transportation costs and standardisation of commodity packaging can also ease the information handling problem. Containerisation has also led to an increase in ship size and in income per ship, but it requires larger and more advanced port terminals to accommodate these ships.

This in turn creates an increase in the container port traffic that needs to be planned by the port as it strives to facilitate truck movement and the growth of the port's container capacity. The increased number of containers entering and leaving the port creates more complexity in container handling that needs to be managed which again, if it is not well managed, creates supply chain complexity (Mei and Dinwoodie, 2005).

2.2.2 ICT in Port Community Supply Chain

ICT has transformed the way companies in all sectors conduct their businesses. The movement of goods along the supply chain is reflected by corresponding movements of information. For example, when an item is sold at the supermarket check-out, this information is captured via a bar code reader and can then be read immediately anywhere in the distribution chain. Computers communicate with other computers via local area, national and, in some cases, international networks (Evangelista, 2005). However, without accurately designed supply chains and skilled and capable people, this will not succeed.

The ICT provides organizations with solutions that integrate elements of that organization or its supply chain linking the output of one action to other related elements. Additionally, the use of the internet technology will enhance communication between supply chain participants (Evangelista et al. 2004).

Since information is one of the key resources of any seaports, information technology play a vital role in seaport competitiveness. The key enabler of internal and external integration is the ICT. It integrates the internal and external levels of port community and meanwhile achieves the integration of processes inside and outside the seaport area (Tijan, 2009).

Considering the seaports as central places in the transport chain, ICT implementation in seaports plays a vital role as a facilitator of international transport (Hsu and Lalwani, 2010). The ports are playing important function in supply chain management; accordingly the concept of port operations has changed to port network concept (Bruce, 2008). There are different elements affect the port network structure. One of these elements is the port accessibility which measured by the degree of the port ability to be reached by other network ports. Another element is the port charges that reflect the service quality and the time costs.

Focussing on the time costs, it determines the demand of port services and reflects the port management efficiency and ICT application in seaports plays a crucial role in reducing the time (Wayne, 2007).

ICT importance is reflected in the major investment which has been made in technology platforms within port communities in the last few years (Richard and Jiff, 2007). The information flow upon which the port operation relies needs to be extended into a wider environment. It also brings the port's system up against other requirements like road or rail traffic management systems. Several main ports around the world including Rotterdam, Houston, Hong Kong and Singapore, have developed electronic port communities systems (PCS) that use Internet based technology to connect the numerous parties involved in moving freight such as shippers, forwarders, insurers, customs, terminal operators, land, ocean and air carriers (Minor and Marinos, 2008).

Port Community System provides a single window that guaranteed a secure exchange of both information and documents electronically across the port stakeholders involved in the maritime transport and logistics chain including the trading partners (Richard and Jiff, 2007). Port community system ensures flawless transport of goods through port systems through providing secured information flow and maintaining business continuity while each stakeholders maintains his/her own autonomy. It also provides the requested data for proper and timely inclusion for other entities included in the PCS (Wayne, 2007). A good example is Hutchison Port Holding's e-commerce platform 'ports-n-portals', which offers a complete range of Internet-enabled business-to-business (B2B) services through its arrangement with Arena, a leading supplier of software for SCM solutions (Evangelista, 2005). The diversity of companies within port communities makes the achievement of the desired levels of integration difficult and requires some changes.

These changes necessitate a change in the way in which new knowledge and skills are developed by the staff involved in companies within port communities. Traditional models need to be re-evaluated to reflect the increasing importance of knowledge and skills acquisition, particularly in relation to the SCM concept and the evolving role of ICT in improving supply chain capability (Bessant et al. 2003 and Sweeney, 2003).

Figure 2.2 illustrates a traditional communication form in a port. Every party or every company needs to send its information to every other party, who needs or wants this information. Various means of sending this information like; fax, email, Electronic Data Interchange (EDI), and telephone can be used.
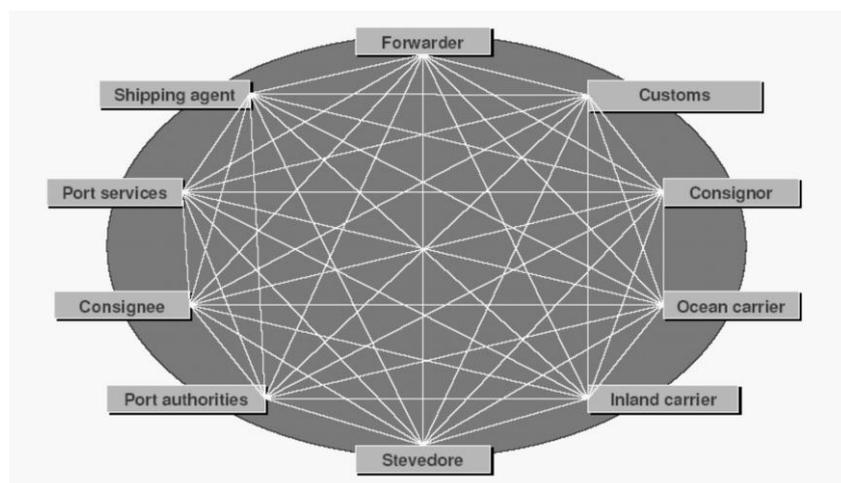
Figure 2.2 – Traditional communication form in a port
Source: Blonigen and Wesley, 2006

Figure 2.3 shows the ideal communication in the case of using a port community system. Every party sends the information required or needed to a central system and the other parties have the option either to acquire the information directly from the system or the system sends the information to that party.
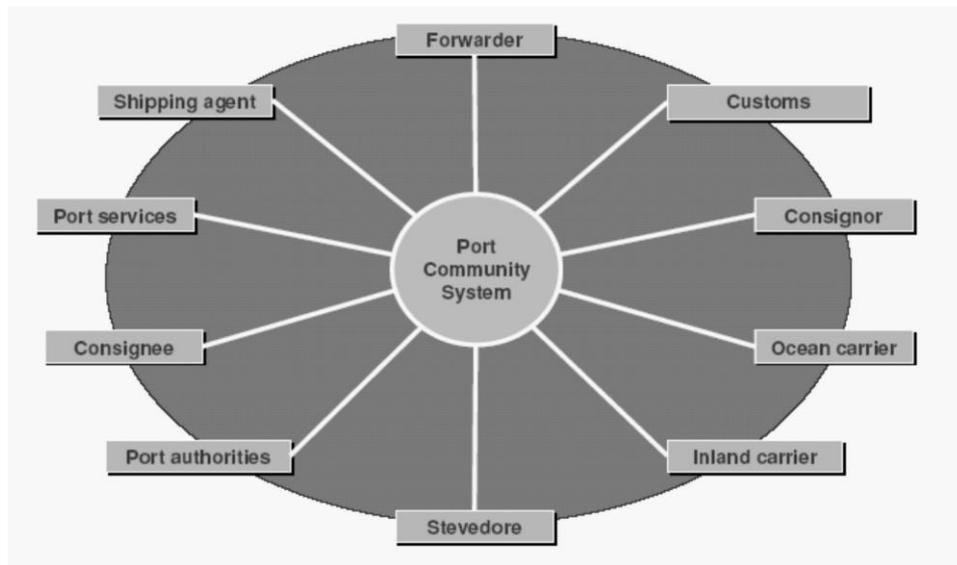
Figure 2.3 – Communication form with a Port Community System (PCS)

Source: Blonigen and Wesley, 2006

The PCS enhances communication efficiency and effectiveness in the port. However, it differs from one port to another; it depends on the function of the port (Minor and Marinos, 2008). The PCS defined in the literature as follows:

> "*A neutral and open electronic platform enabling intelligent and secure exchange of information between public and private stakeholders in order to improve the competitive position of the sea and air ports' communities*"
>
> (Zaki, 2007)

2.3 The Relationship between E-Business, Transportation and Documentation flow

The electronic exchange of information which facilitates and/or enables commercial transactions is known as electronic business (e-business) and is achieved through using the internet, electronic data interchange (EDI), intranets, telecommunications

or e-mail. Serving customers, buying and selling, administering transactions, and collaborating with business partners are examples of such transactions. These transactions could be inside the company among members and employees and will affect their internal supply chain processes and operations, or outside the company among other different companies, which, in this case, will affect their external supply chain processes and operations (Long, 2004). While electronic commerce involves the change of ownership status of a product or service and is simply changing the habits of buying and selling, e-business is the technological means that enables supply chain managers and logistics operations managers to fulfil the customers' demands.

This could be achieved through exchanging and sharing information throughout the entire supply chain, enabling the supply chain partners to plan and organize their processes more effectively, and most importantly, through collaborating within and across other companies (Reylonds, 2001).

E-business also affects transportation when the companies' processes involve producing, planning and delivering a product or service. In addition, the processes involve the fulfilment and the control of these operations and deliver these services or products in an effective and efficient way. The lowest cost should be the main concern when managing the supply chain processes in order for the company to be ready to fulfil customer demands, being responsive, make to order manufacturing concepts, and deliver the product using just in time (JIT) management technique (Tae et al. 2010).

These requirements are what effective transportation can offer. Effective transportation systems can also help the company to make the movement more frequently for smaller quantities of cargoes or products (Raisch, 2001). Transportation has a remarkable influence on both the speed and reliability of the customer order cycle and also on the quality of services the customer is expecting,

taking into account that typically the transportation cost forms the biggest share of the total logistics costs (Chandra and Grabis, 2007). Accordingly transportation is considered one of the most vital issues in the supply chain processes that have to support business which is generated electronically.

Transportation providers must be able to cope, function and participate as partners as they are considered essential members of the supply chain. They have to be able to manage and share information and also produce and provide higher standards of services in terms of speed, reliability and dependability (Tae et al. 2010). They have to be willing to facilitate and make their information ready and accessible for customers.

All partners along the supply chain must be able to trace and track their shipment whenever they need to. Real time information is crucial for the transportation suppliers and logistics companies providers and if this information is in a tailored way, then they can play a major role in their customers' supply chain. Real time information creates and guarantees the opportunities for long-term business contracts by creating an additional value and being further ahead of the traditional transportation and logistics providers offer (Tae et al. 2010).

Electronic technology and the Internet facilitate development and enable integrative and collaborative supply chain strategies, develop the logistical procedures, and improve the electronic procurement processes. The freight transport sector has been affected by on-line retailing through the changes in demand, different service requirements, more capability requirements, and multiple mode use (Carletti, 2007). The market structure of transport and the way this service is delivered and produced have been influenced by electronic business. Some of these influences are (De Lijster, 2009):

- The transformation of the demand for transport by changing the structure of the physical products through reducing their size and weight and/or shifting them from actual to virtual products.

- The generation of new distribution forms through on-line selling and through the quality of transportation services.

- The internal business processes, customer relationship management and procurement and supply chain partners collaborations can be improved through using e-technology.

- Market exchange and electronic marketplace growth through using the e-technology enable the shippers and the carriers to buy and sell transportation through a new medium (De Lijster, 2009).

In developing countries, e-business has increasingly become a necessary part of business strategy and a strong promoter for economic development. The integration of information and communications technology (ICT) in business has revolutionized relationships within organizations and those between organizations and individuals. The use of ICT in business has enhanced productivity, encouraged greater customer participation, and reduced costs (Bonnett, 2000).

Developing countries are given increased access to the global marketplace and to facilitate e-commerce growth in these countries, the relatively underdeveloped information infrastructure must be improved (see chapter 6 for more details). Among the areas for strategies interventions are (Blair, 2007):

- High Internet access costs, including communication fees, connection service fees, and hosting charges for websites with sufficient bandwidth;

- Limited availability and use of credit cards and a nationwide credit card system;

- Underdeveloped transportation infrastructure resulting in the slow and uncertain delivery of goods and services;

- Network security problems and insufficient security safeguards; (see section below).

- Lack of skilled human resources and key technologies (i.e., inadequate professional IT workforce);

- Cross-border issues, such as the recognition of transactions documents, certification and documentation services, improvement of delivery methods and customs facilitation; and

- The relatively low cost of labour, which implies that a shift to a comparatively capital intensive solution (including investments on the improvement of the physical and network infrastructure) is not apparent (Blair, 2007).

It is recognized that in the Information Age, Internet business is a powerful tool in the economic growth of developing countries. While there are indications of business investment among large firms in developing countries, there seems to be little and negligible use of e-business among small and medium sized firms. E-business promises better business for SMEs and sustainable economic development for developing countries. However, this is premised on strong political will and good governance, as well as on a responsible and supportive private sector within an effective policy framework (Carletti, 2007).

The Economy of Egypt report of 2005 stated that there are three primary processes enhanced in e-business:

1. **Production processes:** This includes procurement, ordering and replenishment of stocks; electronic links with suppliers; processing of payments; and production control processes, among others;

2. **Customer-focused processes:** This includes promotional and marketing efforts, selling over the Internet, processing of customers' purchase orders and payments, and customer support, among others; and the related exchange documents.

3. **Internal management processes:** This includes employee services, training, internal information-sharing, video-conferencing, and recruiting. Electronic applications enhance information flow between production and sales forces to improve sales force productivity. Workgroup communications and electronic publishing of internal business information are likewise made more efficient. E-business contributes and promotes shortening the documentation flow (Egyptian State of Information Services – Economy of Egypt Report, 2005).

This research focuses on the last point; i.e. enhancing the documentation flow and reducing the transaction time by transforming the flow into electronic base flow.

2.3.1 The Role of E-Business in Managing Documentation Flow in Sea Ports

Ports and port system transition to an electronic business model has a direct and indirect impact on the rationalization of the cost of port operations. The direct impact is savings in the application of electronic document in relation to the paper document, the price of labour, time and cost of processing.

The indirect cost represented in the use of electronic document focused on; speeding up administrative processes from a reduction in paper work, improved control by a reduction in manual processing, reducing the duration of storage and costs by speeding up access to information flows about the position of cargo transport, reducing consumption of resources and infrastructure, reducing the burden on business and improving the accuracy of the system linking the port with similar systems (Patric, 2008). Through increased effectiveness and transfer of information on the global market, the electronic document also allows the optimization of transport and it improves management through efficient traffic flows and performing port co-ordination (Patric, 2008). The electronic document enables sea ports and all the parties involved in the process to create and maintain a port services foundation for the achievement of sustainable growth and development of the entire port management system (Tae et al. 2010).

2.3.2 Electronic Documentation Usage

Sea ports and transport companies are not only users of electronic business/documents, but also providers of e-services with the objective to optimise business processes. Electronic trade eliminates the operational costs related to manual paper processing (Devlin and Yee, 2005).

It also increases the transparency of the supply chain as a result of using information exchange between trading partners. The usage of the electronic document also has an economic impact since it assists the growth of productivity and enhances the competitiveness (Gunningham, 2002).

A study done by the European Commission in 2008 focussed on the ICT and e-business impact in the transport and logistics services industry, the benefits of using IC and the adoption of Electronic document can be summed as follows:

- Increasing competitiveness.

- Enhancing the inter-firm collaboration.

- Maintaining the relationship between the involved parties and increasing their interacting.

- Driving innovative process through employees' skills and IT know-how.

- Increasing market share and profit growth (European Commission ICT report, 2008).

The report recommended that the public bodies have an important role in helping firms and organisations the interoperability problems that resulting from the co-ordination problem. They also recommended that the training programmes need to be more focused on the skills required for e-business (European Commission ICT report, 2008).

Another study done by the United Nation Network, 2011 stated that each additional day of delay due to inefficient documentation flow included within the trade logistics procedures reduces trade by at least 1%.

2.3.3 Maritime Transport within Paperless Trade

Generally, paperless trade benefits range from a decrease of costs, better and quicker information flows, reduced delays and costs at borders, increased liability of the supply chain and increased security of trade and transport (Devlin and Yee, 2005). Buyers and sellers are on the supply side for the electronic document in international trade and transport.

In the entire transport chain, traders are the source of documents, data and information therefore. Therefore, they need to ensure that the benefits are shared and that quick information exchange and efficient data entry and compliance are the result of using the paperless trade system (De Lijster, 2009).

Figure 2.4 presents an expected scenario of the various standard messages used in inland waterway introduced by De Lijster 2009.
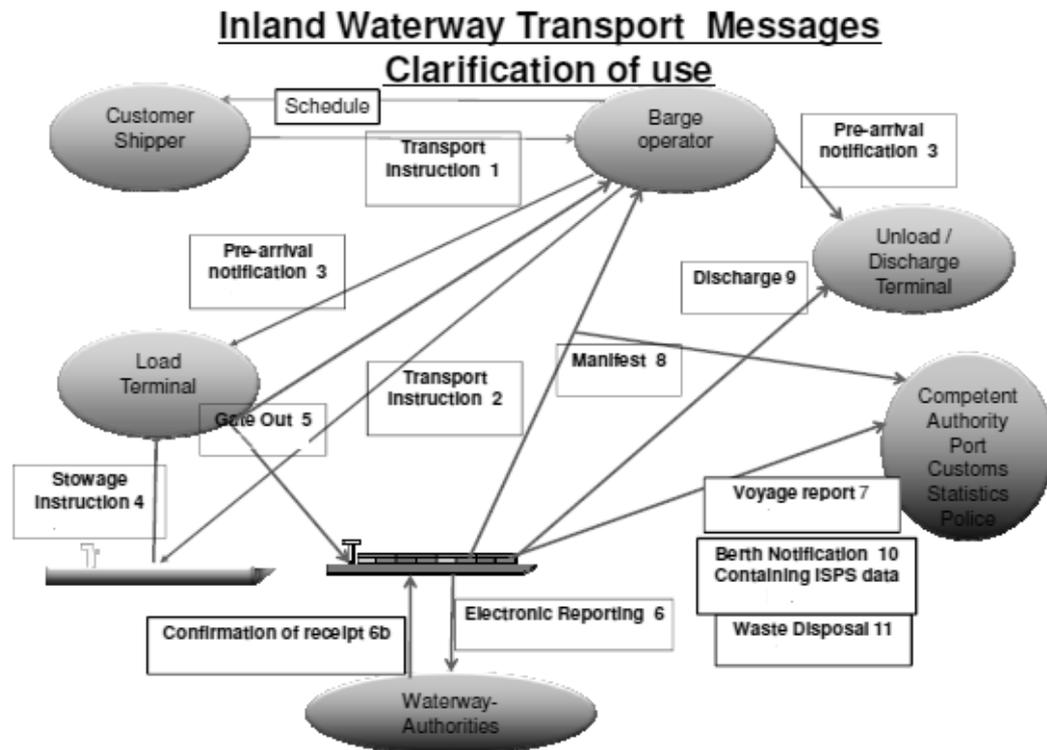
Figure 2.4 – A Scenario of the Various Standard Message used in Inland Waterway

Transport

Source: De Lijster, 2009

The messages are as follows:

1. It starts by sending the transport instruction by the shipper or the trader.
2. The barge submits the message to the skipper of the vessel.
3. The barge operator informs the load terminal.
4. The vessel provides the terminal with the required cargo stowage.
5. The terminal delivers the final stowage through the gate out.
6. The vessel reports the waterway authority.
7. The master sends a voyage report plan to the barge operator.

8. The vessel sends the electronic manifest to the barge operator, the customs and any other authorities.

9. The terminal starts the discharging operations as soon as the vessel arrives to the terminal.

10. For security purposes, the vessel needs to send declaration and security notification before berthing.

11. For some ports, and for the purpose of controlling the waste, the vessel sends a waste report to the authority.

12. It is useful to notify the sender that the information he sent has been received clearly (De Lijster, 2009).

The above scenario reflects the complexity in waterway transport and trade cross borders which also reflects the complexity of the port community systems in ports as mentioned earlier.

2.3.4   *Electronic Documents versus Paper Documents*

Electronic documents management are software applications that replace paper documents and provide storage, security, retrieval and archiving of these documents. The process begins with the conversion of paper documents and records into electronic files. It merits mentioning that guarantee the exchange of business documents in a secure, reliable and interoperable way is crucial to boost the implementation (Cheung, 2009).

This conversion helps in eliminating some obstacles created by paper; labour intensive duplication procedures, misplaced originals, inconvenience of retrieving files from off-site storage and slow distribution (Devlin and Yee, 2005).

Paper files are also costly to process, distribute, duplicate and storage. Electronic documents reduce operating expenses and overhead. Electronic documents can also be easily organised and quickly retrieved, archived and indexed (Garrido et al. 2007).

The difference between electronic and paper documents can be summed up as follows:

- Keeping electronic document is greater than keeping paper document: computers and PC's in any organisation have the potential to keep and distribute several databases and maintain backups.

- The variety of electronic documents is larger than paper documents: a forms of paper documents can be obtained electronically with the possibility to transfer it to charts and formulae (for example) to support the different needs. It also aids analysis and experimentation.

- Electronic documents contain attributes lacking in paper documents: electronic documents maintain information and keep a record of dates of access. It can also be updated.

- Electronic documents are more efficient than paper documents: electronic documents can be stored for multiple users to access while the paper documents are easily damaged and misplaced.

- The structure of electronic document may reach a degree of complexity absent from paper documents: the creation of an electronic document system is a complex matter since it contains a wider spectrum than paper documents.

- Electronic document change faster and easier than paper document: an electronic documentation system to be effective, it needs to be secured and only accessible to authorised persons.

- Electronic document innovation requires support of an infrastructure that means the paper documents are never needed: large volumes of data and the

exchange electronic document require software, hardware, wide area network, servers and personal computers and workstations (Garrido et al. 2007).

The Roadmap towards Paperless Trade report (United Nation Report, 2006) mentioned that adopting electronic trade for developing countries may be difficult due to having few resources for introducing the necessary infrastructure requirements.

Understanding the current situation of the case study of Alexandria Port and solving the problematic issue of documentation flow and considering it as a priority for improvement could be the stepping stone for the creation of better and simplified processes (Patric, 2008).

The outcomes of the comparison between the paper documents and the electronic document can be reflected on ports. Electronic documents help ports to exchange electronic data and information as much as possible to serve their clients and ease their operations and keep the necessary backups. It can help ports in evaluating their operations and measure their productivities. It can also help ports in providing updated services to their clients. Electronic documents can facilitate access to as many port clients as possible to view, review and track their operational processes. The port clients can also perform all due payments. Electronic documents need to be reliably stored. The design and structure of an electronic documentation system needs to be simple, clear and easy to use to encourage the port stakeholders to use it. Usability is critical in encouraging even staff acceptance. Ports should collaborate with the stakeholders and take the necessary measures to guarantee that the stakeholders' information will not be altered or changed. Electronic Information and data should be secured and safe.

2.4 Information Security and Paperless Trade

Information security must be addressed when using e-business to avoid any deliberate or accidental threat. Information security creates trust between the parties involved in e-document exchange. Trust is considered the core issue in every business transaction (Turban, 2004).

2.4.1 E-Security and E-Trust

Creating and maintaining e-trust is another critical element for successful e-business. Building a trustworthy environment is essential not only to e-business success but also to maintain customer relationships. Customers and organizations require and need to be confident that the e-business system is trustworthy; organizations need to be confident about their capability and skills to handle the risks associated with different types of threats and vulnerabilities, while the customers need to be confident that the system of the organization they are interrelating with is trustworthy enough to secure their confidential information (Schneier, 2000).   Organizational confidence must be ahead of customer confidence as the fact is that customer confidence is based on authorized organizational confidence.

The security policy needs to be established first, followed by the implementation of e-business.   Due to this sequence, it requires well-established risk management strategies, risk assessment and analysis and also requires highly qualified teams (Schneier, 2000). The trust building of e-business security creates the double confidence required by both customers and organizations.   To achieve the comfort required for the e-business users, securing their individual data is essential (Oates, 2006). The perceived lack of security on the Web is seen as the main obstacle of the application of e-business.   E-business operators or controllers must take into consideration the harm that might result from unauthorised processing and the nature of the data to be protected (Wang et al. 2008).

Information is very vulnerable and thus information security is crucial. The development of communications technology makes it even more vulnerable. Due to intentional hacking or the effort of an unauthorized person, large losses can be made while accidental breaches are easier and more likely to happen (Panko, 2002).

Electronic communication requires protecting sensitive and confidential data in order to achieve a successful transaction. Continuous improvement should always be the theme for information security as it can quickly become obsolete if sufficient attention is not paid to technological advancements, IT infrastructure and organisational changes (Peng, 2007). The information must be protected against different threats, types of vulnerabilities like loss, alteration, inaccessibility or wrongful disclosure. Threats also include errors and omissions, accident and intentional damage and fraud. The objective of information security is protecting the interest of users relying on information from harm resulting from failures of availability, confidentiality and integrity (Alqatawna et al. 2008). The information security objective is met when:

- Information is available when required and usable (availability).
- Information is disclosed to only those who have the right (confidentiality).
- Information is protected against unauthorised alteration (integrity).

Security solutions require identifying *what is to be protected* and *the means of protection* of this sensitive information (Poirier and Bauer, 2001). Normally, today's e-business security practice is to think about the architecture and plan a protective structure for each part or section. The organization must identify all systems, hosts, networking devices, and applications to realize the objective of providing an end-to-end security concept. *Al-Omari* believes that the trust between the electronic transaction parties is a key to a successful e-business successful relationship. He also believes that building a trustworthy environment is a complicated issue in e-business

especially between parties that have no previous experience of working with each other (Al-Omari, 2006).

E-trust comes in two aspects; trust in the trade itself and trust in the trader. Perceived security and perceived privacy are two components that positively influence the customers' trust (Shumaila, et al. 2003). E-trust is considered an important component for a successful relationship as it creates confidence between the exchange partners. It also increases reliability and integrity (Li-Chang and Chao-Hung, 2008). Figure 2.5 shows an e-trust model put forward by Al-Omari, 2006:
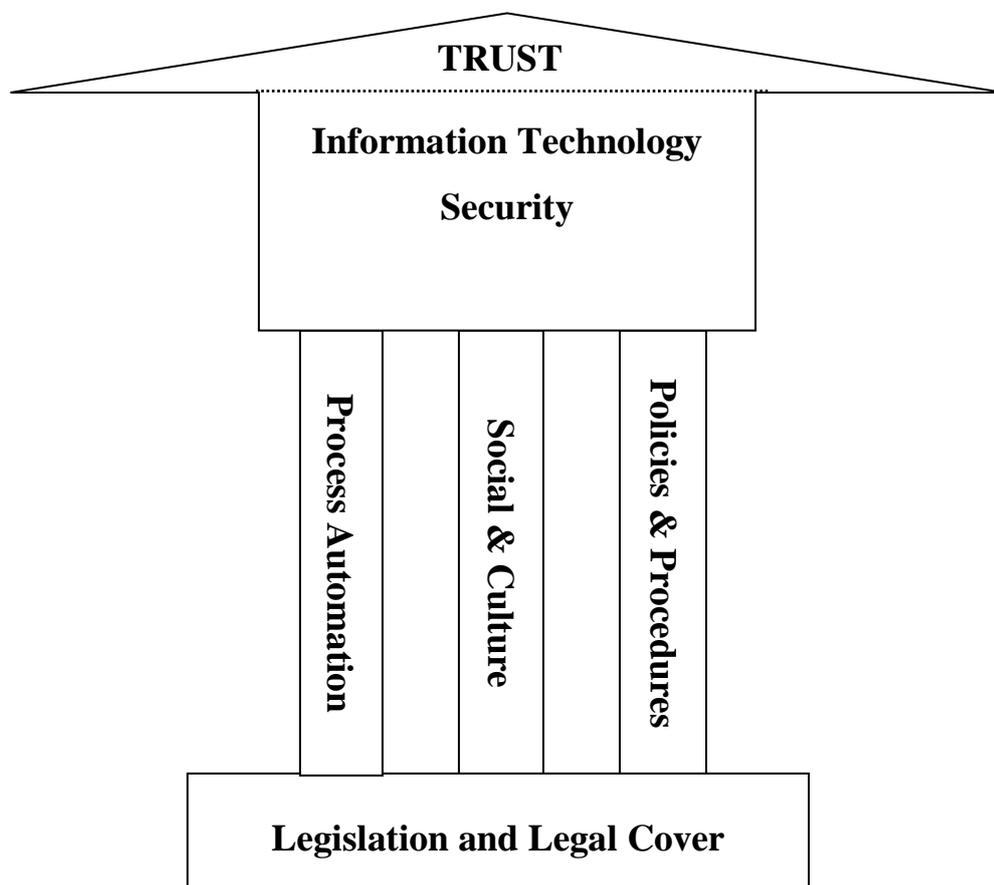
Figure 2.5 – The Trust Model

Source: Al-Omari, 2006

This trust model is expected to create mutual trust between the involved parties and it can be formulated from different components as figure 2.5 shows. The components included in the model are:

- *Information Technology Security (ITS):* It is not enough to provide trust, although it is very expensive. It has to be combined with IT security.

- *Policies and Procedures (PP):* it strongly represents the legal issues which are necessary to support the application of e-business. Transparency should exist, policies should be clear and procedures should be open for the public to inspect, then the trust will be created.

- *Social and Cultural Practices (SCP):* Previous experience plays a major role in building trust. Reliability should be offered by the system to the users, and a solid trust will be formalized as time goes by.

- *Process Automation (PA):* This is the last step of building e-trust. Automation can only speed up the process and identify new channels of delivering services. However, the integration between policies, technologies, and procedures will encourage the users to carry out electronic transactions.

- *Legislations and legal Cover (LLC):* This is the solid foundation that all trust components need.

There are very clear reasons therefore to support the developers of this e-trust model as e-business success depends on successful e-trust and e-security systems.

2.4.2 *The Role of Information Security in E-Business (E-Security)*

There are certain initial considerations that must be taken into account particularly, information security. Competitive advantage could be realized through maintaining information as it is a valuable and economic asset to any company (Panko, 2002).

The problem of information security has increased due to factors such as increasing globalization (Wardlaw, 1999). A central feature of globalization is information technologies and systems that also have become important to the functioning of communication systems, transportation systems and banking systems. The problem is that they now are potentially more vulnerable to the threat of attacks and disruption of hackers. Globalization is about sharing universal values in terms of the easy movement of goods, services and technology. In order to achieve this easy movement of goods and services, an e-business application is increasingly required. Information security has to be combined with any e-business application to guarantee success (Ho, 2007). The increasing complexity of achieving full information and computer security and a lack of awareness and education in the information security era have increased the scale of the problem (Landwehr, 2001). Other factors include users' attitudes and behaviour. Finally, the legal and regulatory positions of information security are still unclear (Wesley, 2006).

Competitive advantage and company differentiation are all about information security. Therefore information security must be a core objective and an essential issue in any company (Pipkin, 2000). Securing data and information is important to the e-users as they need a guarantee that their data and their private information will not be disclosed or altered. Moreover, when e-security is guaranteed, it encourages and increases the number of e-business users.

2.4.3 Reliable & Secure Electronic Transactions

Business opportunities expand and business objectives are promoted through effective information security. Information security should spread throughout the distribution channel. Information security plays an important role when the wider information is distributed to suppliers and/or to any partners in the trading process (Wesley, 2006).

Regarding e-transactions, The Commission of the European Communities (1997) considers that:

> *"The first objective is to build trust and confidence… both consumers and businesses must be confident that their transactions will not be intercepted or modified, that the seller and the buyer are who they say they are, and that transaction mechanisms are available, legal, and secure… trust and confidence is the prerequisite to win over businesses and consumers".*

(The Commission of the European Communities, 1997)

The benefits of e-business information security are: **(1)** the system will be able to deliver undamaged information and it is available for use; **(2)** authentication and authorization for e-business might be required and could be considered the key aspect to confidentiality; and **(3)** Over the network, communications security is also required for the integrity of data (Landwehr, 2001).

2.5 Documentation Systems used in Ports

The first part of this section discusses the documentation systems in the Egyptian Port, followed by some ports from the Arab region and others from Europe.

Egypt has 15 commercial (figure 2.6) and 51 specialized ports (6 tourism ports, 15 specialized petroleum ports, 9 mining and 21 fishing); six ports are on the Mediterranean and nine on the Red Sea. The four main ports include the multipurpose Alexandria Port, the largest in Egypt, handling over 55% of the

country's foreign trade. Damietta Port is the leading Egyptian container handling port, with a handling capacity of 1.15 million twenty-foot equivalents (TEUs), contributing 40% of total containers handled in Egyptian ports. The East Port Said Port serves as a regional trans-shipment hub for container traffic, while the Suez Port plays an important role in both cargo handling and Suez Canal transit operations (Mohamed, 2009).
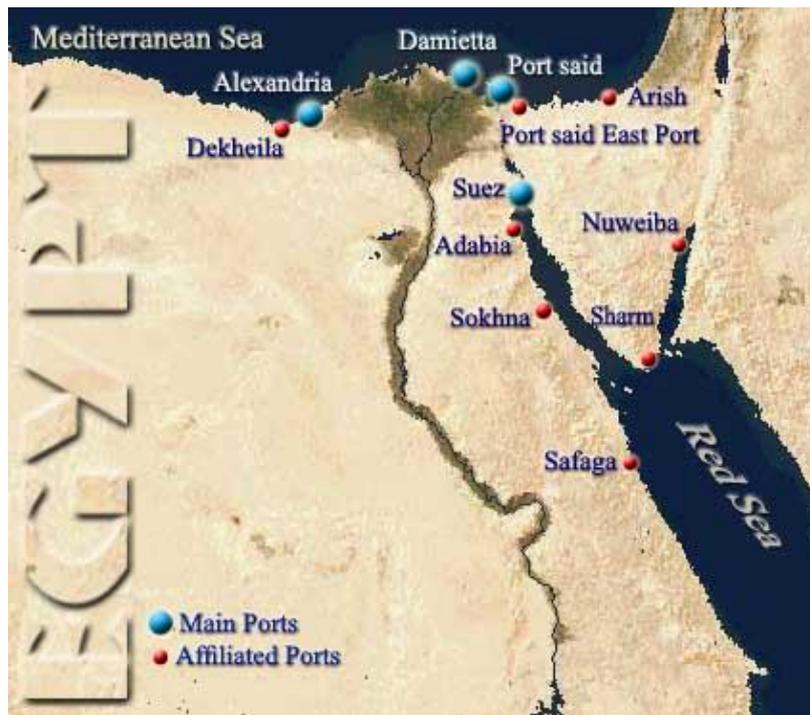
Figure 2.6 – Egyptian Commercial Ports

Source: Egyptian Maritime Transport Sector, 2010

The Egyptian government has focused on developing and upgrading ports to accommodate larger ships and to increase capacity and handling for a larger volume of trade. In 2008, the number of containers handled through Egyptian ports increased by 110% to 6.1 million TEUs, up from 2.9 million TEUs in 2004. It merits mentioning that the number of containers handled between Jan-Oct 2009 recorded over 5 million TEUs (Egyptian Maritime Transport Sector, 2010).

Offering storage, cargo handling, customs clearance and other import/export services, dry ports offer an additional method of bridging the expected gap between port capacity and demand that is likely to arise from a projected 4.8% increase in import/export volume over the next 20 years. The six strategically located dry ports, on the Mediterranean, in Egypt (all accessible by road and one to be accessible by both road and rail) require enhancements to their service portfolios to become integrated logistics centres with efficient operations at lower costs. The electronic documentation flow system has an essential role in the enhancement of the services provided by the Egyptian ports (Egypt State Information Services, 2005). Unfortunately, there is not much literature about the e-business in the Egyptian ports, but the following section focuses on some of the Egyptian ports and how they are doing business.

However, the government's effort is not enough; it has to be combined with the collaboration of all participants to enhance information and documentation flows in ports and accordingly improve the ports' productivity. Training is required to change the mentality of employees to accept change to boost the application of IT in ports (see chapters 5 and 6).

2.5.1 Port Said East Port (PSEP)

East Port Said Port has a notable location east of the northern entrance of the Suez Canal, at a joining point of three continents, the crossroad of the most important world sea trade route between east and west. The port is considered as a promising hub centre for international trade between Europe and the Far East due to its strategic location. Figure 2.7 shows the exact location of PSEP.
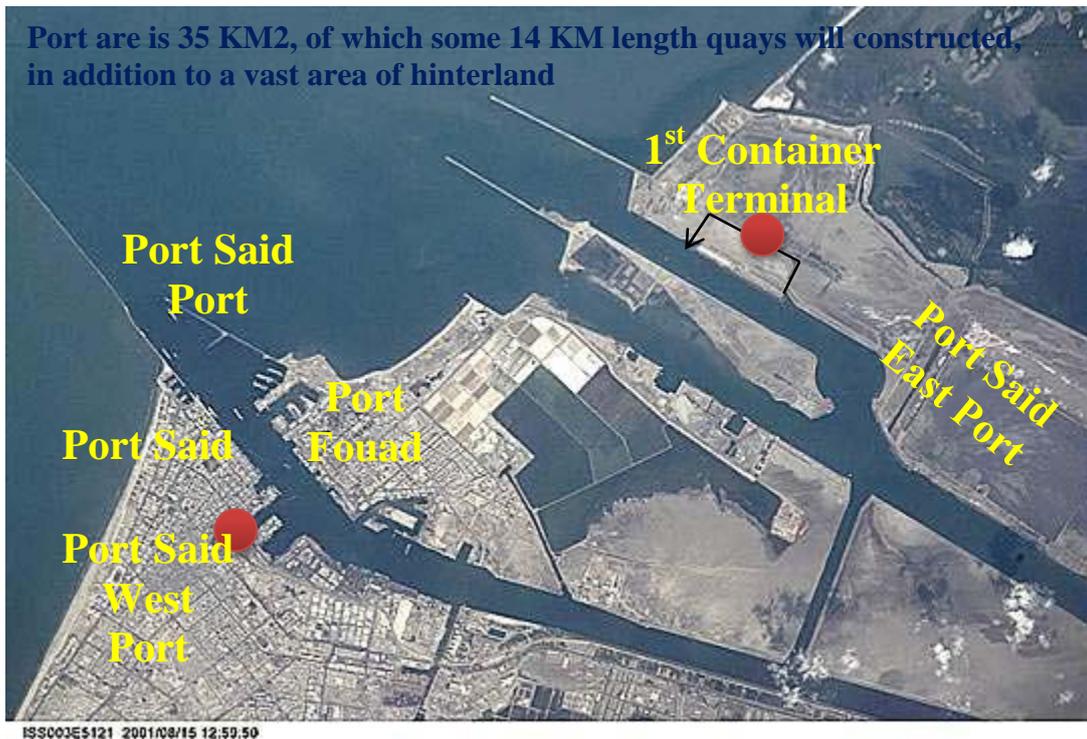
Figure 2.7 – Port Said East Port Location

(Satellite Photo – taken at 62 KM)

Source: Egyptian Maritime Data Bank, 2007

Electronic Data Interchange (EDI) and Electronic Data Processing (EDP) are applied in Port Said East Port in licenses, cargo systems and movement directorate. Figure 2.8 simplifies the automation system.
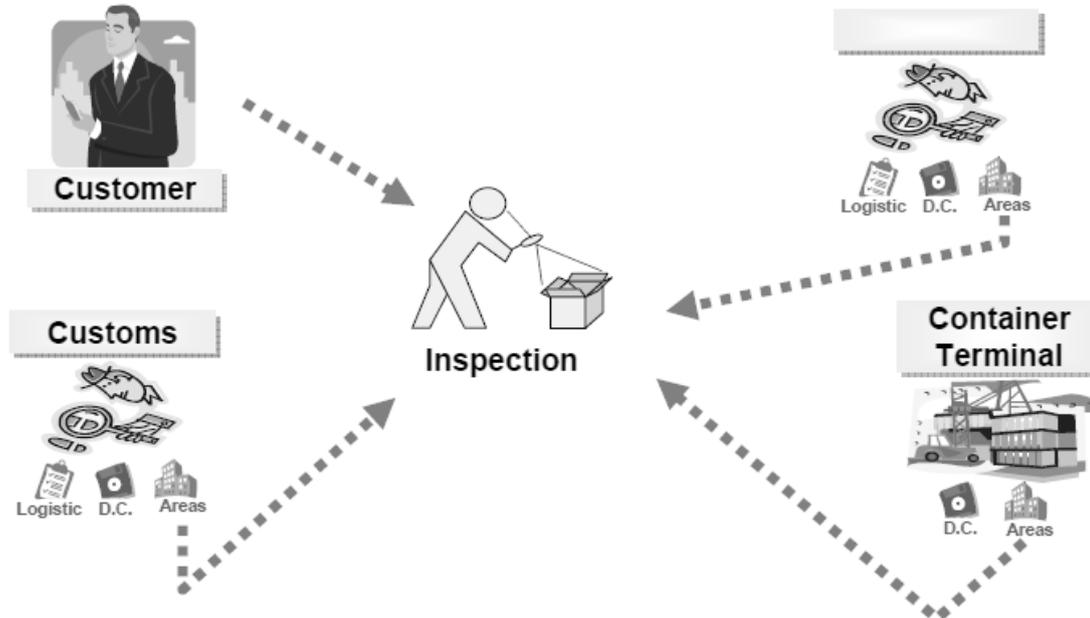
Figure 2.8 – PSEP Integrated Services

Source: Ghoneim et al. 2007

Figure 2.8 illustrates that the customer can automatically communicate with the port to require the services needed, then the information will be exchanged between all the involved parties like; the container terminal, the logistics area, the customs and inspection. An automatic payable invoice is issued by the end. Through the application of this system, the port offers real time data transfer between quay-yard operations, gate complex and terminal planning centre. On the other hand, the port integrated system delivers coordination between the port and other bodies for the pre-arrival documents. Figure 2.9 shows these processes.

Figure 2.9 – The PSEP Port Community Integrated System

Source: Ghoneim et al. 2007

While figure 2.8 shows the integrated services provided by the PSEP, figure 2.9 shows the port community integrated system. It illustrates integration and the co-ordination between the various entities inside the port and the port authority.

The system starts when the vessel approaches the port and deals with all authorities inside the port like; berthing, immigration, health inspection and all the logistics services required till the departure of the vessel.

However, the PSEP authority believes that the human element development lies in the root of the success. Furthermore, international IT companies are interested in Port Said east Port like; AT&T and their representatives who paid a visit to the port for figuring out the opportunities to launch integrated logistics and IT technology project at the port (Ghoneim et al. 2007).

East Port Said serves as a regional trans-shipment hub for container traffic. The PSEP authority believes that the human element development lies in the root of the success. For Alexandria Port to adapt this system, they need some customisation as Alexandria community is larger than the city of Port Said, the volume of trade in Alexandria Port is larger than PSEP, even the culture is different(differ from one geographical place to another) and the human resources need the required development to operate the system.

2.5.2 Sokhna Port

Sokhna Port is located on the western coast of Suez gulf, covers an area 22.3km2 and is 43km away from Suez city. It is considered one of the recent ports that were established by B.O.T system and managed via logistic centres. It is equipped with ultimate technology and it is classified as a third generation port that serves through a wireless technology.   Sokhna Port and the Egyptian Maritime Data Bank (EMDB, 2008) are in a continuous development to cope with the world technical revolutions in Internet application, getting the best utilization by using the EMDB network and the dissemination of pre-designed reports.

Electronic services for Sokhna Port provide customer services in a single entry point via a customer service centre.   The system is called the "One – stop – shop" which offers a range of services including data entry, document scanning, online monitors, video conferencing, banking, kiosks [1]and web services. The electronic customer services include:

- Documents & files reception and routing.
- One-step Data entry & document scanning [for Customs and the General Organization for Export and Import Control (GOEIC)]. Customer-operated Enquiry Stations "Kiosks".

---

[1] A computer terminal featuring specialized in hardware designed and software applications within a public exhibit that provides access to information and application for communication

- On-line Transaction Status Display "Plasma Monitors".

- 2Way, On-line Port-Customer communication via "SMS".

- One-on-One discussions via "Video Conferencing".

- Invoices & Clearances delivery. (Ministry of Transport report, 2008).

These services are provided through:

Front Office Services

- Data entry of Customs declarations and GOEIC Inspection Requests.

- Document scanning and transfer to transaction records.

- Issuance and delivery of customs document, GOEIC and/or DP World - Sokhna payment requests and the delivery of customs clearance.

Video Conferencing

- System eliminates direct contact between consignees and Customs officers (to prevent corruption).

- System designed to facilitate settlement & arbitration negotiations.

- System includes capability to record and manage requests for conference meetings (if any of the customers has any enquiry).

- System records conference sessions. Sessions linked to business transaction records.

Mobile telephony (SMS)

- Auto Notification Messages:
    - Inspection Appointment.
    - Container Ready-In-Yard.
    - Customs Payment Request.
    - GOEIC Payment Request.

- Receive/Send Messages:
    - Inspection Appointment.
    - Taxes & Charges Due.
    - Declaration Status.
    - GOEIC Request Status (Zaki, 2007).

Plasma Monitors

- Display on-line information:
    - Scheduled Inspections.
    - Declarations with remarks.
    - Ready-for-payment transactions.
    - Customs disputes.
    - SMS service User Guide.
    - Inspection Yard status.

Kiosks

- System provides online enquiry responses to Sokhna Port customers.
- System provides natural keyboard data entry and touch screen technology.
- System complements Sokhna Port front office services (Zaki, 2007).

Despite all this technology, Sokhna Port still suffers from some problems in the application of IT. Problems like; the employees' mentality and the acceptance of change remain the same (Ghoneim et al. 2007).

In reality and according to a visit done by the researcher during 2008 (two days visit) the port community system of Sokhna Port does not work properly as for the same reason mentioned by Ghoneim et al. 2007. Employees cannot accept the change and bad habits of doing business still existed.

2.5.3 Damietta Port

Damietta Port is situated 10.5 km. west of the Nile river of Damietta branch westward Ras El-Bar (small town), and 70 km. away from Port Said Port. The port area is 11.8 sq. Km. and is bordered by an imaginary line connecting the eastern and western external breakwaters. Figure 2.10 shows Damietta Port location.

Figure 2.10 – Damietta Port Location

Source: Egyptian Maritime Transport Sector, 2010

Damietta Port has suffered from operating a manual documentation system with important documents being misplaced or lost beside the duplication of work.   This lengthened the process of loading and unloading the cargo and its delivery. Additionally, it resulted in raising the costs that the exporter and importer would have to pay since the ship would have to stay longer and increase the costs by up to $20000 per hour (Blonigen and Wesley, 2006). This in turn, caused traders to look for other less costly outlets for their products.

In an attempt to cope with the international trade requirements, Damietta Port and the Egyptian government has contracted "Prosylab" to transfer the documentation manual system to a total automated system (Egyptian Maritime Transport Sector, 2008). The process then is set to encourage trade at Damietta Port through managing and optimizing the flow of goods within the entire supply chain.

The upgrading process was carried out in two phases:

Phase 1: Contains building a sustaining infrastructure in order to facilitate communication between different areas and buildings inside the port as a first step to

connect these different buildings and segments all over the port to the main data centre (500 different outlets) (Egyptian Maritime Data Bank, 2007). During this phase, excellent customer care has been offered by "Prosylab" staff to gain the support of the customer in software and hardware applications that would further mechanize the port.

Phase 2: Considered the core functional part of the system. It offers monitoring and control of vessel operations, equipment operations, yard operation and any real time operation in the port.

The phase comprises of; (1) Radio Data Terminals (RDTs) that acts as a real time data transfer for loading operations, yard control order management and weighting, (2) EDI support system to increase the service availability to customers, (3) monitor the flow of goods by pressurized cameras with fibre cables with optical converters equipped with monitors and system control.

It merits mentioning that Damietta Port does not have video conferencing facility or Kiosks facility like Sokhna Port. Additionally, there are also limitations in the ability of the workforce to apply ICT.

2.5.4 Trading Across Borders

According to the World Bank – Doing Business report of 2012 for the Arab republic of Egypt, the following data was found:

Table 2.1 – Summary of procedures and documents for trading across borders in Egypt

Indicator	Egypt, Arab Rep.	Middle East & North Africa	OECD high income
Documents to export (number)	8	6	4
Time to export (days)	12	20	10
Cost to export (US$ per container)	613	1,057	1,032
Documents to import (number)	9	8	5
Time to import (days)	12	24	11
Cost to import (US$ per container)	755	1,238	1,085

*OECD: Organisation for Economic Co-operation and Development

Source: The World Bank – Doing Business Report, 2012

Document to export/import: The total number of documents required per shipment to export goods. Documents required for clearance by government ministries, customs authorities, port and container terminal authorities, health and technical control agencies and banks are taken into account.

Time to export/import: The time necessary to comply with all procedures required to export goods. If a procedure can be accelerated for an additional cost, the fastest legal procedure is chosen.

Cost to export/import: The cost associated with all procedures required to export goods. This includes the costs for documents, administrative fees for customs clearance and technical control; customs broker fees, terminal handling charges and inland transport.

As for the export and import procedures, table 2.2 shows the duration time in days and the costs in US$ for each of the procedure required for both export and import.

Table 2.2 – Export and Import Procedures and related Time and Cost

Procedures to export	Time (days)	Cost (US$)
Documents preparation	7	90
Customs clearance and technical control	1	180
Ports and terminal handling	2	170
Inland transportation and handling	2	173
Totals	12	613

Procedures to import	Time (days)	Cost (US$)
Documents preparation	8	215
Customs clearance and technical control	1	90
Ports and terminal handling	1	220
Inland transportation and handling	2	230
Totals	12	755

Source: The World Bank – Doing Business Report, 2012

The above table shows that an increase by only one day between the document's preparation for the import and the documents preparation for the export raised the costs by US$125. This is clearly indicates the direct relationship between the document's duration time and costs.

Table 2.3 shows the document required for both export and import in the Egyptian ports. Exports require eight documents, while nine documents are required for imports.

Table 2.3 – The Documents required for Export and Import

Export Documents	**Import Documents**
1. Bill of Lading 2. Certificate of origin 3. Commercial invoice 4. Customs export declaration 5. Customs procedural certificate 6. Export statistical form 7. Packing list 8. Technical standard certificate	1. Bill of lading 2. Certificate of Origin 3. Commercial invoice 4. Customs import declaration 5. Customs procedural certificate 6. Delivery Order 7. Form of Annex 4 (form of financing imports for trading or production purposes) 8. Inspection report 9. Packing list

Source: The World Bank – Doing Business Report, 2012

It should be taken into consideration that the problem is not with the number of documents but with the number of times these documents are handled. The trade across borders in Egypt showed no change as table 2.4 indicates. This also indicates that there is no upgrading to the current system in ports. Rotterdam as an example was upgrading their system from 2001 till 2006 and by 2008 (Horst and De Langen, 2008) they merged their system with the Amsterdam system as detailed later in this chapter.

Table 2.4 – Trading Cross Borders in Egypt

TOPIC RANKINGS	DB 2012 Rank	DB 2011 Rank	Change in Rank
Starting a Business	21	18	↓ -3
Dealing with Construction Permits	154	155	↑ 1
Getting Electricity	101	99	↓ -2
Registering Property	93	94	↑ 1
Getting Credit	78	75	↓ -3
Protecting Investors	79	74	↓ -5
Paying Taxes	145	139	↓ -6
Trading Across Borders	64	64	No change
Enforcing Contracts	147	144	↓ -3
Resolving Insolvency	137	136	↓ -1

Source: The World Bank – Doing Business Report, 2012

In terms of trade cost and delay, the report states the following:

> *"Excessive document requirements, burdensome customs procedures, inefficient port operations and inadequate infrastructure all lead to extra costs and delays for exporters and importers, stifling trade potential. Research shows that exporters in developing countries gain more from a 10% drop in their trading costs than from a similar reduction in the tariffs applied to their products in global markets".*

(World Bank – Doing Business in Egypt Report, 2012)

The statement above shows that the most important issue for the exporters and importers is the time and cost associated with documentation and procedures. The study by the World Bank was based on some assumptions that the export/import goods (1) do not require refrigeration or any other special environment issues. (2) It does not require any special care or health inspection (green line) or require any

environmental safety standards other than accepted international standards. (3) The goods are one of the economy's leading export or import products which means it has the priority and (4) the goods are transported in a dry-cargo, 20-foot full container load. According to the report, if any of these assumptions change, the number of documents will be increased, the costs and accordingly the procedures duration time, would also be increased.

Based on having similar culture and background, the following section reviews some of the Arab ports in the region like; Port Rashid (DP World) and Jebel Ali Port.

2.5.5 Port Rashid (DP World)

Port Rashid also referred to as Mina Rashid, is a man made, commercial port located in Dubai, United Arab Emirates opened in 1972.   Port's Rashid central location makes it an ideal place for many companies to set up distributorships to establish the shortest routes to most of Asia and other continents.   Figure 2.11 shows a view of Rashid port.

Figure 2.11 –Port Rashid View

Source: DP World, 2010

Port Rashid provides electronic services through what is called the single window for trade services (Dubai Trade Portal, 2010). Through this site more than 750 e-services are offered to various stakeholders involved in trade and the logistics industry.

Port Rashid trade web site is consistently updated and has expanded its portfolio of integrated innovative services to serve the growing clientele of DP World, Economic Zones World, Port Customs and Port Multi Commodities Centre (DMCC).

The e-services offered include but not limited to;
- Marine services (Manifest Document System, MDS),
- Exporters and importers services,
- Clearing agents services (cargo clearance services),
- Cargo haulage services,
- Shipping agents and forwarders services,
- Commodities trading companies and electronic warehouse receipts,
- Centralized electronic payment gateway (invoicing and payments),
- Manifest and cargo handling services,
- Free zone companies and
- Trade statistics and reports to the stakeholders.

Moreover, a report of the DP World of 2010 shows the following progresses in the port business after the application of e-services:
- Increase in the number of customers services by almost 12 per cent (from 750 to 758).
- Increase the number of companies registered using the electronic trade portal to over 35000 companies
- Increase the number of registered users joined the portal by 18175 users taking the users up to 66,775.

- Adding the Emirates Skycargo Co. services to the online services of the port and customs.

Port Rashid started their IT project at 1995 through "Dubai Trade". This e-service platform operated by the leading business facilitator covers different services like; export booking, berth booking and creation of shipping notes. Figure 2.12 shows the electronic document evolution plan of Dubai Trade for Port Rashid:

| 1995 - 1999 | 2000-2002 | 2003-2005 | 2006-2007 | 2008-2009 |

| Evolve | Form | Transform |

Figure 2.12 Evolution Plan of Port Rashid Electronic Documentation System

Source: DP World, 2010

At the first phase, 1995-1999, the electronic submission of the manifest was introduced through using EDI (MDS system) and another system called Mirsal is implemented by customs. The second phase, 2000-2002 the e-mirsal was launched and the online portal for both the port and the free zone are launched. At the form stage, 2003-2005 the consolidation and incorporation of the e services started through Dubai Trade and they reached 240 e-services (Dubai Trade Portal, 2010). Dubai Trade started during 2006 – 2007 to operate as an independent department, the second phase of Mirsal System launched and the e-token, i.e. an electronic system to facilitate port efficiency and movement within the port. The e-token system allows traders and hauliers to log on to the Dubai Trade Portal where they can book in advance the delivery and receipt of containers to and from the terminal therefore saving time, effort and related costs (Dubai Trade Portal, 2010).

In 2008, with the transform stage, Port Rashid launched the fees e-payment gateway (Rosoom [1]system) with the co-operation of the HSBC and Dubai Islamic Banks which is a centralized electronic payment gateway for settling dues of Port Rashid and Rashid multi commodities centre. The vice president of DP World declared on their official web site that to achieve more customer satisfaction and during the transform stage at 2009, Port Rashid started releasing online general cargo services that allows the port to achieve better services through speed and higher levels of efficiency.

Port Rashid online services eliminate the time-consuming manual procedures and facilitate easier and faster business flow. DP World business bureau stated in 2010 that in addition to the effort made by the port operators to focus on transferring all customer-related documentation, payment processes were also transferred to the electronic platform.

These processes required highly qualified and skilled operators which is a basic requirement for IT application in ports that this research is highlighting in chapter 6. The port also needed a professional and independent company to provide the IT services which again highlighted in chapter 6.

Table 2-5 below shows Dubai Trade achievement in Port Rashid between Jan-Sep 2009 and after the application of the port community system.

Table 2.5 – Dubai Trade Achievement in Port Rashid

Operations	% of achievement
Manifests processed	92,367 (100%)
BOL's Validated	1,191,697 (100%)
E-Token Generated	783,831 (71%)
Permits and Visa's Issued	54,643 (93%)

---

[1] Rossom is the Arabic word for fees.

Company Employee Cards issued	25,550 (93%)
Declarations processed	1,630,476 (49%)
Rosoom Amount collected (AED)	83,754,462
Rosoom transactions	122,006
No. of e-services	665
No. of companies	17,608

Source: Dubai Trade Portal, 2010

As mentioned earlier Dubai Trade has provided the IT services for Rashid Port and completed the final stage at 2009. The e-business required a professional IT provider, highly qualified and skilled operators and a time plan to be executed step – by – step to eliminate the time consuming manual documentation system.

It merits mentioning that DP World suffered a lot of problems during the change of processes and automation (DP World, 2010) as violating tradition can carry serious of legal and other problems. It is important to highlight the importance of tradition in the Arab World. This was the main reason for DP World to use an approach that is measured in years not months.

2.5.6 Port Jebel Ali

Port Jebel Ali is 35 KM southwest of the city of Dubai in the United Arab Emirates. Figure 2.13 show this location. Covering over 134 square kilometres (52 square miles), Port Jebel Ali is the biggest man-made harbour in the world and the biggest Middle East port.
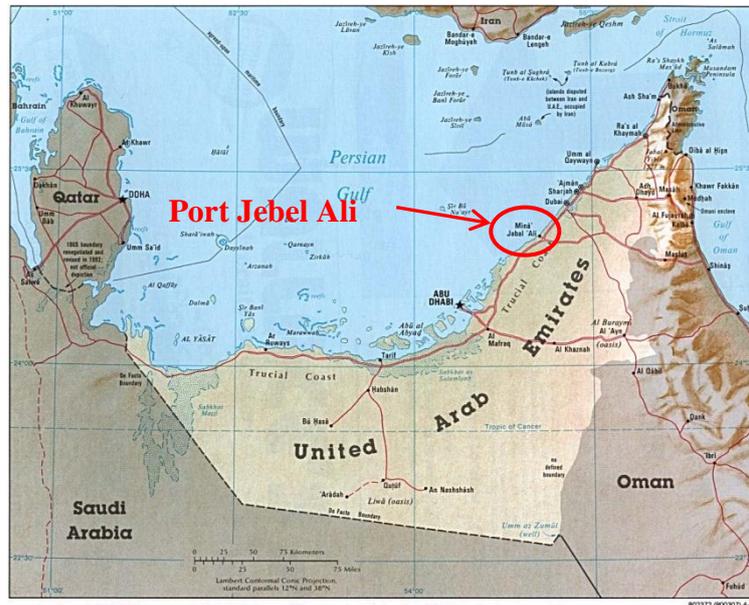
Figure 2.13 Port Jebel Ali Location

Source: DP World, 2010

Dubai Trade takes over Jebel Ali Port and applies the same IT system. It is also one of the ports management projects of DP World. They added new services - e-Oil Billing, e-Certificate and e-Gate Pass systems – which are designed to introduce better economies for the supply chain and improve traffic flow. This new addition can save customers hours of precious time. They bring direct benefits to the customers by significantly reducing the time spent at Jebel Ali Port's terminals.

It merits mentioning that the successful story of Mina Rashid and Jebel Ali Ports in using IT and implementing port community systems reflects some of the success factors. These factors like;

- Identifying the stakeholders from the beginning.
- Co-ordination between all the parties involves during the preparation phase.
- Highlighting the importance of the human resource and the skills needed.
- Set the required training courses for the operators and employees.

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- At ease application, i.e., the transformation to an e-services platform has been applied using the step-by-step approach. The first phase started on 1995 and it was completed (the last phase) on 2009.
- The attention given to upgrading the system and adding new e-services are considered other reasons to success.

Mina Rashid and Jebel Ali Ports are considered two of the successful world ports in the application of IT. This success shows in the increase of their business showed in table 2.5 above.

Co-ordination in the transport chain is important and an effective port community system contributes well in this co-ordination due to the required data exchange between several entities.

For example, when shipping lines submit container data, the terminal operator can plan better. Any port community system can submit standard systems for data exchange. The inclusion of customs in the system is vital as customs clearance is an integral part of a logistics EDI system (Fabbe-Costes et al. 2006).

2.5.7 Rotterdam Port

Rotterdam port is the gateway to the European market of more than 350 million consumers. The port is one of the most important junctions of good flows of the world. The annual throughput is about 430 million tons that makes it one of the main ports of Europe (Port of Rotterdam, 2010).

Rotterdam, Antwerp, Barcelona and Singapore are examples of many ports having a port community system in one form or another. The port of Rotterdam has experienced enhanced volumes of cargo passing through the port by using information technology which plays an essential role for managing the constant

growing and increasing the volumes of cargo. The Rotterdam customs and the port authority have a co-ordination to develop a port-wide community system called (Portbase). The system's main aim is to provide quick, efficient and accurate exchange data to all parties in the port (De Langen and Pallis, 2007). Figure 2.14 describes the port community system of Rotterdam Port.
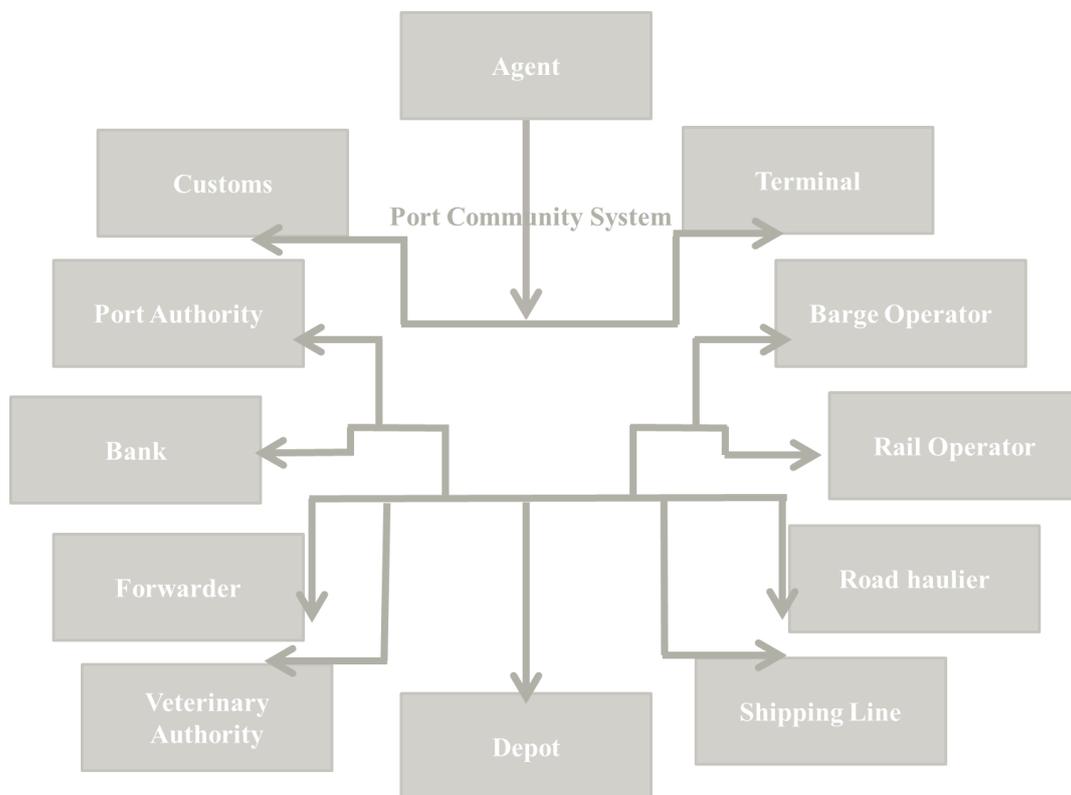
Figure 2.14 – Port Community System of Rotterdam Port

Source: Baan, 2009

All the stakeholders of Rotterdam Port are connected to each other through the port community system.

2.5.8 Port Community Systems of Rotterdam and Amsterdam merge

During 2008, Amsterdam and Rotterdam Ports has agreed together to join their port community systems with one another. The two port community system designer organizations i.e. Port infolink in Rotterdam and PortNET in Amsterdam have merged.

The two ports wished to create one port community system to be operated at both ports to achieve more integration and collaboration by combining the strengths of the two applied systems i.e. infolink and PortNet (Port of Rotterdam, 2010).

According to Baan (2009), Infolink of Rotterdam aims to increase the competitive edge by improving the information flows and accordingly the work processes of the stakeholders. This is by facilitating simple and efficient exchange of data.

PortNet of Amsterdam focuses successfully on the development and use of ICT in the port to enable both public and private sectors to exchange electronic data in a reliable way.

The two ports expect the increase in scale to facilitate the development of new products and improve service. The merged system is called Portbase and it is a port-wide community system that aims to offer all parties the possibility to efficiently, quickly and accurately interchange data electronically which boasting and optimising the logistics services level to the participants. This in turn, improves their competitive position and that of the two ports (Horst and De Langen, 2008).

Port community systems and ICT development enhanced information flows. This is an important issue especially for ports given the essential role the port plays in today's supply chain. The Portbase system of Rotterdam and Amsterdam Ports was the result of two successful systems.

2.6   Other E-Business Models in Different Sectors

Supply chain management and the related e-business models are not discussed much in the literature.   As stated by Papazoglou and Ribbers (2006), most e-business models involve the management of parts in the supply chain and not the whole supply chain.

The management of the whole supply chain is a complex procedure for many organisations and it is difficult for most of them to achieve full control over the whole supply chain especially if it includes electronic and global supply chain procedures.

An e-business model is the method of doing business electronically by which an organisation can survive global competition and gain revenue. However, the supply chain can only be successful if the organisation achieves a successful flow of information and materials and gains a significant competitive advantage (Papazoglou and Ribbers, 2006).

The aim of this section is to review and identify the components of each of the existing e-business models and investigate the relationships between these components. As presented in Figure 2.15, Bertolazzi et al. (2001) proposed an e-business model framework which comprised of four main components:

(1) ***Product innovation:*** it contains three sub-components which are the target customer, value proposition and capabilities.   These three sub-components focus on all product aspects and what the company offers to which customer. They also focus on the capabilities of the company to guarantee the delivery of value expected by the targeted customer.

(2) *Infrastructure management:* it comprises three sub-components; resources assets, activities processes and partner network. This component is necessary to create value and maintain a good customer relationship through e-business.

(3) *Customer relationship:* it also contains three sub-components: information, feel and serve, and trust and loyalty. A company can create its own way to deliver value and extend its reach to huge numbers of customers through different channels; first it should appreciate the customer and then understand his requirements to gain his loyalty which is considered very difficult since there is no face-to-face contact.

(4) *Financial aspect:* it contains all costs and revenues involved in the above mentioned components.
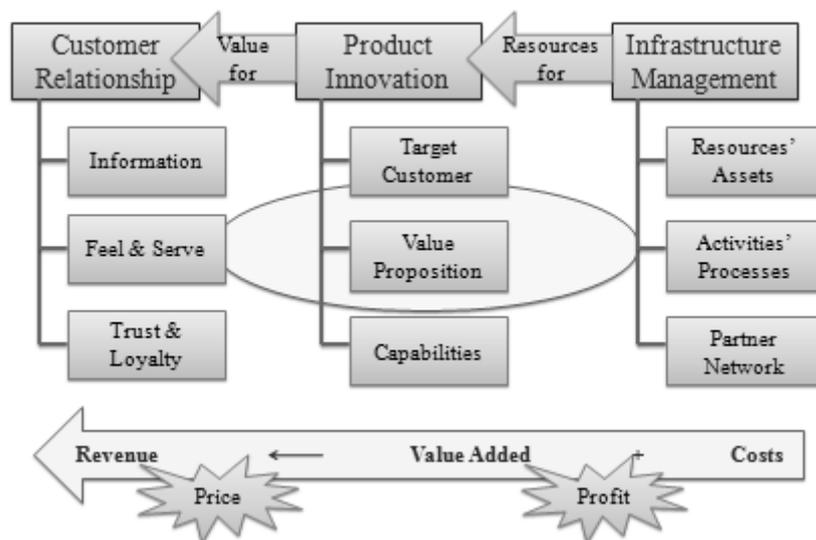
Figure 2.15 - E-Business Model Framework
Source: Bertolazzi et al. 2001

The Bertolazzi et al. e-business model focuses on the products provided to customers to build a trustworthy environment between the customers and the company to obtain their satisfaction and loyalty. The model considered infrastructure management as an essential component for an e-business model to be able to provide and apply the model.

The model also incorporated the financial aspects to evaluate the costs and determine the company's profit and to measure the model's success or failure. However, the expected result of this model is to create customer satisfaction, maintain customer relationships and generate revenue.

The model concentrated on products and customers without considering other factors like strategies and policies and the skills necessary to efficiently run the system. The model also overlooked the community culture.

Another model discussed below is an e-business model for the maritime sector introduced by Martin and Thomas, 2001. The maritime and the shipping transport industry had their own share of the e-Business which has expanded through all sectors of the shipping industry over the past few years. Maritime transportation is one important mode of transport in the global supply chain where the highest percentage of international trade is transported by sea (Khairalah, 2000). E-Business has created opportunities and new players have emerged. The activities offered by the maritime e-business model can be categorized as follows (Martin and Thomas, 2001).

- *Ship management*: ship management is an important component in this model for providing supplies and services necessary for ship operations like, warehousing and storage, crewing and bunkering.

- *Cargo sourcing*: As the model demonstrates, maritime transport demand for the cargo available in the markets that match the ships' capacity could be achieved through freight auction sites for both container booking and chartering agreements.

- *Asset applications*: The model focuses on adding value to data flows among members of the maritime community by offering them online services to enhance processes and increase asset utilization.   Asset management is considered a challenge for companies (Coyne et al. 2002).   Controlling servers, securing data flows, and guaranteeing the continuity of services are essential issues related to asset applications to create the trustworthy relationship between the company and the maritime community.

- *Port community:* Offer information gateways to link community members and improve the flow of information and provide the services required.

- *News and information*: Provide the port community with recent issues, the trade news and weather updates by using a market database and information flows.

The market entry strategy e-Business model aims to obtain a market share in the maritime transport sector or port space through offering a reliable service within the above categories, (see Figure 2.16).
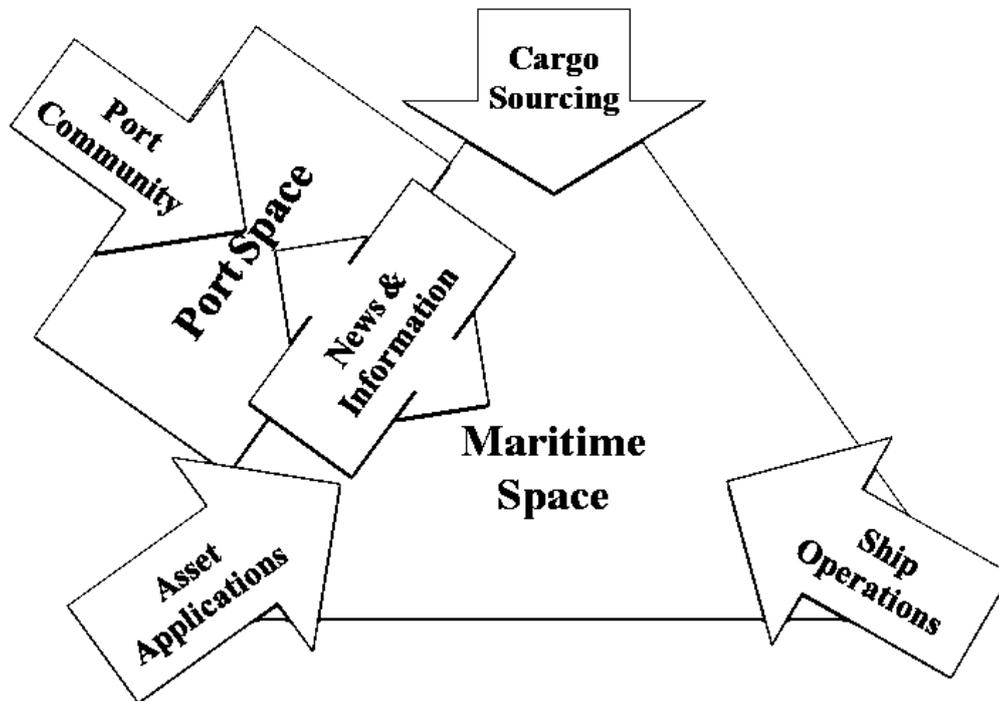
Figure 2.16 - E-Business Market Entry Strategy

Source: Martin and Thomas, 2001

Martin and Thomas (2001) identify the five organisational groups involved as follows:

1. Port infrastructure and facilities providers; (Computers and servers)
2. Cargo handling services providers; (Stevedoring companies)
3. Maritime transport operators; (Cranes and winches operators)
4. Inland transport operators and (Contractors, trucks and lorries transporters)
5. Cargo representatives. (Cargo owners or whosoever represent them like agents).

The above e-business model is designed mainly to electronically book a space for a container on a ship and/or in the port, or in the warehouse inside the port (maritime space), and to arrange for the required services. It was introduced to facilitate the container booking processes which require co-operation between the five organizational groups.

Figure 2.17 shows another view of an e-Business model put forward by the Canadian Transportation Act Review, 2001. The model reflects the relationship between both the demand and the supply sides of supply chain management. Thus, it will affect the market structure, taking into consideration some components like social, energy, environmental, safety, economic and competitive impacts on the supply chain (Figure 2.17).
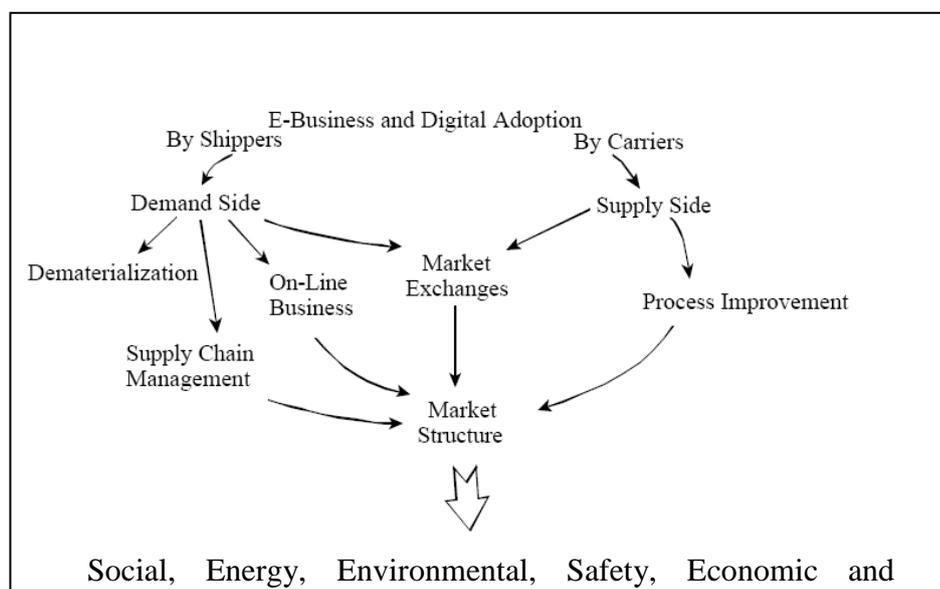
Figure 2.17 - E-Business and Digital Adoption

Source: Canadian Transportation Act Review, 2001

The Canadian Transportation Act Review believed that e-business had an impact on the demand for transportation which is reflected on their framework. They concentrated on both ends of the supply chain, namely demand from customers against the supply of the products. This necessitates managing the whole supply chain of producing and delivering the goods to the end customers and studies its effect on the market structure.

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However, the Canadian Transportation Act Review explained that the impact of e-business on the demand side includes the following areas:

- *Dematerialization:* Planning for the supply of goods and services after shifting the demand to be on-line.

- *On Line Business and Supply Chain Management:* For managers to collaborate to influence the supply chain and create new demands and new distribution patterns.

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- *Market Exchange and Market Structure:* Manage the strategies of outsourcing, alliances, and collaboration to provide new requirements for different types of services.

According to the Canadian model, transportation providers can improve their internal business procedures, maintain customer relationship and enhance supply chain management through creating a new e-business channel. Electronic marketplace and market exchange "virtual marketplace" could also be affected positively by using the internet business processes as it provides a faster medium for shippers and carriers.

These changes on both the supply and demand sides along with the nature of market interaction have an impact on the market structure of the transportation industry and accordingly have a wider impact on social, environmental, safety and economic issues in society (Canada Transportation Act Review, 2001). The benefit of the Canadian model is to facilitate and provide better and faster transportation services and high quality services that have a positive impact on economic growth.

Visvanathan (2001) from the Indian Institute of Sciences indicates in his e-business model that the shipping and logistics industries could have a different scenario for the e-business. Visvanathan (2001) also believed that the shipping industry has to

get an e-business model with a different scenario from a product selling e-business model as the shipping industry is a service industry that has so many variables like the type of cargo and the services provided by ports (loading, discharging, bunkering, warehousing). These variances also include the different types of cargoes and ships and the different logistics activities required. According to Visvanathan, the main factors of his e-business model which might be valid for other business types are as follows:

- **Cost:** At the initial stages of e-business operation, the financial benefits are neither tangible nor straightforward. Therefore, the return on investment (ROI), the relationship between costs and benefits should be studied right from the preliminary stages and before implementation. The medium sized container shipping players must keep these issues in mind and identify them on a large scale implementation.

- **Customer preparedness:** Many users in the shipping community feel secure and relaxed when using the traditional tool that is common and easy to be found. They feel more comfortable using phone and fax than using the internet technology or the e-business based systems.   Training must be presented to those users to enhance the functionality available to them.

- **Interoperability:** There are some differences in the systems and practices along with the business processes due to the wide-ranging history of container shipping organisations.   This creates the interoperability problem that must be taken into account and solved as it forms one of the major problems in any attempt for e-business integration.

- **Legacy systems:**   This is often not a problem since it does not exist, especially in the case of the medium and small size players of the container shipping industry.   The bigger size companies need to treat the gap between

legacy and new technology. They should maintain the data and resources provided by their legacy system which can be a challenge using the web technologies.

The introduction of this model was insufficient since it only mentioned some components that might be included in an e-business model. Visvanathan (2001) stated in his model that the costs and benefits are essential factors that should be considered and discussed with the users. He was in favour of having training programmes for the users to appreciate the benefits of applying e-business. Although, he was right about interoperability, he considered that the legacy in the shipping industry is not a problem since it does not exist.

The researcher disagrees with this assumption due to the direct participation done and discussed in chapter 5. However, the expected outcome for this model is to facilitate the container shipping industry movements in ports.

During Conference No. 6 of the European Strategies in the Globalising Markets, Bakker (2001) listed seven aspects of e-business in the shipping industry. He discussed the impact of e-business on an organization, its strategies, processes and systems. Figure 2.18 shows Bakker's model.
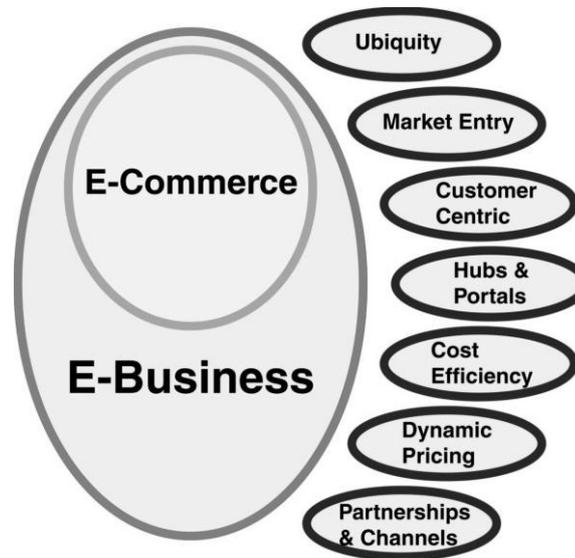
Figure 2.18 – Aspects of E-Business

Source: Bakker, 2001

The seven aspects are:

1. **Ubiquity:** using the internet for doing business means availability all the time and everywhere.

2. **Market Entry:** through delivering unique services to customers with the existence of intermediaries.

3. **Customer Centric:** it is the degree of effort or power the customer should give to shift to e-business. As Bakker (2001) mentioned, this power should nearly be zero.

4. **Hubs and Portals Centric:** the effort that company should make to maintain the customer relationship should also be zero. The developer of this model believes that the access point for the internet becomes the marketplace for on-line shipping transactions.

5. **Cost Efficiency:** Bakker (2001) believes that the cost for online services and transactions could be reduced. He also believed that ocean carriers can save money buying fuel, and spare parts by applying e-procurement.

6. **Dynamic Pricing:** the developer of the model believes that the price of providing e-services will be reduced by eliminating time between supply and demand.

7. **Partnerships and channels:** the internet business creates new opportunities and broadens relationships with suppliers and partners. Bakker said that "E-Business doesn't replace traditional ways of doing business, it just adds new possibilities".

The researcher disagrees with Bakker, in so far to have a successful e-business model, the manual transaction and the traditional ways of doing business should be completely replaced. Furthermore, Bakker overlooked some other important aspects like skills of partners, culture, environment particularities, and regulations.

Pigneur (2002) developed another e-business model. The model is divided into four main categories:

1) *Infrastructure management:* This is necessary to deliver the service and value.

2) *Customer relationship:* This is to understand and appreciate the customer before serving him to enhance the relationship, improve the services provided and create trust.

3) *Product innovation:* This component is necessary to target specific customers and satisfy them through providing the required activities.

4) *Financial aspects:* This aspect concerns the costs required for the infrastructure and the revenues expected.

Each of these components contains other sub components. The outline for this e-business model focuses on the value offered to the customer in order to create or generate profitable revenues. It links the components to create a network of partners, build marketing, deliver value, and maintain customer relationships (Pigneur, 2002).

The e-business model proposed by Pigneur structured these into different levels of increased depth and complexity since it contains four different levels, each of which contains different components. As for the fourth dimension; the financial aspects are considered the measures of e-business success or failure (see Figure 2.19)
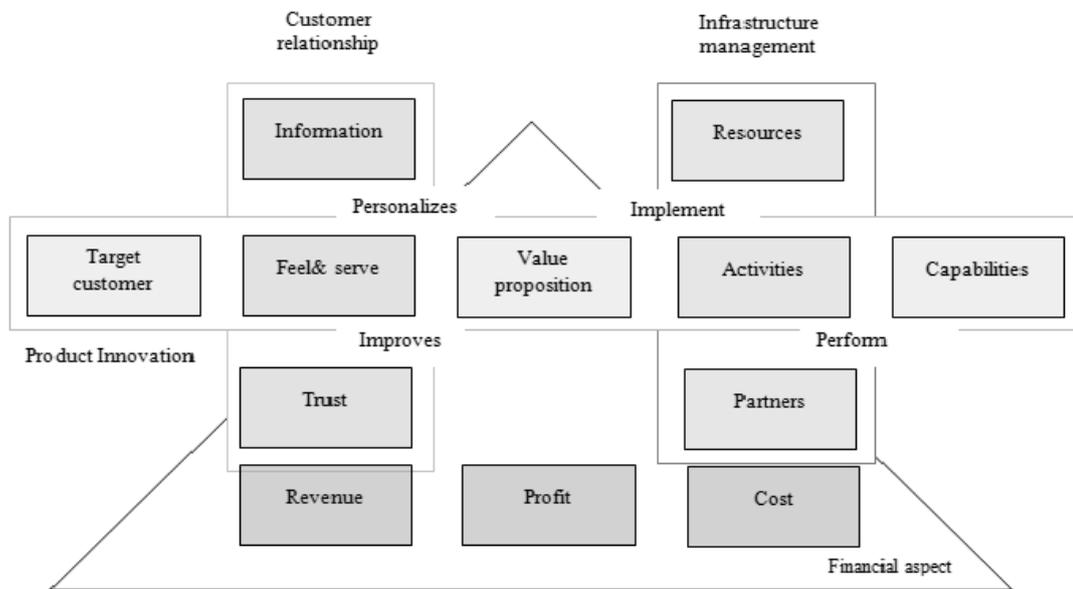
Figure 2.19 - The Main Components of the E-Business Model

Source: Pigneur, 2002

The Pigneur (2002) model paid no attention to culture, regulation or skills. The model mainly concentrated on the customer and product innovation. Revenues and

profits were the main focus. Accordingly, the expected outcome of the model is to generate revenues and profits.

Vassilopoulou et al. (2003) demonstrates another e-business framework in terms of ideas related to the adoption of e-business models. This model examined the following different components in the context of mobile business. These components are: organisational, societal, individual and technical. Vassilopoulou et al. (2003) developed this framework for e-business in five thematic areas related to the adoption of e-business models in the mobile environment.

These five thematic priorities are called the e-factors as mentioned in (e-factors project consortium, 2002).

- **Technical:** The e-business model has been enabled by the initiation of Information and Communication Technologies (ICT). This technological development creates more opportunities for the supply chain partners to provide more accurate information and creates more chances for them to participate in the virtual trading world. Thus, the main focus is to identify the factors that technically affect the implementation of any e-business model rather than only focus on the application of these technologies.

- **Individual:** Marketing and operational issues needed to be considered in e-business models since they are the distinguishing factors that affect decision making for both customers and employees at the individual level. The decision of implementing or adopting an e-business model by a customer or employee is not easy but rather a complex decision which requires interaction and evaluation of a wider range of consequences. The model designers believed that high education and qualifications are required.

- **Organisational:** Both internal and external organisational levels must have some changes in relation to the nature and the structure of work. These changes should adopt with the application of e-business. Organisations must create new types of communities and communications among users, agencies, and partners. This reflects the organisational impact on the users applying e-business and facilitating this implementation.

- **Industrial:** Industry structure is affected by the adoption of e-business models. Most industries face some changes before the adoption of e-business like the communication tools and the way of selling and distributing through using the internet (Vassilopoulou et al. 2003). Another industrial change that might happen with using e-business is the openness on a wide range of customers and the need to provide customized products and services.

- **Societal:** The ability to adopt e-business is required since the new e-business models create new business practices. This reflects the impact of the organisation's capabilities on the application of e-business. However, this will affect both work and employment.

The Vassilopoulou et al. 2003 model overlooked some details under each component like skills, culture and infrastructure. Although the developers of this model believed that the hindrance of e-business application could be the cost of implementation, security concerns, and lack of knowledge (e-business know-how), they believed that the expected outcome is to maximize revenues and profits.

Another e-business model was developed by Sprundel, (2003) for the medical services. The model concentrated on the interrelation between three centres; a strategy and policy centre, a client services centre, and an information technology centre together with the performance of the action teams, (see Figure 2.20).
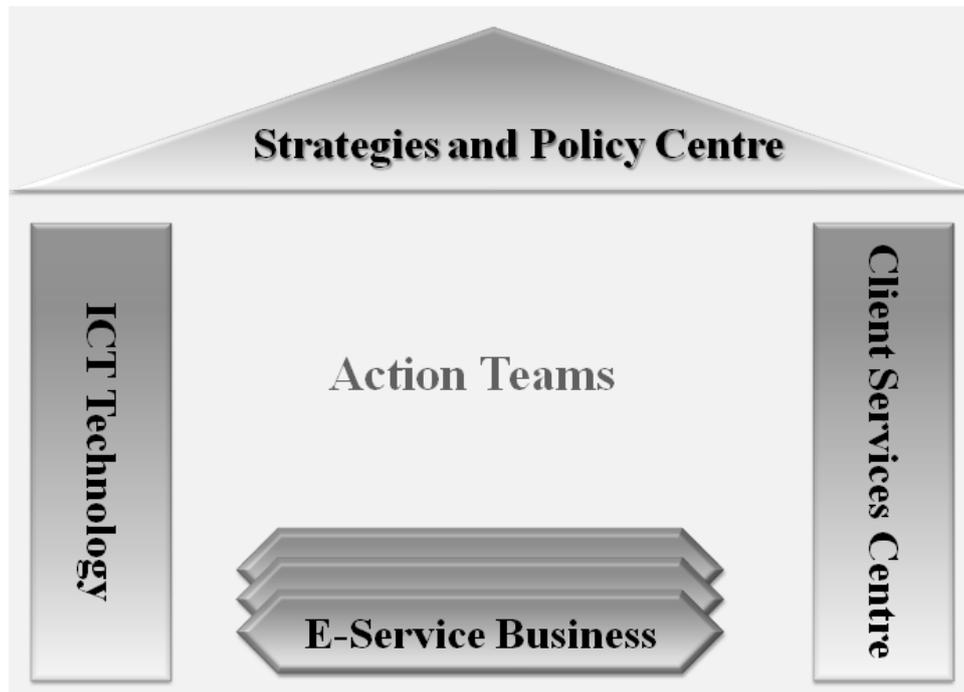
Figure 2.20 - Knowledge Organisation E-Service Business Model

Source: Sprundel, 2003

The first centre is the strategies and policy centre, the main objective of which was to focus on applying the necessary changes to the strategies and policy to match the e-business model.

The second centre is the ICT technology centre: The aim of this centre was to prepare and buy the communication aids required for e-business like servers, networks, computers and data processors.

The third centre is the client services centre: Which had a great role in shifting the services provided by the medical centre to electronic services and creating the client data base.   The three centres have to be online with the action team to perform the required tasks.   The medical model overlooked some components like culture workers skills, and regulations.   However, the expected outcome of the Sprundel (2003) model is to maximize flexibility.

Another e-business framework developed by Auramo (2005) presented an e-business model that contains three categories of benefits: Transactional benefits, Informational benefits, and Strategic benefits. Each category in its turn is divided into three groups as shown in figure 2.21. The transactional category concentrates on the efficiency of communication, business, and system development. This category with its sub groups also focuses on the co-ordination with operational management to minimize the cost throughout the whole supply chain. The second category, the informational benefits, contains three components: information access, information quality, and information flexibility. The informational category and its sub components focus on providing information and communication to the supply chain partners. The third and the last category is the strategic benefit which also comprises three sub groups that are; competitive advantage, alignment, and customer relations. Auramo believes that successful supply chain operations can positively impact the organization's benefits and increase its competitiveness.

Auramo states that there are no empirical results that confirm the benefits of e-business to supply chain management; it is potential, rather than realized benefits. However, when the transactional issue is faster, it helps in cutting costs within the supply chain. Furthermore, the informational issues help in developing the infrastructure of the supply chain.

Finally, the strategic change issues help in determining the level of the organization's competition. Nevertheless, the Auramo model lacked some main components like infrastructure, costs, skills, culture, and regulations. On the other hand, the expected outcome of this model is cutting cost and faster processes.
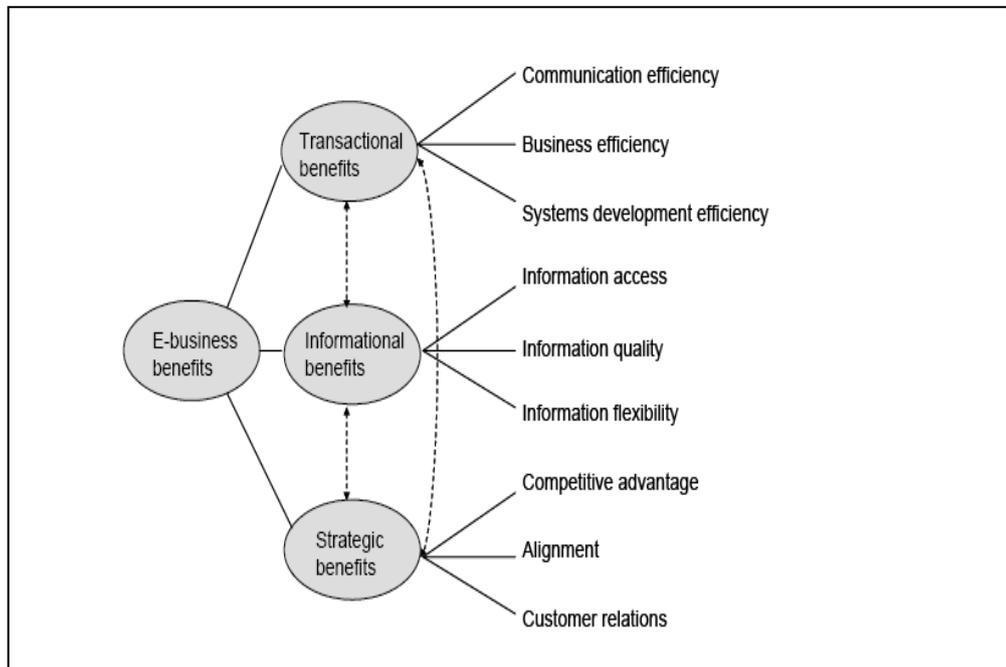
Figure 2.21 - The Benefits of E-business-Framework within the Supply Chain

Source: Auramo, 2005

Figure 2.22 shows an e-business model proposed by Lin et al. (2006); the model was prepared for the logistics industry in Taiwan. The authors reduce the e-business model into four dimensions, each of which has its own sub-dimensions:

The First Dimensions: E-Marketplace comprises the supportive services and trading activities in order to reduce cost and improve operational efficiency. The sub-dimensions are:

1) Product: this consists of complexity of product, characteristics of product, product customization, and product value. All focus on pricing, buying, delivering, and developing the product.

2) Buyer: this sub-dimension contains other sub components which are buyer population, buyer's cost of access, and purchase criteria. These sub components

focus on transaction and communication and access costs including the profit of the buyer.

3) Market: it contains the e-marketplace domain and market variability. It highlights the importance of the transactions and information exchange and the difficulties associated with that in a variable market.

The Second Dimension: Logistics. This dimension contains three sub-dimensions:
1) Purchasing incorporating purchasing procedures, order management, and payment management. It mainly focuses on all activities needed to maintain the company operations, the technicality of using information, and how to manage the function of payment.

2) Inventory comprises inventory procedures, inventory management, and in-coming product management. The authors thought these sub-dimensions to be essential in controlling, checking, and storing inventory as well as managing information related to using information technology.

3) Delivery: this sub-dimension included the out-going product management, and the delivery procedure. The importance of these sub-dimensions is to examine the product's readiness for the out-going zone.

The Third Dimension: Organisational Analysis. This dimension also contains three sub-dimensions which are organisational culture, organisational structure, and human resources, each of which affects the employees in achieving the company's goals.

The Fourth Dimension: Information System: this dimension consists of internal exchange of platform, e-procurement, and XML. All are required to provide the technology needed to smooth operations and share the e-marketplace.
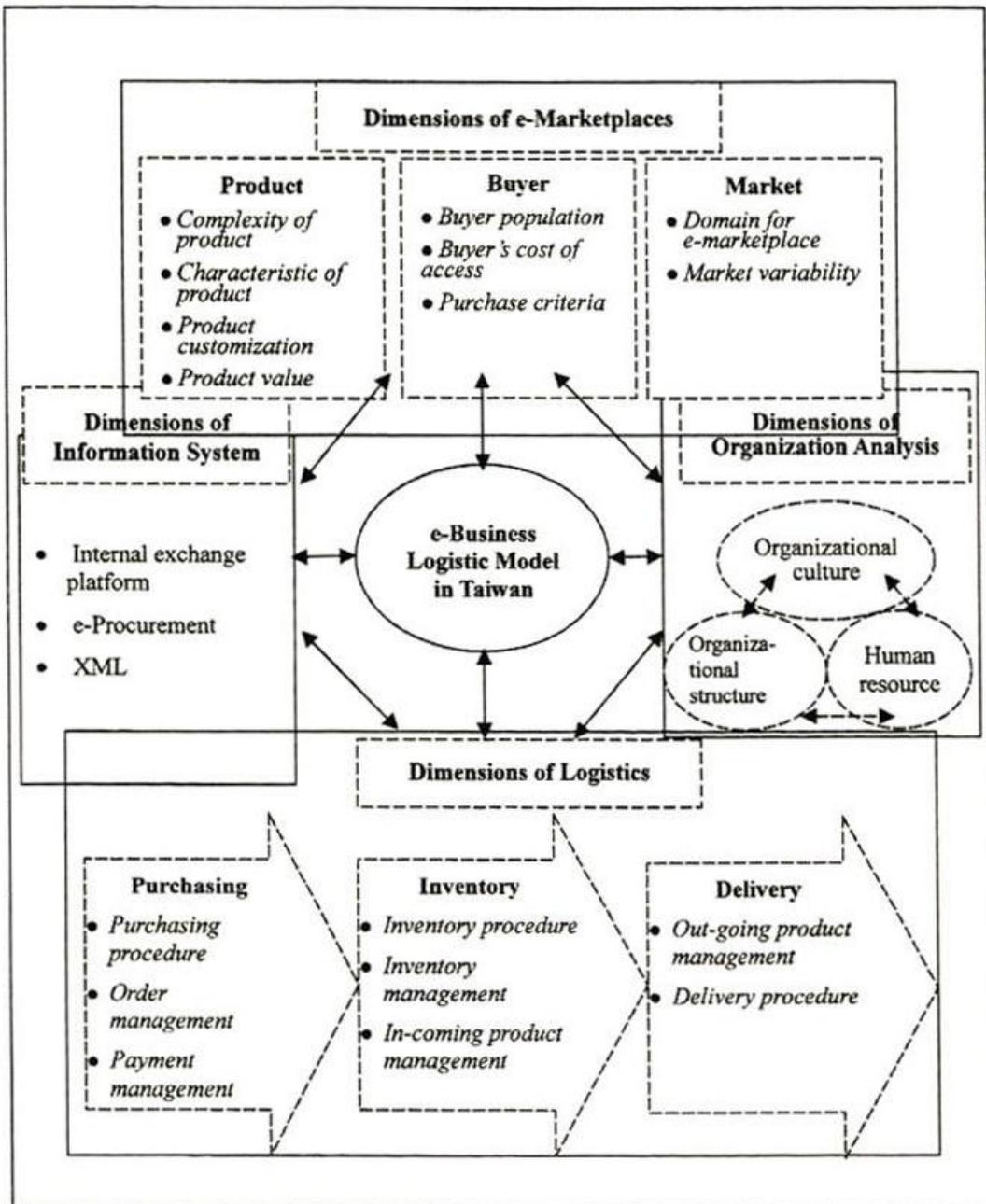
Figure 2.22 –E-Business Model for the Logistics Industry in Taiwan

Source: Lin et al. 2006

The Lin et al. model covered the e-marketplace issues and discussed its related sub issues like the product itself and its specification, the buyer or the client and his criteria and finally the market variance and the e-marketplace domain. The logistics dimension concentrated on three sub-areas; purchasing, inventory and delivery but it did not consider the e-documentation flow that might affect the whole system. The organizational analysis lacked the discussion of infrastructure issues. The dimension of the information system focused on the internal exchange platform but did not pay much attention to the compatibility of the other users' information system. The model also did not consider the costs or the e-business regulations issues. The model also did not give much value to the skills required for the e-business.

Another e-business model introduced by Hart, (2007) is shown in Figure 2.23 which shows the main interrelated components of an e-business model in the European maritime industry. These are: E-Commerce, Customer Relationship, Business Information, Supply Chain, and Enterprise Resources with the interaction between the digital network and the business processes. The expected outcomes of this model are to maintain the customer relationship and provide more accurate business information.

E-Business Model
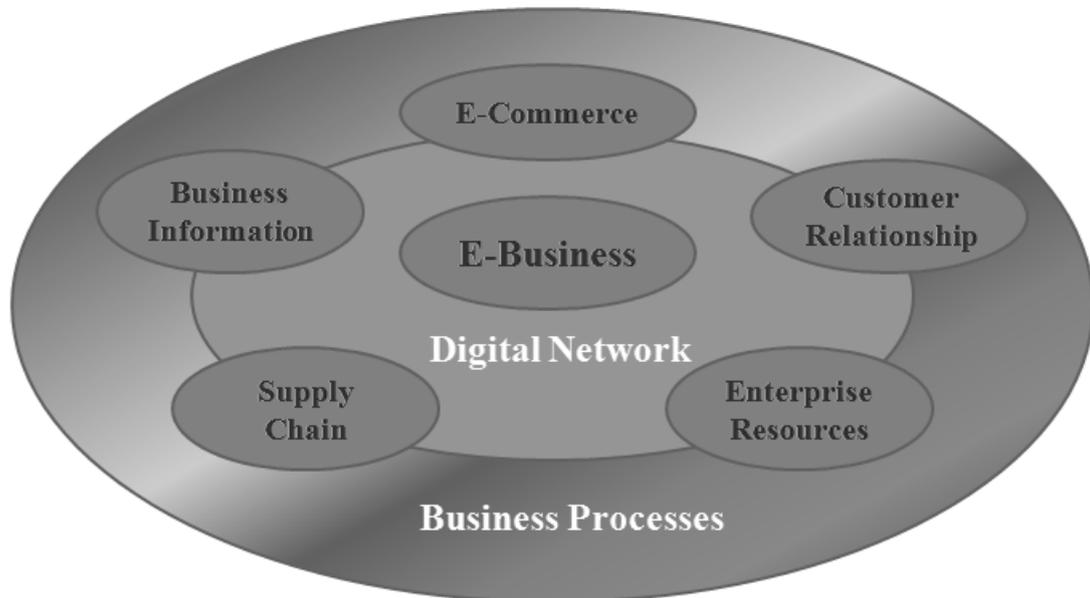
Figure 2.23 - E-Business in the European Maritime Industry

Source: Hart, 2007

Hart (2007) believed that the business processes involve mainly the client, the shipyards and the system supplier and the activities are order, services and payment. He also believed that the interrelation between the model components is crucial to the success of the model. Meanwhile, he did not mention the infrastructure required or users. Hart (2007) focused on the relationship between customers, business information, enterprise resources and the supply chain. Hart (2007) believed that the suppliers insert their data on the internet where the owners can find products via connecting the internet and searching the web. He overlooked some components like costs and benefits, the interrelation and the co-operation between the parties involved. He also overlooked culture, skills and e-business regulations.

However, the expected outcome for this model is to increase the competitiveness in the maritime sector by reducing the contact processes time of the parties involved.
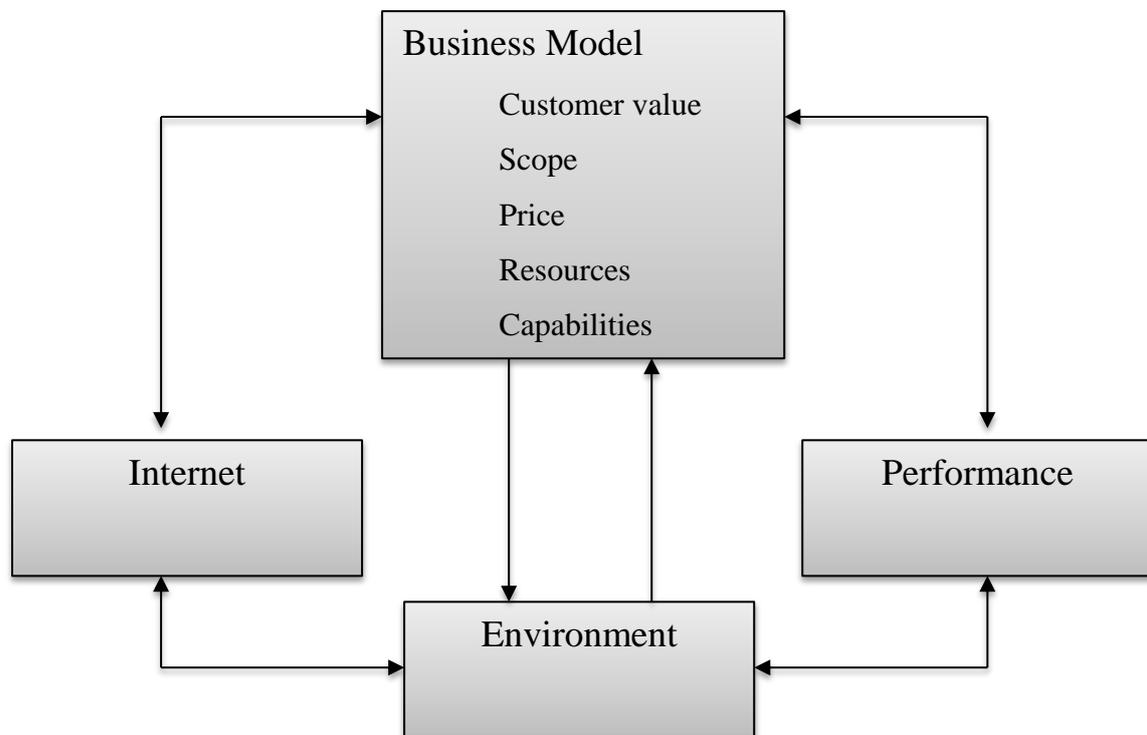
Figure 2.24 – Components of E-Business Models

Source: Song, 2008

Figure 2.24 shows the components of e-business models as presented by Song (2008).   Song believes that the business model depends on the customer value, the scope of business, the price changes in providing the e-service, the resources of the company and its utility, the capabilities of the company's competitiveness, and finally, the implementation requirements.

Song (2008) also considered three other components.   These are internet services, the performance of the model to provide the services needed and the compatibility with the environment.   The model did not consider some components like the skills of the e-business team, the culture, and the e-business regulations.   However, the expected outcome of this model is improving the company's service and fulfilling the needs of customers.

2.7   Conclusions

The world wide spread of information and communication technology is one of the most powerful current economic and social trends (Giddens, 2000).   Competitive opportunities open to developing countries affected by the rapid changes of global business (Ernst, 2004).   The Internet creates the e-business that makes everybody connected; suppliers, customers, service providers, and employees.   It makes the companies more efficient and more responsive and enables them to take advantage of the new opportunities that the global market offers.

Ports can generate profits and obtain significant advantages for their business when improving the documentation flows or when applying port community systems (as discussed earlier in this chapter).   Seaports can also achieve greater efficiency in communication with their stakeholders.

The e-business benefits could include quicker adaptation to market conditions and changes, lower cost, and a better customer relationship.   Providing faster services to the customer is also considered one of the benefits of the e-business application. This chapter has demonstrated some of the existing e-business models that have already been applied elsewhere and has explained the relationship between the components contained in each model of them.   In addition, the recognised models that have been produced are to mainly improve the internal operations and the quality of services provided to obtain customer satisfaction.   Most of the authors considered the infrastructure as an essential component to e-business.   Table 2.2 shows a check list of the components comprised in the above mentioned e-business model

Table 2.6 – A check list of the components comprised in the existing e-business models

E-Business Models' Elements	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	TOTAL (Out of 12)
Infrastructure Management	✓						✓	✓					3
Costs	✓			✓		✓	✓						4
Customer Relationship	✓			✓	✓	✓	✓	✓	✓				7
Product Innovation	✓						✓						2
Ship Management		✓											1
Cargo Securing		✓											1
Asset Application		✓											1
Port Community		✓											1
News & Information		✓			✓				✓		✓		4
SCM			✓		✓					✓			3
Dematerialization			✓										1
Market Exchange			✓							✓	✓		3
Interoperability				✓		✓		✓					3
Legacy System				✓									1
Market Entry						✓							1
Hubs & Portal						✓							1
Dynamic Pricing					✓								1
Partnerships & Channels						✓		✓					2
ICT								✓	✓				2
Organisational Analysis									✓	✓	✓		3
Enterprise Resources					✓							✓	2
Environment											✓	✓	2
Qualification				✓								✓	2

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Each column presents an e-business model and in the same order mentioned earlier:

Column 1:	Bertolazzi et al. 2001	Column 7:	Vassilopoulou et al. 2003
Column 2:	Martin and Thomas, 2001	Column 8:	Sprundel, 2003
Column 3:	Canadian Transportation Act Review, 2001	Column 9:	Auramo, 2005
		Column 10:	Lin et al. 2006
Column 4:	Visvanathan, 2001	Column 11:	Hart, 2007
Column 5:	Bakker, 2001	Column 12:	Song, 2008
Column 6:	Pigneur, 2002		

Table 2.5 shows that only 25% mentioned the infrastructure as a component, almost 33% mentioned the costs while 58% considered the customer relationship. Only one model appreciated the Information and Communication Technology (ICT) but no model gave any value to the logistics skills. Also 16% focused on the environmental adaptability, while none emphasised the culture. Another model focused on qualifications, while the researcher gives more value to the skills over qualifications. None of these models gave any value to e-security or the local strategies and policies.

E-Business offers speedy and accurate processes. It replaces the time consuming manual system with an automated system. It helps in transforming the world to a paperless world that has its positive effects on the environment. It also leads to more efficient and timely services especially in ports when time is a vital element.

Paperless procedures have many benefits; it enhances employees' productivity as they can access data easily from their computer and this improves the efficiency of working. It also improves security since access to the information and data can be limited only to specific people. In addition, paperless procedures may result in time savings especially with the service industries (e.g. ports) as all documents related to the services provided can be changed into online documents (Grainger, 2004).

Chapter 3

The Case Study of Alexandria Port

3 - The Case Study of Alexandria Port

3.1 Introduction

This chapter aims to provide a detailed overview of Alexandria Port and its historical and geographical data. Given its significant geographical place, Alexandria Port is considered the largest Egyptian Port and the one that deals with all types of cargoes. Alexandria Port in its evolving context intends to become the great port of Alexandria to revive the city's prominent international role by the year 2015. Several projects will expand; new and advanced infrastructure and modernising existing facilities are in the plan in order to achieve this goal. One of the major investment projects involves the construction of a new 337 thousand square meter multi-purpose terminal in Alexandria Port with 1450 meters of berth. The terminal will include a commercial zone of 50 thousand square meters. The development of additional transportation modes and establishing an external river port are also in the plan of Alexandria Port development (A.P.A. unpublished report). In parallel to this plan, Alexandria Port needs to apply a new way of doing business through a wider range of IT applications to accelerate the processes and minimize the duplicate and the routine works in order to achieve the set goal in a more efficient manner. To do this, a study of the current business processes in the port along with the trade barriers seems appropriate (see also chapter 5).

This chapter explains Alexandria Port's structural features. It mainly focuses on the trade barriers and comprises of 11 sections. Sections 3.2, 3.3 and 3.4 discuss historical, geographical location and specification of Alexandria Port and the structural features of Alexandria Port of Egypt in addition to the general port information.

Section 3.5 presents the control administration in the port.   Section 3.6 illustrates Alexandria Port zones and the services provided by each zone.   Sections 3.7 and 3.8 show the major and the recently added terminals in Alexandria Port.   The chapter also discusses the barriers to trade in Egypt in section 3.9. Section 3.10 demonstrates trade volume to reflect the importance of enhancing the performance efficiency. Finally, section 3.11 discusses the future plan of Alexandria Port.

3.2   Alexandria Port Historical Data

Alexandria port is one of the oldest ports in the world since its roots can be traced back for 4000 years. It was built in 1900 B.C. in the same place as an old village called "Rakoda" (figure 3.1).   Alexander the Great came to Egypt in 331 B.C. and started the construction of Alexandria city to be the marine base of his fleet.   It was to be the capital of his new Egyptian domain and a naval base that would control the Mediterranean (www.apa.gov.eg).

In the era of Batalesa, in the 2nd century, a bridge was built to connect "Faros" island with the new city. This bridge forms two ports (the eastern & the western).   The second Batlaimos built the famous tower "Faros" which was considered as one of the old Seven Wonders of the World.

At the end of Mohamed Ali's reign (the builder of modern Egypt 1810/1849) the first shipyard was built and the El Mahmoudia channel was completed.   Since then, Alexandria has entered the new era of multimodal transportation by combining sea and road transport.
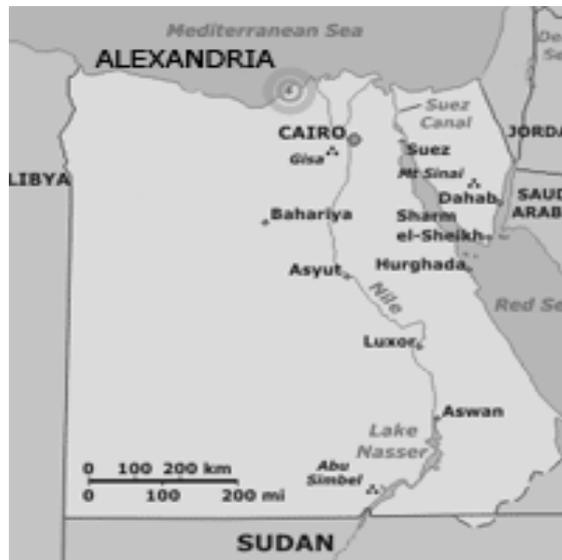
Figure 3.1 – Geographical location of Alexandria

Source: A.P.A. (www.apa.gov.eg)

3.3   Alexandria Port General Information

Alexandria is the second largest city and the largest seaport in Egypt.   It is situated to the west of the Nile Delta between Mariot Lake and the Mediterranean Sea. There are two ports in Alexandria: "the Eastern port" between the imaginary lines which links the two water breaks (eastern and western) passing to the middle water break; and "the Western port" which starts with the imaginary line which connected the two water breaks beside the Elmahmoudia canal (Khairallah, 2006).   Figure 3.2 shows the two ports.

Figure 3.2 – Alexandria Western and Eastern Harbours View

Source: A.P.A. (www.apa.gov.eg)

This port is divided into two ports separated by coal berths and the inner water break. The first part is called the inner port and the second is called the outer port. The eastern port is used for fishing while the western one is what is commonly known as Alexandria Port.

3.4   Geographical Location and Specifications

The following table (see Table 3.1) shows the geographical location and the specifications of Alexandria Port:

Table 3.1 - Specifications of Alexandria Port

Specification	Measures
Lat & Long	29 52 E- 31 11 N
UNCTAD Code	Egaly
Time	GMT + 2 Hours
VHF	10, 11, 13, 14, 67 and channel 16
Area of Water Surface	4.8 Km
Biggest Width	2 Km
Area	8.5 sq. Km
Area of Land Surface	About 1 km
Length of Customs Barrier	About 7 sq. Km
Length of railway inside the port	About 35 km

Source: A.P.A. (www.apa.gov.eg), 2006

Table 3.2 shows Alexandria Port's throughput by cargo type for the year 2007/2008. It specifies the numbers of vessels that visited the port and the type of cargoes. The table reflects the importance of Alexandria Port in terms of the quantity of cargo handled and the number of vessels calling at the port.

Table 3.2 – Alexandria Port throughput by cargo type 2007/2008

Cargo Type	Vessels Visit
Container	1152
General Cargo	1016
Dry Bulk	40
Other	364
Timber	286
Liquid Bulk	281
Car (Ferries)	153
Coal	94
Iron Balls	51
Scrap	44
Wheat/Supply Product	43
Grains	33
Clay	31
Pipes	24
Gas	19
Sulphur	3
Live Stock	8
Tourism & Passenger	10
Services	3
Molasses	2
Mining	1
Total	**4020**

Source: A.P.A. (www.apa.gov.eg), 2010

Table 3.2 shows the throughput of Alexandria Port. The largest throughput is the containerised cargo followed by the general cargo. The table reflects the different types of cargo the port handles. This in turn reflects the importance of Alexandria Port in the region.

3.5   Control Administrations

The administrative controls in Alexandria Port are: the Customs that impose the fees and dues required for each cargo type; Health Quarantine Administration, which is involved with the general inspection of the health of passengers; the General Department of Veterinary Quarantine that is concerned about the health measurements of all import or export live stocks in port; the General Department of Agricultural Quarantine, and the Food Observation Department - these two departments investigate and after inspection, permit the distribution of food and agricultural products;   the Radioactive Inspection Department, the role of this department is to ensure that all cargoes coming to the port are free from any radiations; the Cargo Inspection & Control Office that checks the cargoes and ensures that all kind of cargoes is permitted by law; the General Authority for Imports & Exports Control, issues an approval for the arrival or the departure of any vessel at the port.   Finally, the General Authority of Standards Unifying and Quality Control which checks that all cargoes are according to the set standards required by the Egyptian government (A.P.A., 2010).

3.6   Alexandria Port Zones

The total number of berths at Alexandria Port is 59 berths, each of which is recognized by a certain number but these numbers are sometimes not in order (see figures 3.3 – 3.8).   Alexandria Port contains six different zones, they are as follows:

Alexandria Port First Zone: The first zone of Alexandria port is the area extending between berth 5 and berth 15, used for general cargo handling figure 3.3.
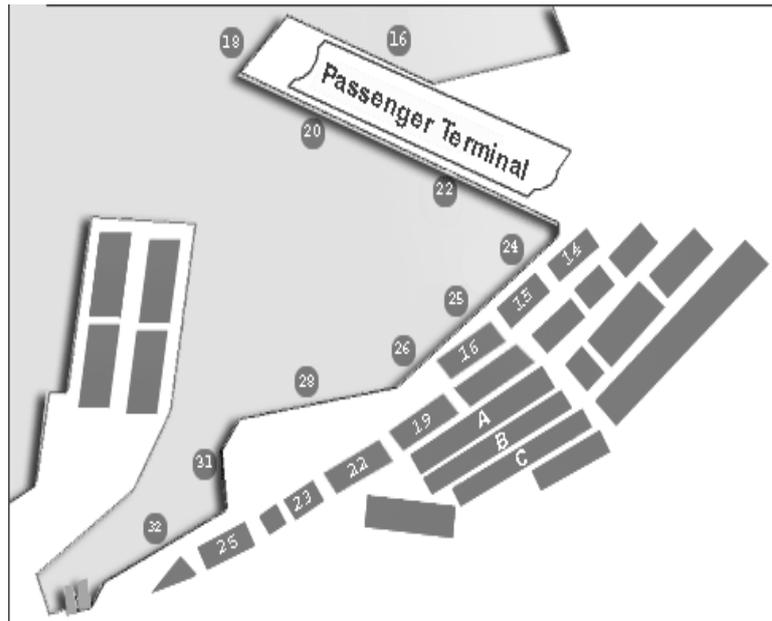
Figure 3.3- Alexandria Port First Zone

Source: A.P.A. (www.apa.gov.eg)

Alexandria Port Second Zone: The second zone is located between berths 16 and 31, and provides 4 types of activities:

1. Unified cargoes and RO-RO ships.

2. Passenger Marine Terminal.

3. Packed bulk cargoes.

4. Discharging from barge.

It can receive only 2 RO-RO ships in berth 18 and bulk cargo in the middle of berth 18, and bulk cargo in the middle of berth 25. The Passenger Maritime Station is situated in the area behind berths Nos. 16, 18, 22, & 24.   The Station buildings' area is about 8000 sq. m. handling operations while the station entrance and gardens area is about 27000 sq. m. of general cargo on berth 16 and 18-28, in addition to handling operations of cargo of barges on berths Nos.30, 31, & 32 (Khairallah, 2005). (See figure 3.4).
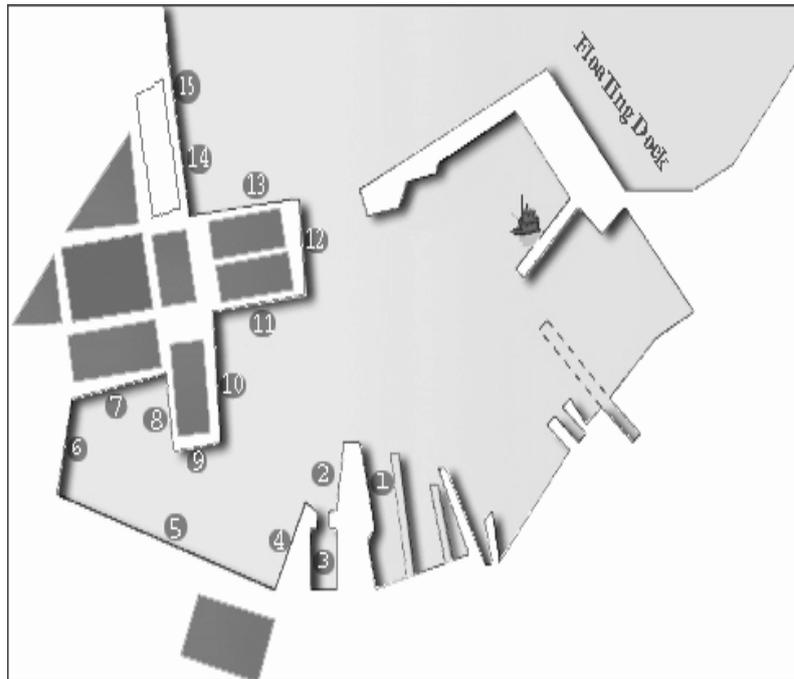
Figure 3.4 – Alexandria Port Second Zone

Source: A.P.A. (www.apa.gov.eg)

Alexandria Port Third Zone: figure 3.5 shows the third zone which is located between berths Nos. 33 to 47. The types of cargo handled are general cargo, cargo from barges and bulk cargo. Berth No.33 is used for discharging barges by movable cranes which work on the berth side to transfer cargo directly to trailers. In front of berth No. 34, there is an open yard and there are stores which are used for storing general cargo. Berth No. 40 is used for receiving RO-RO ships and general cargo ships.
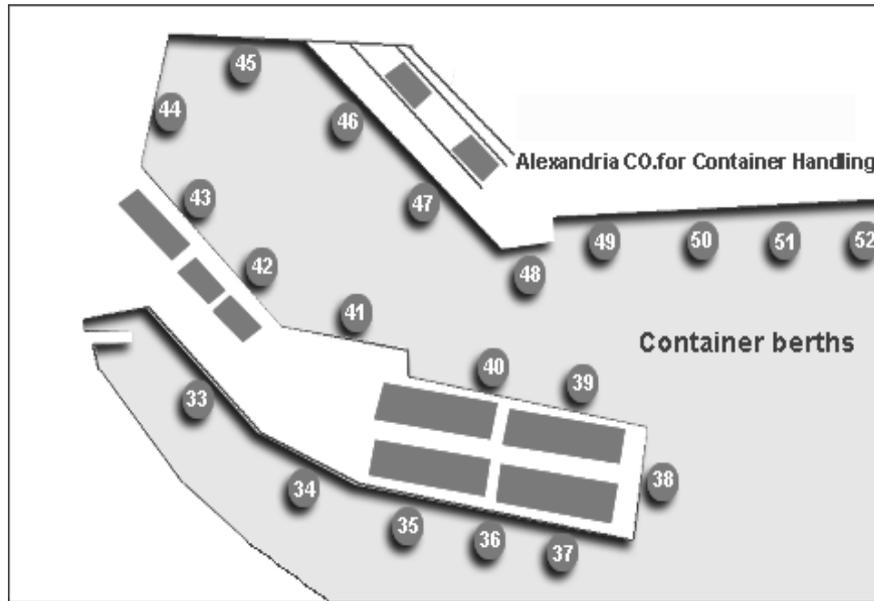
Figure 3.5 – Alexandria Port Third Zone

Source: A.P.A. (www.apa.gov.eg)

Alexandria Port Fourth Zone*:* The fourth zone is located between berth No. 50 and berth No.68. The types of cargo handled are containers, cement, coal, general cargo, timber, ores, fertilizers and general cargo (see figure 3.6).

The Container Terminal is from berth 49 to 54 with a total length of 525 m. for receiving containerships. Berth No. 54 is to the north of the terminal with a length of 155 m. to receive RO-RO ships. The container terminal is equipped with 2 cranes with a capacity of 35 tons and 2 cranes for container transfer and stacking in yards. Berths Nos. 62, 63 & 64 are used for discharging coal with a length of 480 m. and a depth of 9-10 m., which allows two ships with a tonnage of 30000 tons or three small ships to be berthed. It is possible to receive large ships with a tonnage of 40000 tons by using pontoons between the ship and the berth, handling coal operations by three gantry cranes.
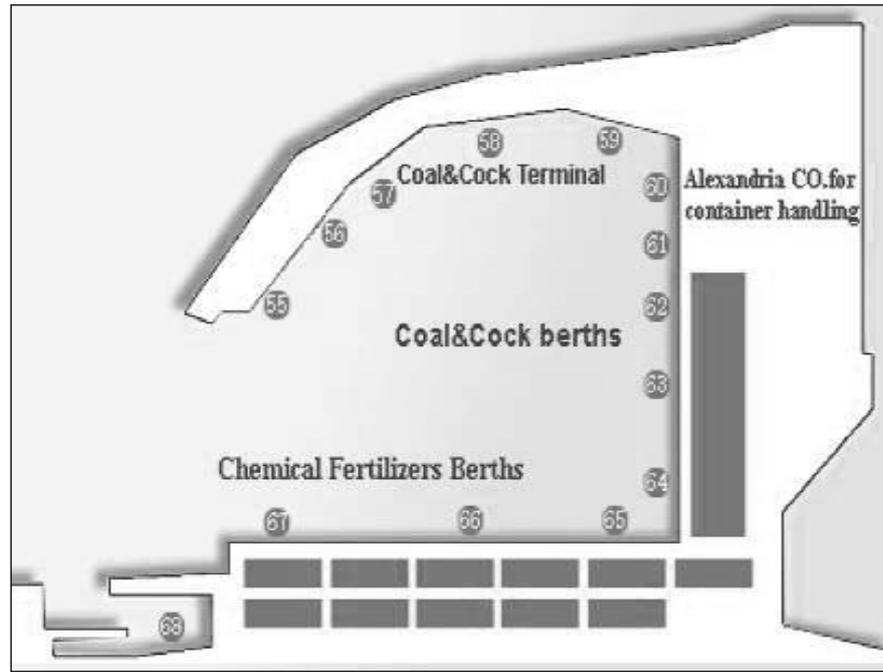
Figure 3.6 – Alexandria Port Fourth Zone

Source: A.P.A. (www.apa.gov.eg)

Alexandria Port Fifth Zone: The fifth zone is located between berths Nos. 71-85. It is used for (figure 3.7):

- Timber and general cargo.
- Molasses.
- Grains.
- Flour & grains.

Timber and grains are discharged from barges

The redevelopment of berths Nos.71, 72 & 81 and the new of multipurpose terminal has been completed during 2006 (A.P.A). The area between berths Nos. 71- 81 is called the timber berths. Berth No. 82 is reserved specially for receiving grains and flours and packing them.

In the back there is a wide area which is fitted with the necessary equipment to receive grains and store them.   There is a parking area for trailers & a small basin beside the store near the lock of El Nobereia channel, which is used for discharging barges. On berth No.82, there are 3 sections and a silo with a capacity of 50000 tons. There is a unit for packing grains into bags and this has a capacity of 3500 tons/day. Internal transportation of packed quantities is done by using trailers. Berth No.85 is reserved for imported grains; there are two suctions and an additional silo with a capacity of 100000 tonnes; loading grains in bulk is available by using railways for local transportation.
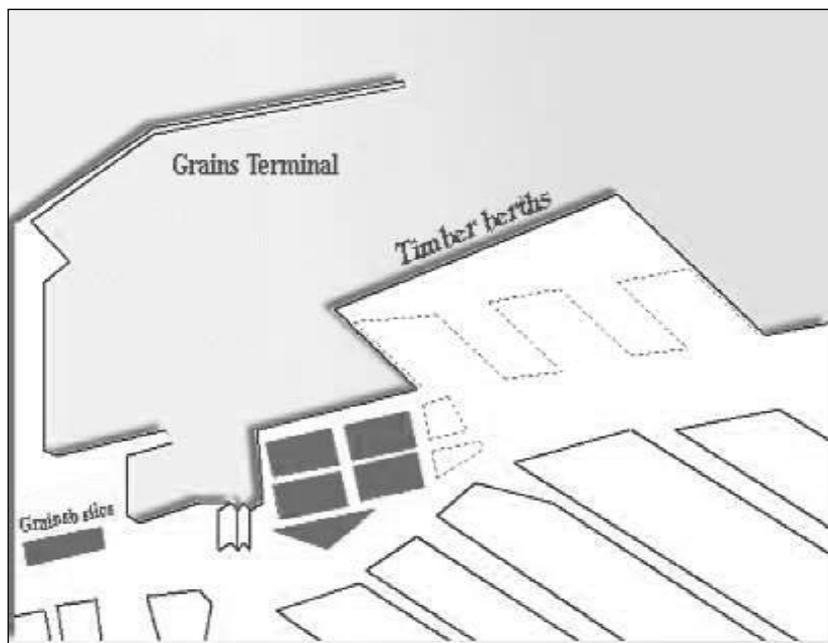
Figure 3.7 – Alexandria Port Fifth Zone
Source: A.P.A. (www.apa.gov.eg)

Alexandria Port Sixth Zone: The sixth zone is located at the end of the west area of the port; there are oil berths Nos. 87/1, 2, 3, 4 & 5 which are used for receiving edible oil, petroleum products and ships provisions and for exporting oil products.

Berth No. 86 is at the end of the port area and is used for livestock. There is no facility for storing petroleum products in the port, but petroleum berths are connected with strainers by a pipeline of 2 km in length (see figure 3.8).
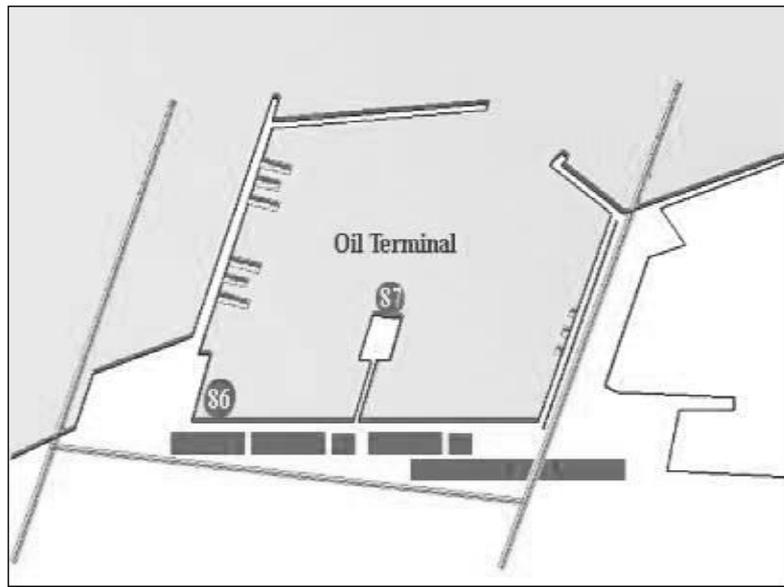
Figure 3.8 – Alexandria Port Sixth Zone

Source: A.P.A. (www.apa.gov.eg)

3.7   Major Terminals in Alexandria Port

Figure 3.9 shows Alexandria Port's major terminal which is analysed in the following section:

Figure 3.9 - Alexandria Port Major Terminals

Source: A.P.A. (www.apa.gov.eg)

Alexandria Port Container terminal: This was constructed in accordance with the Ministerial Decree No. 25 for the year 1984. It is managed and operated by Alexandria Containers Handling Company (ACHC), one of the companies of Maritime Transport Sector.

Berths Nos. 49, 51, 53 & 54, (as mentioned earlier, the container terminal is from berth 49 to 54 within the fourth zone) with a total length of 720 m. and a depth of 14 m. can receive container and RO-RO ships. The terminal is equipped with container handling equipment. The total area of the terminal is 163000 sq. m. and the total capacity is 230000 containers / year and it is possible to increase the capacity to reach 3000000 containers.

Passenger Maritime Terminal: It was established on an area of 15.5 feddans[1] and it was inaugurated in 1962.   The terminal connects with the down town via a bridge at the end of El-Nasr road (customs gate No. 10).   All the necessary services are gathered in this station such as the offices of tourism, customs inquiry, immigration, health quarantine, agricultural quarantine, banks, telephone, post office, police, etc. It contains berths Nos. 16, 18, 20, 22 & 24 within the second zone with a total length of 698 m and a depth of 9–10 m.

***Coal Terminal*:**   This terminal is being operated by El-Nasr Company for Coke Coal & Basic Chemicals.   The terminal contains berths Nos. 61, 62, 63 & 64 within the fourth zone and with a total length of 600 m. and a depth of 9-10 m. and receives ships up to 30000 tons or two/ three small ships.   The actual depth in case of using pontoons between the ship and the berth enables receiving ships of up to 40000 tons.

Handling operations are always done on berths by using two cranes which move on rails; the crane has a long arm (21.5 m) which allows loading the wagons or the barges directly from the ship.   It is provided with 3 gantry cranes and stevedoring equipment with a capacity of 200 tons/ hours/crane), 2 cranes with a capacity of 10 tons/time and one crane with a capacity of 6 tons/time.

Grains Terminal: The grains terminal contains berths Nos. 82, 84 & 85 with a total length of 535 m. and a depth 10 m.   In berth 82 there is one silo with a capacity of 50000 tons behind berth No. 85, and another silo with a capacity of 100000 tons with technical suctions (3 suctions on berth 84 with a capacity of 150 tons/hour and 2 suctions on berth 85 with a capacity of 250 tons/hour).   The extension of berth No. 85 is under construction to reach a length of 300 m., width of 70 m. and a depth of 12 m. (See zone six).

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[1] It is a measure of land in Egypt and Sudan, equal to 1.038 acres.

Oil Terminal: It is located at the west end of the port.   There are 6 berths: 87/5, 4, 3, 2, and 1 within the sixth zone.   It receives imports of food oils and petroleum products, and provides ship supply services.   It is also used in oil, asphalt, fuel oil, and the North American Free Trade Agreement exportation (NAFTA exportation).

Liquefied Gas Terminal is also within the sixth zone and available for a vessel with 8.53 m. draught and 122 m. length.

Cattle Terminal: It is also located at the west end of the port, berth No. 86, in the sixth zone.   It is operated for cattle imports due to its proximity to the automated slaughterhouse.

3.8   Recently Added Terminals

Chinese Hutchison (HPH) Container Terminal: Total investments of 700 million Egyptian Pounds, in addition to other investments of 400 million USD covering 420,000 containers (210,000 containers in each port; Alexandria Port and Dekheila Port) along berths 71/81 at Alexandria Port and the others are at berth 98 at Dekheila Port (Khairallah, 2005).   The HPH container terminal contract is based on the privatization concepts – liberalization, that has created open and free competition with Alexandria container terminal, the one owned by a government company and has resulted in improving the services provided.

Multi-purpose Terminal: There are 10 berths: 71–81 called timber berths with a depth of 4-6 m. and a back yard.   A.P.A. has decided to develop these berths to reach a depth of 12 m. and to extend the storage area to reach 98000 m.   The development project has been completed.

Ship Repair and Dry Docks: Companies specialized in vessel repair are operating inside the port. Two dry docks and 4 slipways fitted with modern equipment are available, as well as installations for vessel construction. Two dry docks are available with the following dimensions:

- 158.5 x 18.9 x 64 m.; and 267 x 39.6 x 9.5 m.

- Floating dock is available.

- Mechanical dock is available.

Main Stevedoring Equipment: In addition to heavy top lifters, tractors, trailers and normal forklifts, the main stevedoring equipment available for Alexandria Container Handling Company is shown in table 3.3.

Table 3.3 − The Main Stevedoring Equipment

A) Gantry Cranes

No Of Cranes	I Post Panamax	2 Panamax
Capacity	40 Tons	32 Tons
Span Between Rails	15 Meter	15 Meter
Outreach	40 M	35m
Height Of Spreader Above Rails	30 M	25 M

B) Stackers

2 Rubber Mounted Stakers	
Capacity:	32 Tons, 3+1 Tiers
Distance Between Legs:	22.5M.
2 Rubber Mounted Stakers	
Capacity:	40 Tons,5+1 Tiers
Distances Between Legs:	22.5M.

Source: Ministry of Transport − Maritime Transport Sector (MTS), 2007

3.9   Barriers to Trade in Egypt

The purpose of this section is to investigate the barriers faced by Alexandria Port in operating an efficient global business.   It also explains in details how the manual and web-based systems of documentation are applied.

3.9.1 Tariff Escalation Barrier

Although the World Trade Organisation urges eliminating tariffs as a barrier to trade between countries, import duties in Egypt range between 5 % and 40%.   They reach 125% on certain raw materials, components and products based on the degree of processing and the nature of the items.   High tariff rates are maintained on some products including passenger cars, tobacco and alcoholic drinks (Egyptian Ministry of Trade & Industry 2005).   The highest rate reaches 300 percent on luxurious items like yachts.   However, Egypt's tariff structure clearly reveals a positive escalation, with an average of 4.8 percent on raw materials, 10.6 percent on semi-processed goods, and 28.2 percent on fully processed goods.   Special tariffs are also added to fabrics, textiles, and garments.   Escalating tariffs are considered a barrier that increases the costs and reduces trade exchange (Mobarak, 2007).

3.9.2 Customs Procedures Barrier

According to Egyptian Customs regulations, to ensure the release of the cargoes, all the documents including invoices, analysis reports, certificates of origin and certificates of health, should be notarized by the local notary offices and should be verified by the embassies and consulates general of Egypt in the countries of origin (A.P.A, www.apa.gov.eg, 2007).

This set of documents is completely different to the document required by customs upon arrival in port. Details regarding this set of documents will be discussed later in this research, as documentary red tape in customs procedures increases the cost of imports significantly (RAFIMAR www.rafimar.com, 2007).

3.9.3 Technical Barrier

The Egyptian government controls and manipulates many service industries. Recent governmental policies allow the private sector to involve and invest in ports, maritime activities, and airports and thus have led to a major interest in the private sector (Egyptian Ministry of Trade, 2005). Services provided by Alexandria Port, such as loading, discharging, warehousing, and container handling do not reach international standards to compete globally with other ports in the developed countries. Other technical formalities, for imported goods for example, must be marked and labelled in the language of the imported country and as for the exported goods, it must be marked and labelled in the language of the imported country mentioning the brand and type of the product, country of origin, date of production and expiry date and if there is any special transportation requirements (USAID/DEPRA Project, 2000). An Arabic language catalogue is also required and must accompany imported tools, machines and equipment. In addition, cars imported for commercial purposes must be accompanied by a certificate from the manufacturer stating that they are suited for tropical weather as the government mandates and according to a 1998 Ministerial Decree, imports of cars are restricted to the latest model year in any given year. Many of these standards are contrary to WTO agreements prohibiting technical barriers to trade (USAID/DEPRA Project, 2000).

3.9.4 Import Restrictions

The import restrictions are many. Egypt maintains import prohibitions for economic reasons, others for environmental or health and safety concerns. Some of the imported items have quotas or extra tariffs imposed on them which are considered other restrictions (A.P.A www.apa.gov.eg).

3.9.5 Documentation Barrier

Many documents are required by the port authority for customs, health, and immigration. The documentation barrier is the focus of this research. Currently, the port is using two systems, a manual system and a web-based system. Documentation flows in the port are considered one of the hindrances that negatively affect the port's productivity. It is considered time consuming and a cost increasing element. Figure 3.10 summarizes the trade barriers in Egypt and emphasizes the focus of this research.
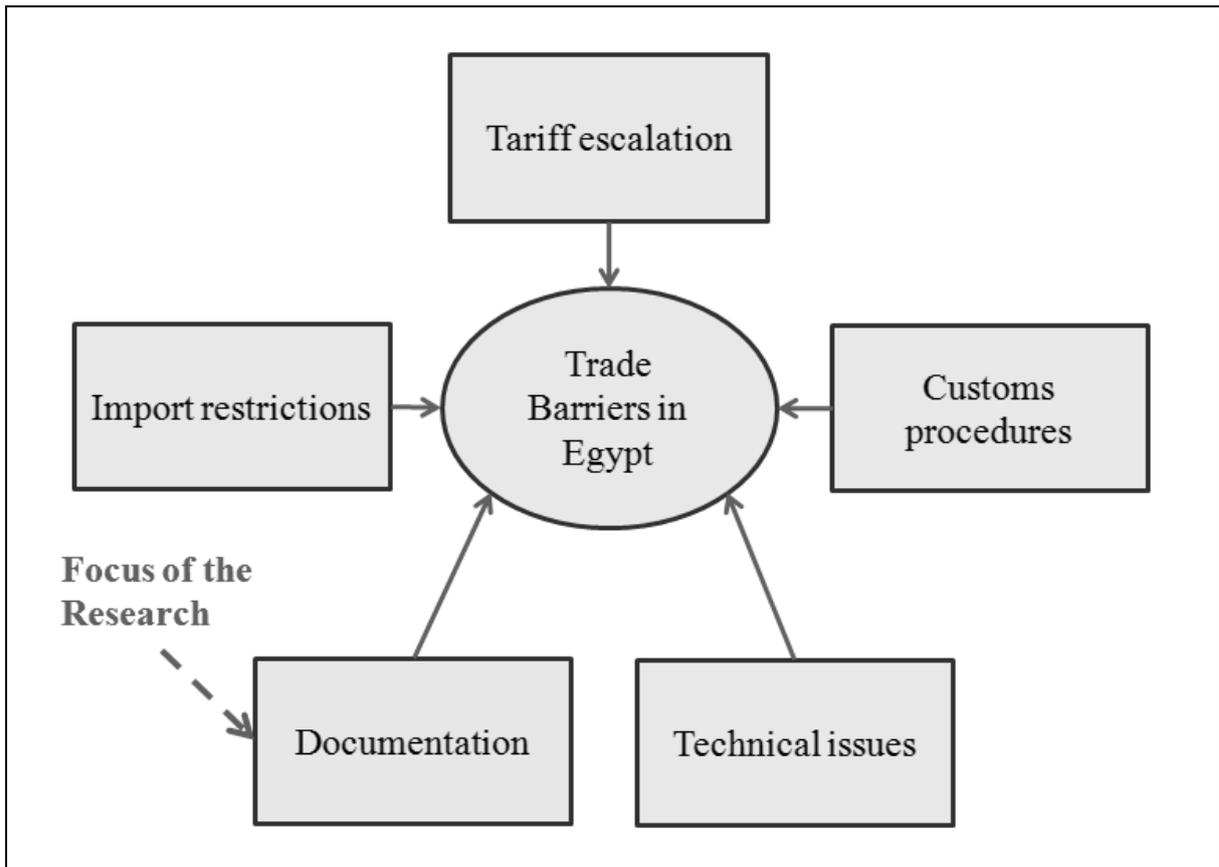
Figure 3.10 – Barriers to Trade in Egypt

Figure 3.10 illustrates the different types of barriers faced by Alexandria Port. The tariff escalation hinders the international trade cycle in the port. The ineffective duties relief schemes and the complexity of the customs system have resulted in relatively high number of disputes between customs and the trade community. Customs administration and employees burdened with bureaucracy indicates the customs hindrances and increases the clearance costs (Radwan, 2006). The outdated organizational structure and the insufficient training for operators reflect the technical problems. Also, the outdated equipment helps in increasing the technical problems. It is noted to mention that the appropriate equipment to deal with the 45 feet reefer is not available.

The import restrictions are also considered an obstacle, the customer must take delivery of shipments within 7 days otherwise cargo will be re-exported under the shipping line's responsibility (A.P.A., 2007) which with the current documentation systems in Alexandria Port is hard to achieve. Finally, the documentation barrier that is the focus of this research is considered the main cause of increased waiting time in Alexandria Port. Cumbersome procedures, the long processes and the replication of paper work, the use of two systems and the lack of IT application raised up the documentation flow barrier (see chapter 5).

3.10 Alexandria port Trade Volume

Despite the existence of the above mentioned barriers, research done by Biblioteca Alexandrina (July, 2007) shows that the bigger part of Egypt's foreign trade passes through Alexandria Port whose capacity is estimated to be 75% of the total capacity of Egypt's ports on the Mediterranean Sea. Due to the fact that through this port the percentage of the ships passing represents 55% of the total number of ships incoming to the Egyptian ports on the Mediterranean, the Egyptian government was stimulated to work on developing the port within a general strategy for developing the country's ports in accordance with the revolution in ports management witnessed all over the world.

Table 3.4 shows the totals of containers handling at the Egyptian Ports during July, 2009 including Alexandria Port.

Table 3.4 – Totals of Containers Handling at the Egyptian Ports during July 2009

Port Name	Local		Transit		Total	
	Teu	the Egyptian vessels shipment rate	Teu	the Egyptian vessels shipment rate	Teu	the Egyptian vessels shipment rate
DAMIETTA	19382	5.2%	77725	8%	97107	7.5%
SOKHNA	29685	0%	2432	0%	32117	0%
WEST PORT SAID	31380	6.9%	43160	11.6%	74540	9.7%
EAST PORT SAID	13286	0%	206101	6.9%	219387	6.5%
ADABIYA	2012	5.5%	3	0%	2015	5.5%
ALEXANDRIA	55848	31.5%	736	48.6%	56584	31.7%
EL DEKHEILA	60649	11%	4878	11.7%	65527	11%
Total	212242		335035		547277	

Source: Egyptian Ministry of Transport, 2010

The above mentioned information and table 3.3 shows that Alexandria Port has the highest rate of handling local TEUs and the transit TEUs among the other Egyptian Ports. Although Sokhna Port has IT application, the handling TEU in Alexandria is almost double. Since Alexandria and El-Dekheila Ports is considerably one unit, both are handling 42.7% of the total local TEUs that reflects the importance of moving Alexandria Port towards the IT application. This raises a question of: *How could the performance of Alexandria Port be improved after becoming an automated port?*

Containers Percentage Handled in the Egyptian Port

7.30%

10.40%

15.50%

66.80%

- ALEX
- PPORT SAID
- DAMIETTA
- SUEZ
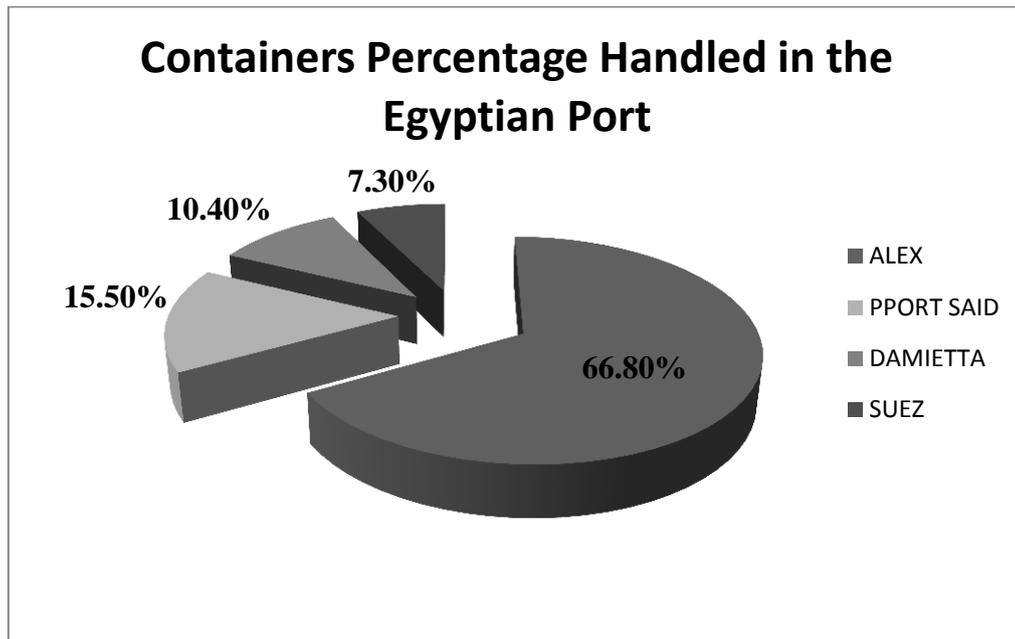
Figure 3.11 – Containers Percentage Handled in the Egyptian Ports

Source: International Marine Services, 2008

Figure 3.11 shows the relative importance of containers handled in Alexandria Port in 2008. Alexandria Port has the greatest share among all the Egyptian ports, 66.80% of the total containers handled during 2008.

3.11 The Future Plan of Alexandria Port

The Alexandria Port intends to become the Great Port of Alexandria and to revive the city's prominent international role by the year 2015. In order to achieve this, several projects will expand and modernize existing facilities and infrastructure. The Alexandria Port will add 11.3 kilometres of berths, add a new 3.5-kilometer breakwater, and extend dock areas by 290 hectares.

Ten new international terminals will be added, two dedicated to containers. New transportation routes will parallel the coast, linking the Alexandria Port directly to El-Dekheila Port and International Road (Egypt State Information Services, 2007). One of the major investment projects involves the construction of a new 337 thousand square meter multi-purpose terminal in the Alexandria Port with 1450 meters of berths. To be located in the B tourist zone, the terminal will include a marina and a commercial zone of 50 thousand square meters. The project will include development of additional transportation modes, establishing an external river port, and completing the external services zone with 200 thousand square meters of area (Egyptian Maritime Data Bank, 2007).

A second major project of Alexandria Port will involve developing a third container terminal at El-Dekheila with an area of 50 thousand square meters; establishing an 800 thousand square meter petrochemicals basin with 1200 meters of berths; upgrading the grain terminal and expanding its berths by 600 square meters; and upgrading the coal, plate iron, and dry bulk cargo berths (Egyptian Maritime Data Bank, 2007).

The Great Alexandria Port project will establish a middle harbour with five kilometres of roads, railways, and utilities and a 3.6 kilometre breakwater. The new harbour will contain seven integrated terminals. When completed, the Great Port of Alexandria will increase the number of berths by 24% and the total length of berths by 63%. It will increase storage yard areas by 54% and the terminal area by 21% (WB Group, 2007).

3.12 Conclusions

Alexandria Port is the largest port in Egypt in terms of volume of trade. The local economic development and competitiveness report of Egypt, June 2007 mentioned that there are some challenges and threats to the work environment in Alexandria Port. The following section summarizes these challenges and threats.

Data and statistics: Lack of coordination in data collection on the local level and between the involved parties. Insufficient information on procedures affecting the business environment is one of the challenges.

Labour market and skills: Overall low technical labour skills which is considered vital to cope with the rest of the world ports.

Infrastructure: Inefficiencies of port infrastructure and poor maintenance of cargo handling equipment making the handling costs and dwell times higher than in other ports in the region. Another challenge is the poor connectivity links amongst the various transport nodes and industrial zones. Frequent power system outage that threatens the IT application is another challenge.

Business environment: Difficult environment to do business for several reasons like: lengthy procedures, lack of adequate information, conflicting procedures and excessive bureaucratic procedures and heavy red tape at the port. Another threat is the old technologies used.

This research focuses on how to improve the way of doing business and enhance the business environment of Alexandria Port by upgrading its performance level through reengineering and redesigning its documentation flow. Transforming the paper documentation flow to an electronic flow provides a better and faster way to service the port community.

Chapter 4

Research Methodology

4 - Research Methodology

4.1   Introduction

Methodologically, the approach used in this research consists of a "before and after" analysis of the two systems of Alexandria Port: the old documentation flow system and the new Web-Based semi-automated system.   The methodological approach used in this case study research is that of multiple data sources to examine the research question.   This chapter gives an overview of the research methodology which has been applied.   The chapter also indicates how the aims and objectives have been met by using these multiple data sources for observation, structured interview, and semi-structured interviews.   The triangulation of the case study; modelling, observation, and assessment of the two applied systems at the port, the literature review and the original interviews will all serve as integrated methods of collecting data for this case study research.

This chapter is divided into five sections. Section 4.2 discusses the research strategy and why that used is justified. Section 4.3 addresses the research design process, and section 4.4 describes the research data collection methods and the advantages and disadvantages for each method and clarification of why the methods were used. It shows how interviews were conducted, the questions' rating scales and the limitations involved. This is followed by a conclusion in section 4.5.

The following figure (Figure 4.1) shows the overall research methodology map and the multiple data sources used. Direct observations are used to note down the actual procedures in Alexandria Port.

The purpose of using interviews is to collect primary data about the two applied systems in the port, also to investigate the procedures that the port community follow and to compare it with the observed procedures.

Documents from the port authority are also used to reflect what the port authority believes and the practices in doing business.   These multiple methods of collecting data will be further discussed in this chapter.

```
                         Research Methodology

        Primary Sources                      Secondary Sources

Direct Observation      Interviews                Documents

Alex. Port visits   Structured  Semi-Structured

Initial                                    - National Publications
Evaluation                                 -Port Records and
                                           Archive
            Freight          -Shipping Lines        -Port Unpublished
            Forwarders       -Customs Clearance     Document
                             and Shipping Agencies  -Literature Reviews
        Sample of            -Freight Forwarders    (Books, Journals,
        Stakeholders                                Internet articles,)
```

Figure 4.1 - Research Methodology

Figure 4.1 shows that multiple sources of collecting data started with direct and participant observations through several visits to the port by the researcher. These were followed by interviews: structured and semi-structured with the parties involved and stakeholders and an analysis of documentation.

4.2   Research Strategy

The term "research strategy" is the general approach that reflects the goals of the research study (Creswell, 1994). There are different types of research. For example descriptive research which is to describe the state of affairs at the time of the study and to measure variables as they exist naturally. Also there is the correlation type of research where two variables are usually measured as they exist naturally; the goal of this strategy is to describe a relationship between these two variables without attempting to explain the cause of the relationship (Denzin, 1992). The non-experimental strategy is another type of research where it provides the answer to a question about the relationship between two variables by demonstrating a difference between two groups or two threatening conditions. Some other types of research approach are discussed in the following sections.

4.2.1   Qualitative and Quantitative Study

Qualitative research is an approach linked with the social constructivist paradigm which focuses on the socially constructed nature of reality. Gaining a rich and complex understanding of people's experience is what researchers are interested in when applying a qualitative research strategy. The approach tends to be inductive (see section below for more details) which means that researchers develop a theory or look for a certain form of meaning on the basis of the data that they have collected (Brouns et al. 2005).

Qualitative research usually involves a smaller number of participants. This is due to the methods used such as in-depth interviews which are considered time and labour consuming. Also due to that, large numbers of people are not needed for the purposes of undertaking statistical analysis (Beins, 2009).

Quantitative research is often related with the positivist paradigm. It generally involves collecting and converting data into numerical form so statistical analysis can be calculated and conclusions drawn. Data should be collected from different sources and prepared for statistical analysis. The researcher should be careful to avoid their presence (Brouns, et al. 2005).

Bogdan and Biklen (2007) explain five characteristics of qualitative research.

- Naturalistic study is when the direct source of data and human behaviour and culture notably affect the actual settings.
- The study does not comprise numbers and measurements but contains descriptive data that takes the form of words.
- The study is concerned with processes rather than outcomes.
- The study has no data to be held to prove or disprove hypotheses and findings that are made inductively.
- The study is concerned with the participants' point of views that enables the researcher to consider experiences from their perspective (Bogdan and Biklen, 2007).

Accordingly and in order to reach a profound understanding of the situation to be investigated, it has been found that evaluative, qualitative and inferential research supplemented by a case study is most appropriate, since qualitative study is exploratory, inductive and emphasizes processes.

Furthermore, the main research problem involves data that cannot be quantified e.g., attitudes, value, culture, and perception but the analysis of the data collected will be quantified. , qualitative research can be defined as follows:

> "Qualitative research is a naturalistic, interpretative approach concerned with understanding the meanings which people attach to actions, decisions, beliefs, values and the like within their social world, and understanding the mental mapping process that respondents use to make sense of and interpret the world around them".
>
> (Ritchie and Lewis, 2003)

Meanwhile, literature reviews have acknowledged the possibility of combining both qualitative and quantitative methods (Patton, 1987 and Guba & Lincoln 1981). This has mainly occurred in this particular study through the use of Likert – style interviews and rating scales, especially during the analysis of the data collected and the analysis of the responses in the form of analytical percentages as a quantitative data to supplement the main qualitative data. This combination of the two methods has been used. Table 4.1 represents a comparison between the inductive and the deductive methods:

Table 4-1 Comparison between inductive and deductive research approaches

Inductive	Deductive
• Theory is developed from the generalization of single cases	• Hypotheses are derived from particularities in general theory
• Observation of a part of reality	• Tries to verify or falsify hypotheses through observations (empirical analysis on a significant number of cases)
• Development of general theory	

Source: Brouns et al. 2005

The inductive approach uses data to generate ideas, while the deductive method starts with an idea or theory and uses the data to verify or disprove the idea (Brouns et al. 2005). Deductive reasoning works from the more general to the more specific which is sometimes called a "top-down approach" and conclusions follow logically from the available facts. Inductive reasoning works the other way – it moves from specific observations to broader generalizations and theories and is called a "bottom-up approach". The conclusions are based on the available facts but involve a degree of uncertainty. In other words, induction is usually described as moving from the specific to the general, from specific observations to broader generalizations and theories while deductive begins with the general and ends with the specific (Trochim, 2006). Argument based rules, law and accepted principles are usually for deductive reasoning. Observations tend to be used for inductive argument. Historically, many researchers believe that logical reasoning is an essential part of the human process and this dominates in scientific and technological research and development (Aqil and Nadeem 2006). Often a combination of both approaches is used.

4.2.2 Alternative Research Approaches

According to Creswell (2007) research consists of five general designs: narrative, phenomenology, grounded theory, ethnography, and case study. Meanwhile, Robson, (1996) identified three different research strategies such as experiment, survey and case study research.

Weigand (2006) has argued that there are seven types of educational research. These are correlation, causal-comparative, experimental, survey, ethnographic, historical, and action research.

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Weigand (2006) criticises the case study method and believes that case study research is useful only as an exploratory tool.   Nevertheless, researchers continue to use the case study with success in crafted studies of real-life situation, issue and problems (Yin, 1994).   Some of these approaches are described below.

- *Experiment*

This type of strategy measures the influence of one variable on another variable. This experimental type of research is considered as the systematic observation and measurement of a number of variables within controlled methods to determine if change in one variable causes a change in another variable.

It is also used to test a hypothesis (Locke et al. 2004).   The researcher normally manipulates one variable that is called the independent, while observing or measuring a second dependent variable. The goal of this type of research strategy is to determine whether a causal relationship exists between these independent and dependent variables (Denzin and Lincoln, 2000).

Experiment features involve choosing a sample of individuals from specific populations and distributing this sample under experimental conditions by establishing a planned change of one variable or more on another and then measuring these variables through hypothesis testing. It is a complicated and long procedure that requires systematic and accumulative steps (Robson, 1996).

This research was not looking for controlling, changing, or manipulating any variables, or other components affecting the supply chain management in the port. It has therefore been discounted.

Meanwhile, there are two reasons why Robson's first research strategy may not be valid for this research; the first is the complexity of applying the proposed General E-Business Model for Alexandria Port and the second is that there is no possible way to control/change any variable in the Alexandria Port environment.

- *Survey*

Survey research is considered a quantitative research method that requires standardized information about the subject being studied. It has been used by many researchers in business research. Survey research has three distinct characteristics; the first and the main aim this type of research is to produce quantitative descriptions of certain concepts of the study population (Babbie, 1973). The second characteristic is that the main way of collecting data is by asking people some predefined questions. The third and the last characteristic, is that data is generally collected about a sample of the population to be able to generalize the findings to the population (Babbie, 1973).

Survey features involve relatively small amounts of data to be collected from a selected sample of individuals from specific populations through structured interviews or a questionnaire. Surveys are well suited when the interest is in how many people in a given population possess a particular opinion, or attribute to a certain situation (Zikmund, 2000).

The use of surveys as the research strategy suits the purpose of this study. This type of research best describes a current situation and one of the main aims of this research is to evaluate the current systems of the port and introduce a new model for future use. The surveys contain open-ended questions where the participants can write their own words that represent the qualitative questions. Meanwhile, the quantitative questions can take the form of rating scales (Roberts, 2004).

This has been applied to the survey questions used in this research. The survey strategy is about using interviews or a questionnaire for the sampling of subjects from a population. The interviewer has a complex role in the survey approach as he or she has multiple tasks such as to find the respondents and locate the specific addresses. The interviewer has to motivate the respondents to provide good answers to the questions included in the interview through clarifying any confusion and seeking quality information. Interviews require constant effort from the interviewer (Curwin and Slater, 2002). The complexity also appears when the researcher has to determine who will be observed, when the observation will occur, where the observation will take place and the time required for each observation. It also requires a lot of time and effort to capture the data accurately. On the other hand, the observation provides the opportunity to collect data and take notes of different behaviours as they occur (Beins, 2009).

- **Action Research**

When a critical paradigm is developed, action research is most appropriate (Kurt, 1984). All forms of action research share some common features although there are many variations. These features include the capacity of research to address practical problems in specific situations, the value of the participation and the relationship between theory and practice (Street, 2003). He further stated that one of the benefits of action research is:

> *"Although context is specific, but action research enables participants to develop and test conceptual models and theories that can be transferable to other contexts within similar issues".*

(Street, 2003)

- *Case Study*

A case study investigation allows the researcher to develop intensive and detailed knowledge about a single case and emphases detailed contextual analysis of a limited number of conditions and their relationships.

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Case study investigation allows the opportunity to examine contemporary real-life circumstances (Denzin, 1992). This research method enhances the understanding of a complex issue such as the system change issues currently presented in Alexandria Port. Some of the key features of a case study investigation consider the study of the selected case in its environment and the information gathered through a wide range of data collection techniques such as observation, interviews and analysis of documents.

The case study generally answers a research question that starts with how or why? This approach is also considered as an ideal approach when an in-depth investigation of a situation is needed especially in organizational and management studies and social science research (Yin, 1994). The case study gives an appropriate understanding of a given topic.

One characteristics of the case study design is that it requires a detailed description of the topic studied. That can be in the form of detailing the origin, structure, activities, management and the inter-relationship with the stakeholders (in the case study of Alexandria Port, the port community) as well as the problematic situation which will be discussed in detail in chapters 5 and 6 (Yin, 2003).

The case study in qualitative research is the situation, individual, group or organization that the research is focused on where a full analysis is required as the main step of the investigation (Robson, 2002). It is best used when studying community life, policies and work or when studying organizational behaviour in the workplace, best practice, policy implementation and evaluation. Robson, (2002) also stated that the case study is the most suitable tool when evaluating management and organizational issues, organizational cultures and processes of change if needed.

Case study research also enhances understanding of a complex issue or concept so that the researcher can extend experience or add strength to what is really known through other research and other similar situations (Patton, 1980). The case study's

strength involves using multiple sources and techniques in the data gathering process as tools to collect data. It can include surveys, interviews, documentation review, observation, and even the collection of physical artefacts (Yin, 1994).

The definitions of case study research are presented in various ways. However, a standard definition does not exist (Yin, 2003). A definition submitted from a number of sources (Hartley, 2003; Yin, 2002; and Sarker and Lee, 2002) is as follows:

> "A case study examines a phenomenon in its natural setting, employing multi methods of data collection to gather information from one or few entities (people, groups or organizations). The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used"
>
> (Yin, 2003)

A case study as a research strategy is appropriate for this research, particularly with its emphasis on study in context. Comparing the actual situation with an optimal solution will be of great importance to transfer the documentation flow to an electronic flow and accordingly reduce time. This choice of case study investigation has been supported by Yin (2003) as he noted that the case study research strategy is a feasible research strategy when the following matches the research environment:

1. The research question is explanatory;
2. The focus of the research is on current or advanced events; and
3. Behavioural events within the research environment are outside the researcher control and are taking place within the real world context.

Moreover, descriptive case studies describe the natural phenomena which occur within the data in question (McDonough, 1997). The detailed qualitative data often produced in a case study not only helps to explore or describe the data in the real-life, but also helps to explain the complexities of real life situations which may not be captured through experimental research (Zaidah, 2003).

According to Patton, (2002) within a case study investigation a small geographical area or a limited number of individuals can be selected as the subjects of study.   In addition, case study research allows the exploration and understanding of complex issues.

It can be considered a robust research method particularly when a holistic, in-depth investigation is required (Eisenhardt, 1989). The case study is also considered by Sarker and Lee (2002) to be viable for three reasons:

1. It is required to study the natural setting of a phenomenon.
2. Questions like "how" and "why" can be asked by the researcher to recognize the nature and difficulty of the processes taking place.
3. Research is being undertaken in an area where few studies have been carried out.

This research meets these conditions especially if there is a need to focus on a contemporary event or phenomenon in a natural setting. The investigation is mainly geared around a case study that is prompted by the need for initial observation followed by semi-structured interviews.

One of the advantages of using a case study approach is that the case study develops problem solving skills. This is reflected in developing the proposed e-business model for the case of Alexandria Port and the associated skills, information and communication and computer skills (see chapter 5 and 6).

Another advantage is that the case study allows the researcher to explore a solution for complex issues. This is also applied in the chosen case study of Alexandria Port by introducing a conceptual e-business model to overcome one of the main obstacles of the international trade in the port and hinder the supply chain operations in terms of slow, duplicate, and routine documentation flow (see chapter 6 and 7).

The case study approach also allows the application of new knowledge and skills. The chosen case study provides this by introducing a conceptual e-business model. Also by the expected outcomes of eliminating time and the related costs, it enhances the supply chain operations in the port through enhancing the documentation flow and transforming it into e-transactions. It also provides the new skills needed to run the technological e-system and to create specific training courses.

The case study also gives the opportunity of using a variety of research methods to produce a full true picture of an identified subject. It offers a chance to focus on topics relevant to the researchers' field and educational background. The introduction of innovation is the starting point to a successful case study (Davis, 2007).

The use of a single case study is appropriate when it represents an existing theory or rare or unique events. A single case study approach has the potential to deal with simple through to complex situations. A single case study design can also be used where there are no other cases available for replication. It allows the researcher to answer how and why questions. It enhances understanding of how a phenomenon is influenced by the context within which it is situated. For this particular research, a case study is an opportunity to gain great insight into a current situation and to investigate its development. It also enables the researcher to collect data from different sources and to gather the data to clarify the case (Yin, 2003).

A case study is a detailed analysis of a single individual or group. Case studies can be qualitative or quantitative in nature, but often combine elements of both. The major feature of a case study is its holistic approach; it aims to capture all of the details of a particular individual or group which are related to the purpose of the study, within a real life context.

Furthermore, case studies rely on multiple sources of data including interviews, direct observation, internal documents, and artefacts (Yin, 1993). The use of

multiple data gathering techniques is a key element of case study based research (Pedrosa et al. 2012).

Flyvbjerg (2006) states that case study research can develop a strong view of reality. He also declares that the case study is well-suited to produce context-dependent knowledge as human behaviour sometimes cannot be meaningfully understood.

The single case studies have been considered a different methodology than multiple case studies. While one set of rationales is required for doing single case studies, a second set is required for doing multiple case studies or what have been considered comparative studies (Robson, 2002).

A single case study is also appropriate when it is used to provide detailed descriptions of specific situation using interviews, observations, and document reviews as it describes things as they are. It works best to know how people do their work or implement their processes. It identifies what challenges people face and discusses what people's perceptions are (Cepeda and Martin, 2005).

However, in comparison with single case studies, multiple case studies have advantages and disadvantages (Yin, 2003). Evidence from multiple case studies is more compelling and is therefore the study is more robust (Aastrup and Halldorsson, 2008). Yin (1989) stated that the single case study is appropriate on the basis that the case is revelatory. This means that there is an assumptions or a belief that problems in a specific case are common to other cases.

However, case study research has some limitations. Hodkinson and Hodkinson (2001) criticised case study research on the ground that:

1) *There is much data for simple and easy analysis:* the case study researcher is swamped in data that makes it difficult to analyse it in a simple format.

2) *Expensive, if attempted on a large scale:* both data collection and data analysis in case study are time consuming. This means that large case studies can be expensive.

3) *The complexity examined is hard to be represented simply:* if the case study is to reveal a complex situation in the society (most of the cases) there is often a problem of presenting the case in a simple way.

4) *They do not provide numerical representation:* some aspects within the case study (s) can be presented numerically but many other aspects cannot be represented numerically.

5) *They are not generalisable in the conventional sense:* findings are not generalizable except to similar situations (Hodkinson and Hodkinson, 2001).

In that sense, Colley and Diment (2001) argued and discussed how researchers can generalise the case study research findings.   They stated that a case study can provide more than simple understanding of a situation.   The issue is whether the case study data collected can provide information about a situation to society beyond the actual case studied. However, as Colley and Diment (2001) claimed, below are some ways of how to generalise the case study findings:

1) *Theory can be moved beyond the original sites of study:* case studies generate new thinking which can be judged against and validated in other similar or different cases.

2) *Findings can 'ring true' in other settings:* based upon what the readers know about similar situations, they can judge whether the findings and data analysis are presented in a sound, convincing way. Experienced and professional readers can understand case study research as it provides a convincing presentation of findings based upon what they know of similar situations (Colley and Diment, 2001).

Accordingly, Alexandria Port has been chosen as the case study due to the significance of its geographical location in the Mediterranean Sea. Also for the reason that it is the largest port in Egypt and the only port that deals with all types of cargoes. The case study compares the actual situation with an optimal solution that would be of great importance to accelerate the documentation flow and reduce its time to a minimum level (see chapter 3).

The research focuses on the explanation and the importance of using an e-business model within a specific environment. It emphasizes that Alexandria Port has to adopt a general e-business model with customised elements that suits the environmental particularities and culture. This will help in achieving the port's primary goal to increase productivity through enhancing the efficiency of the documentation flow related to the import and export operations. Enhancing the efficiency of the documentation flow can help in reducing both time and costs and speed up the procedures by transferring it to data flow and e-transactions rather than documentation flow. Justifiably, when the researcher is interested in the relation between context and the phenomenon of interest, case studies are most appropriate (Visvanathan, 2001).

Alexandria Port was selected due to the manual documentation system used at the time this research started and later due to the selection of the e-business systems used.

4.3 The Research Design

Research design is the logical and systematic planning and directing of a research project. It gives an outline of the structure and process of the research. It is also the framework for conducting the research project and specifies the details of the procedures for obtaining the information needed to structure or solve the research problem (Yin 2003).

The research process starts by defining the research problem, reviewing the literature and developing the research plan. It involves collecting and analysing data. It is the steps carried out to develop a research (Trochim, 2006).

The literature review showed that there is a gap in considering some elements in applying e-business. These elements included the culture, the peculiarities in the local environment and the training courses needed to upgrade the personal skills to operate and manage the use of an e-business system and above all, the collaboration required between the parties involved. The literature also showed the important role the ports play in the supply chain and how the use of ICT with the port community is enhancing this role. Moreover, after conducting a few visits to Alexandria Port, the researcher has observed that there were several attempts to apply the e-business in the port without any success. Figure 4.2 shows the sequence of the various components of the research process design.
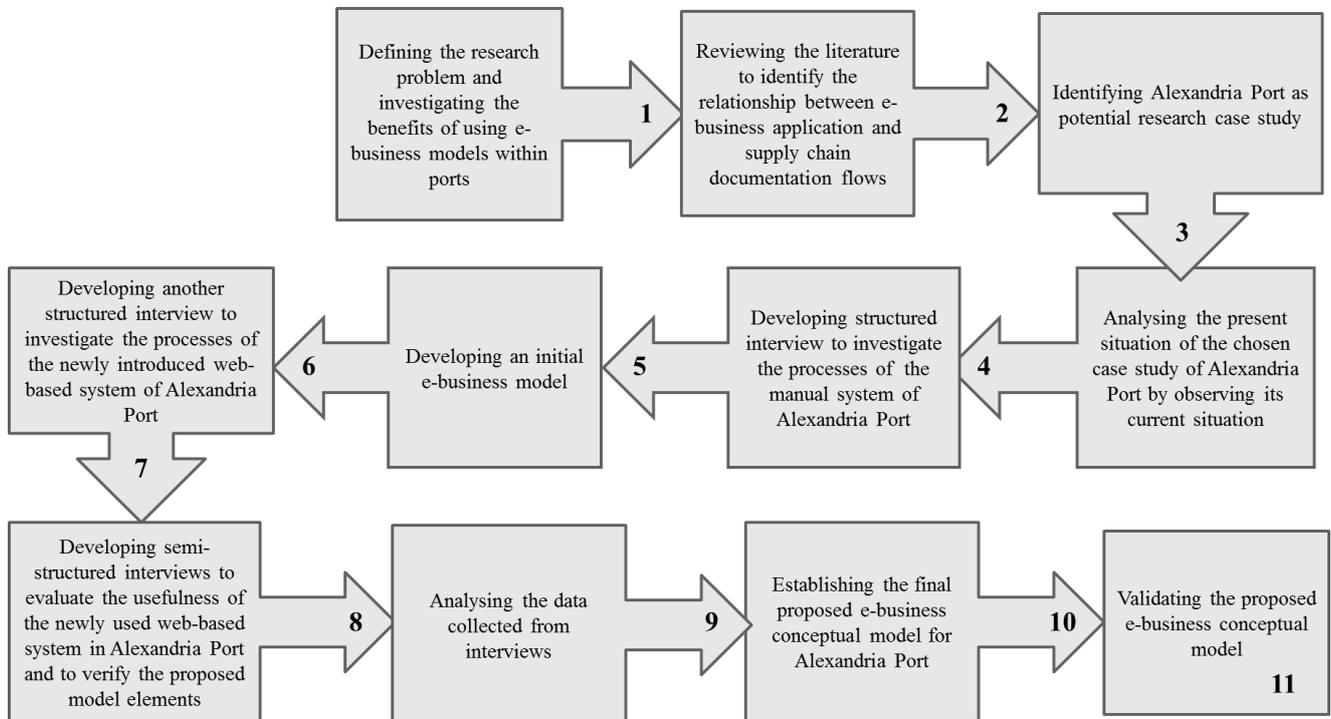
Figure 4.2 – The Research Design

Figure 4.2 above shows the actual research design processes used and which are elaborated below:

The research started by defining the research problem and investigating the benefits of using e-business models within ports. This was followed by reviewing the literature to identify the relationship between e-business applications and supply chain documentation flows. Then Alexandria Port was identified as a potential research case study and that required data to be collected to analyse the present situation by observing its current situation. This was followed by designing structured interviews to investigate the processes of the manual system of Alexandria Port. This resulted in developing an initial e-business model.

At this stage of the research, Alexandria Port introduced a new documentation system called The Web-Based System which necessitated developing another structured interview to investigate the process after the implementation of the new system in the port. Another semi-structured interview was designed to evaluate the usefulness of this newly used web-based system and to verify the proposed model elements. This was followed by analysing the data collected from the interviews. All these processes resulted in establishing the final proposed e-business conceptual model for Alexandria Port and then validating this proposed model.

4.4 Data Collection

The data required for this research were derived from two main sources; *primary data* which contains expert opinion of the key players, stakeholders, and the users involved in the global business, and *secondary data* that includes documented literature. Data are considered the raw materials for the research analysis and provide the basis for testing hypotheses. Data also help the researcher to draw conclusions on specific issues (Yang, 2006). For this research, data is collected from different sources that allow the research questions to be addressed.

4.4.1 The Research Data Collection Methods

The data collected for any research can be divided into two categories; quantitative and qualitative data. The quantitative data is normally collected in terms of numbers, while the qualitative data are not. Qualitative research methods are more diverse than quantitative methods (see above). The qualitative data are collected through observation, interview, questionnaire, and searching documents (Zikmund, 2000).

Some of these data collection methods which are used in this research will be elaborated below.

Step 1: Direct and Participant Observations

Observation is an essential instrument for the in-depth study of culture and/or organizations that require taking field notes (Allen, 2007). Direct observation has a high percentage of reality as it covers events in real time (Robson, 2002). It also covers the framework of an event. It reflects a situation while it is happening in real life at the time it happens. Although it is has much degree of reality, sometimes events are done differently to what is being observed, putting into consideration that observation is also time consuming (Marshall and Rossman, 2006). For the Alexandria Port case study, direct and participant observations were useful approaches for taking notes and writing up the documentation flow cycle step by step as it occurred in real life; this will be elaborated through the analysis of the applied systems of Alexandria Port in chapter 5. Direct observation is contextual and reliable and covers the events in real time. It was one of the basic tools of this research when the researcher paid many visits to Alexandria Port in order to observe the operations of both export and import focusing on the documentation flow as a barrier to supply chain efficiency.

The researcher started by planning to observe the current situation in Alexandria Port. This step required contacting some of the stakeholders to organise and follow up with them how and when the visits can take place and what permits were required

for these visits to make them official. This preparation plan took almost a month to be set up and required a continuous follow ups to get appropriate permissions.

The researcher visited Alexandria Port at least three times a week. Some weeks the visits were every day for more than 9 months and some days the visit was more than once (depending on the shift as discussed below). The outcome was to observe and record the current situation in an accurate way (to be discussed in detail in chapter 5). Sometimes the researcher participated in the process which gave a chance for the observed party to act naturally and freely and in turn increased the credibility of the notes. Some other times, if there was no participation or the port employee refused the observation, or refused the note taking, this part of the process has to be repeated with another shift that was more co-operative. However, direct observation is a time consuming source of data but reliable and a purposeful and selective way of data gathering (Achasoso, 2003).

During these visits, data has been collected from other different sources like archive records and published and unpublished documents.

The archive data are the routinely gathered records of the society, community, or organization. It is an important source to look at the history of an organisation (Berg, 2004). Knowledge of the history and context surrounding a specific setting comes, in part, from reviewing documents.

Archive data was an effective tool to highlight the port's failure to practice the Spanish PORTIC system which was the trigger that initiated this particular research study and which necessitated the need for another approach for the automation of documents. Archive records have been used in this research as it has the same strengths as documentation.

Although it presents more quantitative source of data (Berg, 2004) and the research is about contemporary events, archive records have been used and referred to as a

source of data collecting and as evidence to support the contribution of knowledge. The proposed e-business model has to be incorporated with customised elements to deal with the particular case of the Egyptian environmental particularities. Nevertheless, archive data has been used as a reference to the failure that happened when the Spanish tried to adopt Barcelona port e-business system (PORTIC). The PORTIC system is a successful system in Barcelona Port. This approach therefore tests the contribution of knowledge of this research.

This research has applied participant observation, during which gathering and analysing documents produced useful data. The review of documents is an unobtrusive method, rich in portraying the values and beliefs of participants for the applied case study (Bogdan and Biklen, 2003).

Documents have been collected for this research during personal visits to the port. These provide accurate details of an event and have wide coverage that contains many events and settings for a longer period of time (Berg, 2004). The weakness is that the possession of a document can be limited and subjective if it is incomplete. It could be intentionally blocked and cannot be reviewed (Hartley, 2004).

However, documents from different sources have been used in this research as a source of data. These were from Alexandria Port Authority with respect to the manual documentation system flow and some documents were from members of The Egyptian Chamber of Shipping which represents official parties. This ensures accuracy and validity.

These documents were about the new Web-Based System of the port. Others were collected from stakeholders and key persons in the field who reported the difficulties and long procedures they have to practice with the documentation flow using the two systems. Some of these documents are unpublished, others are not. Documents relating to current systems, together with the used forms, have been collected from the port. In addition, documents relating to the actual process of the newly adopted

web-based system and the expected outcome of applying this system were collected from the Egyptian Chamber of Shipping.

Other documents relating to the required changes to conform to the new system were collected from some stakeholders. Different information relating to the actual process of the manual documentation system and the web-based system was gathered through the visits to the port and the notes taken during the said visits.

Step No. 2 Structured Interview

Step No. 1 generate the plan for step No. 2 which is the structured interviews. The interview is a preferred type in qualitative research to extract the meaning of concepts and the flow of processes (Ziemer and St'alhane, 2004). According to Yin (1994) interviews are considered one of the most essential sources of case study research. This source of data focuses directly on the case study that is appropriate for this research and provides fundamental conclusions.

Interviews as another method of collecting data in this research focus directly on the case study and provide apparent fundamental conclusions and in-depth information. The questions can be explained during the face-to-face interviews. Two structured interviews have been used in this research and conducted in a face-to-face approach to collect primary data.

The interview data and analysis will be discussed in details in chapter 5. There were two structured interviews. One was to investigate the manual documentation flow system in the port and the second was to examine the changes among the procedures after the implementation of the new Web-Based system.

Interviews were selected as the appropriate data collection for this research and consist of interviews with:

1. Shipping lines in Egypt.
2. Shipping agents and the customs clearance agents in Egypt.
3. Freight forwarders in Egypt.
4. Key persons in Alexandria Port Authority.

- ***The first interview*** was designed to evaluate the manual documentation system and to investigate if it impairs the supply chain operations in Alexandria Port. It has been conducted by the researcher in a face – to – face approach and was in the form of a structured interview with one central question:

Question: "Please specify the documents handled right from the moment of the ship's arrival at, until the final clearance of cargo from, Alexandria Port".

This aimed to investigate the manual documentation flow system of Alexandria Port and evaluate its suitability.

A sample was chosen from the stakeholders, one company of each, from the shipping lines, shipping agents, freight forwarders, and shipping customs clearance since the focus was on a processes common for each category and not viewpoints. The interviews focused on investigating and studying the actual procedures of the current system that would not be changed from one company/agent to another.

The time plan for the first interview was to take approximately five months, but in reality it took almost 9 months as fixing appointments with the stakeholders by telephone was not as easy as expected. Planning interviews took longer than originally estimated; the overall time spent to complete this task was 8.5 months.

Step No. 3 Process Mapping

The first step (Observations) and the second step (Structured interview) created step No. 3 which was the use of process mapping to determine the flow and the steps needed to complete the whole cycle of the documentation flow in the port. The

information required was collected from the observations and the interviews and identified how the information or documents were exchanged between different departments in the port. It is an essential step to acquire information on every process that takes place to complete the whole documentation cycle of one operation using the manual documentation system in the port. It also helped to identify the potential problem areas (Egan, 1998). Process mapping is a kind of tool that shows the link and the relationship between one process and another. When the process is apparent, it is easier to be developed (Howard, 2003). Process mapping protocol was designed in 1998 by the University of Salford to provide a framework to help companies to improve process by clarifying the current design. This helped to identify the weakness among the process design and then improve this weakness. It also helped to provide the basic set of definitions and documentations to generate new developed and easier sets (Wu et al. 2002 and Fleming et al. 2000).

Step No. 4 Introduce an Initial E-Business Model

Step No. 4 was to introduce an initial e-business model for the chosen case study of Alexandria Port took place after analysing the manual documentation system and after evaluating the need for a system change in the port. It is considered as a problem − solving technique (Numilakso, 2008). Modelling is a mathematical, graphical, physical or verbal representation or simplified version of a phenomenon, concept, structure, relationship, system or an aspect of the real world (Herrmann et al. 2003).

The developed model incorporated general elements that can be transferred to other e-business models and other specific elements that required local customisation. The main elements included in the initial model are as follows:

- E-Security.
- Local strategies and policies.
- Local culture
- Logistics and ICT Skills.
- Local Regulations.

These elements will be discussed in full details in chapter 6.

At this stage of the research, Alexandria Port has introduced and implemented a semi-automated documentation system called the web-based system. It is considered a semi-automated system as it is concerned with automating only the customs procedures. This in its turn generates *step No. 5, another structured* interview to investigate the newly introduced documentation system.

Step No. 5 the Second Structured Interview

- ***The second interview*** was again in the form of a structured interview using the same central question with the aim to investigate the newly adopted Web-Based Semi-Automated System. It was designed to examine the changes within the documentation flow. It contained the following central question:

Question: "Please specify the documents handled right from the moment of the ship's arrival at, until the final clearance of cargo from, Alexandria Port using the Web-Based System."

The most appropriate parties that could answer this question and process such documents were the freight forwarders because they are the only stakeholders who can perform and provide all services throughout the entire supply chain that involve full logistics activities. Accordingly, they are the appropriate parties to identify and measure the changes which occurred after the implementation of the new Web-Based System. The target time set for this group of interviews was around three months, but in reality it took around seven months for the reasons mentioned earlier. Managers from fifteen freight forwarding companies were involved in this interview survey.

Step No. 6 the Semi-Structured Interview (The Third Interview)

A semi structured interview formed step No. 6 which is the third interview.

- ***The third interview*** was in the form of a semi-structured interview with respondents covering three main objectives: (1) Knowing the views of the respondents concerning the importance of having a fully automated E-system since the newly introduced web-based documentation system is considered a semi-automated system; (2) Assessing the usefulness of the Web-Based customs system recently used by Alexandria Port; and (3) Verifying each of the elements of the proposed e-business model system.

The interview technique, especially the semi-structured interview, is critical. A semi-structured interview gives flexibility to ask subsequent questions (Yin, 1994). The questions for a semi-structured interview are ideally constructed before the interview. This allows time to ask additional questions to clarify points and ask for more detail where necessary. Each interviewee is given a brief idea and verbal explanation about the research and asked if he/she would be interested in taking part in such a research.

The main objective of this type of interview is to evaluate the features of the proposed e-business model and to investigate if this proposed model requires any further modifications. The second objective was to evaluate the newly applied Web-Based System of Alexandria Port and to determine its weaknesses in order to highlight the need for a system change.   The third objective was to specify the legal problems and any other constraints in the implementation phase for the proposed e-business model from the interviewees' perspectives.

The final objective of the interview was to ascertain whether the parties involved were aware of the e-business importance and benefits of adopting this technology to increase port productivity and if they opt for a readymade e-business model or a customised e-business model for a particular environment. The target time set for this interview was around one year, in reality it took about one year and 2 months.

The semi structured interview conducted in this research contained 21 questions in four parts of the questionnaire. The results will be discussed in more detail later in chapter 5. The questions were structured to meet the following requirements:

1. What are the benefits of the new Web-Based System applied recently at Alexandria Port?

2. How much value is there in having a customised e-business model that particularly suits the Egyptian environment?

3. What elements should be included in any e-business model to suit the local environment? And what skills are required to run a successful e-business system?

4. What are the social aspects and legal constraints that should be taken into consideration when applying an e-business model at Alexandria Port?

5. How can e-business models be beneficial in Alexandria Port?

6. What are the other considerations that taken into account at both the preparation and implementation phase?

These broad questions formed the group of questions at the final interview which comprised of 23 questions. The first 20 questions are rating scale questions and the last 3 questions are the open-ended type of questions (see appendix A). The same questions were translated into Arabic and are presented in appendix B. The interviews were conducted in Arabic followed by a translation in English by the researcher for the purpose of this research. (Appendix A and B: Copy of the questions in both English and Arabic).

Step No. 7 Develop and Modify a Final Conceptual E-Business Model
The data collected through these interviews formed step No. 7 and enabled the researcher to modify the initial model and develop a final conceptual e-business model for Alexandria Port. The modified model will be elaborated in detail later in chapter 6.

- *The Interview Population*

The target survey population was professional people working in the field of maritime transport and logistics and involved in international trade. Accordingly, they are engaged in global businesses which have Alexandria Port as a link in their transportation chain.

This population was drawn from the Alexandria port community. The face-to-face interviews were conducted with two or more of the employees in each company/agent. Usually the import operations manager, his assistant and the clerk who is already involved in carrying out this task in the port together were in the same interview. However, one answer has been collected for this group of three. A similar situation occurred with export operations where the interview took place between the exports manager, his assistant and the operations clerk. This was a common practice within almost all parties interviewed. However, this was not the request of the researcher but it was considered valuable as the answers to the questions were enhanced by the knowledge of the group. The import and export managers has been chosen as each of them were responsible for distributing tasks with respect to the supply chain documents and the port to the rest of the team. They were fully aware of the situation; they were considered the most appropriate to discuss it.

This sample is divided into three main categories of a total of 30 different companies;
- The first category: Shipping Agencies and Customs clearance Agencies that consists of 15 different companies.
- The second category: Freight Forwarders that consists of 8 companies.
- The Third Category: Shipping Line that consists of 7 companies.

4.4.2 Formulating the Interview Questions

The wording and form of questions is extremely important in any research project as they influence the quality of the information obtained. Therefore, the questions

should be relevant to the study, appropriate, short, simple and easy to understand so as to encourage people to complete the survey (Warburton, 1996). The questions should be organized and put in systematic order; the related questions should be put in a separate group in order to get full concentration and attention of the interviewee and not to let the person think of a previous question while answering a later question. The difficult questions should be left until the end of the interview as sometimes the interviewee would stop at such point, and if this is the case, the interviewer would not lose the whole interview.

- **Types of Questions**

Questions may be divided into two categories (Yang, 2006):

> Closed–ended; or
> Open–ended.

In the closed–ended questions the possible answers are mentioned just after the question and the respondent marks off the category that best describes the answer. It is always better to provide different choices or scales to the responses.

In open–ended questions, the possible answers are not provided or given to the respondents. The interviewer writes the answers as the respondent says it or writes summary describing this answer (Zikmund, 2000). The semi structured interview conducted in this research comprises of three questions of this type contained in the last group of the questions. This will be also discussed in more detail in chapter 5. Table 4.2 shows the use and the advantages and disadvantages of these two main types of questions that are used in this research project:

Table 4.2 - Advantages and Disadvantages of Interview Questions Types

Question Type	Uses	Advantages	Disadvantages
Close–ended Multiple Choice (Scales)	- Many questions could be asked in a short period of time. - Measure Knowledge. - Assess concept when issues are clear.	- Easy and fast to complete. - Facilitate data summary and analysis.	- Limited response options. - May skip preferred answer. - Lacks detail.
Open–ended Short and Easy Answers	- Disclose related issues. - Attain a full range of response. - Explore in depth the respondents' point of view.	- Identify the most relevant issues. - Create new ideas about the concept investigated. - Provide details and depth.	- More time is required. - Communication skills are required. - Time consuming. - Complicate data summary and analysis.

Source: Yang, 2006

- **Limitations of the Questions**

A limitation of the semi-structured interview is when the researcher cannot ask all the questions required due to the time limit of the interview. Normally, a semi structured interview is time consuming. To overcome this problem, the interviewer should concentrate on the questions to be asked and the answers given.

- **Question Rating Scales**

There are three main types of scaling method (Yang, 2006). These three types are:

➢ *Summated Scales (Likert Scaling):* A number of statements are developed to reflect either positive or negative responses about a particular concept. Each question contains several categories. The most common type is the 4 point Likert Scale and is the most commonly used method of scaling in social sciences research. A typical scale is (1) Strongly disagree (2) Disagree (3) Agree (4) Strongly Agree. The reason is that Likert Scales are to a large

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extent easier to construct and are more reliable than others when the respondent has to declare whether to agree or disagree with the item in question as the neutral answer is not an option. This type of scaling is used in the semi-structured interview adopted in this research as the respondents had to clearly express whether they agree or disagree about the local customised e-business elements.

➢ *Differential Scales (Thurstone Scaling):* Developed by Thurstone, 1929, these are scales created in a number of steps. Each of the question responses are recorded and assigned values by experts, then ranked into groups or piles and then each respondent is given a value of 10 to measure their response. It is only meaningful for numerical values.

Practically, the differential scale method is not used much and the reason for this is that it is a really time consuming approach and swiftly becomes out-dated if there are any changes in the concept investigated that would affect the responses. A differential Scaling type was excluded from being used in this research as it more suits quantitative research (Roberts, 2004).

➢ *Cumulative Scales (Guttman Scaling):* Developed by Guttman, 1944, the difference about this type is that the items are related to each other. Accordingly, the data collected on a cumulative scale is simply a hierarchically placed value and it only has relative meaning when compared to other numerical scale scores as it has no meaning itself. This type of scaling has no relevance in this research.

Rating scales are used to determine the degree of the response or opinion about a specific issue. The advantages of using rating scales are: (Roberts, 2004)
➢ Provide more accurate measures than yes/no or true false items.
➢ Fast and easy to be completed.
➢ Facilitate data analysis.

The secondary data comprise textbooks, journals, research papers, articles, Alexandria Port periodicals and the port community reports. They were collected from the library and the Internet.

4.4.3 Interview Design

Interviews conducted in the research were face–to–face which is proven to work when:

> *Tackling a complicated subject*, which is the concept of introducing an e-business model requiring briefing and explanation before the interview takes place, and

> *Gathering specialists' opinions* from the stakeholders where the interviewer could ask follow up questions to investigate the benefits of the semi-automated system of the port and the benefits of the fully automated GEMA e-business model which is the core of this study (Yin 1994).

Table 4.3 below summarises the broad data collection time spent in carrying out each method used i.e. the observations, the structured interviews, the process mapping, the introduction of the initial e-business model, the second structured interviews, the semi-structured interviews and developing the e-business model.

Table 4.3 – Data Collection Time

Step No.	Step Title	Step Time
1	Direct and Participant Observations (Including archive data and documents)	9.5 Months
2	First Structured Interview	8.5 Months
3	Process Mapping	6 Months
4	Introduce the Initial E-Business Model	6 Months
5	Second Structured Interview	7 Months
6	Semi Structured Interview (Third Interview)	14 Months
7	Develop a Final E-Business Conceptual Model	6 Months

4.5 Conclusions

The research constituted a case study of Alexandria Port, the largest port in Egypt and the only port that deals with all types of cargoes. Primary data were collected using face-to-face structured and semi-structured interviews. Multiple data sources were used such as observation, documentation, surveys and literature reviews, archival records and interviews. A triangulation was used in collecting the primary data. The rationale of using multiple sources of data is the triangulation of evidence. A combination of these sources for data collection can provide greater depth of information for the purpose of achieving the research aims.   The concept of triangulation was introduced by Webb et al. (1966). Methodological triangulation refers to the use of more than one way of gathering data.

It is an important element in the validity of qualitative research and it is an appropriate strategy for ensuring the credibility of the qualitative analysis. It is also the linkage between the primary data generated or collected and data extracted from secondary data sources (Denzin, 1992). This research is using the triangulation of evidence that shown in Figure 4.3:
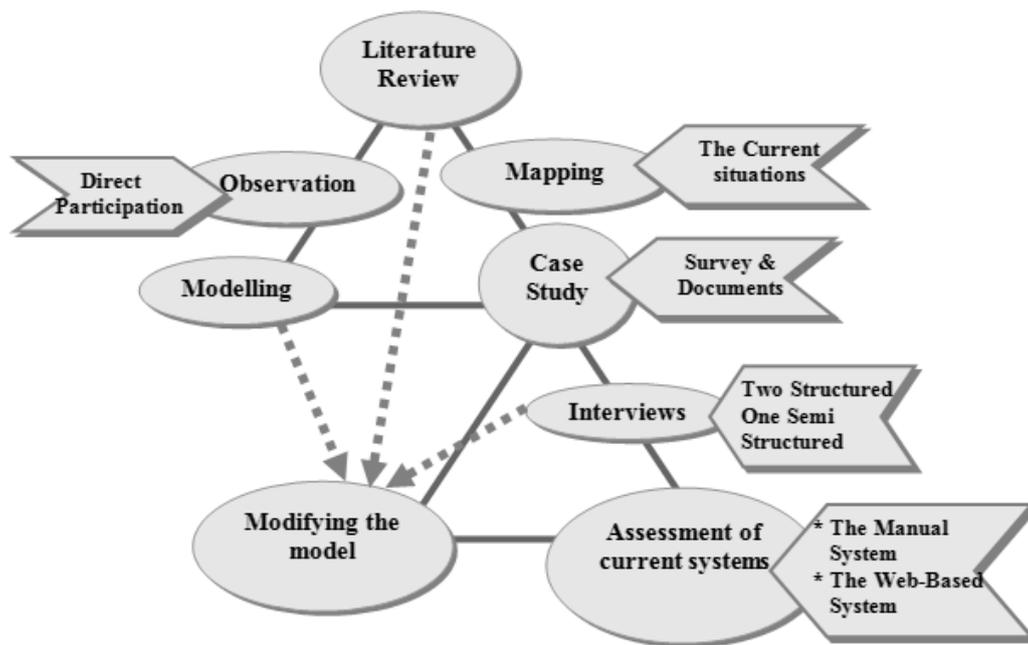
Figure 4.3 - Triangulation of Evidence

Triangulation is an integrated analysis of data using multiple sources. It also increases the reliability of both the data and the process of gathering it. With data collection, triangulation serves to support the data gathered from different sources. In brief, triangulation is a process of verification that increases validity by combining three or more different data collecting methods in the research, thus it enhances the validity of the research findings (Rubin and Rubin, 1995).

Updating the elements of proposed model was needed by considering an additional element that had been overlooked earlier. The sample interviewed comprised experienced persons involved in the supply chain operations and the related documentation flows, such as shipping lines, shipping and customs clearance agents and freight forwarders who deal with Alexandria Port as a link in their transportation chain. The first structured interview was designed to investigate the actual procedures of the manual documentation system. Only one company was chosen from each category of the stakeholders: shipping lines, shipping and customs

clearance agencies and freight forwarders since it investigated the common processes that would not be changed from one company/agent to another. The second structured interview was designed to assess the implementation of the newly applied Web-Based system in the port. Freight forwarders were the most suitable parties since they are involved in the entire supply chain operations and the related documentation flows and, accordingly, they were able to determine and evaluate the exact changes that took place after the application of the Web-Based system. The third semi-structured interviews were to investigate the importance of e-business in general and to evaluate the proposed model elements in particular. The population comprised the key persons involved in global businesses and has a great credibility in the Egyptian markets as well as worldwide.

The questions contained both types of questions: the closed-ended questions and the open-ended questions. The closed-ended questions were rated using the Likert Scaling system that is considered more reliable when the respondents have to clearly express whether they agree or disagree to the item in question.

The content of these interviews and data analysis will be discussed in chapter 5.

Chapter 5

Flows of Documentation within Alexandria Port: the Manual System and the Web-Based System

5 - Flows of Documentation within Alexandria Port: the Manual System and the Web-Based System

5.1   Introduction

This chapter focuses on exploring the two systems of documentation currently applied in Alexandria Port, the manual documentation system and the web-based semi-automated system.   In particular, it discusses some of the operations in the port, the documents required and the time duration.   Section 5.2 focuses on explaining the manual documentary system through initial observations, followed by section 5.3 that analyses the data collected during the second participant observations. Section 5.4 highlights the web-based customs services' system of the port through initial observation; this is followed by section 5.5 that discusses the analysis of the data collected through the second participant observations of the Web-Based system.   Section 5.6 explains the analysis of the data collected from the semi-structured interviews and is followed by the conclusion of this chapter in section 5.7.   The research methodology used in this chapter is of the initial, direct and participant observations and taking notes through several visits to Alexandria Port.   A mapping tool is also used to assist the understanding of this real situation.

5.2   The Manual Documentation System in Alexandria Port (Initial Observation)

Evaluating the importance of an e-business model requires an accurate analysis of the current manual documentary system of Alexandria Port.   Assessing the number of exchange documents and the volume of correspondence within the extended supply chain of the port is crucial to eliminate unnecessary paperwork as the first step to develop and adopt a dedicated e-business model.   Analysing the Egyptian regulations and laws related to all of the subjects involved within e-business

implementation is required. This will not be detailed further in this work. This section aims to provide a detailed explanation of the manual documentary system currently used in Alexandria Port followed by a discussion of what the newly adopted (2006) Web-Based semi-automated documentary system has achieved as a result of information collected through direct observation from visits to Alexandria Port over 9 month period of time. The researcher has visited Alexandria Port three times a week; some weeks the visits were every day, for 9 months. Through these visits, the researcher was able to notice and take notes of the actual processes and observe the way of doing business in the port as referred to in detail in chapter 4. The following section presents the data collected from an initial observation within Alexandria Port with one of the personnel supported by one employee from the port to observe the manual process without any direct participation by the researcher.

It merits mention that each and every observation that took place was accompanied by a member of Alexandria Port or a shipping agent representative. Some other observations were accompanied by a freight forwarder or a customs clearance representative. As mentioned in chapter 4 this enhanced the observation as it gives the researcher the opportunity to participate in the process. This in its turn encouraged the port employees to act freely as they did not feel observed.

For each process, a time duration has been identified. Some of the data represent an average where for some others it is the actual time required. This has been represented in all the final figures.

Special attention is given to the operations that affect the port supply chain processes and operations and that require a larger number of documents handled which adversely affect the port productivity and also negatively affect the operation of an efficient supply chain. An essential stage which enables transfer to the automated system is to analyse the current systems in Alexandria Port. The manual documentation system and the flows within are analysed in the following order:

A. Vessel Entry and Container Vessel Entry.

B. Loading Instructions.

C. Vessel Departure.

The following section explains the above mentioned processes using a mapping technique:

5.2.1 The Vessel Entry and the Container Vessel Entry

The processes, procedures, and the handling of documents relating to any vessel entry (except container vessels) according to the current manual system and the direct observation done by the researcher are shown in figure 5.1. This system is still in place in Alexandria Port as the Web-Based system only concerns customs procedures (see the next section). The documentation process diagrams (see figures from 5.2 to 5.17) have been constructed using Process Mapping Protocol (Fleming, et al. 2000). This is detailed in appendix D.
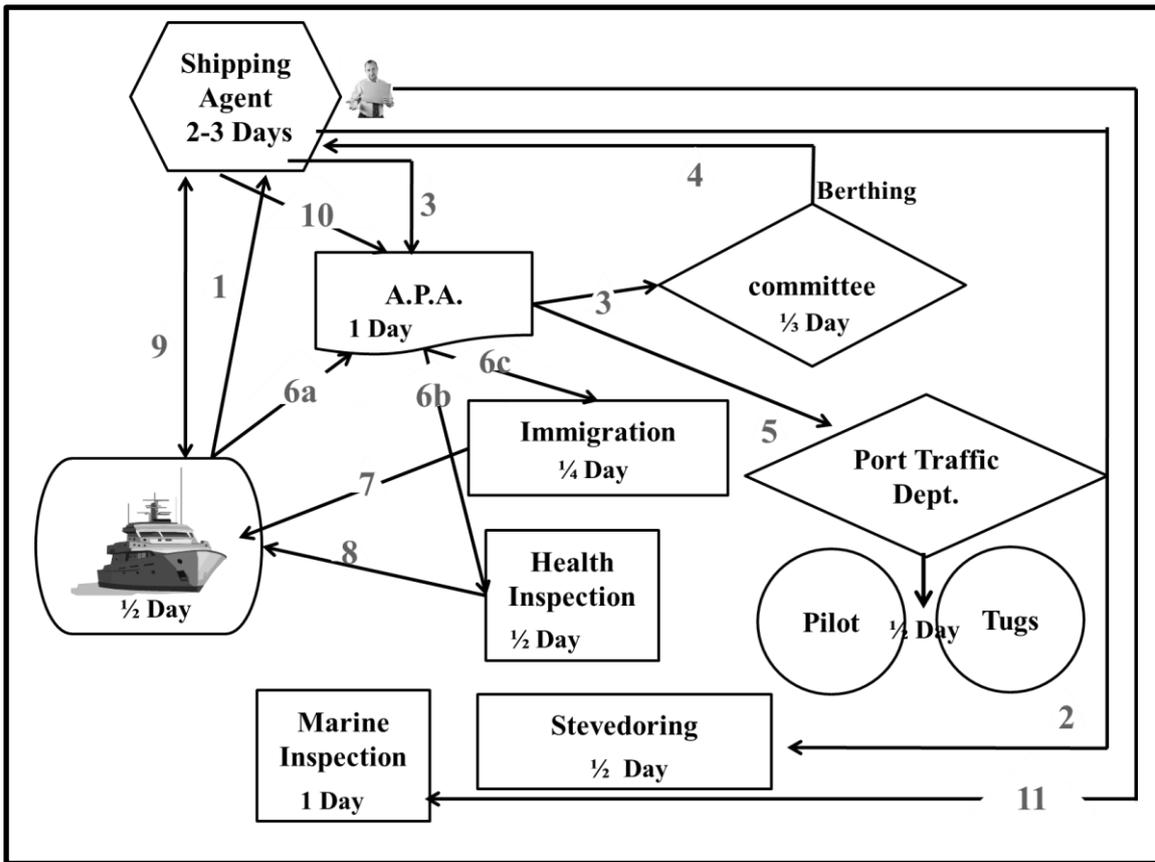
Figure 5.1 - The Vessel Entry Manual Documentation Flow

1. Notification of Arrival.

2. Notification of Vessel Arrival.

3. Berthing Application and request for Ship Movement.

4. Number of Berth.

5. Daily Work Plan (Internal)

6. Notification of Vessel Arrival.

7. Crew Declaration Form.

8. Health Declaration Form.

9. Declaration of Arrival.

10. Declaration of arrival (answer), Crew List and Ship Certificates.

11. Declaration of Arrival (answer).

The shipping line sends the vessel's schedule of arrivals for the next three months to its shipping agent. The master of the vessel directly sends by e-mail confirmation for his specific vessel a few days (3 to 4 days) before the arrival to the same shipping agent; this is called the notification of arrival. As soon as the shipping agent knows the exact time of arrival from the master, he hires or appoints a stevedoring company and sends it a copy of that notification of arrival to ensure that this company will be fully aware of the exact time of arrival and will be ready for the cargo discharging operation. The shipping agent then fills in the berthing application and Request for ship movement and deals with the port Financial Department to pay all the fees required such as the port dues, the Seamen's Club tax and L.E.1/TM[1] for the cargo. After finishing the payments procedures, the shipping agent submits the Berthing Application Form to the port Traffic Department. The shipping agent should do this step in parallel to the previous ones. Alexandria Port Authority has a committee that meets every day at 11 o'clock, during which, the berth number for each Berthing Application Form should be allocated and announced to the attendants of that committee who are representatives of the shipping agents, stevedoring companies, and customs. The shipping agent informs the ship master which berth he should approach and the stevedoring companies prepare their equipment at this specific berth to start their operations. The customs also needs to know where they should go to get their work done. However, the main objective of this port committee is to control the daily operations of the stevedoring companies and rate them according to the standards set by the port due to their work. Their achievement directly affects port productivity and accordingly the ship's delay. The committee also gives the permission for the vessel to depart. The Port Traffic Department's role starts after the committee specifies the berth number. It informs the pilots and the tugs that there is a vessel about to enter, move, or depart. The Port Traffic Department also submits an internal daily work plan report to the Pilotage Department. The senior pilot allocates the tugs and pilots for each and every vessel (sea and harbour pilots).

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[1] It is the Tonnage or Measurements of the cargo.

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While the vessel is waiting at the anchorage area, the master calls the Port Tower by radio and then the Port Tower fills in another notification of arrival mentioning the necessary general information about the vessel.   The Port Tower then announces to the Immigration Department and Health Inspection Department (Quarantine) by radio that the vessel is ready for crew inspection (see steps 6a, 6b and 6c).   The immigration inspector uses a boat to go to the vessel and then asks the master to show both the crew list and the seamen's passports. When everything is completed, the master fills in IMO Crew Declaration Form that should be stamped by the inspector. The health inspector goes aboard the vessel to carry out an inspection and stamp the Health Declaration Form. Once the vessel has permission to enter the port, the master fills and signs the Arrival Declaration.   After the Arrival Declaration is signed, the master submits it to the shipping agent, together with a copy of the crew list and a set of the vessel's certificates. The shipping agent in turn submits these documents to the Maritime Inspection Department (ports and lighthouses).   Again, a copy of the Arrival Declaration should be given to the Port Authority by the shipping agent.

The above mentioned procedures take an average of 4 to 5 days which is considered a delay for the operation to commence. It could be reduced to few hours instead of a few days if these transactions are done electronically. This delay results in increased the vessel congestion in the port and reduced the number of vessels that can dock, and accordingly reduces the port's productivity. In addition, the agent needs from 2 to 3 days to arrange, prepare, and collect the shipment documents before the process is commenced in the port.   This results in an average total of 6 to 8 days to finalize this process.

The Container Vessel Entry: Most of the above processes are the same for container vessel entry except for the following differences: (see figure 5.2)

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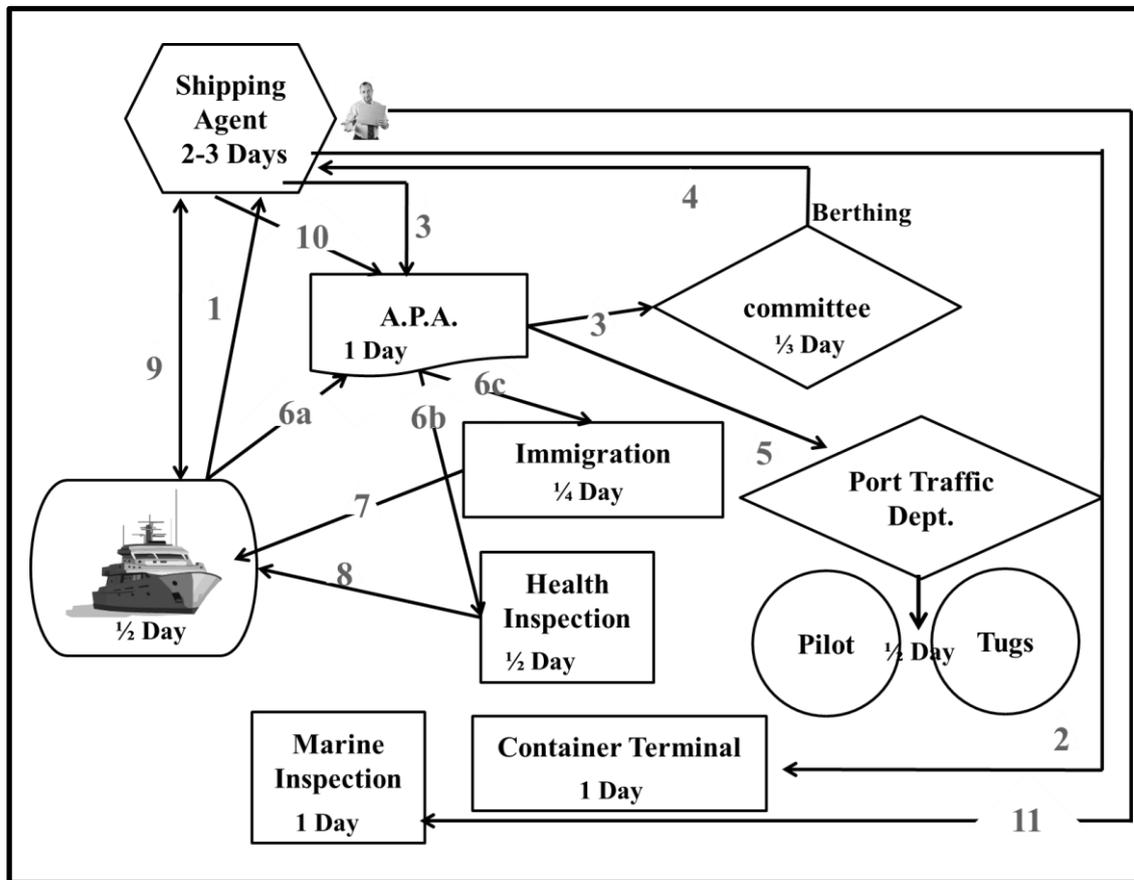
Figure 5.2 - The Container Vessel Entry Manual Documentation Flow

 As soon as the shipping agent knows the exact time of the vessel's arrival from the vessel master, he informs the container terminal of the notification of arrival and gives them a copy of the Bay Plan, the Cargo Manifest, and The Cargo Discharging List as well as the services requirements form.   When the container terminal accepts the vessel's entry, it should inform the port authority of the berth number assigned for the vessel.

The manual process is a repetitive process that requires many documents and stamps and which results in excessive time consumed. The above mentioned procedures take an average of 5 to 6 days this is also considered a delay for the operation to commence. In order for the port to be competitive, it must maintain an appropriate

system to help in eliminating the documentation time cycle. Increased productivity should enhance port revenues and also require a balance between the competing goals of revenue collection and facilitating the business for traders. To achieve this improvement, the development of an electronic documentation system between the port community to maintain these procedures and handling the documents in a better, easy and fast way is required.

5.2.2   Loading Instructions

This section analyses the loading instructions as one of the processes associated with export activities.   The average time required to finish the loading and instruction ranges between 5 and 6 days. This again reflects a delay in the process that requires redesign. Figure 5.3 shows the flows involved:
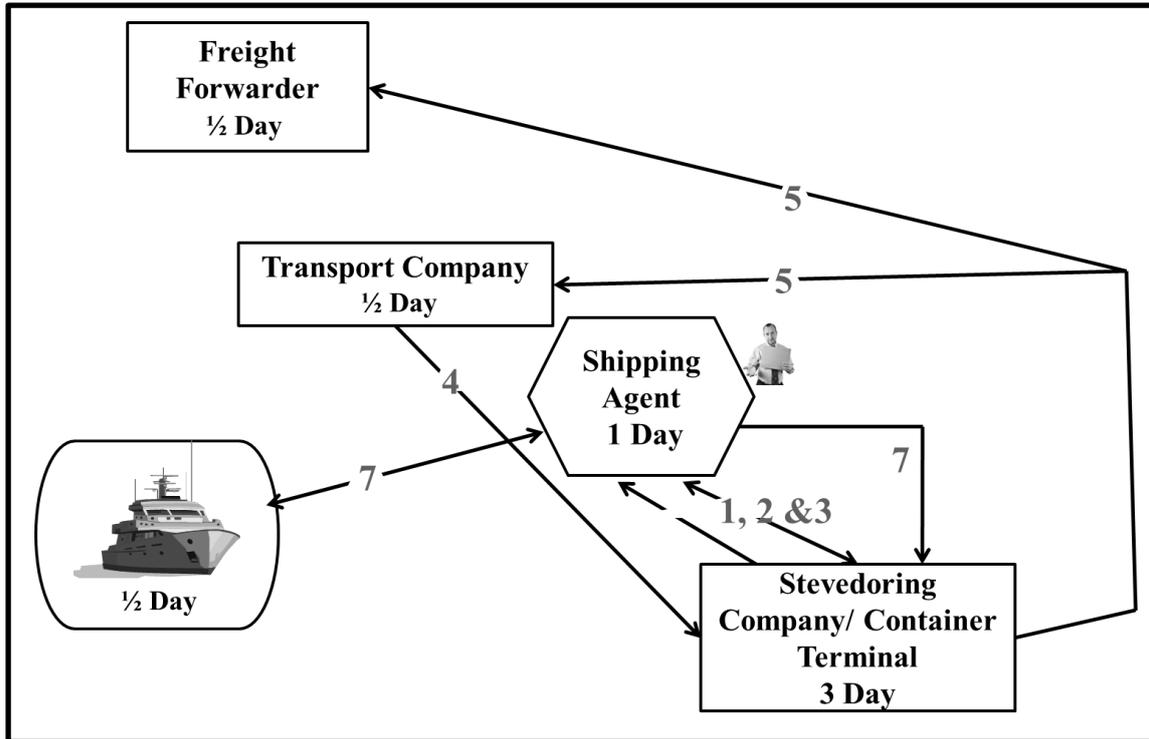
Figure 5.3 - Loading Instructions Manual Documentation Flow

The documents required for this process are as follow:

1. Appointment Letter, Cargo Plan or Bay Plan (Copy), Cargo Manifest (Copy), Dangerous Cargo List (If Applies).

2. Appointment Letter (Stamped).

3. Loading List.

4. Shipping Order.

5. Shipping Order (Stamped).

6. Operational Report and Statement of Facts.

7. Statement of Facts and the stamped Copy by the Master.

Appointment Letter, Cargo Plan or Bay Plan (Copy), Cargo Manifest (Copy), Dangerous Cargo List (If applies): The stevedoring company or the container terminal, as the case may be, must receive the following documents from the shipping agent:

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- A copy of the cargo manifest.
- A copy of the cargo plan or the bay plan, if the cargo is containerized.
- A request letter for terminal service (Appointment letter).
- The dangerous cargo list, if any.

The stevedoring company or the container terminal gives back the answer for the request and stamps the appointment letter. This is followed by submitting the loading list from the shipping agent to the stevedoring company or the container terminal. The shipping order will be submitted by the transport company to the stevedoring company or the container terminal. After the transport company receives back the stamped shipping order from the stevedoring company or the container terminal, they send it to the freight forwarder. The statements of facts[2] and the operational report will be sent to the shipping agent by the stevedoring company or by the container terminal operator after the cargo is loaded.

These statements of facts will be received back by the shipping agent after the master of the vessel signs it. There are three copies: one copy goes to the master; the second copy goes to the shipping agent, and the third one is for the stevedoring company.

Loading requires many documents and stamps. Many copies of each document need to be exchanged with more than one place and more than one entity in the port. The documents are exchanged between the stevedoring company, the container terminal, the shipping agent, the transport company and the master of the ship. The port authority, the customs, the export and import inspection department are also involved.

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[2] An official document declare all the facts and actual operations done on or for a ship

Using a one-stop shop or a port community system should assist in reducing the number of documents and reduce the time consumed. This is good practice and evidenced in other ports around the world as discussed in chapter 2.

5.2.3   Vessel Departure

After the completion of all the operations needed, the vessel's master starts the departure procedures which are shown in figure 5.4:
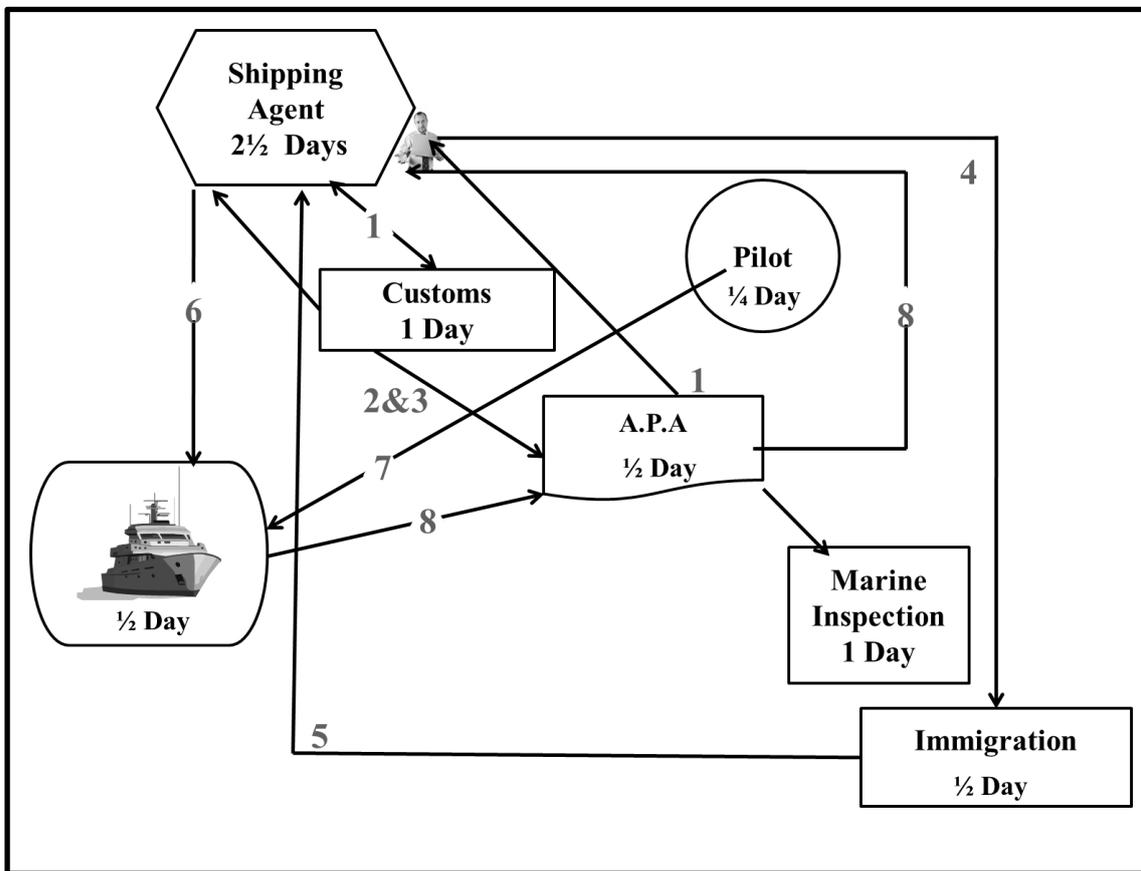
Figure 5.4 - Vessel Departure Manual Documentation Flow

The documents required for this process are listed below, followed by an explanation to each step as observed during the initial observation of port activities.

1. Departure Application and the collection of the stamped copy by Customs and Maritime Inspection.

2. Departure Application (stamped) and Letter for Departure Request.
3. Port Departure Permission.
4. Inspection Request Letter.
5. Immigration Departure Permission.
6. Immigration Departure Permission and Port Departure Permission.
7. Pilotage and Towage Receipt.
8. Pilotage and Towage Receipt (answer) with the Invoice.

The master of the vessel determines the proper time of departure after completion of the loading and/or discharging operation. The shipping agent starts the processes for departure.   He must first pay all the customs dues then stamp the Departure Application.   Then he goes to the Ports and Lighthouses Authority to get the maritime inspection stamp.   The vessel must depart within 24 hours from the permission issuing date as this permission is only valid for this period of time.   This is another delay as the agent should come back to get this permission as his last step. After the shipping agent gets the Departure Application stamped by the Customs and the Maritime Inspection, he submits it to the Port Authority together with a formal request letter for departure.   When the shipping agent receives the permission to depart, and if vessel does not depart within 24 hours, such permission will expire, and the shipping agent must apply for a new one.   Before the vessel leaves, the shipping agent also applies for Immigration Inspection.   When the Immigration Inspection is accomplished, the shipping agent obtains a departure permit from them. The master of the vessel gets a copy of both the Port Departure permit and the Immigration Departure from the shipping agent.   When the pilot gets these two departure permits, he gives the master the pilotage and stowage receipts to be stamped. After getting these two stamped receipts, the pilot submits a copy of each to the Port Financial Department and the original will be submitted to the shipping agent together with the invoice to finalize any other requirements.

The average time required to release the vessel from the port (vessel departure) ranges between 4 to 5 days.

The above analysis has showed clearly that the manual documentation system requires long procedures and many steps for each operation i.e. 11 steps for the vessel entry, 7 steps for loading instruction and 8 steps for vessel departure. These steps reflect the import procedures that represent a total of *25 days*. Documents are also repeatedly shown such as having the departure application signed and stamped by the customs; the agent should also have a request letter of departure to be submitted with the application to the A.P.A., which consumes time.

This clearly reduces Alexandria Port's global competitiveness. Accordingly, a system change was required to improve the quality of services provided by the port through minimizing the flow of documents and reducing documentation time in port. It can also be estimated that reducing the time required for these activities will ultimately have an effect on reducing the overall costs. Introducing the Web-Based System was to fulfil the need for upgrading and re-engineering the current manual documentation system to provide the port community with a better quality service.

It merits mentioning that within the manual documentation system of Alexandria Port, the export procedures require the following duration in days to finalise the whole cycle and are as follows:

Preparation of documents	13 days
Customs clearance and technical control document	1 day
Handling in port and terminal document	3 days
Handling related to Inland transportation document	3 days

The total documentation cycle time for the exported cargo is 20 days. This affects the smooth movement of vessels in the port and in turn affects port productivity and revenue. It also increases the congestion of vessels in the port. The total documentation cycle time for the imported cargo is 25 days. It causes delays and congestion and negatively affects the port productivity and revenue. Less

productivity for the port means less vessels calling at the port and that in turn reduces port revenues.

Exported time duration (above) and imported time duration (below) as observed and supported and also mentioned by The World Bank – Doing Business Report, 2007 by the time this analysis took place is as follow:

Preparation of documents	19 days
Customs clearance and technical control document	3 day
Handling in port and terminal document	1 days
Handling related to Inland transportation document	2 days

This is validating the data collected through the observations done by the researcher. (See The World Bank – Doing Business Report, 2012 in chapter 2 for more recent analysis).

5.3 The Data Collected during the Second Observation

Multiple methods of collecting data have been used in this research as explained in the following section.

5.3.1 The Second Observation

The analysis of the documentation cycles and flows in Alexandria Port through direct observation showed that the manual documentation system was negatively affecting Alexandria Port's supply chain operations and the related documentation flows and as a result, required a system change. The implementation of an e-business model which eliminates document flow time to a minimum level is what the port should seek. This is consistent with the findings of chapters 2 and 3. Figure 5.5 shows the documentation flow for imported cargo using the manual system.   During the observation 10 processes have been identified. These processes have to be done in a particular sequence. Some of them are linked to each other, such as steps 7 and 8. It has also been observed that steps 1, 2, and 3 are considered as documentation

preparation within the process. This process takes approximately 6 days to be prepared.

1 Cargo Manifest, and correction, Bill of Lading (B/L) and Cargo Plan sent from the port of Origin to the **shipping agent** (Copies) – 3 Day

2 Notification of Cargo Arrival from the **shipping agent** to the cargo consignee – 1 Day

3 Cargo Manifest and correction, B/L, Cargo in Transit, and Cargo Declaration from the **shipping agent** to the port authority after being stamped by the port traffic department (Copies) – 2 Days

4 The **shipping agent** gets the cargo certificate (Form 61KM) and gets it stamped by APA – 2 Days

5 The **shipping agent** gets the approval of the vessel master on the Cargo Manifest (Original) – 1 Day

6 The **shipping agent** approves the Cargo

Civilian Defence Department 1 Day
Military Defence Department 1 Day
Cargo Monitoring Observation Department 2 Days
Arab Industrial Authority 2 Days

7 The **shipping agent** submits the originals of all documents and seven copies to the Customs – 2Day

The Customs Department gives back form 61KM to the shipping agent after the data included in the cargo manifest (this required 10 workstations and 20 employees!)
3 Days

8

The **shipping agent** submits the Corrections' letter & the Cargo Manifest to the Customs Department to check the reliability of these corrections at this stage

9 The Customs Department submits the Cargo Manifest and the letter of Manifest correction with the seven copies of all documents to the warehouse Department – 2 Days

10 The shipping agent submits; negative Declaration of dangerous cargo, negative declaration of IMO1, and negative declaration of IMO7 to the Civilian Defence Department and the cargo ready for loading

Figure 5.5 - The Manual Documentation Flow System for Imported Cargo

The starting point of the import process is when the port of origin sends the following documents to the shipping agent:

- A copy of the cargo manifest[3]. (The cargo which should be discharged in Alexandria Port is specified in that manifest).

- The manifest correction, if any.

- A copy of the Bill of Lading.

- The cargo plan or, in case of containerization, a bay plan.

The shipping agent receives these documents and sends notification of arrival to the cargo consignee. The shipping agent submits a formal letter stamped from the Port Traffic Department and a copy of the cargo manifest to the Port Authority and gets Form 61KM4 (Form 61KM is a cargo certificate). The shipping agent submits a certificate of non-bulk cargo in transit and a cargo declaration to the Traffic Department and gets the stamp on the Form 61KM. The cargo declaration specifies the cargo discharged in Alexandria Port. This declaration is also necessary to prepare and determine the dues for the shipping agent. The shipping agent gets the stamped copy of Form 61KM from the Port Authority, while the Port Authority keeps a copy of the cargo manifest in order to prepare the cargo requirements. The shipping agent obtains the cargo manifest stamped by the master of the vessel. The shipping agent seeks other stamps on the cargo manifest from the following departments to the Original Cargo Manifest (Stamped by all) and Form 61KM (Stamped by APA):

- Civilian Defence Department.
- Military Defence Department.

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[3] The document contains the data of the cargo loaded by sea or air or road when entering a country. Law No. 66 for the year 1963, article 31 of the Commercial Maritime Law of Egypt mentioned that this document has to be made for all cargo incoming and signed by the master. The data concluded such as; vessel name, nationality of the vessel, type of cargo, No. of shipment, serial No. of shipment, description of cargo, name of the carrier, type of transportation, consignee name, consignee address, and port or place of loading.
[4] Encoding Import Cargo Data Certificate

- Cargo Monitoring Observation Department.
- The Arab Industrialization Authority.

After the shipping agent gets all these stamps on the cargo manifest, he submits the original cargo manifest and seven copies of it to the Customs together with Form 61KM stamped by Alexandria Port Authority. He also submits a letter with the manifest corrections request (if any). When the Customs Department stamps Form 61KM they give it back to the shipping agent as a receipt for submitting the cargo manifest. If any modifications to the cargo manifest are made, which normally happens, the shipping agent applies for a request for this modification with an official letter to the Customs. The Customs are required to enter 80% of the data and information mentioned in the cargo manifest for their own application and their own use after checking the reliability of these data. Such data are entered on a daily basis and this requires ten workstations and twenty people to carry it out. The Customs in their turn submit the seven copies of the cargo manifest and the manifest corrections, if any, to the Warehouse Department. The shipping agent presents the following Declarations to the Civilian Defence Department and delivers copies of all documents to the Port Authority to make the cargo ready for loading on board ship:

- Negative Declaration of dangerous cargo.
- Negative Declaration of IMO 1[5].
- Negative Declaration of IMO 7[6].

The manual documentation flow system for imported cargo as observed requires 10 steps that reflect routine and bureaucracy. Some steps are repeated, others required lots of approval and stamps that is time consuming as noticed and observed. The

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[5] Explosive Cargo Declaration (IMO1 is a standardized Form provided by the International Maritime Organization)

[6] Radioactive Cargo Declaration(IMO7 is a standardized Form provided by the International Maritime Organization)

time duration for these steps is 25 days as detailed earlier. During the observation, the agent's representative was always complaining about the routine and the copies he has to make and submit. He believed that he cannot take one step without a stamped, signed, and copied document. Figure 5.6 has been designed to summarise the documents required for each step regarding the imported cargo from the agent's perspective. However, more detailed figures are discussed later in this chapter.
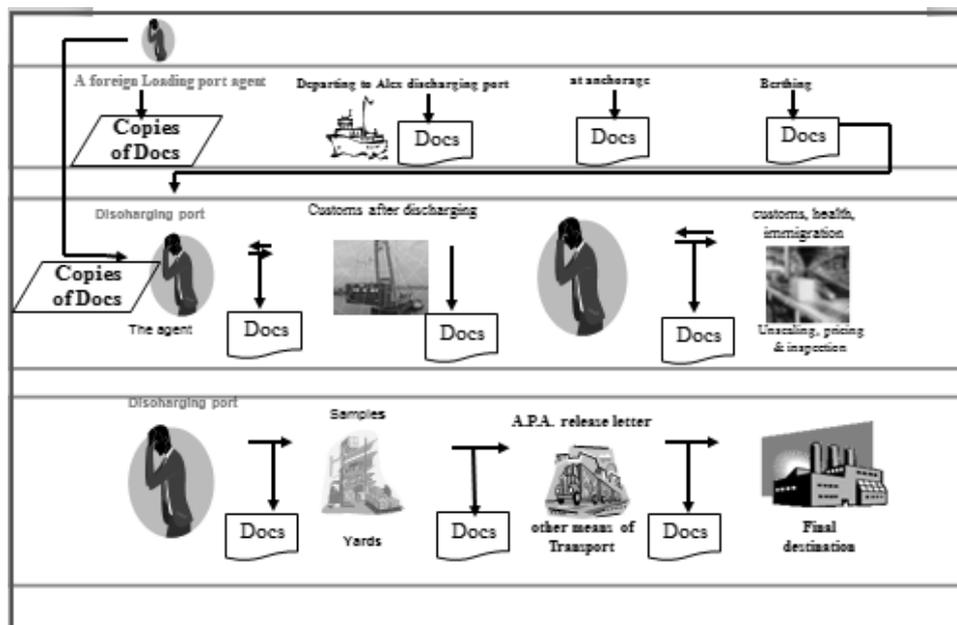
Figure 5.6 – A Summary of the Manual Documentation Flow from the Agent's Perspective

The above figures and direct observations indicate that many documents are required and needed to be submitted at every stage, e.g., formalities and long procedures take place between the parties involved and the port authority. Many documents are exchanged inside the port itself in order to achieve each individual step related to the supply chain operations, which causes wasted time and detracts from the global competitiveness of Alexandria port. As the volume of international business is growing, the efficiency of port operations increasingly depends upon a better port management information system. One way to achieve a reduction of process time is the use of e-business. Therefore, the manual documentation flow system requires

change, which supports the implementation of an electronic system as a solution to reduce the procedures and documentation flow time.

As mentioned earlier the documentation cycle for the imported cargo is a time consuming process that takes an average of 25 days as detailed above.

The manual documentation flow system for export cargo from direct observation involves the following steps and is summarized in Figure 5.7. It has been observed that these steps need to be done in a specific order and as a consequence, figure 5.7 has been designed.

1. **The exporter** gets an export licence and hires a Customs Clearance – 4 Days

2. The **Customs Clearance** Rep. submits these docs.
3 Days
1. Shipping Order
2. Commercial Invoice
3. Packing List
4. Customs Declaration

3. **Customs Dept.** specifies the type of inspections required and indicates the inspection entity on the Customs declaration (first answer) – 2 Days

4. The **Customs Clearance** Rep. submits these docs. **Note**: The inspection team finish the inspection & sign the customs declaration (2nd answer)
3 Days
1. Export licence
2. Authorization letter
3. Customs Declaration (1st answer)
4. Collective Inspection Application for Export

5. The **Customs Clearance** Rep. submits these docs.
2 Days
1. Customs Declaration (2nd answer)
2. Export Permission
3. Inspection Result Report

6. The **Exporter** receives one original & three copies of the Customs declaration – 1 Day

7. The **Exporter** provides all these documents to the Customs clearance rep – 1 Day

8. The **Customs clearance** goes to the importer shipping agent and submits a copy of the shipping order and obtains the original B/L – 1 Day

9. The **Customs Clearance** Rep. submits a copy of
2 Days
1. Customs Declaration (2nd answer)
2. B/L
3. Commercial Invoice

10. The **Exporter** gets 2 copies of the certificate of origin & the original goes wherever the cargo goes – 1 Day

Figure 5.7 – The Manual Documentation Flow System for Export Cargo

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The Customs clearance receives a copy of the export license issued by the Chamber of Commerce to the exporter. They also get the exporter's signature on an official letter to authorize him to act on his behalf. The Customs clearance representative submits a copy of the shipping order to the Customs Department. He also submits the commercial invoice (Copy), the packing list, and the Customs declaration (First answer) containing all cargo data. The Customs Department specifies the type of inspections required for the cargo clearance and indicates the inspection entity (First answer). At this stage, the customs clearance representative submits documents such as Export Licence (Copy), Authorization Letter (Copy), Copy of Customs Declaration (First answer), and Collective Inspection Application for Export. The Customs representative submits the Customs declaration (first answer) and the collective inspection application for exports to the General Authority for Imports and Exports Control and asks for an inspection to take place. The inspection team take a sample of cargo from the export storage area for inspection. The inspection team sign a Customs declaration after they finish the necessary inspections (Second answer). The Customs clearance representative submits the following documents to the Customs Department:

- A copy of the Customs Declaration (second answer), and/or
- The export permission.
- The inspection report results.

The customer receives one original and three copies of the Customs Declaration after the Customs inspection.

In turn, the customer provides all these documents to the Customs clearance. The Customs clearance representative goes to the shipping agent to obtain the original Bill of Lading when he submits a copy of the shipping order. The Customs clearance representative submits a copy of the Bill of Lading and a copy of the commercial invoice to the import and export control and gets the certificate of origin. These should go together with a copy of the customs declaration (second answer). The

original certificate of origin goes wherever the cargo goes and two copies go to the exporter after loading has commenced.

The manual documentation flow system for export cargo requires 10 steps within a duration time of the documentation cycle of 20 days as shown in figure 5.7.   This hinders the export operations and negatively affects the entire Egyptian exportation process due to the complexity of the procedures and the time allocated to finalise the processes.   The weakness of the manual documentation flow system requires a change to be made to speed up the port operations processes.   This manual system and the time consuming documentation flow together with the routine are considered crucial barriers to global trade in the port as discussed earlier in Chapter 2.   An electronic documentary system could maintain these operations and significantly reduce the documentation cycle.   As discussed in chapter 2, the electronic documentation systems reduce the documents exchange cycle time from days to a few hours e.g. Sokhna Port in Egypt (EMDB, 2008), Rashid Port in Dubai (Dubai Trade Portal, 2010), U.A.E. and Rotterdam Port in Europe (De Langen and Pallis, 2007)

5.3.2   Structured Interview with the Stakeholders

Structured interviews have been conducted to validate what has been observed.   This section presents the responses to the central question raised in the structured interviews which is to specify the differences of the manual documentation flow system directly from the users' perspective.   The respondents consisted of a sample chosen from the stakeholders, a shipping line, a shipping agent, and a freight forwarder, one to represent each category.   The central question is:

Question: Please specify the documents you handle right from the moment of the ship's arrival in port until the final clearance of cargo?

The shipping line interview: The shipping line was represented by the Maersk – Sealand Company which is considered one of the biggest shipping lines worldwide. They own 500 container vessels and more than 1,900,000 containers (Moller, A.P. – Maersk Group) and have five branches in Egypt, one of which is in Alexandria.

Maersk Sea Land was at the top of the major shipping lines with respect to handling containers in Egyptian ports in 2005 when it handled about 666.2 thousand TEUs, i.e., 18.2% of the total TEUs handled in Egyptian ports (MRCC report, 2006). Figure 5.8 presents a summary of their response to the requisite processes and documentation flow.   This illustrates the actual procedures that any port client is required to follow in order to complete the release of their cargo.
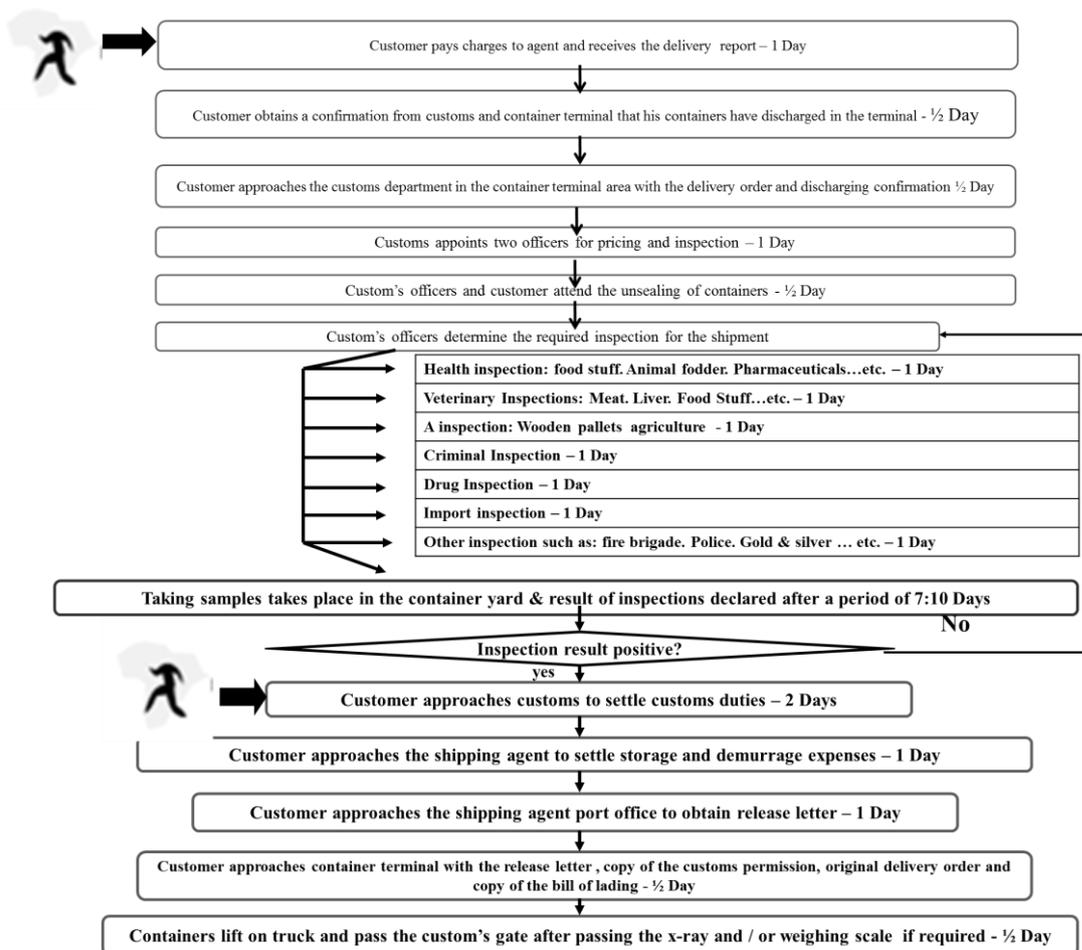
Figure 5.8 – The Manual Documentation Flow from the Customer's Standpoint

Figure 5.8 and the data analysis show the exact steps that the customer should carry out to finalize the processes for any imported cargo using the manual documentation system. These steps are from the customer's point of view; 13 different steps start after the shipping agent finishes his work. As an outcome of the shipping line interview and the customers' standpoint, figure 5.8 has been compiled. The customer is required to carry out these steps by himself or hire a Customs clearance agent to represent him. The starting point is when the customer pays the charges required to the shipping agent and receives the delivery report that declares the arrival of his cargo. The customer has to go through all the inspections processes and settle all Customs dues until he gets the release letter to receive the cargo. These processes and all documents exchanged between different departments and authorities take days to be completed. Typically the time duration to finalize an imported cargo from the customer point of view takes twenty three and half days. It has been mentioned by the UNCITRAL, 2008 that this process takes an average of 14 to 21 days. But in reality and from the customer's point of view it takes more days as mentioned earlier. This was concluded through the data collected within the structured interview. This delay is considered a waste of time for both the customer and the port. With respect to the increasing importance of globalization and the increasing need for faster and more flexible communications, a system change is required. The challenge the port faces is how to achieve quality, accurate and faster services. When it comes to reducing procedures and eliminating documentation flow, automating processes and integrating the entire supply chain services through the implementation of an e-system is what the port should seek.

The shipping agent interview: The shipping agent is represented by Abu Simbel & Tiba Shipping Agencies in the Shipping Agents Sector. It is owned by the public sector (The Egyptian Government) and is considered the biggest shipping agent in the Alexandria community. This agent has an office inside the port which makes them more involved than others. The responses that show the actual documentation flow in the port starts after the contract of sale has been signed between the importer

and the exporter, and after the exporter appoints a shipping line to transport goods from the port of export to the port of import, which is - in this case - Alexandria Port, then the importer or his agent will carry out the procedures from there.

The following describes the procedures that have to be followed by any shipping agent:

The shipping line will contact a shipping agent in Alexandria, and then the shipping line should send all documents related to the shipment to that agent. **Notes: 1)** it is possible that the shipping line contacts the agent before loading to discuss any unusual matter, if any. **2)** The ship's documents: all ship declarations and certificates. **3)** The cargo documents: The shipping line issues the bill of lading; the original should be given to the importer, and a copy of it to the agent in Alexandria. The shipping line also gives the cargo manifest to the agent together with any other documents that contain the cargo description. The agent submits the ship's documents to the following bodies:

- The Maritime Inspection Department (Ports and Lighthouses)
- Port Traffic Control Department.
- Health Inspection Department.
- Alexandria Port Authority.

The entire cargo document is submitted to: (A copy of each)

- Customs Authority.
- Health Department.
- Security Department. (Criminal Inspection Dept.).
- Alexandria Port Authority.

Alexandria Port Authority, Traffic Control Department, then allocated a berth according to the data and the document they received from the agent. After finishing the payment for the cargo (according to the contract of sales' terms between the importer and the exporter), the importer receives the original bill of lading; he in turn

delivers it to his agent in Alexandria. When the agent receives the bill of lading from the importer, he gives him a delivery order in return. After submitting all of the above-mentioned documents to the Customs Department, and after allocating the berth and the ship berths, the importer or his agent (depending on the contract between them) appoints or hires a stevedoring company for discharging in Alexandria Port and arranges for warehousing whether it is inside or outside the port. The Customs Department appoints one of its representatives to check the cargo and its value to calculate the required Customs fees and dues. The importer pays all Customs fees and receives the delivery order and submits it to the Customs Department to declare that payment was settled. The Customs Department gives the importer a clearance or a permit (a release letter) to allow him to take the cargo out of the Customs area. The importer gives a copy of this letter to his agent. The agent carries out the responsibilities of taking the cargo out of the port. Sometimes not all the cargo is released at the same time and in this case, the agent has to use a local document or form called a release card to mention the quantity of cargo that goes out the port in each time in order to calculate the whole amount by the end of this process. After getting all the quantity of the cargo out of the port, the importer signs the cargo receipt for the agent. **Note: 1)** Continuous communication should go on between the shipping line and the shipping agent to guarantee the completion of all tasks. **2)** The agent has to facilitate all the work and solve any problems or obstacles to carry out the work and facilitate and serve the master and the crew during the ship's stay in port. The imported cargo procedures using the manual documentary system from the shipping agent's perspective require 12 steps. It clearly reflects duplication in the work and consumes more time than it should be. Many authorities in the port are involved in this procedure. Alexandria Port desperately requires an integrated system to facilitate the communication between them and achieve faster and easier communications. It has been observed that the steps presented in figure 5.9 occurred in the same order and accordingly the said figure been built. The shipping line has to initiate the process and the agent has to prepare some documents before approaching the customs department. However, according to the observations,

the imported cargo documentation flow from the shipping agent standpoint is summarized at figure 5.9 below:
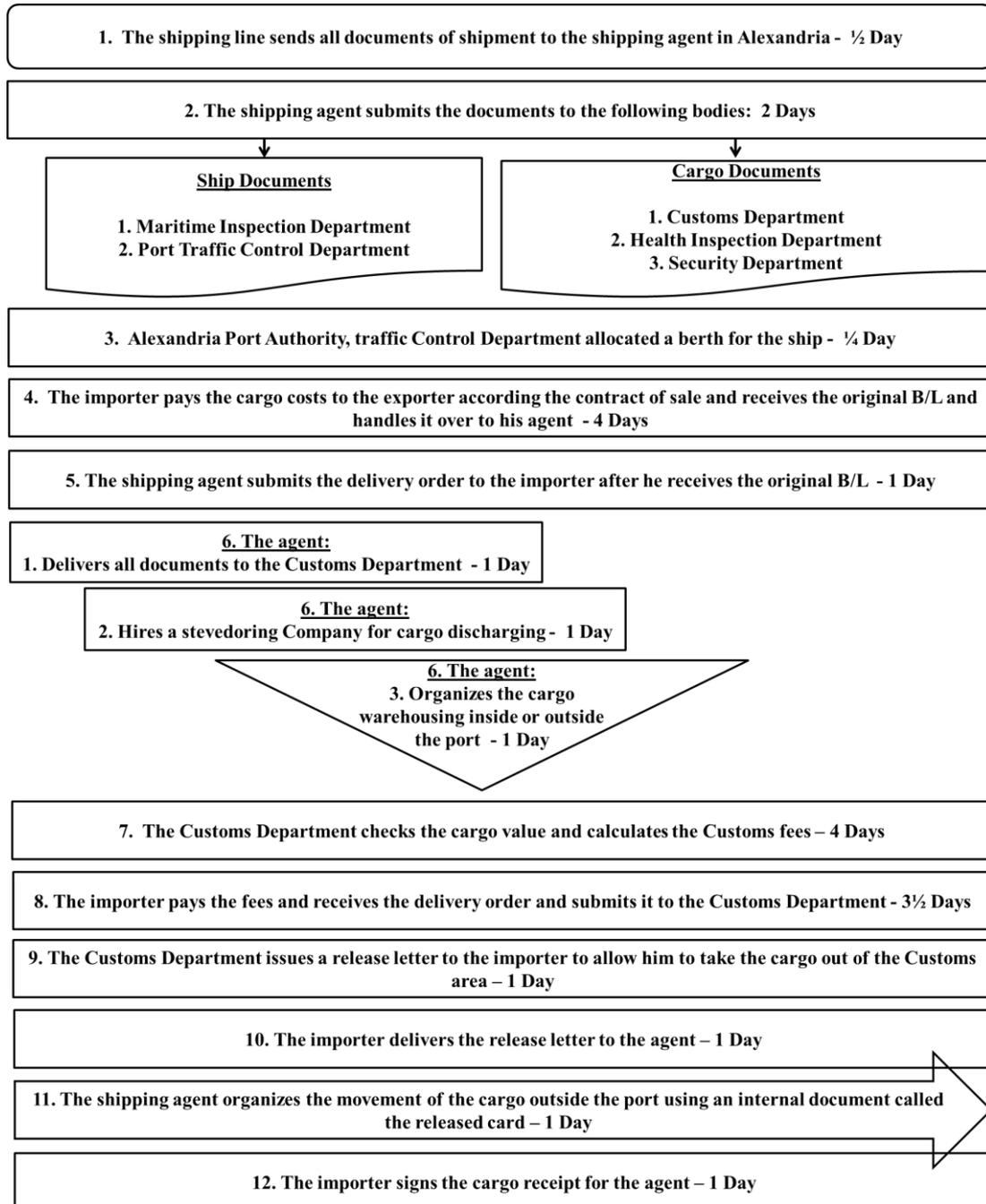
Figure 5.9 – The Cargo Documentation Flow from the Shipping Agent's Standpoint

The cargo documentation flow as observed and analysed takes almost 23 days from the shipping agent's standpoint. Based on the sensitivity of time as a factor pertaining to international business, the procedures, documentation flow and information exchange are considered inefficient. Integrity of information, the speedy flow of documents, and reduction in time spent in each process and the development of procedures could be achieved through the implementation of an e-business system. The implementation of an integrated e-business system could be a step towards increasing the efficiency of the documentation cycle, upgrading the processes and resulting in a reduction of time that vessels spend in the port.

The Freight Forwarder Interview: Cargo Express Co. is the most well-known freight forwarder and has the largest market share in Alexandria community. Their responses were as follows:

The freight forwarder receives the cargo delivery note from the shipping agent within 48 hours of the ship's arrival. He receives all the documents of shipment after revision and getting consents from the Operation Department of Alexandria Port. The freight forwarder takes the cargo manifest from the Central Office of Alexandria Port Authority after having it stamped. (This is considered as a declaration that the cargo is in the Customs area). This is followed by taking the approval from the Tariff Department Manager to start working on this specific shipment. The freight forwarder has all the documents of the shipment stamped again by the Central Office of Alexandria Port Authority, and takes the names of the officials who will evaluate and classify the shipment, i.e. evaluator, tariff representative and payment observer. After taking their names, the freight forwarder goes to the yard to prepare the cargo for inspection and evaluation by the tariff and Customs representatives. The evaluator starts work and checks the type of cargo, the certificate of origin, and the quantity of the cargo. The evaluator also classifies the cargo and specifies the Customs terms. The evaluator should mention in the Customs certificate if the cargo requires a sample to be taken and the Customs clearance representative carries that out. The evaluator then accepts the certificate and approves it after the Customs

clearance representative finishes the sample inspection. The Customs certificate is submitted to another office to be revised again and given to the Financial Department to calculate the dues, fees, and taxes. The freight forwarder issues a cheque (to order) on behalf of the customer to the Customs authority. He receives the approved originals of both the clearance certificate and the delivery note from the Financial Department. He should refer to the shipping agent to pay any demurrage, if any, to have the release letter from the Port Authority in order to receive the cargo. Later he appoints a transport company which then receives the Customs declaration or the clearance certificate and the agent release letter in order to move the cargo outside the port.

The manual documentation system procedures for imported cargo from the freight forwarder's perspective need 16 steps. It would be easier and faster to achieve if all the parties involved co-ordinate to use one electronic documentation system. Since the freight forwarder is that party who provides a door to door service and carries out all logistics activities, he is the party that suffers most from the routine and the duplication of work. The 16 steps he should carry out include preparation of documentation, collecting different forms from different officials in the ports and get them signed and stamped. He also deals with paying the customs, the inspection and the evaluation. During the observations done by the researcher, the 16 steps were completed in a certain sequence which generated figure 5.10 from the above procedures.
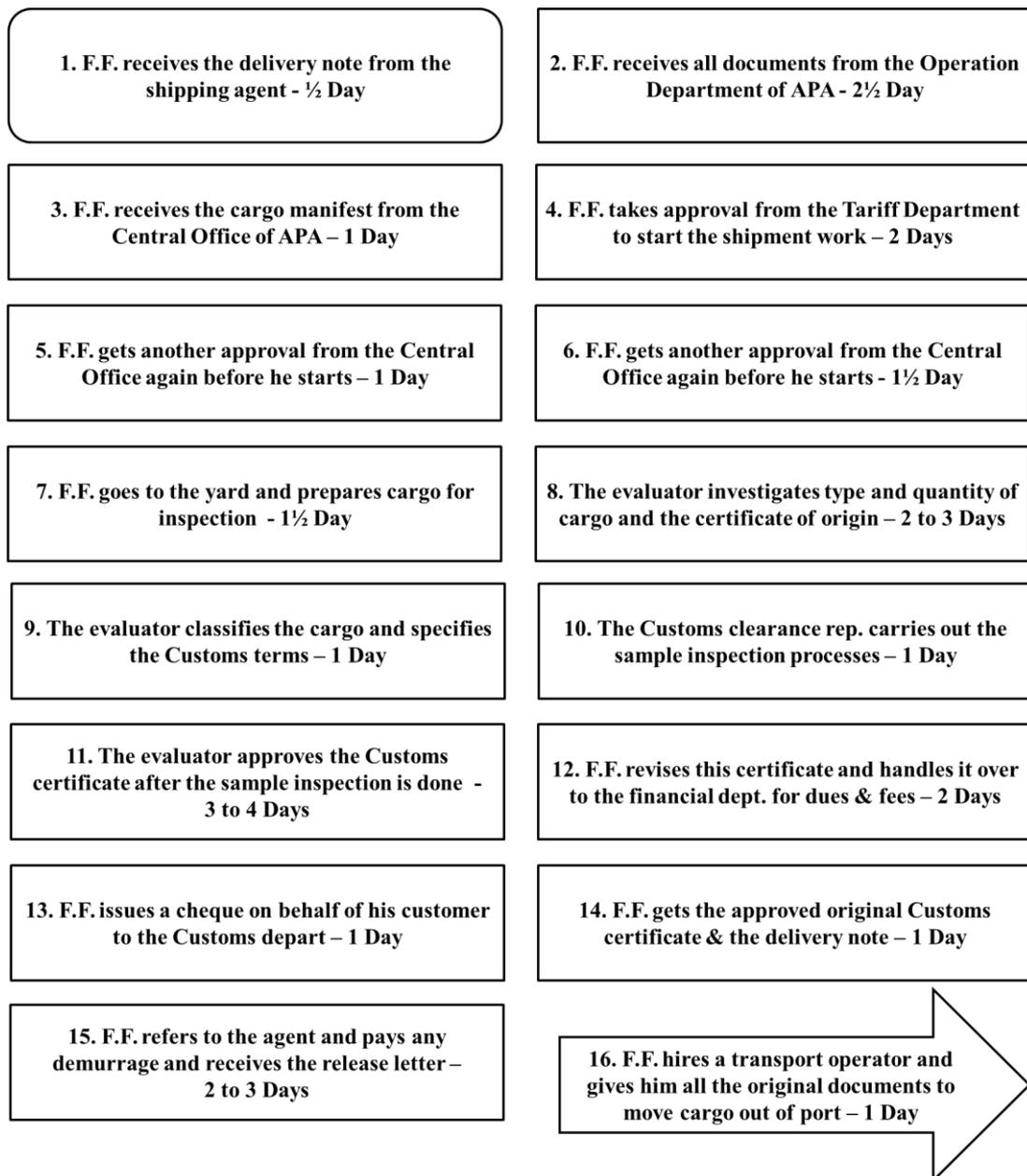
Figure 5.10 - The Cargo Documentation Flow from the Freight Forwarders'

Perspective

The above documentation flow is a complex one that requires long procedures and formalities, some of which are repetitive steps which are time consuming. The time duration for this process ranges between 24 to 27 days from the freight forwarders standpoint. Time pertaining to the documentation flow negatively affects the entire supply chain operations and the documentation flow in Alexandria Port. Improving technologies and communication is required to eliminate these barriers in order to efficiently participate in international business and compete globally. These are two crucial factors, time and documentation cycle. The application of e-business as a solution to minimize the documentation flow time by transforming its manual system to e-transactions is what the port needs to address.

The Customs Clearance Interview: The fourth interview was with one of the successful customs clearance companies that have the majority of the market share in this business sector and their response was as follows:

The exporter signs the contract with the importer according to precise INCOTERMS[7] that specify the rights and obligations of each as regards activities and payment. The importer, or whosoever represents him, prepares and issues a letter of credit for the same value of the shipment. The Letter of Credit (L/C) is considered a guarantee for the contracting parties for delivery and payment as the case may be. Loading from the foreign port takes place and then all the documents of the shipment should be sent including the bill of lading. The customs clearance representative receives the notification of cargo arrival from the agent. He prepares the shipment Customs certificate and receives the cargo manifest from the agent. He approaches the Customs Department to register the shipment according to the submitted documents. The Health Department and Customs Department inspect and specify the cargo. The tariff committee evaluates and classifies the cargo and then the Customs Department calculates the Customs fees. The Inspection Department, Agriculture Department and Immigration Department start their inspections after finishing the previous

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[7] International Commercial Terms of Sales issued by the International Chamber of Commerce (ICC)

stages. The Customs Clearance Company pays the dues, fees and taxes to get the Customs declaration. The importer gives his orders to a transporter and gives him all the documents to move the cargo outside the port to the importer's warehouse.

Due to its central position in all import and export operations trade transactions, customs needs to play a vital role in trade facilitation but the customs clearance companies stated that they have to go through 13 steps to achieve their transaction. This has been observed and analysed as time consuming and delays for all stakeholders. Customs must work and co-ordinate closely with the parties involved in trade transactions including: importers, exporters, freight forwarders, customs brokers, shipping agents, carriers, banks, port authority and other government agencies. The participant observation with the customs clearance representative has resulted in figure 5.11 below which presents a summary of the procedures.

1. Signs the contract of sales and specifies each party's obligations & rights	**2. The importer issues the letter of credit – 4- 5 working Days**
3. All the documents of shipment are sent from the port of loading after the loading commences – 3 to 4 Days	**4. The Customs clearance receives the notification of cargo arrival from the agent – 1 Day**
5. The Customs clearance prepares the shipment Customs certificate – 2 Day	**6. The Customs clearance receives the cargo manifest from the agent – 1 Day**
7. The Customs Dept. in port registers the shipment based on the documents mentioned above – 1 Day	**8. The Customs Dept. & Health Dept. starts cargo inspections & specifications – 2 to 3 Days**
9. The Tariff committee evaluates and classifies the cargo - 2 Days	**10. The Customs Dept. calculates the Customs fees for the cargo – ½ Day**
11. The Customs Clearance representative approaches and finishes with the other authorities; inspection, agriculture, and immigration – 3 to 4 Days	**12. The Customs Clearance pays the required fees and gets the Customs declaration – 2 Days**

13. The importer gives all the documents to a transporter to move the cargo out – 1 Day

Figure 5.11 – The Documentation Flow from the Customs Clearance Agent's Standpoint

The above observations indicated that the documentary red–tape in the procedures results in a cost increase for imported cargo as each step requires different fees. The

time estimated for this type of process ranges from 23 to 24 days as observed from the customs clearance point of view. Due to this red–tape and poor logistics information about exported cargo, the costs of customs procedures might exceed the tariff in some cases and so hinder exports. The increased time consumed is considered an obstacle that leads to many empty containers leaving the country, as observed, which causes another loss for the stakeholders. The manual documentation flow system is influenced by a history of corporate culture and orientation that needs to change. It hinders the entire supply chain operations in the port of Alexandria from being more efficient.

As also observed the above step by step figures and procedures reflect the complicated and sophisticated documentation cycle. Alexandria Port is required to consider a system change and put into account the application of an integrated electronic system to facilitate the documentation flow. Sokhna port in Egypt and Port Rashid from the Arab region are good examples in reducing the duration of the documentation flow through transforming it to an electronic exchange system. It reflects how shorter their cycle became following its implementation (see chapter 2).

5.3.3   *Summary of Responses of Evaluation the Manual Procedures*

The four representative interviews have produced the following criticisms of the manual documentation flow system procedures: (these were some of their exact words)

   (i)   "***Long procedures required for each operation***",
   (ii)   "***Obvious routine reflected from going back to the same entity more than once during the process***",
   (iii)   "***Many signatures are required for each single document***" and
   (iv)   "***Too many stamps have to be there on the same document***".

These criticisms highlight weaknesses as observed like the increased time to finalise any operation and repeated steps that consume even more time are required. The

long procedures and the time consumed are considered hindrance of the entire cycle that directly affects the supply chain operations. A reduction in port productivity that is reflected in increased vessel waiting time in the port leads to less turnover for the number of vessels calling at the port. As observed it is also reflected by the huge number of empty containers in the yard as this complicated and repeated documentation cycle hinders exports which again affects the port's revenue.

In summary, the time required to conduct an operation using the manual documentation system according to the observations above and the interviews below ranges from 23 to 25 days. This is supported by the World Bank Doing Business Report, 2010. Moreover, the above criticism and the previous reasons provide clear evidence why an alternative and integrated system is needed. However, Alexandria Port considered that there is a need to improve the documentation cycle. They introduced the Web-Based system that is considered a semi-automated system since it is only focuses on automating the customs procedures. The following section discusses Alexandria Port's semi-e-business system.

5.4   The Introduction of the Web Based Customs Service's System of Alexandria Port (Initial observation)

As previously explained earlier in this chapter and in chapter 4, the direct and participant observations done by the researcher were accompanied by one representative from different stakeholders i.e., shipping agent, freight forwarders, shipping line, customs clearance or from the port employee. However, by direct contact and discussions with some key persons at the port during the observation, the Alexandria Port Authority officials said that the main aim of this system is to facilitate global trade exchange via Alexandria Port by automating the customs services using the internet. This will be achieved by providing better services to the port's clients and other parties involved in terms of time reduction. Another aim is to electronically inform these clients of all the customs fees and dues, customs

regulations and rules that regulate the Egyptian Customs Authority inside the port. The information collected through port visits is explained below.

Alexandria Port introduced an electronic manifest[8]. The reason for replacing the manual manifest with an electronic one as an essential step is that the customs procedures play a major role in enhancing global trade and in maintaining the competitive advantages for the port. As observed the manifest should be submitted without any delay as the first step in the whole process. Meanwhile, accuracy of the data included in the manifest is vital because it is an accumulative process that starts with introducing this manifest. Using a manual manifest is considered a serious hindrance to the port's development. The manifest has to be submitted in time without any delays and be accurate without any mistakes. For these reasons, Alexandria Port Authority decided to introduce the electronic manifest as a preliminary step in their recently applied semi-automated system aiming to facilitate operations and minimise the time and effort pertaining to documents and procedures. To submit the manifest electronically and according to the web-based system, port clients carried out some steps as the researcher observed during the initial observation to this newly introduced system. It started when the client accessed to the system according to an ID name and a password. He inputs all data included in the bill(s) of lading and inputs all the manifest data and revise it. Then he sends the manifest to the Customs Department and downloads the electronic file to the port site.

As an outcome to the initial observation, these steps take hours and could be up to one day to be completed. The data collected through the questionnaire and analysed later in this chapter shows that the incompatibility of the software between the port and the stakeholders made the above steps difficult to implement. This resulted in the existence of the host company which works as an intermediary between the

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[8] A list showing in detail all items of cargo carried on a given vessel voyage. It is a document which lists all bills of lading particulars of the goods loaded on a vessel, for official and administrative purposes.

parties involved. This in its turn caused an error message most of the time when sending the manifest to the customs due to the unprofessional performance of this company. Alexandria Port Authority should consider better co-ordination between all the parties involved as an essential step at the preparation phase and before the application of their new electronic system to overcome such incompatibility of software.

The initial observation of the procedures for introducing the electronic file to the Port, it starts when the main shipping agent submits the berthing request form according to the new automated system requirements. The port authority employee inputs the main manifest data and creates an electronic file to be available for the agent. Then the main shipping agent accesses the site to complete the data for the manifest using his electronic file. When appointing any sub-shipping agent, the main shipping agent should include their names in the manifest to give them accessibility to the electronic file. The main shipping agent sends the electronic manifest to the customs. It has been observed that due to the use of two systems, the manual documentation system and the semi-automated system, the shipping agent has to send the main manifest document in paper form to the A.P.A. and another electronic copy to the customs. Figure 5.12 shows the result of this process.
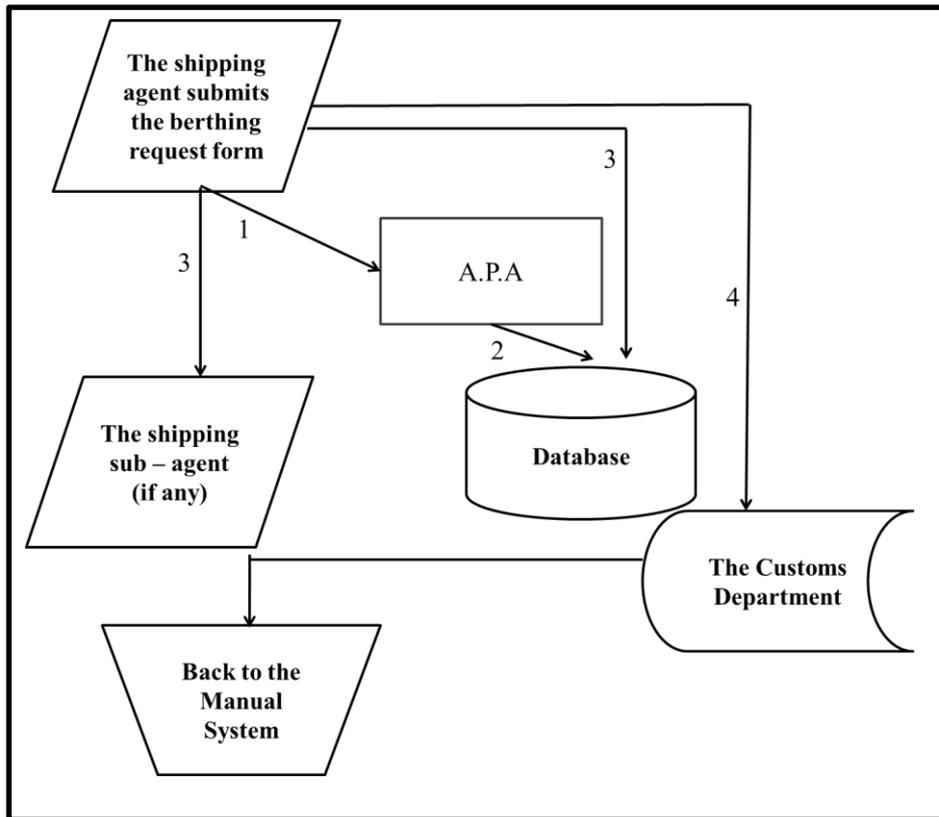
Figure 5.12 - The Procedures for Introducing the Electronic File to the Port

Figure 5.12 above shows that after finalizing the customs procedures, the port client has to use the old manual system to finalize the entire procedures. It has been mentioned earlier that the two systems have to be used simultaneously. This is due to the fact that the Web-Based system is only covering the customs procedures. By introducing one integrated system, the manual documentation system is no longer in use and this result in shorter procedural time.

It merits mention that first, the structure of the electronic file/manifest should be as the one accepted by the Egyptian Customs. Second, the name of the file should be the same as the vessel name mentioned on the berthing request form. Third, the voyage number should be identical to the one in the above mentioned form. Finally, the calling vessel number as well as the tax register number for the shipping agent should also be identical. Other outcomes of the observations are stated below.

During the observation it was noticed that the documents required for the electronic berthing and procedures are as follows:

The shipping agent sends the electronic berthing request form to the logistics centre of A.P.A. This request includes all the data about the vessel as well as the following documents:

1. The Manifest.
2. Declaration of Dangerous Cargo (If any).
3. Security request.
4. Crew List.
5. Stevedoring Companies List which deals with the vessel.
6. Warehousing Companies List.
7. Stowage Plane for the General cargo.
8. Passengers List (If it is a passenger vessel).
9. Declaration required by the international security memorandum (ISPS Code).
10. List of the services required at berth.

The person responsible for the vessel's traffic reviews the vessel berthing request and other documents before incorporating the vessel into the berthing plan.

Note: *As observed, although this procedure is done electronically, the actual berthing procedures and decision was done manually until the beginning of 2010, the last observation done by the researcher.*

5.4.1 The Import Procedures Generic from the Initial Observation (the first observation)

During the process of this research project and after Alexandria Port introduced the new Web-Based system, the researcher had to visit the port to evaluate the new system. Compared to the manual documentation system, the new Web-Based system has been observed for almost three months, during which, the researcher

visited the port at least thee time a week to observe, evaluate and analyse the usefulness of the system. The following section explains the actual observed procedures for import cargoes using the Web-Based system. It has been observed that the procedures are connected to each other in specific sequence. Figure 5.13 shows these procedures in their sequence as occurred and as observed. Figures 5.12 to 5.14 represent the broad procedures from the data collected during the initial observation which was accompanied by one of port employees. The visits to the port and the observations of the new processes is summarised in these figures which clearly show the reduction in complexity of the operations.

The shipping agent submits the vessel entry request form to the logistics centre and the A.P.A. has access to the information. The centralised vessel traffic management employee registers the actual arrival for the vessel according to the wireless message from the vessel master. The pilotage and the towage services will be provided according to the berthing plan. After the berthing is completed, the public authorities will start their procedures; *Quarantine:* to inspect crew and seafarers and they have to report and declare the exact time of starting such inspection and again when finished to be registered on the system. *Immigration:* to investigate the crew's passports and issue any shore leave permission if required and they also have to report and declare the exact time of starting this inspection and again when finished, it has to be registered on the system. *Customs:* to inspect the cargo and seal it in storage or in a container as the case may be, they have to report and declare the exact time of starting their inspection and again when finished, it has to be registered on the system. Figure 5.13 shows the actual procedures as observed and investigated by the researcher.

Note: *The shipping agent has the possibility and the access to investigate at which stage of procedures the vessel is.*
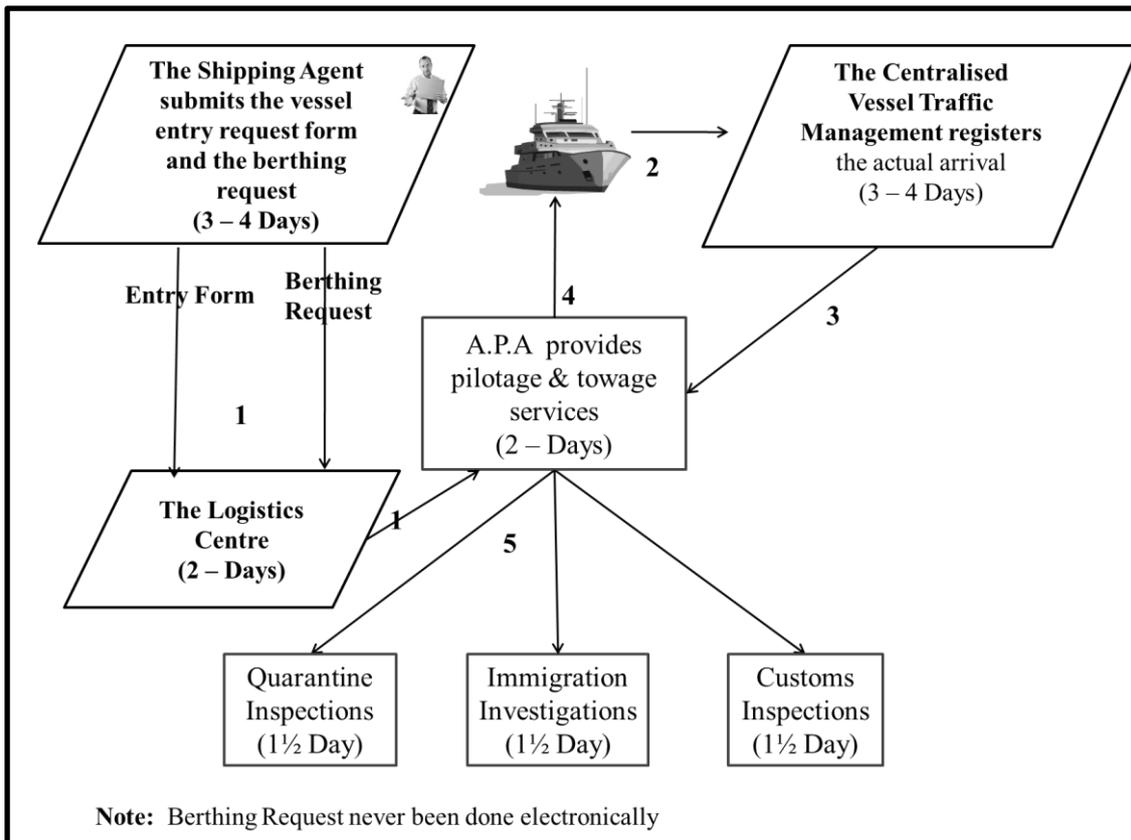
Figure 5.13 - The Actual Import Procedures and the Parties Involved using the Web-Based system

It merits mentioning that after the application of the semi-automated Web-Based documentation system, the documentation cycle for the imported cargo has fallen from *25 days* to *15 days* as noted through initial direct observations and as mentioned in The World Bank doing business report, 2010, table 5.4 at the end of this chapter (World Bank report, 2010).

5.4.2 The Export Procedures Generic from the Initial Observation (*the first observation*)

Figure 5.14 shows the actual processes for the export cargoes using the Web-Based system as observed and investigated by the researcher during the initial observation.

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The shipping agent submits the vessel departure request form to the logistics centre. The centralized vessel traffic management employee reviews this request form before including the vessel in the departure plan. Then, the public authorities; Customs, Marine Inspection Authority, Immigration, The Port Authority, and the Quarantine have to consent the vessel departure and send such consent to the shipping agent through SMS message. After the shipping agent receives the SMS message, he issues the departure declaration from the logistics centre. The finance department issues the port services provided invoice to the shipping agent within 72 hours of the vessel departure and to the bank for payments.

During the initial observation and due to the need to use the manual system before and after customs, it has been observed that the semi-automated Web-Based documentary system did not achieve much improvement as the port client has to provide the documents needed in both electronic and manual forms.
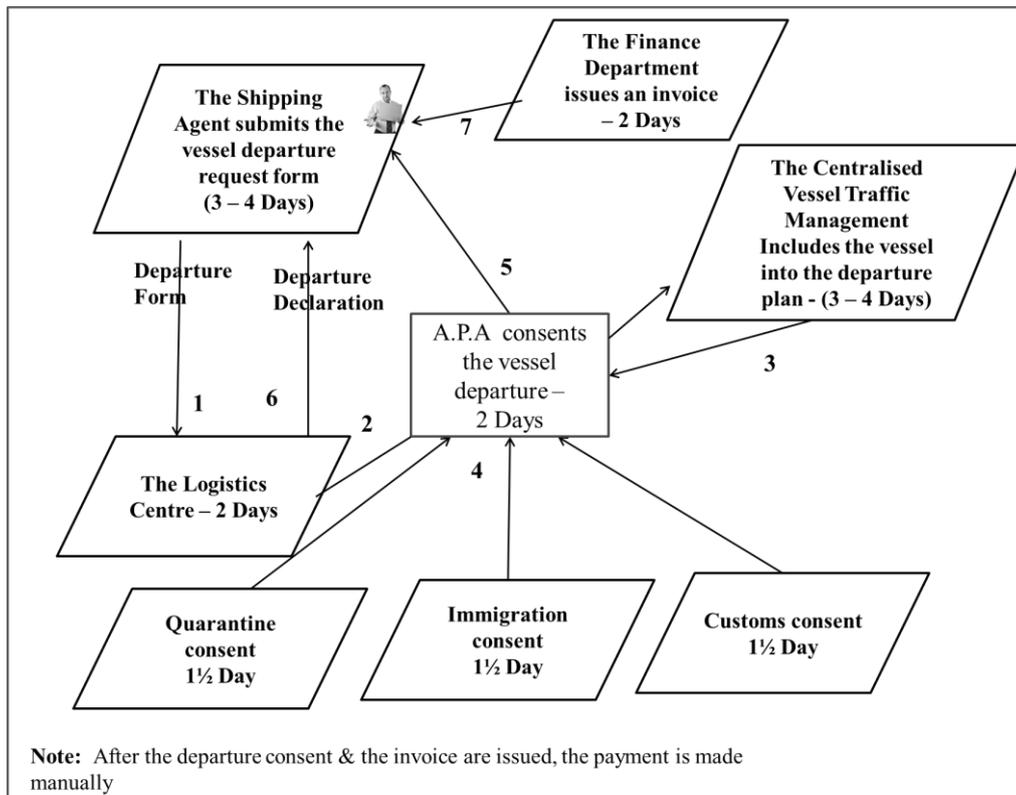
Figure 5.14 - The Actual Export Procedures and the Parties Involved using the Web-Based system

Although it is mentioned in the literature (The World Bank – Doing Business Report, 2010) that the export duration time from Alexandria Port is reduced to 14 days, in reality it is more than that. It has been observed that the document cycle for the export cargo ranges from 16 to 18 days using the Web-Based system in the port. This was the result of the initial observation done by the researcher.

5.5 The Analysis of the Data Collected of the Web-Based Semi Automated System (the second observation)

This section discusses and analyses the data collected through direct and participant observation (the second observation) done by the researcher. As discussed earlier in this chapter, the Web-Based Semi Automated System which was applied (by the end of 2006) in Alexandria Port is a system to enhance and automate the Customs procedures. The analysis of this System through direct observation showed that the system did not achieve its expected outcomes or set objectives. This section also explains the reasons for this unexpected result and shows the actual procedures for both import and export cargoes through participant observations.

5.5.1 The Actual Import Cargo Procedures

The user of the Web-Based system to import cargo has to deal with different **internal** bodies in Alexandria Port. This starts with the Containers Yard which has to approve the cargo delivery order, to specify the container spot in the yard and to takes a turn to prepare the container for inspection that "*takes place on the next day*". The second step is to refer to Alexandria Port Authority to take the shipment number contained in the manifest that has been sent electronically by the shipping line (although the manifest has been sent electronically, this step needs to be done manually and receive the shipment number also manually). This step takes around 3 hours. The Central Manifest Office is the third step to make any manifest correction that is required; this step takes about 3 hours. The fourth body in the port is The Customs Clearance Authority which specifies the Customs category and classification and then refers it to the audit to revise the classification and the whole

set of documents for the shipment. After the audit revises the entire documents and the classification, they deliver the preliminary customs declaration. The duration time required for this step, as observed ranges from 1 to 2 days. The Data and Computer Centre is the fifth body to refer to in the port to take the Customs serial number for the Customs declaration and inputs the data into the web-based system. This step takes from 1 hour to 2 hours. The sixth step is to go back to the Customs Clearance Authority to get a computer printout of the customs declaration and back again to the audit for a final revision of the printout. This takes about 3 hours and it shows repetition of work and reflects noticeable complexity, the normal outcome of using two different systems, one manual and one semi-automated. Reference to The Risk Management Office appear as the seventh step to specify and declare whether the container should pass through a green channel or a red channel – it depends on the cargo type and the inspection requirements. Through the green channel, the port client is required to write down the names of the authorities required for checking and inspecting the container. Through the red channel, the port client is required to write down the names of the authorities required for checking and inspecting the container, such as import/export authority, agriculture, quarantine and others. It is then referred for the customs clearance to approve and stamp all copies of documents in order to finalize the inspection procedures. When the client takes the Customs clearance declaration he gives it to another employee in the same clearance office to send a scanned copy of it to the data centre. The time duration observed for this step ranges between 3 and 5 days to be finalized depending on whether the cargo is a green channel or a red channel. This step reflects a remarkable bureaucracy and addresses the mismatch between the two systems and highlights that one integrated electronic system might provide a good solution to the port. Step number eight is to approach the Import/Export Inspection Authority to submit all sets of documents related to the shipment. The client takes a receipt of submission to deliver it to the data centre and gets the inspection committee's individual names. The duration time for this step, as observed, takes around 1 day. The final step is to go back again to the Container Yard accompanied with the inspection committee members and write

an official memorandum for the purpose of unsealing the container. The required and actual inspection takes place and then, the customs fees evaluation is submitted, this step takes around 2 day**.**

Note: the following notes should be considered within the imported cargo procedures:

(i)   When the required inspection takes place, the inspection declaration is sent to the data centre through the scanner.

(ii) The agent refers to the logistics centre to finalize the evaluation of Customs fees procedures.

(iii) The agent gets a print out of that evaluation.

(iv) This evaluation declaration has to be revised **manually**, once by the procedures' manager and again by an APA financial audit.

(v)   The agent finalizes all the procedures and makes the payment **manually**.

(vi) The agent gets the final Customs declaration, and finally, the cargo can be taken out of the port.

As observed, the time duration for the above operation is around 13 and half days. The Customs procedures are still considered an obstacle to the port's operations especially for the products that need a timed delivery and for seasonal products. The port's clients deal with multiple governmental authorities inside the port, which leads to extended procedures and customs clearance remains time consuming, even when it is automated. The use of the manual system is still required to finalise the processes.

5.5.2 The Actual Export Cargo Procedures

The actual export cargo procedures by using the Web-Based System as observed are considered below. The user of the system carries out the following procedures. The

user provides a standard form "form 13"[9], to the Alexandria Port Authority, gets a preliminary customs declaration certificate from the data centre and takes the cargo certificate number (3 days). The user registers all data manually in a standard internal use register called "46 register"[10] (this is done manually by one of the port employees within a day and half). He also registers the cargo in the sorting office according to its type and specifications and delivers form 13 to the sorting traffic manager for revision together with any other document required (3 days). The sorting traffic manager decides which inspection authorities are required for this type of cargo (1 day). The user submits a copy of the customs preliminary declaration to the Alexandria Port Entrance Gate (½ day). Overall inspection of the whole shipment takes place while it is in the containers on the port roller (½ day). The user signs and approves the entrance permission from the inspection committee and approves the export declaration specifying the category of the cargo and the commercial classification and gets the loading permit from the traffic control manager and then delivers it to the agents' department inside the port (4 days). The user issues another copy of the documents to be distributed to the different authorities. The user then makes all the payments required manually (3 day), but normally it is deducted from the agent's balance by the port authority.

The procedures for the export cargo have not changed much from the manual system which results in excessive time. In the best case scenario, the customs clearance procedures for exports alone take about 3 days as observed. The total time duration is around 16 days as mentioned above. The inspection team or the inspection technical committee comprises three individuals, which is an excessive use of manpower that leads to even more costs. All of these additional costs adversely affect Egyptian exports and the entire supply chain documentation cycle and accordingly have a negatively effect on the operations in Alexandria Port.

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[9] An export certificate including shipment data; the exporter's name, export country, loading port, discharging port, vessel's name, exporter representative, the value and the type of cargo, Net Weight and Gross Weight.
[10] A register to issue a serial number for the shipment.

Although some of the steps have to be repeated due to the use of both systems, the exported cargo documentation cycle has fallen from 20 days to 16 days as noticed during the observation.   In the World Bank report of 2010, after the application of the semi-automated documentation system, the export duration time is 14 days, see table 5.4 below. The differences between the literature and the real situation reflect the unclear and complex processes due to the use of the two current systems.

5.5.3 The Freight Forwarders' Responses

This section presents the responses from freight forwarders that were collected through a structured interview to specify the Web-Based Semi Automated System. The reason for choosing these organizations is that they are the only ones which carry out the procedures and provide a door–to– door service which involves all procedures and authorities.

Freight forwarders are judged the most knowledgeable to provide information on the procedural requirements to trade since many businesses use their services to move their products in and out of the country. They are the only transport providers that offer door-to-door services. They are companies that go through and are involved in the entire operations of the port and the related documentation cycle. Accordingly, they are the most appropriate organizations to assess the changes that have occurred by using the Web-Based System and they will be able to describe the actual procedures right from the beginning to the very end.

Question: Please specify the documents you handle right from the moment of the ship's arrival in port until the final clearance of cargo using the Web-Based System?

The analysis is divided into two sections: one for the import cargo and the other for the export cargo, taking into consideration that this new Web-Based System only

involves the automation of Customs clearance procedures. This structured interview took place after the direct and participant observation to validate the data collected through the observations. The responses showed the following:

Import Cargo Procedures Analysis

The freight forwarder prepares the cargo Customs certificate and all the documents pertaining to the cargo. He then creates the electronic manifest according to the Web-Based system (if possible) depending on the compatibility of their software and if the message goes through. He makes sure that the cargo which has arrived is identical to the one mentioned in the B/L and to all the documents and revises all the shipment documents in the data centre. The data centre verifies all the documents and specifies whether the cargo is a green or red channel type. After this, the freight forwarder waits for his turn and the shipment serial number on the computer screen and pays all fees and the dues required in the bank at the logistics centre if the cargo is a green channel type. The freight forwarder again waits for the inspection or the technical committee for the cargo inspection and pays all fees and dues to the shipping agent if the cargo is a red channel type.

It has been observed that all of these transactions have to be done again manually so the client can have the approval to take the cargo to the next level and give his orders to load the cargo into the vessel. It has also been observed that the steps included in this process have to be done in a specific order as the freight forwarder cannot proceed to the next step unless he finishes the previous step. Accordingly figure 5.15 has been established to summarize these procedures.

1. F.F. prepares the Customs certificate & all the shipment documents - 4 Days

2. F.F. creates the electronic manifest (ranges from few minutes or never)

3. F.F. makes sure that the cargo which arrived is identical to the B/L – 1 Day

4. F.F. verifies all the above documents at the data centre – 3 to 4 Day The F.F. has to do this step manually as well

5. The data centre specifies whether the cargo belongs to the green channel or a red channel - 1 Day

6. F.F. waits for the cargo serial number on the screen – Same Day

7. F.F. pays the fees due in the bank if it is a green channel cargo – 1 Day

8. F.F. waits for the inspection committee and pays the fees through the agent if the cargo is a red channel type – 3 Days

Figure 5.15 – F.F. Import Cargo Procedures Using the Web-Based System

The respondents also stated that all documentary exchanges between them and the data centre are done through a scanner which sometimes has a *"technical problem"* and a *"long waiting time"*. They also stated that all these procedures have to be done once more manually. This Web-Based system is only for the customs procedures; before and after that, the customer, or whosoever represents him, has to refer back to the old manual documentation system and that creates confusion for them and is even more time consuming. The indicated duration time for this process as observed in the port ranges between 16 and 17 days. This indicates that Alexandria Port needs to redesign the documentation system. An integrated e-system could achieve the aim the port seeks.

The following section discusses the export cargo procedures under the Web-Based system as an outcome to the observations in the port and at the same time, when these procedures took place.

Export Cargo Procedures

The majority of the respondents stated that the export procedures using the Web-Based System did not change much from the old manual system. The freight forwarders declared that the export documentation flow and procedures still rely on the old manual system of the port. They also stated that the only difference is - to the contrary - adding a new internal Form for Egyptian exports for the government to analyse. However, the respondents clarified that the system did not automate any part of the procedures other than the following two items:

1. Register of the vessel's complete data when she calls at the port.
2. Register of the export cargo at the data centre for statistical internal purposes.

Note: *Neither document nor payment is made electronically.*

There is a duplication of work by using the two systems. 87% of the respondents expressed that the Web-Based System was designed to cut down the time spent in finalizing the Customs procedures and its related documentation flow to 4 hours but in practice it takes 3 days! The majority of them believed that introducing a fully automated e-business system would give better results rather than using the two systems simultaneously. A full statistical analysis and assessment of the outcomes of the Web-Based system collected through semi-structured interviews is discussed in detail in the next section.

5.6 Analysis of Data Collected from the Semi-Structured Interviews

The semi-structured interview has high validity and reliability when people are able to express themselves and give their own opinions with little direction from the interviewer (Yin, 1994). Meanwhile, they are able to talk freely about the subjects asked in detail and in depth due to their knowledge. All the interviewees were those involved in international business and maritime transport and some of them were also involved in multimodal transport. They are key persons in the port community, i.e., people who work in the maritime field and are involved in international business. Some are managers with international companies and others are with domestic companies. Therefore, their opinions are of great value and likely to be reliable. As Detailed in chapter 4, thirty different organizations were sampled in this part of the research: fifteen shipping companies and Customs clearance agencies, eight freight forwarders, and seven shipping lines companies. The semi-structured interviews in this research consisted of 23 questions (Appendix A). A combination of closed questions and open-ended question was used and Likert rating scales were applied. The overall time span taken for these semi-structured interviews lasted for nearly a year because the face-to-face interview requires an appointment to be made with the respondent prior to the meeting. The first group of the questions are discussed in the section below, while the rest of the questions will be discussed in chapters 6 and 7 as they are related to the e-business usefulness.

Responses to the First Group of Questions

The first group contains four questions. The main aim of these questions is to evaluate the Web-Based System of Alexandria Port and whether there is a need for a system change. This group of the questions below (Appendix A) was chosen to fulfil the objective of investigating the usefulness of the Web-Based System and to study the need for a system change. The questions also investigate the importance of having an integrated system with customised elements.

This group contains three general questions about the Web-Based and the e-business systems. They are of the type of open – ended questions, and consist of:

1. To what extent do you think the newly applied Web-Based Semi-Automated System of the Customs procedures of Alexandria Port is useful?
2. To what extent do you think using a fully e-business system (one integrated System) will positively affect the documentation flow in Alexandria Port?
3. To what extent do you think it will be useful to have a fully automated e-business model for Alexandria Port which incorporates elements that requires local customisation?

From the perspective of *Shipping Agents and Customs Clearance Agents* (15 companies), 60% of the respondents believed that the Web-Based system had no use and 40% of them said it had little use due to reasons given in table 5.1 below.

Table 5.1 – The Shipping Agent and Customs Clearance Companies responses to the First Question

To what extent do you think the newly applied Web-Based Semi-Automated System of the Customs procedures of Alexandria Port is useful?			
	Shipping Agents and Customs Clearance Agents 15 Companies		**Remarks**
Scale	No use	Little use	
Usefulness of the Web-Based system	9 companies 60%	6 companies 40%	These were the interviewee exact words
Red Tape is the cause	53%		
Software problem	53%		
Using the two systems	93%		
Not enough skills and no training	67%		
The host company unprofessionalism	40%		
Culture	60%		

Out of fifteen interviewees from shipping agent companies, nine of them declared that the Web-Based System had no use. Routine and red-tape still hinder the processes as stated by 53% of respondents. Many papers and many signatures are still required. The software used by Alexandria Port Customs Department and that used by the stakeholders either did not match or was not compatible with each other, which created problems with reading the exchanged e-documents. Meanwhile, the stakeholders could not change the software they were using because it was used in their other branches around the world or in the other international offices they represented. At the same time, Alexandria Port Authority cannot force the use of their software at this stage. Accordingly, 53% evaluated that the system did not achieve its aim due to the incompatibility of the software. Due to the previous problem, it was necessary for a host[11] company to work as an intermediary between the port and the stakeholders. 40% of the respondents stated that this created another problem on its own. Alexandria Port Authority chose the host company from the public sector companies owned by the government (Egyptian Post Authority). They were not of the professional type to efficiently provide this service. They have various difficulties such as operators and technical staff, inefficient administrative staff, lack of awareness of using new technology and lack of professionalism. They also practice routine, long procedures and formalities as this company is regulated by Egyptian governmental rules. Using the two systems simultaneously meant that the Web-Based System did not provide a complete electronic documentation flow as this consumes time and was confusing. Most of the interviewees in this category (93 per cent) agreed that the problem was due to the use of the two systems in the port as the e-business system provided only a partial e-system. The respondents raised the issue that the system needed some changes and improvements as it only concentrated on the Customs procedures, which necessitated referring back to the manual system. The lack of skills and training to upgrade the skills required to run an e-system was raised by 67% of the interviewees. The

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[11] The Host Company is a company which works as a software translator and as an intermediary between the port and stakeholders to convert their software to another that can be read by the port system.

respondents stated that there were not enough skilled employees available to run the new system and that they did not have enough awareness of its benefits. The respondents confirmed that training is needed to acquire the necessary skills and awareness. 13% went to the extreme of asking for a complete replacement of existing employees and operators as they did not have the required skills or the awareness or even the necessary shipping business background. The respondents gave much value to the culture and how the people needed to change and accept changes; 60% of the respondents in this category stated that the culture as an important element for e-business success.

From the perspective of the ***shipping lines*** (seven companies), 67% of the respondents agreed that the new system had no use, while 33% agreed that it had only little use. Table 5.2 summarises these responses.

Table 5.2 - The Shipping Lines responses to the First Question

To what extent do you think the newly applied Web-Based Semi-Automated System of the Customs procedures of Alexandria Port is useful?			
	Shipping Lines 7 Companies		**Remarks**
Scale	No use	Little use	
Usefulness of the Web-Based system	4 companies 57%	3 companies 43%	These were the interviewee exact words
Red Tape is the cause	43%		
Software and technical problems	100%		
Using the two systems	43%		
Not enough skills and no training	28%		
The host company unprofessionalism	28%		
Culture	43%		

Respondents from the shipping lines raised other problems during the interviews. These are summarised below:

Continuity of service: 43% of the respondents confirmed that providing the services with sufficient continuity is impossible with this host company or the port due to technical problems. 28% of them referred this problem to the host company. 72% of the respondents were confident that there was no collaboration, when needed, between Alexandria Port and the parties involved at the preparation stage. 28% of these respondents believed that the collaboration problem created many other problems during the implementation stage such as incompatibility of the software.

Duplication of work: 43% of the respondents stated that for them the new system caused twice as much work, which is considered a waste of time and money. They believed that this is due to the use of the two systems.

From the perspective of the *freight forwarders* (eight companies), 63% of the respondents stated that the new system had no use while 25% of them said it had little use. 12% stated that the new system was useful, but the implementation was wrong. Table 5.3 summarises the freight forwarders responses.

Table 5.3 - The Freight Forwarders responses to the First Question

To what extent do you think the newly applied Web-Based Semi-Automated System of the Customs procedures of Alexandria Port is useful?				
	Shipping Lines 8 Companies			Remarks
Scale	No use	Little use	Useful	
Usefulness of the Web-Based system	5 companies 63%	2 companies 25%	1 company 12%	These were the interviewee exact words
Red Tape is the cause	25%			
Software and technical problems	38%			
Using the two systems	75%			
Not enough skills and no training	-			
The host company unprofessionalism	25%			
Culture	75%			

The freight forwarders raised some of the issues mentioned by the shipping lines. For example, 38% of the respondent stated that collaboration during the preparation phase should take place. They also mentioned the continuity of the services – 13% of the respondents doubted this issue. Another 13% of the respondents believed that this e-system should be enforced to all the stakeholders, but only when it is properly implemented. It merits mention that Alexandria Port could not apply any of the existing e-business systems without any changes even if it was a successful system elsewhere. It had to be customized to suit the Egyptian environmental peculiarity.

The second question contained in this group was as follows:

To what extent do you think using a fully e-business system (One integrated System) will positively affect the documentation flow in Alexandria Port?

All respondents from the three categories positively responded to this question. The question scale was no effects, little effects, some effects, and affects a lot. 100% of all categories mentioned earlier were in favour to change this ***"partial e-system to one integrated system".*** They believed that this will eliminate the duplication of work and reduce the duration of time of the documentation cycle. Another comment to this question was ***"the change is needed***". And another was from a manager from one of the shipping lines was wandered ***"why a partial e-system***".

The third question in the same group was:

To what extent do you think it will be useful to have a fully automated e-business model for Alexandria Port which incorporates elements that requires local customisation?

Once more, all the respondents from the three categories positively responded to this question. The question scale was no use, little use, useful, very useful. The responses to this question were that of all of them believed that local customisation is a "***crucial element to success***". They referred back to the Spanish practice (see

chapter 4). They also mentioned that the Egyptian "***culture and environmental peculiarities should be valued from the beginning***".

5.7 Conclusions

The manual documentation flow system requires a large number of documents and repetitive steps that reflect the bureaucracy in the port. Each and every document has to be signed by at least two persons and stamped. This has led to the introduction of the newly adapted Web-Based system which is a semi - automated system. Direct participation, the primary data collected and interviews (see chapter 4) showed that the result of this new system was not as expected or as planned and this in its turn has led to the port to use the two systems simultaneously. However, the two systems required a large number of documents, long procedures and lots of signatures (see chapter 4). This restricts Alexandria Port's global competitiveness. Accordingly a system change is required and a fully automated system is needed to cope with global changes and to increase the port's productivity and competitiveness through enhancing its supply chain documentation flows.

The manual documentation system is obsolete, while the semi-automated Web-Based system concentrates only on the customs procedures. It also requires using the two systems simultaneously which has resulted in duplication of work among the import cargo procedures. As for the export procedures, neither changes nor shortened procedures occur.

In brief, the manual documentation system requires too many and repeated procedures for each operation which is time consuming. It also affects the productivity of the port. The new Web-Based system does not eliminate the use of the manual system completely as this new system concentrates only on the customs procedures which require the use of the two systems simultaneously.

Using the two systems necessitates a system change. One fully automated and integrated system is needed to minimize the documentation exchange time and to minimize additional costs that might rise as a result.

The majority of respondents in all three groups interviewed stated that a system change is required and essential for the more efficient management of the port. They were in favour of a local customised e-system to deal with the Egyptian environmental peculiarities. They insisted that what was needed was not only a local customised system but also customised training courses for those operating such a system.

Their summary responses were as follows:

- An electronic system which incorporates elements that requires local customisation is the best solution for Egypt.

- Alexandria Port failed in the past (2003-2004) to adopt the Spanish e-business system because that system was not customized locally to suite the Egyptian environment and accordingly could not deal with its peculiarities. (It was what they successfully applied in Barcelona ports). Barcelona e-business system application in Alexandria Port did not consider creating the awareness of the e-business importance to the port. The parties involved at that time did not study the Egyptian psychology of being reluctant to change. There was no an effective plan for employee training; they depend on the individual training provided while they are running the system themselves (A.P.A unpublished report).

- There are some factors relating to the Egyptian environment like culture that should be considered.

- Customized training courses are essential before the implementation phase.

They also raised the question of why a semi-automated system is applied. The port is in need of a fully automated e-business system in order to avoid using the manual system. The majority of respondents believed that one integrated e-business model could meet their requirements and achieve the port's objectives.

To conclude, table 5.4 shows the time needed to complete the import and export processes in days according to the World Bank Doing Business Report of 2010 along with the Egypt rank of doing business related to trading across borders (World Bank, p. 37, 2010).

Table 5.4 – Trading Across Borders in Egypt

Trading Across Borders Data	Doing Business 2008	Doing Business 2009	Doing Business 2010
Rank	-	27	29
Cost to export (US$ per container)	714	737	737
Cost to import (US$ per container)	729	823	823
Documents to export (number)	6	6	6
Documents to import (number)	6	6	6
Time to export (days)	15	14	**14**
Time to import (days)	18	15	**15**

Source: The World Bank Doing Business Report, 2010

The first row of table 5.4 shows the general Egyptian rank of doing business related to trade across borders. There is a decline in the rank from 2008 to 2010 of 27 to 29. Although the number of export and import documents is only six, it takes a duration of 14 days for export and 15 days for imports to be processed. These recurrent delays continue to impact negatively on port competitiveness. These findings therefore are fully consistent with the extensive observations and interviews discussed in this chapter.

There is a need for improving the operations documents cycle. Therefore, the evaluation of e-business procedures is investigated in the following chapter to study if this can generate improvement for Alexandria Port.

Chapter 6

The Development of a Generic E-Business Model (GEMA)

6 – The Development of a Generic E-Business Model (GEMA)

6.1   Introduction

This chapter aims to construct a generic e-business model that seeks to reduce the complexity of the manual documentation system of Alexandria Port by reducing the number of steps. It also aims to overcome the incompatibility of the Web-Based system by introducing one integrated e-business system. Therefore, this chapter is structured as follow:

It comprises of five different sections. Section 6.2 explains the e-business infrastructure and the related costs. Section 6.3 discusses the local customisation requirements for Alexandria Port. It highlights the e-security and the strategies and policies. Section 6.4 explains the customer focus for Alexandria Port. Section 6.5 describes the Generic E-Business Model for Alexandria Port (GEMA).

This chapter proposes and develops a generic e-businesses model for the Alexandria Port community. It is a conceptual model which incorporates elements that have certain local customisation to suit the Egyptian environment and overcome its peculiarities.

6.2   E-Business Infrastructure and the Related Costs

It has been observed that Alexandria Port needs to upgrade the port infrastructure in terms of information and communication technology when applying an e-business model.

6.2.1. Infrastructure Management

The e-business infrastructure requires more consideration for future expansion, availability and security than the traditional business infrastructure to meet future needs. Organizations should refer to all the system components such as hardware and software that enable e-business to operate when discussing e-business infrastructure. E-business infrastructure requires more flexibility than traditional business infrastructures, allowing e-business systems to communicate, exchange data and change this data to e-data and e-transactions with systems outside the organization and beyond (Inmon et al. 2001). Defining an appropriate e-business infrastructure is vital to the organisation applying e-business as it affects the quality of service experienced by all users of the system in terms of responsiveness and speed. The first decision that affects the e-business infrastructure is which elements are located within the organisation and which elements are going to be outsourced (Nurmilasko, 2008). The rapid changes within the IT technology is an element that should be taken into consideration in order to design infrastructure flexible enough to support the changes required to compete effectively (Hassall and Welsh, 2007).

The infrastructure components describe the value of the system that has been designed (Gordijn, Akkermans, van Vliet, 2000). These components are necessary to deliver the value proposition: *resources*, *network*, *assets* and *activities*. It was observed that the infrastructure for Alexandria Port can be summed up as follows:

Software Requirements

From observation, it is evident that technical personnel and specialist programmers are required at this stage (the preparation stage) and the previous one (the infrastructure stage) to set up the necessary required programs and to prepare the software to automate the system. A system like WebGear Software – Shipping Management System which was designed by Microsoft creates master files and manages the supply chain processes.

Another system is Oracle E-Business Suite that provides integrated business applications. However, certain modifications should be made for each organisation to suit its individuality. The system needs a main server, web and database server, an upgrading and loading server and a firewall to protect stored data against unauthorized access. Some of these components like the main server and the database server are already available following the application of the semi-automated Web-Based system. However, the researcher recommended the Oracle E-Business suite as it is successfully applied in some Egyptian companies with the necessary modification to suit the local culture.

Hardware Requirements

The observation found out that Alexandria Port Authority has many choices; it should get a hosting company where the continuity is long lasting and the power supply is guaranteed because an insufficient power supply is one of the most important and essential problems the port should avoid, especially when the system is automated and in the operational stage. This company is also necessary to be of the professional type and specialized in providing this type of services. Thus, it is preferable for this hosting company to be located outside the port itself. The hosting company will provide around the clock continuity of the e-services in the port, in addition to operating as a link between the parties involved (the users and the port).

After the application of the Web-Based system it was very clear that the choice of a hosting company is considered the best for Alexandria Port. Many management services can be provided by hosting companies as value-added services, which is in line with the outsourcing concept of modern management that - from the economic point of view - is more advantageous. For example, Barcelona Port Authority had the choice of doing this job itself and they did, but unfortunately, they had to upgrade all their hardware after only three years of implementation because of rapid developments in hardware, and this was very costly (Mila, 2011). Alexandria Port Authority cannot afford doing the same.

6.2.2. E-Business Infrastructure Related Costs

The financial element also belongs to any e-business model framework. This is the cost required to create the infrastructure which will generate revenue. The difference between revenue and cost determines the *effectiveness* and the *profitability* of a company (Osterwalder and Pigneur, 2002). Analysing e-business costs will help the company determine and calculate the costs for undertaking the project successfully. Companies do not want to have hidden costs. They should make sure that they have studied, investigated and analysed everything in detail and included all possible expenses. There are two types of costs to consider: direct and indirect costs (Mattias and Lyn, 2003).

Direct Costs

In-house costs: These are classified as very expensive. Mattias and Lyn (2003) define in-house costs as the costs of buying all equipment and developing software borne by the company. This requires an IT line instead of a simple Internet connection to obtain a higher capacity Web connection. The large companies usually take this route if they seek to have absolute control over security and to get a unique successful system. It was observed that this element would be very expensive for Alexandria Port due to lack of funds. However, it is needed to guarantee both the continuity and security of the system.

Outsource: Companies could outsource website development to specialists in the field who can maintain the customer relationship management and provide website management expertise services (Mattias and Lyn, 2003). As mentioned earlier and as one of the observation outcomes, this is the optimum option for Alexandria Port in order to avoid the in-house direct costs which are classified as a very expensive cost.

Indirect Costs

When planning an e-business project, companies must consider the indirect costs as they can be higher than the direct costs (Osterwalder and Pigneur, 2002). The management of software and technology that helps the business operation and the

design, management and marketing of the company website are usually considered indirect costs. However, when planning for indirect costs, companies consider *Mobile Business Management* which is a common indirect cost normally extends to the operation of business outside the traditional office environment. Other cost aspects that companies should consider are:

- *Communications:* this includes traditional telephone services, messaging and e-mail that can be conducted via the Internet. Often, these communications tasks can be conducted via handheld devices. Studying and analysing the business to determine what kind of communications management would best suit the company's needs and then decide the best means help in reducing the indirect costs.

- *Networking:* Many companies need to remain continuously connected to information sources. Today, there is virtual office software available, often at low-cost or relatively low-cost; software is available to connect a portable computer to a larger fixed computer so that it acts as a field terminal (Osterwalder and Pigneur, 2002).

- *Payment, banking, and accounting:* Low cost software is available through readymade CDs or through any specialized body that can help the company manage accounting and cash flow. Some of this software also provides financial intelligence functions such as cash-flow statements. This software is also transferred by the wireless networks.

- *Task and time management:* Time management is one of the indirect cost components that companies should consider. Busy companies must often schedule their activities in order to be efficient. So, scheduling and task management software help administer the company's time. This software usually has a quite low cost, and is often sold as a package. From the observations discussed in chapters 4 and 5, there is a lack of the organized work and awareness of the time value; task and time management is one of the components that Alexandria Port Authority should consider.

- *Technology Maintenance:* Simply buying computers and other technology (such as networking technology) is not enough. Hardware and software must be maintained, checked, repaired and serviced regularly (Mattias and Lyn, 2003).

It has also been observed that this element is considered as one of the major obstacles in Alexandria Port. However, this can be done by:

- *Creating an IT department*: If the business is heavily dependent on technology like the e-business, it might be wise to have in-house and professional IT persons available at all times. This will ensure that critical operations and the related problems are always solved. From the observation, it has been noticed that Alexandria Port is in need for IT professionals.

- *Contracting out maintenance*: Contracting out the technology maintenance for a monthly fee and on a regular basis enhances the continuity of service.

As observed, Alexandria Port needs to consider its options regarding these components as creating an IT professional team during the preparation stage might be a quite good idea, but at the beginning of the implementation stage, contracting out to a technology maintenance provider will be a better idea in order to maintain the customer relationship through continuous services.

Implementation Costs

Calculating the costs is not possible until you have a clear understanding of the system needs and objectives and have identified the best technology for the task. The types of costs the port needs to consider are the software purchase price which depends on the selected solution and the software options. On-going maintenance cost could range between 15-18% of the initial cost annually (Kaushik, 2003). Another type of costs is the communication expenses that depend on the bandwidth the system will require and the nature of the connections. The last type of costs is the e-business personnel which is very dependent on whether running the company computer systems in-house, and how far it integrates the systems using e-business

techniques. A key to success is to have at least one person within the organisation taking charge of e-business systems (Kaushik, 2003).

As a summary, infrastructure management related to the application of e-business clearly generates different types of costs, direct, indirect, preparation and implementation costs. Figure 6.1 below indicates this link.
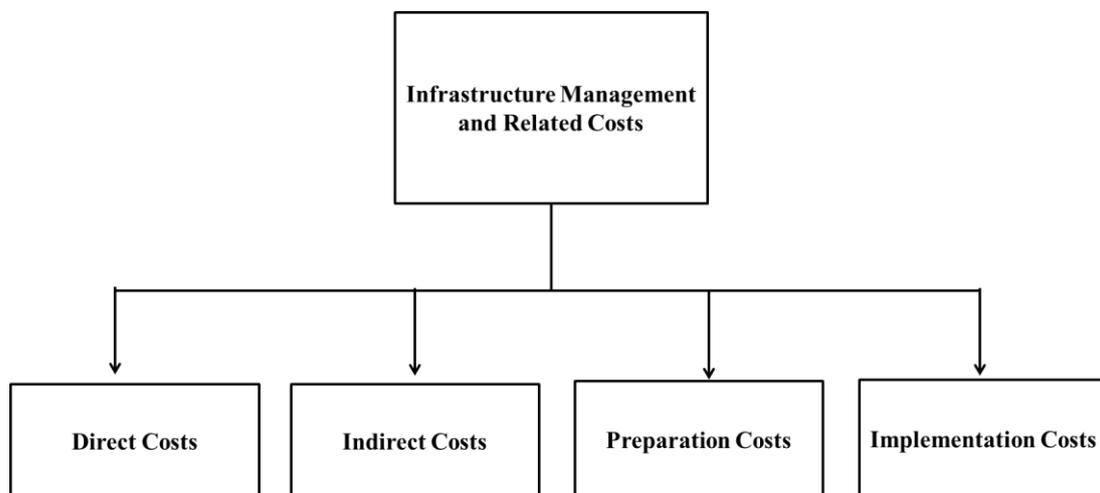
Figure 6.1 E-Business Infrastructure Management and Related Costs

From the observation, Alexandria Port needs to consider infrastructure and the related costs. They also need to study the costs of upgrading the system and maintaining it, as these are the most expensive items as mentioned above. As observed these two items are the most important to consider due to a lack of funds on the part of the port authority.

6.3. Local Customization Requirements for Alexandria Port

It was observed that Alexandria Port also needs to consider some local requirements before applying any e-business model. These are discussed below.

6.3.1 E-Security, Strategies and Policies and Regulation Requirements

As observed and as collected from the interviews conducted with the stakeholders one of their concerns is the security of their data and information. Unfortunately Alexandria Port did not guarantee this issue with the application of the Web-Based system. This was one more reason that discourages people to use e-business in Egypt. E-security is considered an essential element for any e-business model as discussed in chapter 2. It is essential to ensure that only authorised persons have access to the system and to ensure that all documents sent or received are not altered or changed in any way. However, e-security strategy should not be the organization's weak link in its overall e-business processes whether it is a port or any other type of organization.

Most organizations applying e-business technologies spend the majority of their time setting suitable strategies and policies which guarantee and secure the flow of e-business processes inside the organization and to protect them from outside forces. However, it is wise to plan for attacks from within the company. The insider threat is defined as risk introduced to the business by employees, agencies and stevedores who are authorized to have access to the e-business of the supply chain of the organization. Over the past twenty years, many studies have shown that insiders' attacks accounted for more than 80% of all breaches (UNCITRAL, 2006). An organization using e-business technology should implement policies and procedures that can minimize the risk and impact of the insiders' threats. In Egypt, one of the main components to secure the electronic data is to implement a certain strategy and policy that suits the local environment.

However, e-business strategy should determine from the beginning *who* is providing services, *what types* of service are provided, at *what time* the services should be and to *whom,* all with the least costs. Regular auditing and sudden checking procedures should take place to test out the work performed by employees (UNCITRAL, 2006). One strategy that is needed to be applied in Egypt is that the employees are offered

no guarantee of privacy of data stored on the organization's computers, so the managers need to reserve the right to check, watch, supervise and inspect the employees' computers and the data on them at any time. Building awareness of the importance of such checks for the parties involved is crucial to accept this type of inspection.

Meanwhile, employees should be kept informed at all times of any changes in this plan. Availability of data and services should be guaranteed. Back-up and recovery processes should be available especially when the electricity goes off which sometimes happens in the port of Alexandria! Another strategy that is needed to be applied is the issuing of security IDs to enter the e-business centre. These should be structured to eliminate direct contact between the customs' employees and the port clients to diminish all forms of corruption. When any organisation applies e-business, the IT department and system must meet the demands for e-business strategies as this alignment is considered one of the successful factors (Carletti, 2007).

However, e-business strategies should meet the customer's requirements and gain the satisfaction to encourage them to use the system. That raises the question of what the customer really needs. Identifying some of the keys to success in terms of realizing the customer needs are summarized below (Martin, 2009). These are:

- **Reliability**: Dependable service that is on time, every time with no surprises is the key performance metric particularly in the case of carriers. A special strategy is required to guarantee the reliability of services.
- **Cost savings**: Customers appreciate ports that help in cutting cost to a minimum level, as most of them measure the services' quality in terms of money. Accordingly, choosing and applying an adequate e-business strategy helps in that regard.
- **Inventory reductions and cycle time improvement**: Lowering inventory time in port is one service the customer needs. It improves the entire supply

chain thus software and strategies that support this effort are winning requirements.

- **Flexibility and problem solving ability**: The ability to adapt quickly to change and the ability to customize solutions to meet evolving needs are highly required to run the port supply chain smoothly.

- **Visibility**: Companies want technology and service providers that can provide real-time information whether it is shipments, orders or inventory, thus a special strategy is required to organize this such as the availability of a problem solver and a decision maker at all times is highly appreciated.

- **Continuous improvement**: Companies want help improving their own processes, and expect that the service providers are constantly improving their own processes to enhance the mutual benefits. A strategy that guarantees the continuity of services is recommended.

- **Value-added knowledge and expertise**: Customers expect their technology and service providers to offer them special expertise and innovation. Strategies that provide employees and operators with the necessary knowledge, skills, and training are crucial to keep them updated all the time.

- **Ease of use**: Customers seek to adapt e-business by the least effort. This creates another strategic burden for companies to deliver an easy use model to gain the benefit expected with no or little training.

- **Can-do attitude**: Customers expect that their service provider takes all measures, takes on any challenges and finds a way to accomplish goals with no excuses. Applying the know-how concept is recommended to achieve this goal.

- **Supply-chain integration ability**: Integration throughout the entire supply chain is necessary. Technology can help make the supply chain as seamless as possible to both internal and external users. A co-operative strategy between partners should be considered.

- **Global coverage**: Customers require the port to have the ability to provide good quality service and backed by local knowledge anywhere in the world,

thus the global coverage strategy and knowledge strategy are essential to achieve this aim.

Furthermore, strategic management control should be applied to guarantee that the actual performance is according to the set plan (Porter, 2005). Alexandria Port Authority needs to consider the change management concept. Applying any e-business model requires some organizational changes (Yi-Mak and Harrison, 2001). Communication and information flows and human resources and skills requirements are the most common examples of organizational change. It was observed that these changes are required to take place before the implementation phase.

Current Attempts to Reform the Legal Situation in Egypt

The General Organization for Export and Import Control (GOEIC) works as the coordinator for all import inspections. Despite the designation of their inspections, the import inspection process remains confusing. Quality control inspections are a mandatory process for over 130 categories of import including foodstuffs, electrical products, auto parts and appliances. UNCITRAL reported in 2001 that the imported refrigerated containers of foodstuff usually take 25 days to be cleared from the customs with a delay of two months. This delay was common in the past but nowadays, the import inspections normally take two to three weeks which indicates that the overall customs clearance times have improved but are still not even close to the international clearance average time.

As for exports, the Egyptian Parliament approved in June 2002 a new export Promotion Law: Law 155 for the year 2002. Although the Ministry of Agriculture and the Ministry of Health maintain their own inspection units and procedures, Law 155 reinforces the co-ordinating authority of the GOEIC over the import inspection.

Improving the duty drawback and temporary admission systems for exporters were among the Law 155's priorities through establishing a central unit along with the

joint supervision of the Ministries of Finance and Foreign Trade and Industry to continuously screen out and modernize the systems when needed (Egyptian Maritime Data Bank www.emdb.gov.eg). The duty drawback system requires full custom duties to be paid on semi-finished imports. There is a one-year time limit for re-exporting these imports as part of a final product in order to have the right to claim back the full amount of duties and taxes paid. In November 2002, the Ministries of Foreign Trade and Finance jointly inaugurated the new temporary-admissions unit at the Port of Alexandria, a first step in a plan to upgrade the operation of the temporary-admissions system at all ports of entry in the country. The law also established an "export promotion fund," to promote Egyptian exports and increase their share in foreign markets, but the specific activities of the fund have not yet been determined. To date, the fund has not been used to subsidize exports and the executive regulations of the laws have not yet been issued (Egyptian Maritime Data Bank, www.emdb.gov.eg).

Meanwhile, shipping and air transportation services were liberalized when the law of 1998 ended the monopoly and the long held governmental ownership of maritime transport. The private sector is now responsible for most maritime activities, such as loading, discharging, and occasional ship repair. The private sector has also become increasingly involved in container handling operations (Egyptian Maritime Data Bank www.emdb.gov.eg). The government still own the other container terminal and are the landlord of the port of Alexandria.

Complying with E-Business Legal Requirements

Electronic information requires risk management that is considered a legal issue and the organizations which fail to provide good protection for their electronic information as assets, face a real risk problem and legal problems related to this risk (Vijiyana, 2002). Organizations should practice due diligence in protecting their information, meanwhile, information privacy has a legal requirement to be well protected. Reducing the chance of legal disclosure and liabilities due to careless

protection or due to certain damage will be a lot easier when the organizations' members practice and are devoted to a strict information security policy. This information security policy will also reduce the damages caused to partners, customers, contractors or any other entities (Vijiyana, 2002).

One of the main issues in e-business is the enforceability of the e-transactions. Semedinghoff (2002) stated that to ensure enforceability requires that all parties involved should focus on:

- *Notice and consent*: Do the parties agree to apply the document exchange in electronic form? And do they have the necessary notices granted?
- *Signature*: Do they have the formalities required for the transaction such as signature in a legal accepted form to be changed into an electronic signature (e-signature)?
- *Record accessibility*: Are these electronic records available and accessible to all parties?
- *Record keeping*: Do these electronic records of the transaction conform to the applicable record-keeping legal requirements?

Local Regulations

Signing a document is a basic legal act. Almost every document of any importance and considered a commercial document is signed (Reed, 2000). Information security simply means that an electronic document meets the business and legal requirements of integrity, authenticity, non-repudiation, signature, and confidentiality forced by regulations. E-signature proves the identity of the signatory (UNCITRAL, 2001), his intention to sign and abide by the contents of the document as their own (Reed, 2000). Although, not free from problems (Josang et al. 2002), e-signatures are arguably the only technology currently available which satisfy the requirements of the e-transactions legislation although it is not free from problems (Gamertsfelder et al. 2002). For Egypt, although the electronic signature law was passed in 2004, the e-signature bill has not yet been approved to facilitate e-business implementation.

This represents a particular obstacle at present.

Analysing and reviewing the Egyptian regulations and laws that relate to all the subjects involved within the e-model's implementation and the regulations relating to the creation and management of the technological platform is essential. The Egyptian regulations need to be revised, changed and made more adaptable for the technology (Bort, 2002). The necessary changes require an analysis and revision of the current situation and faster decision making. Security and Network Services, Egypt Trust, Advanced Computer Technology, Misr for Central Clearing and Depository and Registry (MCDR) were the four parties chosen in July, 2006 by the Information Technology Industry Development Agency to be given licences. These licences are for the launch of electronic signature solutions on the Egyptian market and which has not yet been activated in the market (Blair, 2007).

The Current Legal Situation Pertaining to E-Business in Egypt

A written document has its own requirements. These requirements are imposed or implied by laws in most jurisdictions. The current legislation of the Maritime Commercial Law in Egypt contains some obstacles that hinder the application or the implementation of e-business. The maritime contract in Egypt for example as mentioned in The Maritime Trade Law No. "8", Article No. 197, 1990 states that a contract should be proved only in writing, which is not the case with E-business when the contract will be in an electronic form. Article 202.2 of the same law also states that the signature on any commercial contract should be in writing. The only form of authentication required by the domestic law and by the mentioned Articles is a manual, written signature. It has been reported in official daily papers that the latter problem has been solved by the Egyptian government. Egypt has drafted an electronic signature law, which has been approved by the Cabinet and was discussed by the parliament in the 2003-2004 sessions (UNCITRAL, 2001). A broader electronic business law that will address such issues as domain names, customs and duties, and creation of a certificate authority to verify electronic signatures has not

yet been applied and it has not been activated. The development of electronic business in Egypt has been delayed by concern about the lack of security in computer networks, the relatively high prices charged by Internet Service Providers, infrastructure, and problems related to unified software (UNCITRAL, 2001). Some changes are required such as allowing the use of e-signatures and authorizing e-mail as a legal form of communication. Creating a data base and national information infrastructure in a legal framework for the online business is also required. Establishing the necessary acts to protect privacy and confidentiality of e-business users is crucial for the implementation of e-business in Egypt. E-business is a global facility; therefore, it is also necessary to set the government laws and mechanisms to solve the globalization concerns. Finally, issuing new legislation to govern e-business matters are also needed (Blair, 2007). Three main components that have been observed as essential for the success of an e-business model are:

- *E-Security:* The users need to be given a reasonable and acceptable guarantee that their private data would not be altered.
- *Strategies and policies:* with adaptation to the local environment to create the awareness of e-business importance and encourage people to apply e-business and to overcome the reluctance to change are needed.
- *E-business regulation:* The Egyptian e-business regulations require to be redesigned.

The above observations and investigations has generated figure 6.2 below.
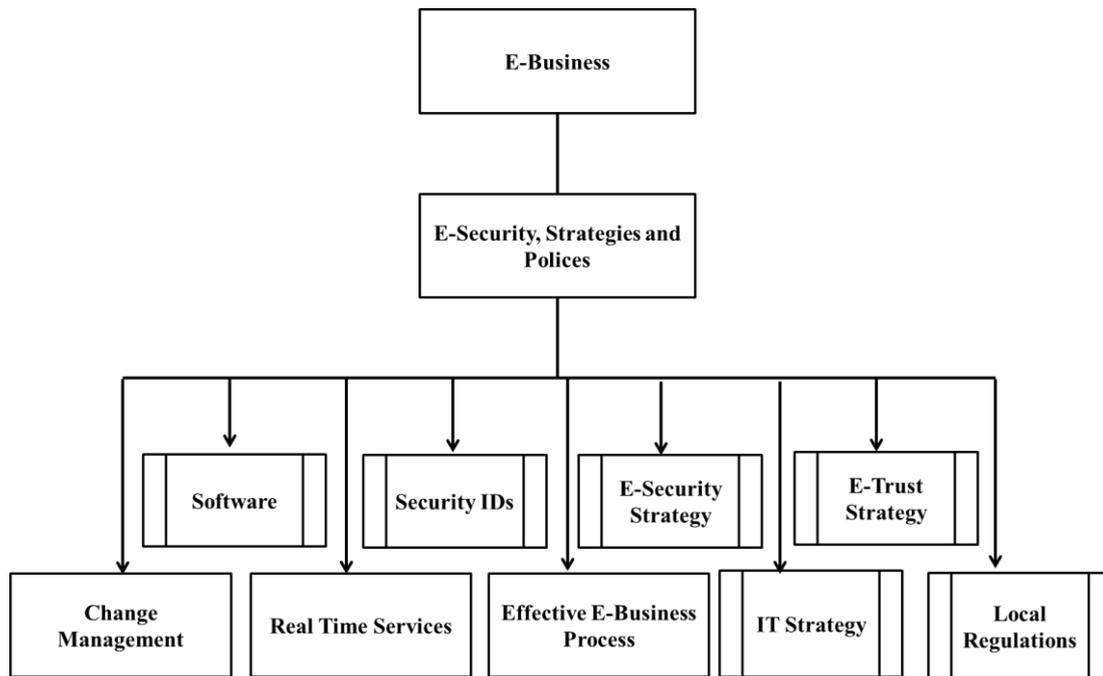
Figure 6.2 – E-Business Security, Strategies and Policies

Specific strategies and policies should be part of the development plan for any e-business model to suit each local culture. In Alexandria Port, the workforce has held the same job responsibilities for many years and there is a reluctance to change. The new strategy must gain the acceptance of such employees to achieve the set objectives. This implies taking into consideration the local culture (discussed below) which, as an element, did not have much value in most of the existing models applied elsewhere (see chapter 2).

6.3.2 Culture and Skills

Local culture is another indispensable element that should be taken into account when designing an e-business model. As for Egypt, people are reluctant to change, which may be attributed to the normal fear of the unknown and/or lack of information (El Shenawy, 2001). The Egyptian basic thinking has not changed (Aljifri, et al. 2003). So, employees, operators, and managers should always be well aware of the new system. As observed in the port, reluctance to change might be one of the reasons that the Web-Based system did not achieve its objectives properly.

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Personnel should also be informed and kept updated all the time to fully understand the new technology in order to be able to adapt to it. They should obtain adequate training to deal with, and apply, the new technology. In Egypt, there is also an inappropriate attitude of working in teams that should be remedied (Mubarak, 2004). Many Egyptians have difficulty in working in teams.

Culture plays an important role in the harmonization between global and local levels. The English language as a global language for most international trade information forms another barrier for the Egyptian as an Arabic-speaking nation. It is the responsibility of the companies and the government to increase the use of the English language and provide and facilitate some cheaper English courses for employees and users. Additionally, people in different countries can value the same issue differently; it depends on the influence of culture.

The increased complexity of logistics and global supply chain management and the increased need for compliance with environmental and safety legislation in a highly-priced competitive market will place vast demands on the supervisory management and technical and professional staff in the field (Reynolds, 2001). High quality and qualified recruits are needed and intensive training courses should be designed. The rising impact of technology in the field of logistics and the supply chain has highlighted the relatively low skills levels that exist and the need for higher level skills in the workforce (Reynolds, 2001).

Human Resources

An UNCTAD report of 2011 stated that the e-business application could turn into a crisis in the developing countries due to the lack of human capacity to cope with the new development. The report described the human resources in developing countries as inappropriate for the e-business application. The human resources needed for the application of an e-business model are divided into three main levels (Chesbrough, 2007).

- *Level 1 - Information Technology Staff:* They should be highly qualified and skilled and should have full awareness of the information technology systems. Training will be provided internally for the employees, and the technicians. The consultants will be either outsourced or newly hired.

- *Level 2 – Support Personnel:* They should also be highly skilled; these are the decision-makers. Training will be provided for them either internally, i.e., inside the port itself, and/or externally in local institutions, especially the Institute of International Transport and Logistics of the Arab Academy for Science and Technology and Maritime Transport. This Institute can offer customised training courses as required by Alexandria Port Authority. The training courses could also be provided externally at any of the international training institutes that specialize in the fields of management, engineering, planning, and operations. Courses at all levels like the preparation level, the transformation level and the implementation level are required.

- *Level 3 – Operators:* These are the most important group and the majority as well. Training is highly recommended internally in the Information Centre of Alexandria Port Authority, and in the General Administration of Information and Decision-Making Centre, and/or externally as well. The operators need to have the necessary maritime background as well to be able to adapt to any changes. This is a problem that came out within the data analysis in chapter 5. The operators also need to be trained on how to think and act at the international level.

These are the human resource required to run the e-business system. There are other groups of human resources needed to be highly skilled and qualified such as the employees at the different departments in the port; customs employees, health and safety employees, quarantine employees, stevedoring operators, and cargo handling operators. Staff across the port supply chain operations from warehouse staff to professional logisticians will be all in need of skills at higher levels than is currently the norm. They are in need to be trained on the e-business transactions, gaining new logistics skills and learning how to adapt to change. The port needs an

orientation to the new concepts, planning, and preparation in order to offer the services to its customers to draw a broad picture of skills and competencies needed for the port supply chain processes and e-business management. As observed this skills shortage is very costly to Alexandria Port, reduces its productivity and accordingly reduces its competitive advantage. Alexandria Port staff community also need to have workshops on team work to get used to it and to realise its importance. The data analysis discussed in chapter 5 showed that the current operators did not have the sufficient shipping background to run the system adopted by the port. Training for information and communication technology is also required for the employees involved in the e-business transactions. However, with proper training for employees, operators, and managers it is possible to increase:

- Productivity of the port,
- Profits and revenues,
- Staff motivation,
- Customer satisfaction,
- Staff retention and attendance at work and
- Efficiency and competitiveness (Mubarak, 2004).

Another two elements have been observed. These are:

- *Local culture:* people mentality, habits and the way of doing business in Egypt require a change to be able to provide a better and faster service. Local culture needs to be highly appreciated when applying e-business.
- *Logistics and ICT skills:* the logistics skills of the cargo handling operators need to be upgraded to match the speed of the e-business application. The operators who handle the port community information also need to have the necessary skills to run the e-business system with the sufficient maritime background. These observations have resulted in figure 6.3 below.
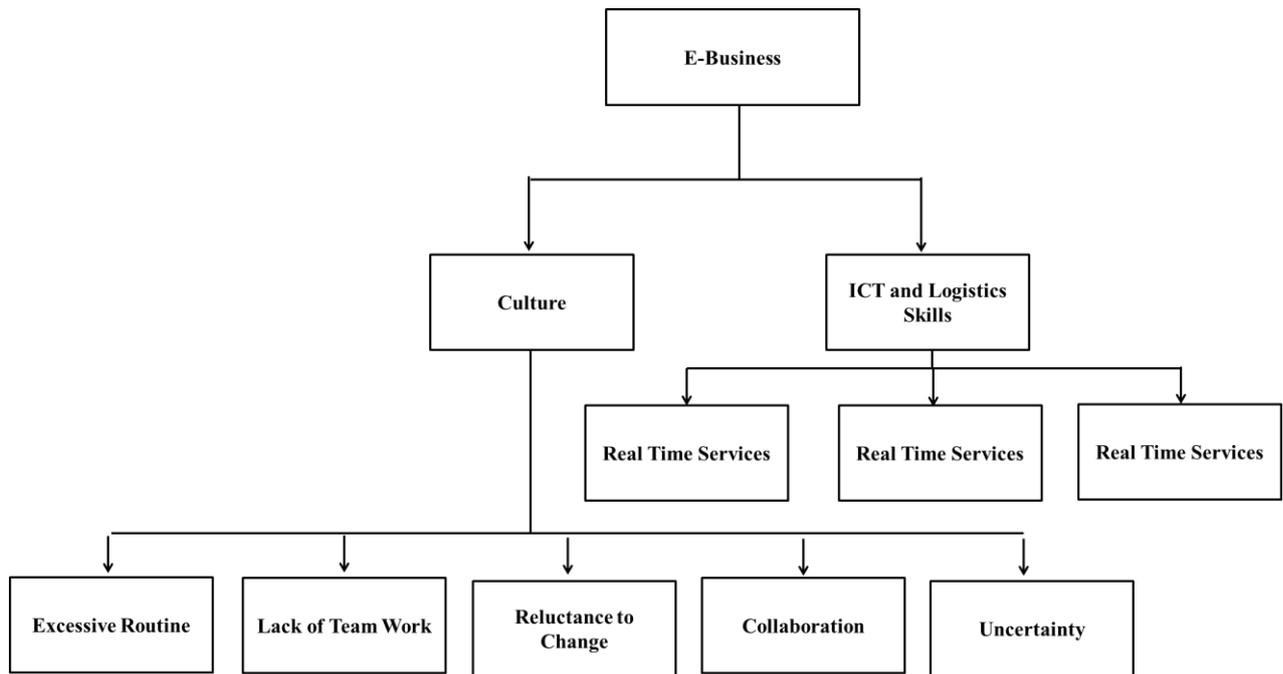
Figure 6.3 – Culture and Skills Considerations for E-Business Application

6.4 Customer Focus for Alexandria Port

The external customers and the internal customers of the port form the port community. The customers' relationships between the port community is the focus of this section. It also focuses on the e-documents exchange between the port community. The external customers mainly address the stakeholders that exist outside Alexandria Port. These are customers like the shipping lines, the shipping agents, the freight forwarders and the exporters and importers. The co-operation between these customers and Alexandria Port authority is required to apply a successful e-business model. As discussed in chapter 5 one of the problems of the application of the Web-Based system was the lack of co-operation and collaboration between the parties involved. The internal customers represent the customers that existed inside the port such as shipping line agents' and customs agents, freight forwarders, importers and exporters and/or the cargo owners. As observed and analysed (see chapter 5 for more details) the external and internal customers are required to provide full co-operation, collaboration and understanding of the

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technological stage during the preparation and implementation phase to overcome any expected problems.

Applying an integrated e-business system in Alexandria Port can positively affect customer relationships. As observed, this can be achieved through: **1)** Improved services provided by the port through reducing the wasted time in repeated steps of processes or in confusion caused by using two systems (see chapter 5). **2)** The real time information can also enhance the customer services. **3)** The e-business system maintains stronger relationships with all of the port community which includes the existing customers and the ability to attract new customers. **4)** Decreasing costs by eliminating the unnecessary steps and saving time and by reducing the unnecessary manpower costs. **5)** The integration and collaboration the e-business system creates ensure continued communication around the clock. This, in its turn reflects again the importance of the collaboration of all the parties involved.

The e-documents exchange created by the implementation of e-business enhances the satisfaction and fulfils the needs of the port community. This increases the ability for every member in the port community to co-operate efficiently with all other partners in the supply chain operations. E-document services provided by the implementation of an integrated e-business system can be, for examples but not limited to the following:
- Sending and receiving the bill of lading
- Sending and receiving manifest,
- Sending berth request and receiving reply,
- Sending and receiving vessel declarations.
- Receiving invoices.
- Sending e-payments.
- Sending request and receiving replies for permits and visa issuing, if any.
- Finalising customs processes
- Receiving the release letter of the cargo.

All of these e-documents and more require the collaboration between all the port community and all the supply chain partners.

E-document exchange also increases the responsiveness of the port and provides faster, accurate and more efficient operations due to the reduction in the consumed time with the paper documents. In addition, it ensures no replication in the process as the access will be available for all authorized and involved parties. In order to achieve success with e-documents exchange, the system has to be simple, flexible and easy to use to allow the transmission and to facilitate efficient processing. A common understanding of the exchanged document between the port communities is also required to achieve the goal of the system. The end-to-end trust workflow is ultimate by what requires a reliable and secure platform. The e-document exchange through the implementation of e-business needs to be a free-to-use open source tool between all the involved parties. As observed in Alexandria Port and according to the Egyptian regulation discussed above, e-business analysis and current document systems need to be compliant with this legal framework.

Based on the data analysis and the study of the current document systems in Alexandria Port, the e-document exchange needs to be unified, simple, and trustworthy and provide services 24/7 to improve the services provided and increase efficiency which maintain the customer relationship. The lack of collaboration resulted in various problems for the web-based system (see chapter 5). Figure 6.4 is derived from these observations.
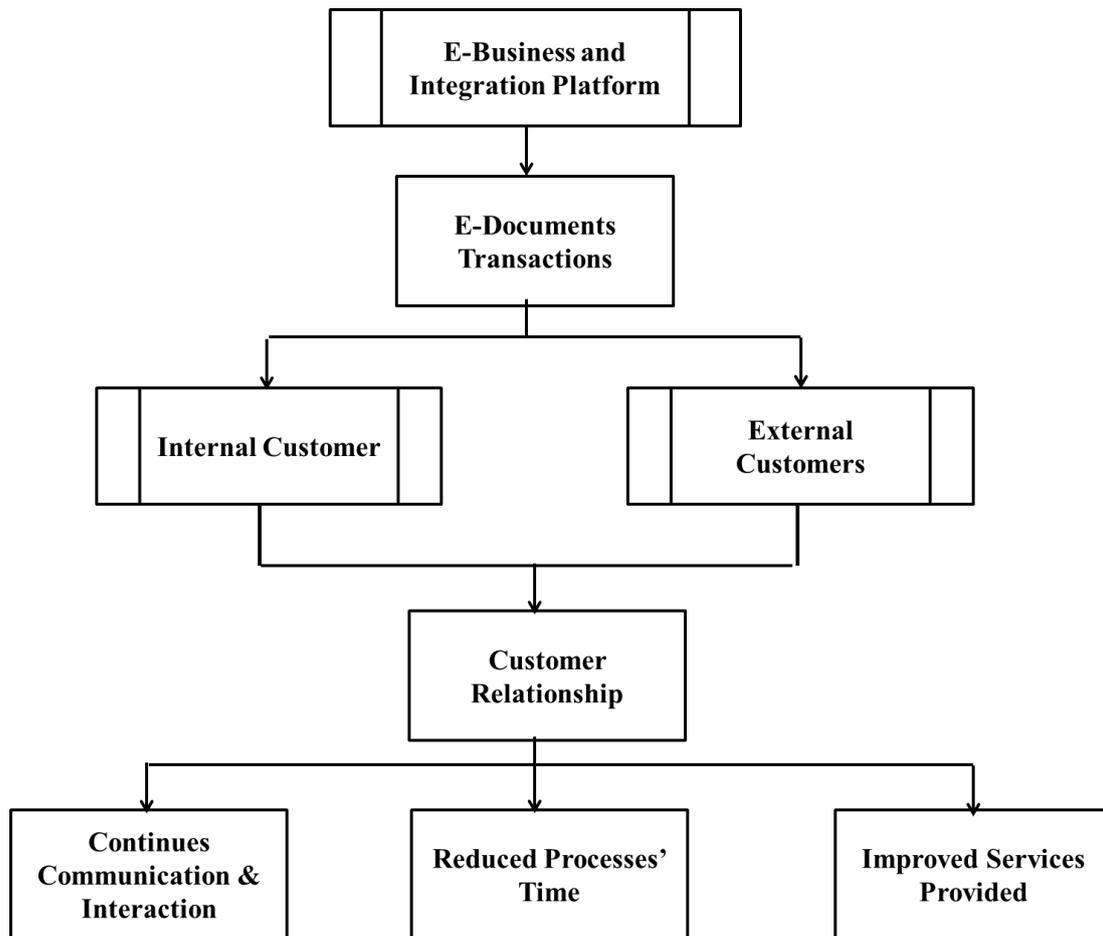
Figure 6.4 – Customer Focus for Alexandria Port

6.5 A Generic E-Business Model for Alexandria Port

As a conclusion to the previous part and to the analysis of the data collected through observations and interviews, the research proposes a conceptual e-business model. The model name is GEMA which stands for Generic E-Business Model for Alexandria Port. It comprises of three main sections. These are: the Infrastructure and related costs, the local customisation requirement and the customer focus for Alexandria Port. Figure 6.5 represents all three sections which have been detailed earlier.
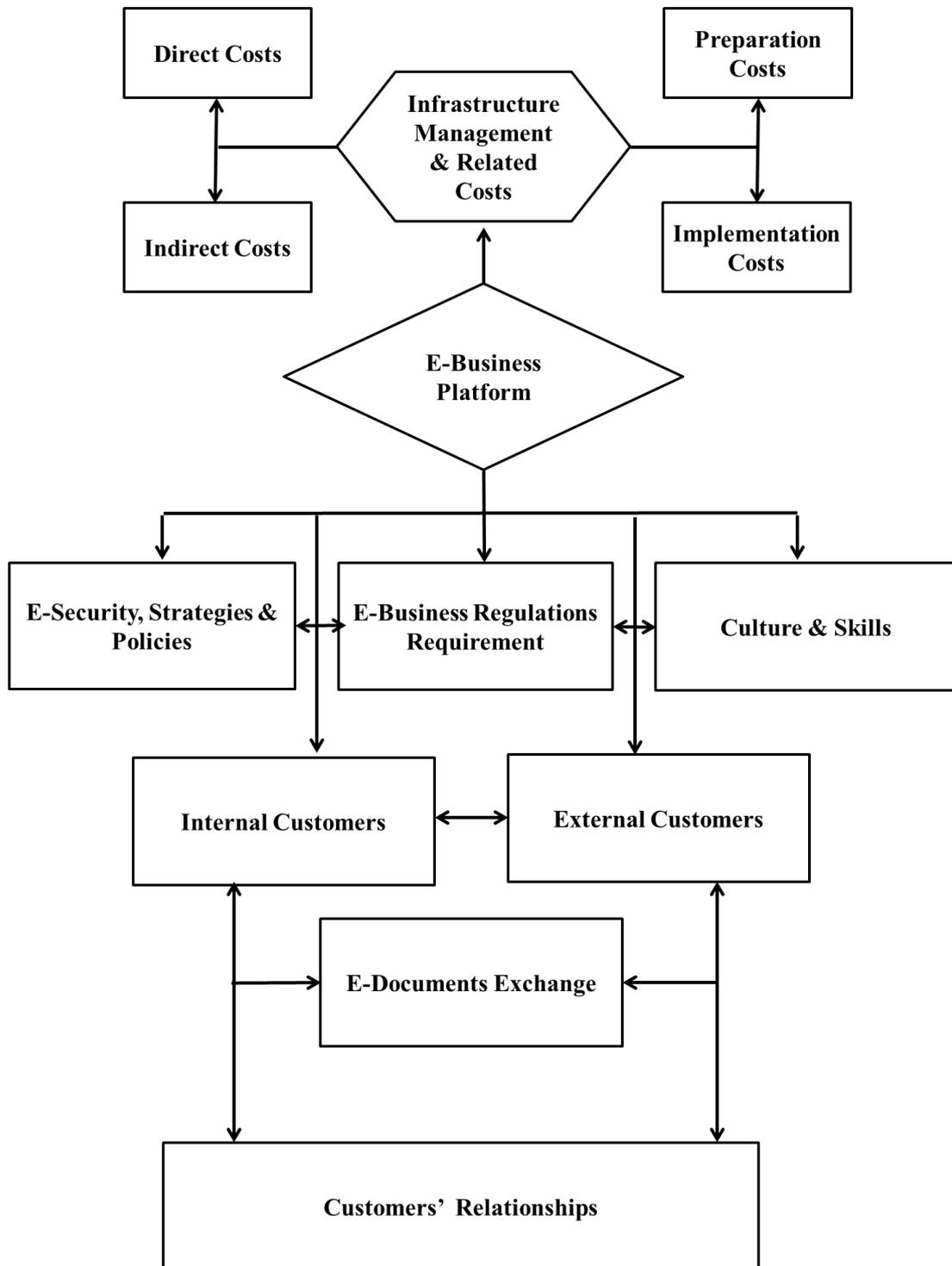
Figure 6.5 – A Generic E-Business Model for Alexandria Port (Conceptual Model)

6.6 Analysis of Responses Related to the GEMA Model

With reference to the analysis of responses discussed in chapter 5, the following section analyses the questions contained in the questionnaire related to the GEMA Model. Responses to the first group of questions was discussed and analysed in detail in chapter 5.

6.6.1   Responses to the Second Group of Questions

The second group of questions in the interviews comprised eight questions. The main aim of this group was to validate and investigate the necessity of the GEMA elements. All participants had positive responses towards the GEMA elements. The questions are: (4 to 11 in the original questionnaire).

1. Having a proper and fully automated system in the port creates an infrastructure management problem.

2. The infrastructure creates costs that are considered another related problem.

3. Data security is one of the constraints when applying a proper automated system.

4. Reliability and continuity of the service are negatively affecting the automation process.

5. Local customised strategies and policies that suit the local environment affect the application and the use of the system.

6. Culture is another factor that affects the implementation of a fully automated system.

7. Computer and information and communication skills are considered one of the obstacles.

8. Logistics skills constitute another constraint.

This group of questions were scaled as: strongly agree – agree – disagree – strongly disagree. Table 6.1 below summarises the responses for the three categories i.e., Shipping and Customs agents, shipping lines and freight forwarders (30 companies where one response was considered for each company) of the questions from 1 to 8 referred to above. Table 6.1 also presents some of the respondents' exact words.

Table 6.1 – Reponses of the Second Group of Questions (from 1 to 8)

Element	Scale				Remarks
	Strongly Disagree	Disagree	Agree	Strongly Agree	Some of the Respondents exact Words
1. Infrastructure				83%	- Privatization is required
			17%		
2. Related Costs				83%	- The port has to consider how to generate revenue to have the sufficient funds for the technology
			17%		
3. E-Security				93%	- The most of users concerns
			7%		- Awareness is needed
4. Reliability and Continuity				90%	- New strategies and policies are needed
			10%		
5. Customisation				97%	- It is the main issue
			3%		- It should be considered - The routine is a serious problem
6. Culture				100%	- Needs a change
			-		- People has to lean to accept and adopt to changes
7. ICT Skills				93%	- Awareness is required before skills
			7%		
8. Logistics Skills				77%	- It is needed to match the faster processes.
			23%		

The majority of the respondents in the three categories of surveys agreed for the need to include all the elements suggested in the GEMA model with high consideration to the local customisation. Designing the questions pertaining to the elements identified the following considerations:

- GEMA necessitates infrastructure change and requires costs.

- Data security is an essential element that has to be considered by giving the users of the GEMA enough guarantees that their data would not be altered or accessed by any unauthorized entity.

- Reliability and continuity of the services are crucial especially with the existing problems of the Web-Based semi-automated system.

- Local customised strategies and policies are vital elements for the system to survive with the local environmental peculiarities.

- Creating awareness, changing the way of thinking and the habits of doing the work give culture top priority.

- Computer information and communication skills are significant elements, taking into consideration that operators have the necessary shipping industry and international business background; being just computer operators is not enough. These skills could be acquired through intensive training especially in logistics skills.

The responses analysed above have supported the design and the choice of the GEMA Model elements. The analysis sustained a system change with one integrated system. It also reflects the desire of the port community and the parties involved to apply an e-business model. The e-security was one of the respondents' concerns as they wanted to be sure that their private information and data would not be altered or hacked. Their initial concern was getting a reliable and continuous e-service. Providing the essential needs for ICT skills required respondents to highlight that upgrading of the logistics skills for the port operators and workers should be associated with the e-business application. They also believed that the Egyptian culture has to be wisely dealt with.

6.6.2 Responses to the Third Group of Questions

The third group of questions comprises five questions. The main aim of this group was to investigate the obstacles of the societal aspects and the legal constraints. The responses are divided into two groups: one group was positive and the other group was negative with respect to the laws that regulate e-business in Egypt.

This group of the questions comprises five questions (12 to16 in the original questionnaire). The questions are:

9. To what extent do you think the Egyptian regulations that govern e-business affect the implementation?

10. Do you think the legal issues associated with applying e-business in Egypt require a change?

11. To what extent do you believe that the port community collaboration affects the process of applying a fully automated system?

12. To what extent do you think specialized training programme for all the involved parties affects the usefulness of this system?

13. Do you think Alexandria Port has technological difficulties which hinder the application of fully automated system?

This group of questions are uses two different scales as shown in the table below. Table 6.2 summarises the responses from this group of questions and presents some of their exact words

Table 6.2 – Responses to the Third Group of Questions (from 9 to 13)

Element	Scale				Scale				Remarks Some of the Respondents exact Words
	Strongly Disagree	Disagree	Agree	Strongly Agree	No Effects	Little Effects	Some Effects	Affects a Lot	
9. Egyptian E-Business Regulations								90%	- It very difficult - As a start, e-signature has to be activated
							10%		
10. Legal Changes				90%					- But how? - Decision takes forever
			10%						
11. Collaboration								93%	- It is required from the beginning
							7%		
12. Specialized Training Programme								87%	- Professionals are needed - Workshops is also needed
							13%		
13. Technological Difficulties			70%						- The technology can be bought, but people! - Outsourcing - Hiring experts
		30%							

The majority of the respondents stated that the Egyptian regulations relating to e-business are negatively affecting the implementation phase and thus a change is both required and essential. For example the electronic signatures law which has not been activated since 2004 (as mentioned earlier in this chapter).

The minority of the respondents were having negative thoughts and wondered how this problem could be solved. They assumed and believed that it wouldn't be solved soon as the Egyptian government does not have the ability for fast decision making. They referred back to the collaboration and co-operation between the port and stakeholders as a fundamental aspect in both the preparation and the implementation phases to overcome this problem. The respondents believed that one of the ways to overcome the lack of e-business Egyptian regulations is to collaborate to set and agree upon certain standards of doing business to deal with the current legal situation. In addition, they did not want technological difficulties, they stated that the technology can be bought, but the people's ability to use the technology is the main issue.

6.6.3 Responses to the Fourth Group of Questions

Group 4 of the questions are scaled as used with groups 2. In addition to the scale, "not at all – little – some and fully" are used. Questions 14, 15, 16, and 17 form this group (17 to 20 in the original questionnaire). The main aim of this set of questions was to examine the expected result or the outcome of the GEMA Model. These questions are:

14. Do you think the proposed model is expected to reduce operations' time and cost in Alexandria Port?

15. Do you think such a model would increase the global competitiveness of Alexandria Port?

16. To what extent do you think e-business enhances customer's service?

17. To what extent do you think e-business maintains customer relationships?

The majority of respondents were confident that the expected results would be to reduce time consumed. They believed that the application of e-business in general and the GEMA Model in particular could shorten the documentation cycle from days (18 days for import after the application of the Web-Based system) to just one day. However,

For this to be achieved, the respondents set a condition that the other problems like the logistics and ICT skills would be solved. Accordingly, it will speed up the port supply chain operations processes and minimize procedures, which will result in reducing the vessel time in port to the minimum and so increase the competitive advantage of the port. Also, maintaining customer relationships through enhancing the quality of the services provided is one of the expected outcomes, which definitely increases the port's productivity. They believe that the GEMA Model is an integrated system that covers all the procedures among the different authorities at the port. They also were in favour of using one fully automated system that the GEMA Model presents.

Table 6.3 summarises the responses to this group of questions and some of the respondents' comments.

Table 6.3 – Responses to the Fourth Group of questions (from 14 to 17)

Element	Scale				Scale				Remarks
	Strongly Disagree	Disagree	Agree	Strongly Agree	Not at all	Little	Some	Fully	Some of the Respondents exact Words
14. Reduces Time and Costs				93%					- Increasing the retune on investment
			7%						
15. Increases competitiveness				90%					- It has to be gained at least in this geographical area
			10%						- Essential to participate in the international trade
16. Enhances Customer Services								83%	- People has to change first
							17%		
17. Maintain Customers Relationships								87%	- This is really needed
							13%		

Questions 14 and 15 of the questionnaire focused on whether one fully automated system like the GEMA model could overcome the problems raised by using the current two systems in Alexandria Port (the manual documentation system and the semi-automated web based system). 100% of the respondents were for a single integrated system. Time consuming, work duplication, clients' confusion and increased transactions costs due to long procedures and repetitive steps are the main issues that the GEMA model overcomes. Upgrading the infrastructure before the implementation of GEMA overcomes the problem of continuity of services to be 24/7 available for all users. The pre implementation phase collaboration with the parties involved solves the obstacle of the software and delays in the application. After the implementation phase, collaboration helps to solve any problems at the time. Choosing the host company through a general bid for all specialized and professional companies and not through the direct order also helps in solving software problems. It also helps in an indirect way by improving the current applied system.

Applying the GEMA model shortens the time consumed and the time wasted to finalise the processes using the manual documentation system simultaneously with the semi-automated system especially, when there are many stakeholders involved. Meanwhile, the GEMA restores the process duplication using the semi-automated web based system by dealing with one fully automated system, i.e. the GEMA model.

6.6.4   Responses to the Fifth Group of Questions

The final group of questions is group five which investigated the other considerations that should be taken into consideration when introducing the GEMA.

This group of questions comprises three open-ended questions. Questions from 18 to 20 form this group of the questions (21 to 23 in the original questionnaire). The main aim of these questions is to foster awareness of any other considerations which must be taken into account or emphasised through descriptive answers from the interviewees. They are "of the open-ended type of questions used to support the previously gathered data and to expand the depth of data gathering" (Tellis, 1997). These questions are:

18. What other barriers might impede the implementation of a fully automated system?

19. Are there any other elements you would like to include?

20. What other benefits do you hope will result from such an automated model?

The responses of this group have been categorised into three surveys, each of which represents different perspectives from the port community as follows:

- *Survey 1* represents the shipping and customs clearance agencies standpoint (15 companies).

- *Survey 2* discusses the shipping lines point of view (7 companies).
- *Survey 3* explains the freight forwarders standpoint (8 companies).

The data collected from the three surveys are discussed below.

18. **What other barriers might impede the implementation of a fully automated system?**

Survey 1 The shipping agents and Customs clearance agents. Their responses are:

- **Acceptance of change***:* 40% of the respondents again raised this issue (6 out of 15 companies) said that the degree of how people may respond to the changes should be considered as a barrier. Egyptians in general and the port employees in particular are reluctant to change. Most of them suggested enforcing the implementation of the e-system in order to overcome this problem.

- **Government decision–making***:* 53% of the respondents (8 out of 15 companies) agreed that e-business rules will not change in the near future because the electronic signature dating back to 2004 has not yet been activated.

- **Routine***:* 73% of the respondents (11 out of 15 companies) declared that the port suffered from routine for decades. They suggested specific training courses with a final assessment must be a solution for this problem while 13% said that training would also solve the problems of awareness and professionalism. Another 14% stated that the customized training courses could also solve the problem of the port employees' replacement.

19. **Are there any other elements you would like to include?**

Most of the respondents, (93%) stated that there are no more elements other than those mentioned. The minority (7%) said that the qualifications of employees and operators should be considered. They also added that awareness of the e-business benefits would be essential.

20.   What other benefits do you hope will result from such an automated model?

The majority of the respondents stated that time and transactions cost reduction would lead to other benefits like increasing the port productivity. The minority also mentioned that faster supply chain operations and more productive work would make Alexandria Port rank as one of the best ports in the world. Faster supply chain operations will increase the whole processes which reduces the congestion in the port and accordingly increases the vessels turn round.

Survey 2 The shipping lines, their responses are discussed below:

The responses to the first question of this group (question 18 above) did not differ much from the responses in survey 1. The only difference was that 43% of the respondents (3 out of 7 companies) added that one of the barriers is the old handling equipment as an element which might hinder providing speedy services, and which was considered one of the technical problems.

Responses to the second question of this group (question 19 above) were: 29% of the respondents (2 out of 7 companies) stated that the language skills in global operation are considered a barrier during the implementation phase. 57% of the respondents (4 out of 7 companies) confirmed that there were no other considerations other than those mentioned. Another 14% (only one company out of the seven companies) declared that the qualification of the operators could be a barrier due to low salaries offered by the port.

Responses to the third question of this group (question 20 above) were: 71% (5 out of 7 companies) stated that there were no other expected benefits other than time and cost reduction which they need most. 29% of the respondents confirmed that port productivity will increase and the number of vessels calling at the port will increase.

Most of them agreed that upgrading skills and qualifications and to changing the thoughts of employees and operators to accept the changes needed were two issues that should be considered from the beginning. Few respondents stated that Return on Investment (ROI) will increase and that reducing the prices of the imported commodities in the local market could be achieved as a result of reducing document exchange costs in the port.

Survey 3 The Freight Forwarders (8 companies).

The majority of respondents raised the same matters as in surveys 1 and 2, with the exception of two issues which were:

75% (6 out of 8 companies) said that unifying the software for all users would be a problem due to the lack of collaboration during the preparation phase. The need for a professional host centre which translated one routine into another eligible to both exchangers and that had efficient tools and fast decision–making was essential. The other 25% (2 out of 8 companies) different comment was that the port had to be privatized to run an efficient e-business system without any interference from any public authorities or the government. Most of them insisted that priority should be given to culture as a crucial element contained in the e-business model.

6.7 Conclusions

Alexandria Port has various international trade barriers. One of these is the documentation flow which is the main focus of this research. The analysis (see chapter 5) indicates that the port's manual documentation flow hinders the entire supply chain operations and that it should be improved to eliminate these barriers. It consumes time and requires too many procedures and formalities. International trade and cross border business normally create costs and these long procedures add more costs especially at the customs phase as mentioned in chapter 5. This additional cost hinders the supply chain operations, the global business of import and export and the competitiveness of the port.

The newly introduced Web-Based Semi Automated System of the port has its own difficulties and deficiencies (see chapter 5). A lack of collaboration during the preparation phase created software and other problems during the implementation phase. More awareness and different skills at all levels and sufficient training are required. A system change is needed to support the introduction of the GEMA model. The majority of the respondents agreed to the suggested model's elements. They all agreed to giving priority to culture and training to cope with the Egyptian environmental peculiarities. The Web-Based system did not achieve the expected or planed objectives. The system users are sometimes confused by the combined old manual system and the new Web-Based System.

It is to be noted that most of the company managers surveyed were well aware of the importance of an e-business model which incorporates elements that require local customisation to overcome the Egyptian environment peculiarities. A summary of the e-business requirements and the contribution needed to achieve the minimum expectation of the developed GEMA e-business model are shown in the following table:

Table 6.4 – Basic Requirements for a Successful E-business System for Alexandria Port

Level	Requirements	Contributions to achieve the objectives for Alexandria Port	
Implementation	Direct implementation for the majority of participants with only a transition period for the old systems	The e-system will be applied and enter into force at a preselected date, after which the old systems is not valid anymore. So if coordination takes place between all the parties involved at the preparation phase, then the stakeholders should have a predefined date to start the full use and implementation of the	- Full collaborative stakeholders - Continuity of service - Professionalism - Transferring the documents flow to data flow

Level	Requirements	Contributions to achieve the objectives for Alexandria Port	
Implementation	Efficient service provider	system; the old systems will be omitted and the new one take over. An efficient service should be guaranteed by professionals and experts to maintain the continuity of services	
Logic	Faster decision making Professional operators	With e-business, data and information passes from one person to another immediately that support the faster decision making, which in its turn requires professional operators and managers	• Faster utility • Faster processes time
System	Designed feasible information exchange system Guaranteed authorization	Securing information is one of the requirements for successful application for any e-business system. Since Egyptians question e-security issues, then this should be solved through workshops to explain how the system is actually running and what the e-security offers	• Accuracy, transparency and visibility • Faster implementation
Data	Interoperability of data interoperability of business	Interoperability of data and business is essential to maintain data exchange and to fulfil the business services requirements	• Faster awareness • Faster data handling
E-Document Exchange Platform **E-Document Exchange**	Secure Reliable simple	The e-security policy should guarantee the data and information against hacking or alteration. Reliable, the system should provide 24/7 uninterrupted services.	• e-security and authorisation system • continues e-connection • collaboration and study of the business

Level	Requirements	Contributions to achieve the objectives for Alexandria Port	
Platform		Simple as easy to fill whatever forms online	requirement
Technology	Infrastructure Advanced equipment	New infrastructure is required to operate the e-system like servers and software, along with advanced computers and hardware.	• New technology implementation • Reliable e-connection
Skills	ICT skills Logistics skills	ICT and logistics skills are crucial for operating the e-business system with the background of maritime transport to be flexible and faster decision makers to maintain faster services.	• Better errors handling • Professionalism

Table 6.4 above shows that there are certain requirements which must be fulfilled to implement a successful e-business system in Alexandria Port that match the Egyptian environment. The culture element included in the GEMA model will be taken into consideration through achieving these requirements and the well-organized collaboration between all the parties involved right from the very beginning, which will help overcome the difficulties of the rules that regulate e-business in Egypt. The collaborative framework enhances the implementation of e-business in the port community as this original investigation has shown.

Organizations can gain competitive advantage when having efficient supply chain operations. One way of providing this efficient service is through applying new technology that should be kept up-to-date all the time. The technology of applying e-business, especially in ports or in any productive organization, is of great importance particularly with globalization and the internet concepts because this technology helps to reduce documentation flow time and transaction costs. Nevertheless, e-business has its own costs which are categorized as direct and indirect costs and

discussed above. Organizations should work on reducing these costs from the outset if they seek to have an efficient and profitable e-system. They also have to get their in-house IT department parallel with outsourcing the IT maintenance and expertise. Training courses are considered as one of the components that should be taken into account to upgrade the skills of the organizations' employees. Appropriate software, hardware, technicians, logisticians and support teams, and a data centre are critical prerequisites for e-business.

The GEMA Model is a general model that could be adopted in any similar situation by considering the environmental peculiarities and the local customisation. In Alexandria Port, the GEMA Model gives great value to the local culture and suggests local customised strategies and policies to overcome the difficulties in the application phase.

The literature review necessitates a modification for the GEMA Model by adding an additional element which is the infrastructure and its related costs. It also demonstrates that no existing e-model has included all the components in GEMA. This supports the contribution of this research to existing knowledge and expertise. The GEMA model's components are; infrastructure management and its related costs, e-security, local strategies and policies, local culture, logistics and ICT skills. The GEMA model takes into account the local regulations to maintain the customers' services and relationships in order to obtain efficient and effective supply chain operations.

E-Security is needed to maintain the trust and minimize risk by guaranteeing the e-security for the parties involved as this will encourage them using the system. It maintains the relationship and remedies the reluctance to change. This increases the number of users.

Local Strategies and Policies and applying the concept of change management through creating alternative plans and enhancing collaborative practices increases in turn the acceptance of the system. Collaboration overcomes the delay in the application and any problems related to the software

High value should be given to the local culture to deal with the negative attitudes in the local environment and this is also expected to increase the chances of success for the new system.

ICT and Logistics Skills training for employees, workers and operators are essential to guarantee the continuous running and the success of the system.

Chapter 7

Testing the Generic E-Business Model (GEMA)

7 - Testing the Generic E-Business Model (GEMA)

7.1 Introduction

The challenge in implementing e-business models goes beyond managing technology. It requires all business partners to match their business strategies, technologies and processes. It also requires full understanding on the managers' part of the changes introduced by using the internet (Wang, et al. 2007).

In order to improve information and documentation exchange of port related supply chains, many ports around the world have developed e-business models or port community systems to provide services more efficiently and quicker (De Lagen and Pallis, 2006) (see chapter 2).

The main aim of this chapter is to test and validate the GEMA Model. The chapter comprises of five sections. Section 7.2 covers the Model's validation. Section 7.3 addresses the theoretical application of the Model and explains how it can overcome the drawbacks of the Web-Based system. Section 7.4 discusses a theoretical comparison between the GEMA Model and the other models in ports and in different sectors followed by a discussion of 'what if scenario' for the application of the Model in section 7.5.

7.2 The GEMA Model Validation

Model validation is about evaluating its usability. It measures to what extent the model matches the real world. Validation also assesses the reliability of the model (Chen, 2003). There are about eight different ways of model validation (Carley, 2002). The one used in this research is processes validation. It describes how the developed model corresponds with the real processes and discusses the effects of the

e-business model on the documentation flow.   Figure 7.1 shows the GEMA Model validation processes.
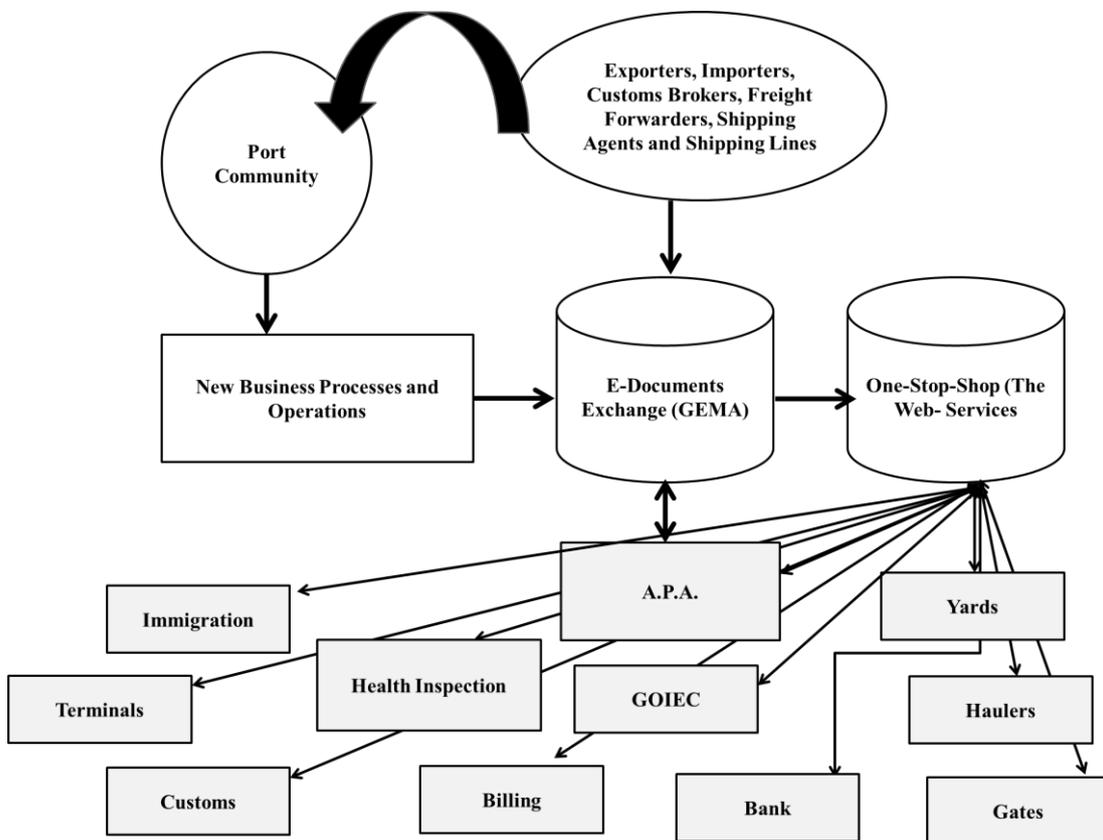
Figure 7.1 – The GEMA Model Validation Processes

Figure 7.1 represents the transformation to the electronic documentation flows and how the GEMA Model can make a change. After the re-engineering of the import and export documentation flow and after the application of the GEMA Model, the business process will change therefore other changes will be required.

One of the requirements for port community members will be to collaborate through a web based service. The e - document exchange will enhance the integration and collaboration between the supply chain partners.   All documents like berth requests, booking, manifest, bill of lading, packing list, certificates, declarations and the release letters will be exchanged through the web. All partners will have access to all information at the same time. They will be all connected, and any partner will be

able to track their own process and accordingly their cargoes. The *one-stop-shop* as a provider of a multitude of services will give a convenient and efficient service and create the opportunity and facilitate the integration. The one-stop-shop is where various requirements can be achieved in one place. Through this one-stop-shop web service, the documents will be accessible for all of the port community after the necessary authorisation is done. Each member of the port community will be able to have timely and accurate information. The system and the one-stop-shop guarantee the integration between the partners involved in just one keyboard click. The members of the port community are divided into the governmental organisation, the service companies and the port traders.

7.3 Validating the Application of GEMA for different Stakeholders

The participants of the port and their role in the supply chain in a general overview are discussed below.

- ➢ **The Governmental Organisations:**
- *Alexandria Port Authority:* to monitor the whole operations and work as a facilitator, decision maker, and a problem solver (if required). It also promotes the exchange of information among members. However, training strategy and staffing policy are strongly needed. It issues the final release letter.
- *General Organisation for Import and Export Control (GOIEC):* to be prepared for export/import quality inspection and for statistical purposes. It is an organisation affiliated to the Ministry of Trade and Industry. It approves the import/export certificate.
- *The Customs System:* the most complex operation and should operate in a fully automated and paperless environment. Tariffs should be generally non-prohibitive and easy to apply to reduce the high transaction costs for importers and exporters which negatively affect the port's competitiveness. The customer needs to previously know the exact fees, so the customs scheme requires upgrading. The Customs Department claims that they are

updating the customs fees on a regular basis; it was observed that this is not the case, the last version of the customs fees have been issued in 2010. It also issues the vessel clearance statement.

- *The Banks:* to accept the e-payment and mark the shipment to be released through the gates.

- *The Ministry of Transportation:* to monitor maritime transport and issue permits for vessel entry/departure. The general authority of Alexandria Port is affiliated to the Ministry of Transportation.

- *The Maritime Safety System:* to prepare and manage safety of maritime navigation in compliance with the international conventions. It also provides navigation aids and approves related permissions and certifications.

- *The Cargo Monitoring System:* to prepare the appropriate cargo handling equipment and direct the cargo wither in yards, warehouse or directly released off the gates.

- *Quarantine Inspection System:* to inspect the cargo and issue the official certificate indicating that the cargo is free of pests and insects. The health inspection is also valid for passengers and crews.

- *The Police Department:* including immigration, vehicles traffic, criminal inspection, tourism police, civil defence and guarding will have the necessary information as accurate and at the time needed.

➤ **The Service Companies**

- *Trucking Companies:* to be informed and prepared for the cargo movement to reduce terminal congestion.

- *Stevedoring Companies:* to be ready with the appropriate cargo handling equipment at the berth for loading/discharging also to reduce congestion.

- *Warehousing System:* to prepare the stowage plan if the cargo needed storage before leaving the port to keep the terminal and berth clear.

- *Container Terminal:* to be ready for the vessel approach with the appropriate container handling equipment and to stack them if necessary.

➢ **The Port Traders:**

- *Customers:* like exporters and/or importers, they need the facility to send/receive the information and the e-document they need.

- *Shipping and Travel Agencies:* being able to inform their customers and provide them with all the information and keep them updated all the time.

However, validity has two major forms (Cooper and Schindler, 1998) which are external and internal validity. The external validity of the research findings refers to the ability of the GEMA Model to be applied across different places and environments that have similar patterns. The internal validity is limited to the ability of the research model to fulfil what it is designed for. This is to reduce the time related to the documentation flow and accordingly the costs of documents. The GEMA Model is fulfilling the two forms - it is a generic model and applies different strategies that suit other environments. By setting the training courses required for employees, it enhances their capabilities to use the e-technology. In this way the GEMA Model is of more general relevance. The strategies should address each environment by its needs and deal with its peculiarities.

Meanwhile, it should be designed to overcome any difficulties in that environment. It should also provide the necessary e-security measures and precautions, create a trustworthy environment and maintain trust between the parties involved. The GEMA Model can be generalized in other different environments due to its flexible nature. Accordingly, the Model's main aim is to reduce the documentation flow time and to provide a better service in this matter. A complete verification is not intended due to the complexity of the actual application of the GEMA Model in Alexandria Port at this stage. There are some variables that cannot be controlled like the vessels' approach to the port, the process cycle, and the documentation flow. Imposing the application of the GEMA Model to the port's clients is also considered one of the uncontrollable variables and limitations.

The following section focuses on the internal evaluation of the potential for the application of the GEMA Model to the actual procedures, i.e. reducing the documentation flow time of a real operation at the Alexandria Container Terminal and Cargo Handling Company. The GEMA Model overcomes the problems and difficulties arising from using the current port two systems.

7.3.1 The Alexandria Container and Cargo Handling Company Overview

This section is an overview and provides some information about the Alexandria Container and Cargo Handling Company that justifies the reasons for choosing this specific company to validate the GEMA Model. The section is divided into two parts; the first part explains the actual procedures of one operation at the container terminal using the newly adopted Web-Based system i.e., the container handling and clearance phase. The second part discusses how the GEMA Model overcomes the difficulties and problems raised by using the two current systems in the port.

The data has been collected using direct observation through several visits to Alexandria Port and interviews with two of the key persons at Alexandria container terminal (see chapter 4 and 5 for more details). One of them was the Technical Engineer who is responsible for the transformation of the procedures to an electronic procedure; the other was with the Chief Operator who performs the actual procedures of handling containers until they are delivered to the client using the two systems.

The Alexandria Container & Cargo Handling Company is the first specialized container handling terminal in Egypt. It was established in 1984. The company operates two major terminals: the first is the Alexandria Container Terminal at the port of Alexandria and the second is El-Dekheila Terminal at the port of Dekheila. The Alexandria Terminal has 3 berths for container vessels and one berth for RO-RO vessels. The El-Dekheila Terminal started operating in 1996 with one berth which can accommodate three vessels at one time.

*"The company obtained the ISO9002 certificate in February 1998
and the ISO 9001-2000 QMS in the year 2003. It was also granted
the certificate of Occupational Health & Safety Assessment Series
OHSAS-180001/99 in the year 2004".*

(The Company's Official Website www.alexcont.com).

The Alexandria Container Company has been chosen due to the following factors
that create its competitive advantages:

- *Its remarkable competitive location in the East Med. region.*
- *Its competitive location relative to the main sailing routes of
  container vessels in region (diversion distance 32 miles).*
- *Its intermediate location relative to other ports in the region.*
- *Both Alexandria and El-Dekheila ports are connected to other
  ports in the region by a large net feeder.*

(The Company's Official Website www.alexcont.com)

The terminal is equipped with advanced container handling equipment like gantry
cranes, yard gantry cranes, other container handling equipment, heavy, light and
mobile cranes and trucks. As for Alexandria Port, the company is the only
governmental container company inside the port. This is a further reason to choose
it.

The Operational Procedures using the Two Current Systems

The analysis of the data collected from the interviews with the key persons at the
company and from direct observations provides the actual procedures for the
imported containers as shown in figure 7.2.

1. The shipping agent informs the container company about the vessel's estimated time of arrival through an EDI message (few Hours)

2. The freight forwarder (FF) provides all documents and the shipment manifest (Import Manifest) with the discharging plan, if any, manually to the manifest centre and electronically to the Customs Dept. (1½ Day)

3. The discharging operation takes place (2 - 3 Days)

4. The ship's master delivers the bill of lading to the shipping agent (½Day)

5. The F.F. goes to the shipping agent to receive the bill of lading and pays all the fees required (1½ Day)

6. The shipping agent delivers a copy of the payment receipt to the container company to receive the delivery note and the discharging bill (1 Day)

7. The F.F. prepares the customs clearance certificate and brings together the delivery note, the bill of lading, the certificate of origin and a packing list for his shipment (1 Day)

8. The agent delivers the vessel work order number, the yard spot number of the container, the number of containers and whether it is 20' or 40' containers (½Day)

9. The F.F. goes to the Customs Dept. to deliver all the mentioned documents manually to be transferred into electronic version and fill register 46 (2 Days)

10. The F.F. receives a copy of the automated document to be delivered to the port authority to obtain permission for the truck to enter the port (1 Day)

11. The Customs classifies whether the container passes through a green channel or a red channel (few hours)

12. The Customs obtains a manual copy of all documents to compare it with the electronic copy (1 Day)

13. The F.F. pays the customs fees after inspection, if any, and receives the release letter from the Customs (1 Day)

14. The F.F. goes back to the container company to get the permission to release the containers after delivering of the following:
1. The original delivery note
2. The original bill of lading
3. A letter from the shipping agent declaring that he paid all the fees required
4. A copy from the release letter (1 Day)

15. The F.F. submits the release permission to the port gate to input all the data electronically and prints two copies of the outgoing permission; one to be given to the client himself and the other to the truck driver (1 Day)

Figure 7.2 – The actual procedures applied for imported containers using the current two systems from the Container Terminal Standpoint

The analysis of these procedures is as follows:

1. It consists of 15 steps which reflect routine.

2. Many of these steps are repeated. (Steps; 5, 7, 9 and 10 of the figure above could be done in one step) which indicates a waste of time.

3. Lots of the documents are provided and exchanged manually.

4. The Web-Based System is a semi-automated system; accordingly the company is still using the old manual system in parallel with the Web-Based System (that reflects the need for change to one fully automated system).

5. Using the two systems (the manual and the semi-automated) is time consuming.

6. Referring to item 5, the time taken causes a decrease in employees' productivity which increases overhead costs.

7. Using the two systems simultaneously causes confusion to the client.

8. Items 2, 3 and 4 create a source of double work for the company's employees.

The above steps as described normally take between 15 to 18 days as observed.

As noticed from the data collected and from figure 7.2, the only noticeable observed improvement after the application of the new phase of the Web-Based System is the automated message between the shipping agent and the container company.

These weaknesses confirm why an alternative system is needed. The Web-Based System is a semi-automated system and a transformation to an integrated system is needed. The GEMA Model seeks to address this need and this gives weight to the case for its introduction and the consequent reduction of the documentation flow time outcome. It is also designed to overcome the weaknesses raised in the previous section.

Explained below is how the GEMA Model will achieve its expected objectives for Alexandria Port and how it is going to overcome the problems mentioned above.

Overcoming the Drawbacks of the Web-Based System by using the GEMA Model

This section discusses the main components of the GEMA Model from the perspective of how to overcome the weaknesses of applying the semi-automated system. (The GEMA Model components were discussed in full in chapter 6). It focuses on how it can reduce the number of step associated with the above mentioned operation and accordingly reduce the cycle time.

The GEMA Model is an integrated system that will enable the port to withdraw any other old systems and accordingly, it should and could be the only system applied. It generates no duplication of work and no repetitive procedures are created. Good planning at the preparation stage should be put into consideration right from the beginning in order to overcome the problems raised with the parties involved pertaining to software when the Web-Based System entered into force. The lack of collaboration during the preparation phase of the web-based system created software problems and other problems like a delay in the application, messages error and failure of sending or receiving any e-transactions during the implementation phase.

The co-operation between the parties involved during the preparation phase would also eliminate the need for a host company as the latter caused a lot of problems with the web-based system application – referred to in chapter 5. However, Alexandria Port now is dealing with one company as a developer of the Web-based system and as an intermediary for exchanging messages between parties. Since the company is the designer for the Web-Based System accordingly, they observe no weaknesses or drawbacks in the system. This creates problems of its own such as, no improvement or development of the system would take place in the short run.

Note: the company refused a request for an interview to highlight the weaknesses of the Web-Based System. They also refused to participate in this research in any other possible way.

The GEMA Model is a generic model which incorporates general elements that can be identified as common from or transferred to other business models. Other elements require local customisation to overcome the peculiarities of the Egyptian environment which is something not offered by any readymade e-business model, not even by the designer of the Web-Based system.

The GEMA Model deals with the Egyptian culture by creating the necessary awareness of importance of the e-business and the necessity of applying advanced technology to increasing the port productivity and accordingly raises their welfare. Creating this awareness, as one element of the GEMA Model, is expected to overcome the reluctance to change which always results in a delay in applying any new technology.

An e-services centre was established during the application of the web-based system. Logging into it is exclusive for only the employees through issuing security IDs. It has been observed that the centre did not achieve its expected objectives due to the system applied being a semi-automated system. It has a partial effectiveness only with the customs procedures rather than providing services to the whole port. Also, the operators do not have the necessary background of the shipping industry (see chapter 5). The GEMA Model is an integrated system and then it could provide the services from that centre to the whole port.

E-Security should be offered and guaranteed to encourage the parties involved to use the e-transaction and to overcome two issues; 1) hesitating to apply the e-technology, 2) being reluctant to change. However, putting into consideration the Egyptian habits and norms of doing business, customised strategies and policies should be set right from the beginning to overcome all negative attitudes like routine and red-tape, duplication of work and delays. An awareness of the importance of e-business and the benefit of using it should be created by keeping the employees and the port workers well trained and informed. They should have sufficient knowledge to minimize the issue of being reluctant to change; the mentality and attitudes have to

change.   Different skills at all levels and sufficient training should be offered to have skilled personnel and workers to cope with the system.   Workshops on how to run the system are needed.   These workshops are also required to train the port employees on the team work and make them realise its usefulness.   Hiring a professional IT team to run the system is highly recommended (at least at the beginning when the system is launched) with the necessary shipping background to apply the GEMA Model to minimize the operators' deficiencies which was one of the obstacles of applying the Web Based system as evidenced in chapter 5.

Reference to figure 7.2 earlier in this chapter, the same import operation is illustrated in figure 7.3 below using the GEMA Model.
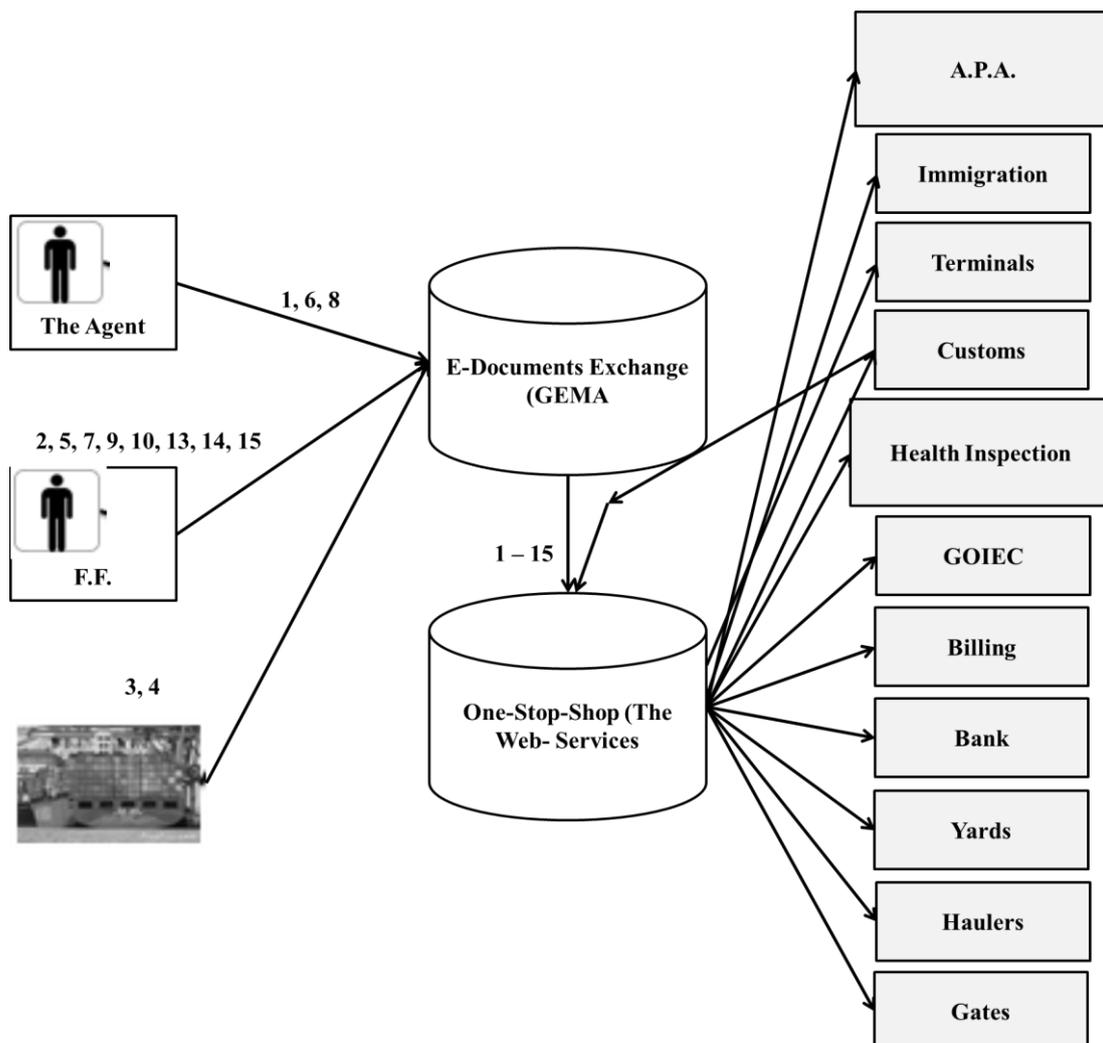

Figure 7.3 – Imported Containerized procedures using the GEMA Model

Figure 7.3 shows that when implementing the GEMA Model – one integrated e-business system – the number of steps can be reduced from 15 to only 5 steps. This reflects a better and faster service provided, however, the GEMA steps are as follow:

1. The agent can perform step number 1, 6 and 8 through the application of GEMA Model and the e-exchange in one step.
2. The freight forwarder can provide all the documents required in one step which represent steps number 2, 5, 7, 9, 10, 13, 14, 15 in figure 7.3.
3. The shipping line can also combine steps 3 and 4 in one step.
4. The customs can reply once to all the involved parties.
5. The one-stop-shop and the web services will automatically send all the information available to the entire member in the port community. Each of which will fulfil his task at a time.

These five steps along with the physical movement of the cargo and after the implementation of all changes required and training courses needed take between 3 – 4 days. To achieve a better result than this, a replacement of the old and outdated cargo handling equipment should take place.

7.3.2 The Processes of Vessel Entry and Departure Using the GEMA Model

Reference to figures 5.1 and 5.4 in chapter 5 that represent the process of vessel' entry and vessel' departure, are figures 7.4 and 7.5 below represent the same processes and the related document flow using the GEMA Model.
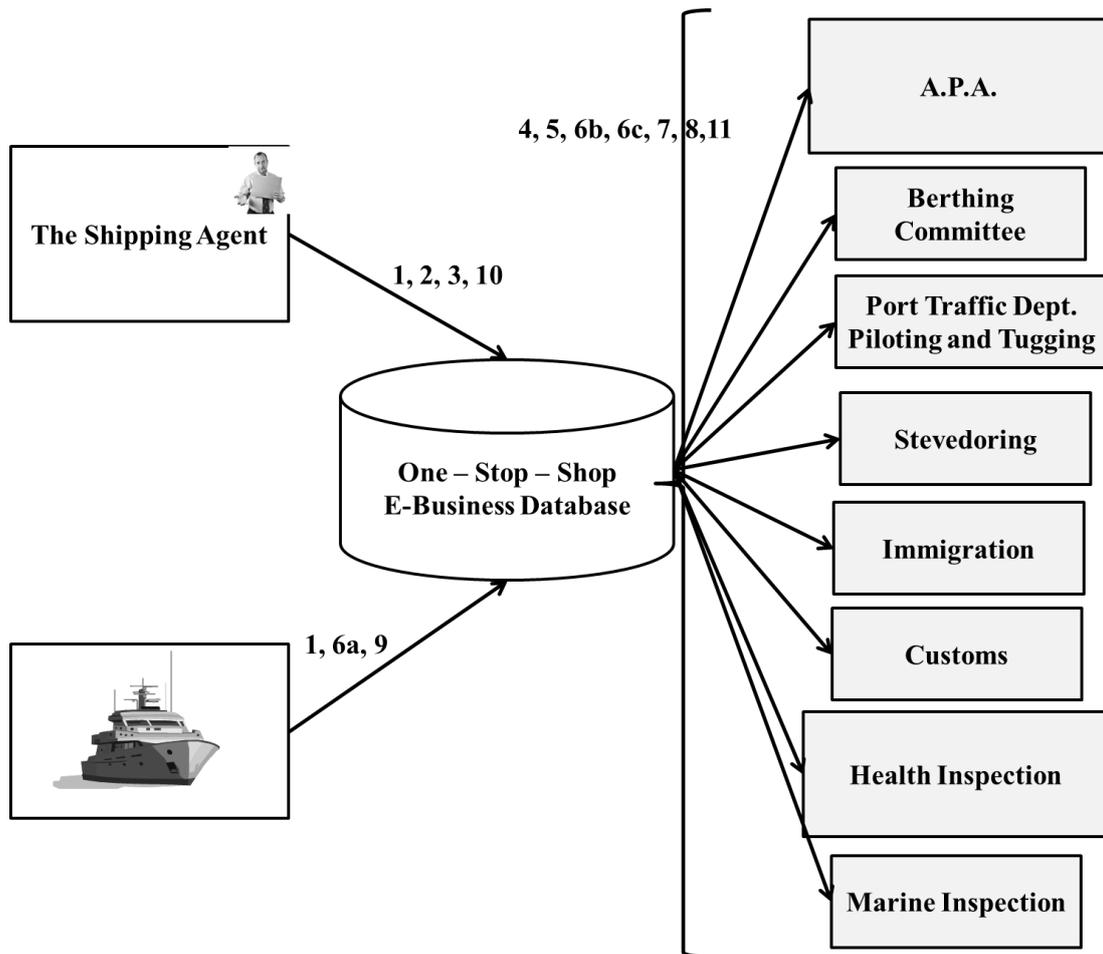
Figure 7.4 – The Vessel Entry Processes using the GEMA Model

It merits mention that the vessel entry process using the manual system of the port needs 11 steps. The above figure (figure 7.4) shows that the same processes can be done in only 3 step using the GEMA Model i.e., one integrated e-business system

1. The shipping agent can perform 1, 2, 3 and 10 in only one step.

2. The shipping line can send all documents required and fulfil the entire task in one step (1, 6a and 9).

3. The A.P.A and all its affiliated authorities can pass and exchange all the documents required in one board click. Then each one performs his task.

All documents are exchanged electronically and every involved party will be informed by the necessary and needed information at the same time. It is noted that

these step using the old systems of the port takes from five to six days.   It is expected that this process takes maximum of half a day when using the appropriate e-business model (GEMA), provided that there is no congestion in the port and that the berth is free.

As for the vessel departure, figure 7.5 below reflects the reduction in the documentation cycle and the related time.
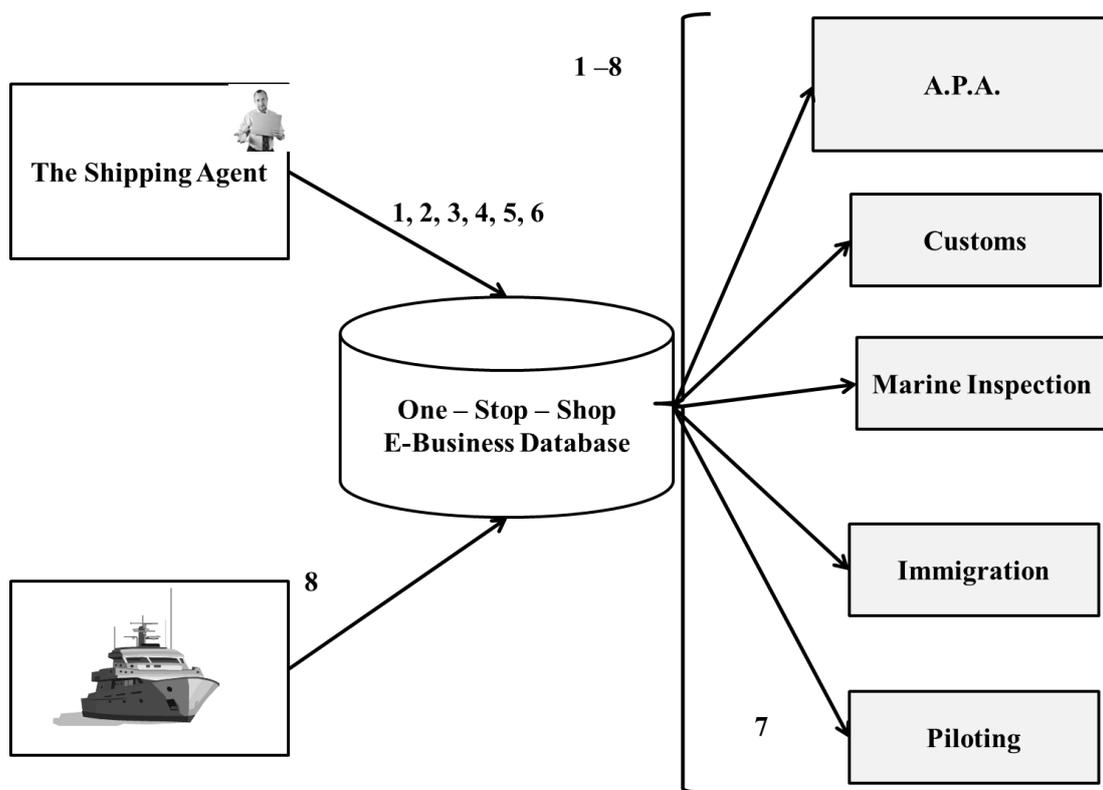

Figure 7.5 – The Vessel Departure using the GEMA Model

It has been noted and as discussed in chapter 5, there are 8 steps of the vessel departure. Using the GEMA Model as an integrated system, these steps can be done in only 2 steps as follow:

1. The agent will send all the documents required to release the vessel from the port in one step instead of personally contacting each involved entity.
2. The pilotage then takes place to guide the vessel's departure.

This operation takes 3 – 4 days using the old systems of the port, but with the GEMA Model it is expected to take just a *few hours* to be completed.

7.3.3 The Process of Imported Cargo using the GEMA Model

Reference to figure 5.5 in chapter 5 which represents the documentation flow for an imported cargo, figure 7.6 below shows how the use of one integrated system can reduce the number of steps and the related time. Figure 5.5 showed that this process takes 10 steps (see chapter 5 for more details) and takes an average of 25 days. However, figure 7.6 below shows that the same process can be done within only 2 steps and the duration time expected is *2 to 3 days* with the physical movement of the cargo using the GEMA Model.
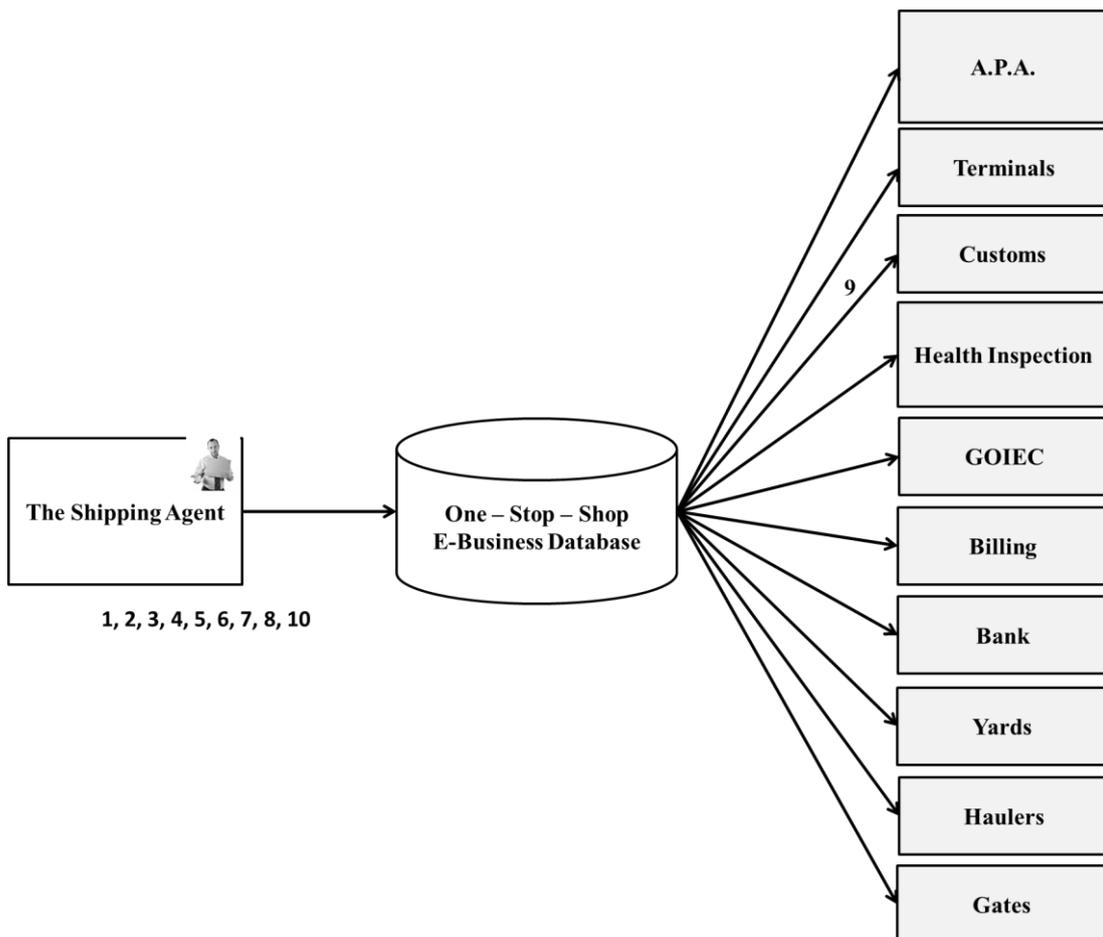

Figure 7.6 – The Imported Cargo Documentation Flow using the GEMA Model

For the imported cargo documentation flow the new steps are as follow:

1. The agent can place all his demands and its related documents and official forms in only one step i.e. step 1, 2, 3, 4, 5, 6, 7, 8 and 10.

2. The Customs Department replies electronically and then the agent can release the cargo.

7.3.4 The Process for Export Cargo using the GEMA Model

Reference to figure 5.7 which represents the manual documentation flow system for export cargo in chapter 5 that takes 10 steps and a duration time around 21 days, figure 7.7 shows the same documentation flow using the GEMA Model. The below figure also shows the reduction in the number of the steps that come down to 2 steps and the time expected to finish this process is *between 2 and 3* days.
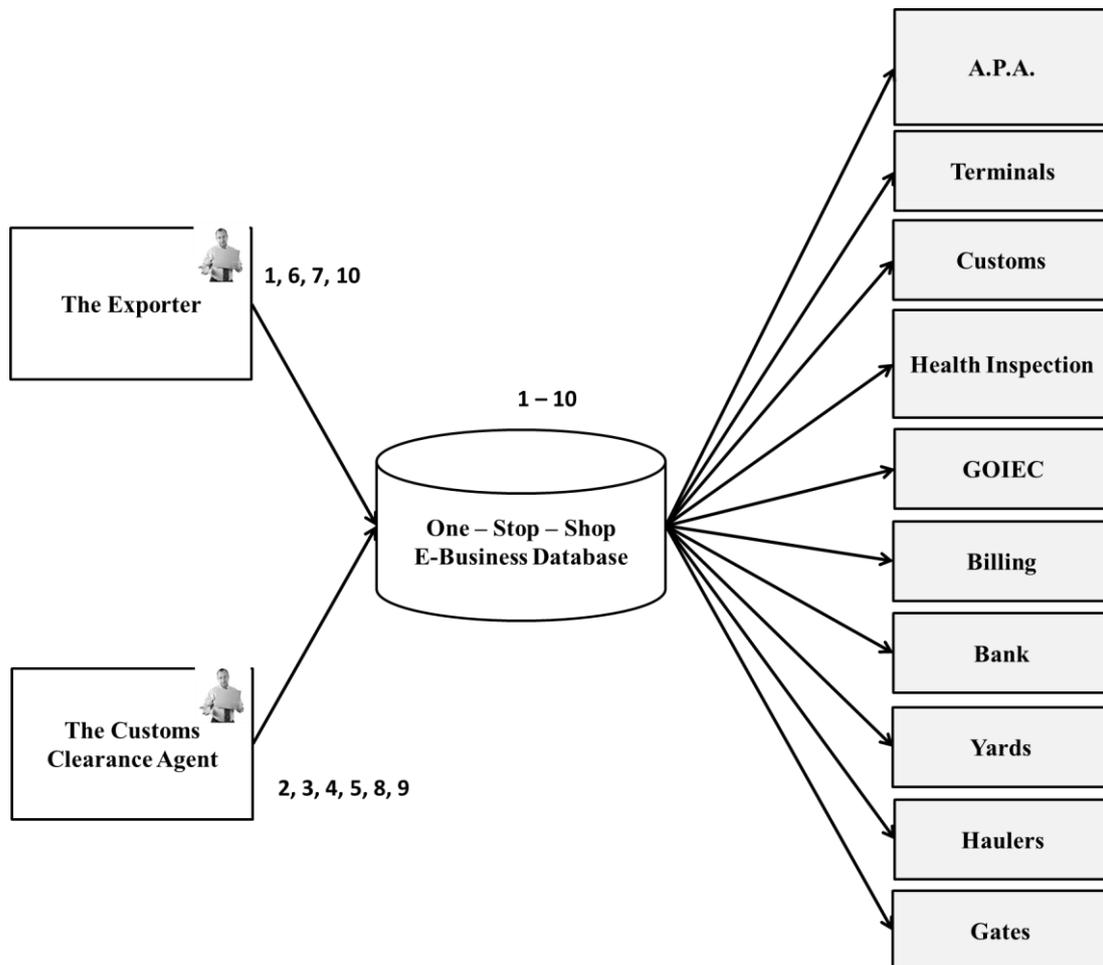
Figure 7.7 – The Process for Export Cargo using the GEMA Model

1. The agent can do steps 1, 6, 7 and 10 in one step. This represents all the services required by the agent.

2. The customs clearance representative performs steps 2, 3, 4, 5, 8 and 9 in only one step which also presents all the documents he should prepare and submit.

The A.P.A and all the involved parties will have access to all information at the same time which facilitate and accelerate the process.

7.3.5 The Cargo Documentation Flow from the Shipping Agent's Standpoint

In comparison with figure 5.9 in chapter 5, figure 7.8 below shows the same process using the GEMA Model. This results in reducing the number of steps from 12 steps to 4 electronic steps. The time duration for this process was 23 days, while after the use of an integrated e-business model; the duration time is expected to be *from 2 to 3 days*.
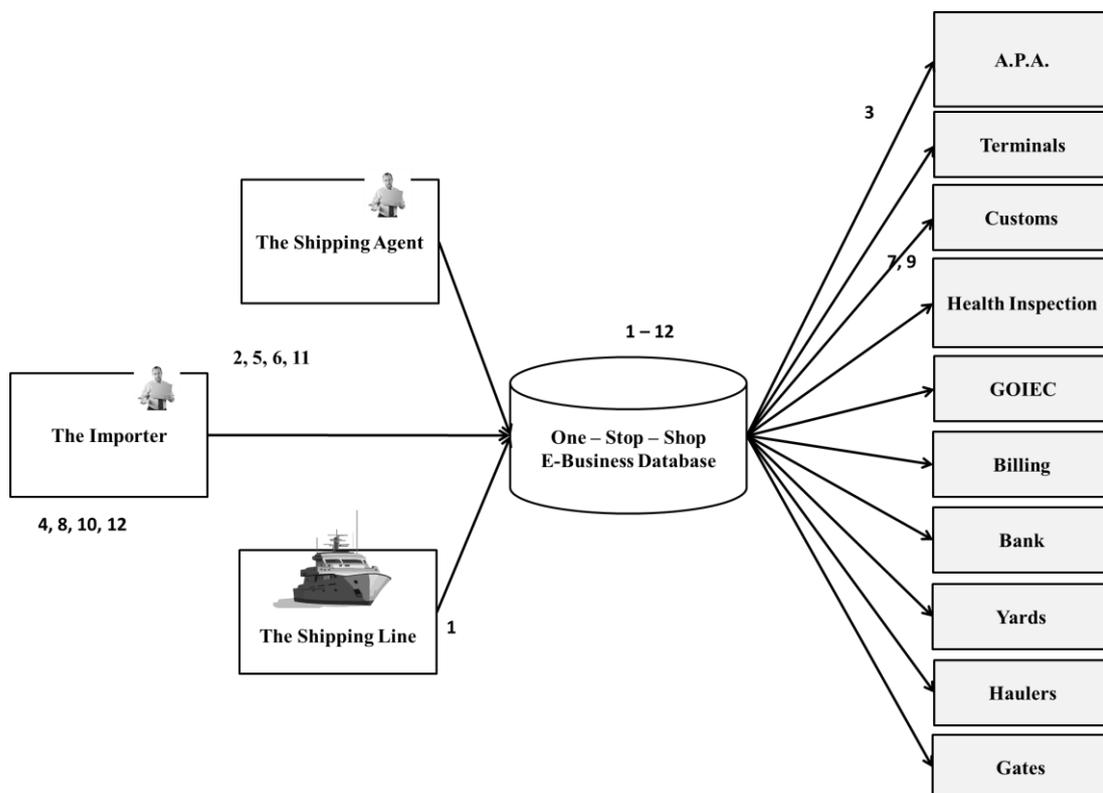

Figure 7.8 –The Cargo Documentation Flow from the Shipping Agent's Standpoint using the GEMA Model

The steps after the use of GEMA Model are:

1. The shipping line electronically send all the information needed so the operation could start, step No.1.
2. The shipping agent does steps 2, 5, 6, 11 in one electronic step.
3. The importer or whosoever represents him carries out steps 4, 8, 10, 12 in one electronic step.

4. All the authorities inside the port electronically provide all the services required in an accurate and timely way.

7.3.6 The Cargo Documentation Flow from the Freight Forwarders' Perspective using the GEMA Model

This section discusses the cargo documentation flow from the freight forwarders perspective before and after using the GEMA Model. Figure 5.10 in chapter 5 reflects the before approach, while figure 7.9 below shows the after approach. Figure 5.10 showed that 16 steps were needed taking an average time of 25 days. Figure 7.9 shows that the steps are down to 2 steps and expected to take an average of 2 to 3 days.
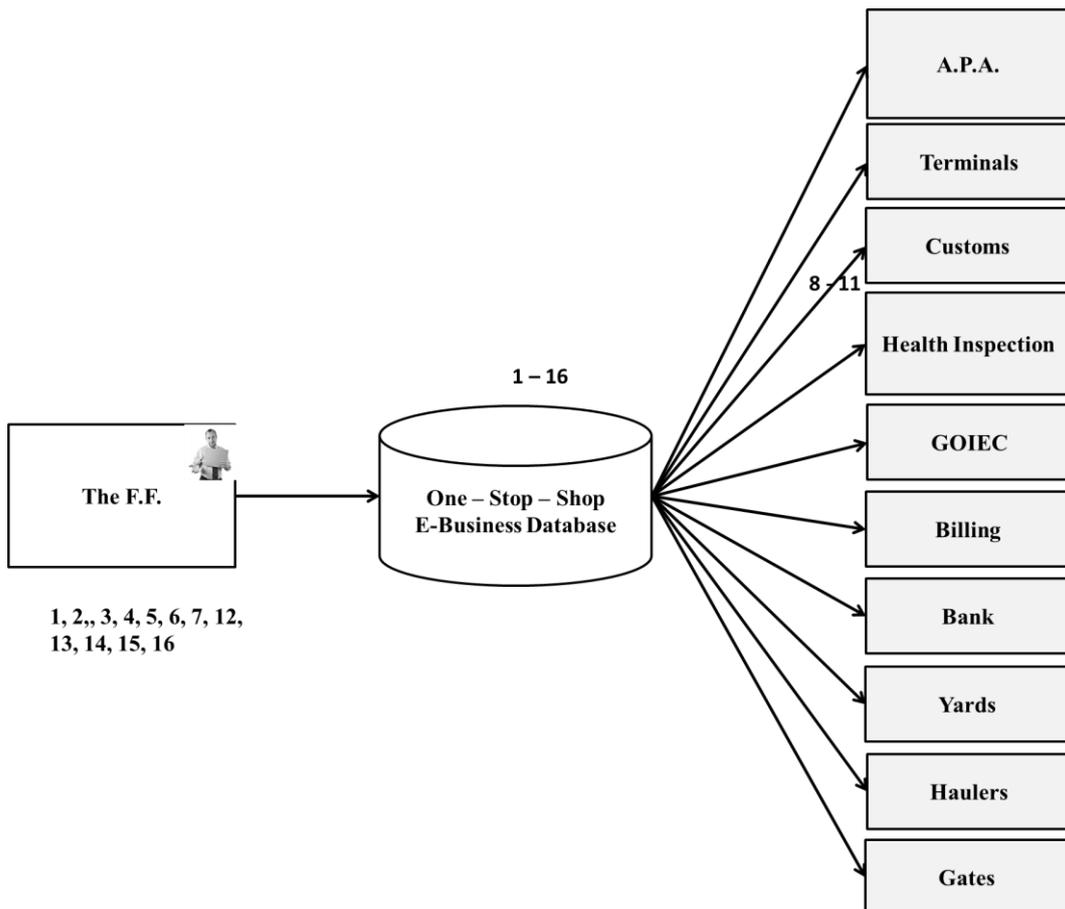

Figure 7.9 –The Cargo Documentation Flow from the Freight Forwarders' Perspective using the GEMA Model

The new steps are as follow:

1. The freight forwarder place all the documents, pay the fees and demand for all the services he need.

2. The customs and the evaluator perform their physical task and reply electronically.

These 2 steps replace the 16 steps for the same process using the GEMA Model as one integrated system.

7.3.7 The Cargo Documentation Flow from the Customs Clearance Agent's Standpoint

The participant observation with the customs clearance representative resulted in figure 5.11 in chapter 5 which presented a summary of procedures and the cargo documentation flow from the customs clearances agent's perspective. However, figure 7.10 below shows the same documentation flow using the GEMA Model.
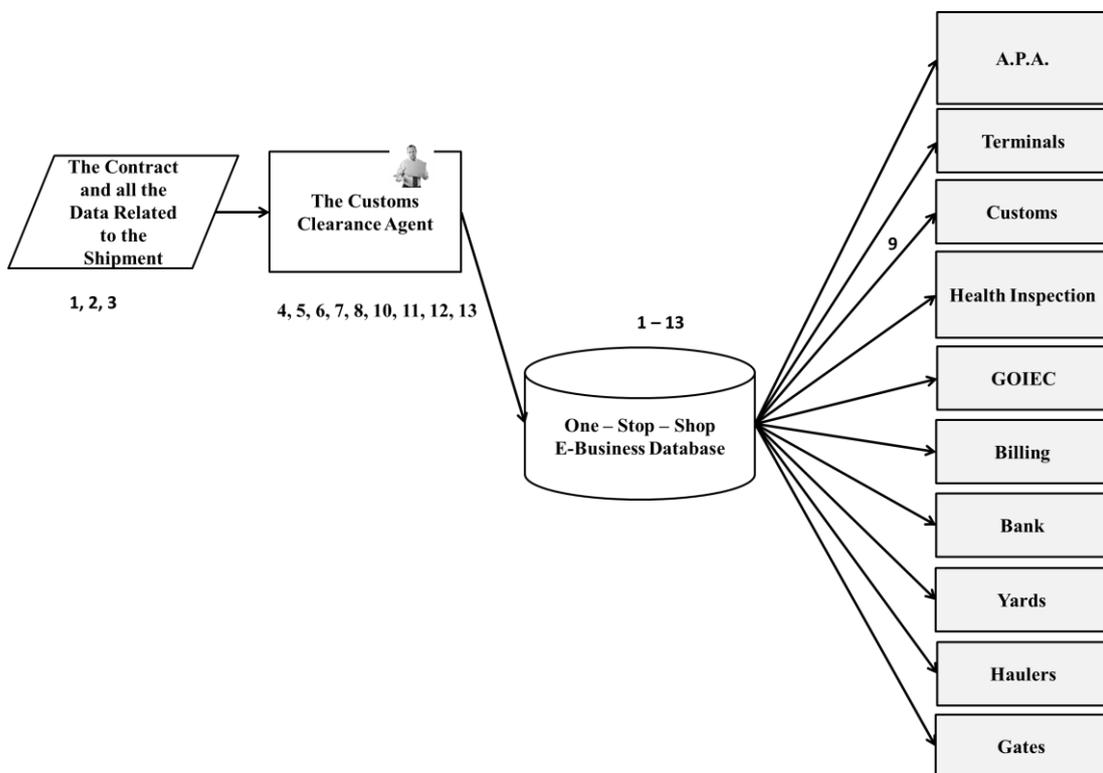

Figure 7.10 –The Cargo Documentation Flow from the Customs Clearance Agent's Standpoint using the GEMA Model

Figure 5.11 showed 13 steps while figure 7.10 above shows only 3 steps after the theoretical application of GEMA Model. These steps take from 23 to 24 days before the application of the e-business, but after the application of the GEMA Model, it only takes 3 steps and it is expected to be done within *2 to 3 days.*

In comparison to the manual documentation system and the semi-automated web based system application, the GEMA integrated system has some financial and non-financial benefits that can strongly affect the port's development and enhance the quality of services provided.   These assumed benefits are shown in table 7.1.

Table 7.1 – The likely Financial and Non-Financial Expected Benefits of the GEMA Model

	Client	**Port**
Financial Benefits	Reduced documentation flow	Increased number of vessels
	Lower process time (as mentioned above)	Increased revenues (by increasing the port productivity)
	Transforming the paper documents into e-documents requires redesign of the entire processes which leads to a reduction in the number of documents as per the figures explained above, thus results in reduction in time to finalise the whole processes.	*Faster documentation flow cycle leads to an increase in the number of vessels turn round and accordingly to increased productivity of the port and increased revenues. Also reducing the workforce costs.*
	Reduced cost and time of electronic versus paper document	Reduced work force capital
	Lower transaction cost. (each step in the paper documentation cycle creates new fees as observed)	Lower clerk cost (transferring the documents to an electronic documents reduces the clerk works, filing and archiving)
	The reduced number of manpower and personnel needed to finalise the procedures also saves costs.	

	Client	**Port**
Financial Benefits	Reduced ships' delay time	Maintain revenues; increase
	Increased business revenue	Increase cargo moves/day
		Lowered terminal and port congestion
	The time saved in finalising any operation could be used in any other business matters or in doing other operations	*Reduction in congestion in the port of Alexandria due to the delay in the documentation cycle will be obtained.*
Non – Financial Benefits	Less complaints (no replications of work and no human error)	Reduced duplication of efforts
	Higher satisfaction	Improved visibility of clients
	Easier processes	Improved management information
	Reduced error rates	Ability to cope faster with any changes
	Increase in the number of users.	Enhance competitive advantages
	Improve customer services	Higher efficiency and better services
	Single point of access	One-stop-shop
	Avoid data replication	More customer satisfaction
	The port client will be more satisfied which will reduce their complaints of delay or congestion in the port. The removal of the duplicated work and the single point services (one-stop-shop) will reduce error and increase the number of users. The improvement in port client services will lead to enhancing the import and export supply chain in the port and maintaining the port's competitive position.	

The above table shows the *likely* financial benefits of the GEMA Model which can be measured when the actual application takes place. Although the non-financial benefits cannot be measured, it helps the port to be more advanced, provides a better quality service to the port clients, increases the port capabilities to cope with the international technologies and changes, and increases efficiency. All non-financial benefits lead to enhancing the competitive advantage of the port and its international image.

7.4 Theoretical Validation of the GEMA Model

This section compares the GEMA Model with the other port community systems in a number of ports from the Arab region and some other international ports. It is divided into two parts; the first part discusses a theoretical comparison between the GEMA Model and other e-business models applied in other ports. The second part discusses a theoretical comparison between the GEMA Model and other e-business models from different sectors.

7.4.1 Comparison between the GEMA and other Systems Applied in Ports

There are some ports around the world that are successfully using e-business. Chapter 2 discussed some ports from Egypt, others from the Arab Region and rather more from Europe..

- **Egyptian Ports**

The researcher paid two visits, one to Sokhna Port and another to Damietta Port in 2010 each for the period of 3 days to observe and take notes to evaluate the application of e-business. The following outcome was the result of the observation:

- There are some difficulties in the application due to the lack of the collaboration between the port community members in the preparation phase.
- Other difficulties due to the mentality remained the same and there are some reluctant to change.
- Some users are unwilling to invest in IT application.
- The infrastructure of Damietta Port is highly upgraded.
- Both Sokhna and Damietta Ports operate using advanced cargo handling equipment.

Table 7.2 represents a comparison between the GEMA Model and some e-documentation systems applied in other Egyptian Ports.

Table 7.2 – A Comparison between PSEP, Sokhna, Damietta Port Systems and GEMA

PSEP (Port Said East Port)	Sokhna	Damietta	GEMA
(1) Connect container terminal, logistics area, customs & inspection. Covers issues like an e-invoice. (2) Data transfer between quay-yard operations, gate complex & terminal planning centre. (3) The connection is between the port authority and the various entities inside the port. (4) The main objective is to achieve an internal integration.	(1) Sokhna Port provides customer services in a single entry point via a customer service centre. The system is called the "One – stop – shop" which offers a range of services including data entry, document scanning, online monitors, video conferencing, banking, kiosks and web services. (2) They are using front office services, video conferencing to reduce the direct client-employee contact, mobile telephony between inspection and yard, Plasma monitors to display on-line information, Kiosks; the software and hardware provider. (3) (4) Despite all this technology, Sokhna Port still suffers from some problems in the application of IT. Problems like the employees' mentality and	Damietta has applied the port community system on two phases which comprises: (1) Radio Data Terminals (RDTs) that act as a real time data transfer for loading operations, yard control order management and weighting, (2) EDI support system to increase the service availability to customers, (3) monitor the flow of goods by pressurized cameras with fibre cables with optical converters equipped with monitors and system control. (4) Damietta Port does not have video conferencing facility or Kiosks facility like Sokhna Port. (5)	(1) Connects all departments inside the port. (2) Connects all port community (outside stakeholders with the port authority and other officials). (3) Use one stop shop approach that facilitates the connection and the e-transaction. As mentioned above and reference to figures from 7.4 to 7.10, the GEMA Model is expected to have positive effects on the port operations by reducing the process steps and time.

	the acceptance of change remain the same (Ghoneim, et.al, 2007). (5) In reality and according to a visit done by the researcher during 2008 (two days visit) the port community system of Sokhna Port does not work properly for the same reason mentioned by Ghoneim, et.al, 2007. Employees cannot accept the change and bad habits of doing business still existed.	Additionally, there are also limitations in the ability of the workforce to apply ICT as a key person in the port clarifies and observed (due to lack of training) during a visit paid by the researcher for 3 days in 2008.	

The table above shows that each port has its own e-system, with different characteristics. Further research needs to be done for the integration of all these systems or having only one system to be applied in all of the Egyptian Port.

- **Arab Ports**

Table 7.3 shows a comparison between GEMA Model and other models from other ports in the Arab Region.

Table 7.3 – A comparison between Rashid, Jebel Ali port systems and GEMA

Rashid	Jebel Ali	GEMA
Rashid Port provides electronic services through what is called the single window for trade services. Through this site more than 750 e-services are offered to various stakeholders involved in trade and the logistics industry. It has expanded its portfolio of integrated innovative services to serve the growing clientele of DP World, Economic Zones World, Rashid Customs and Dubai Multi Commodities Centre (DMCC). Resulted in increasing the volume of trade. (1995 – 2009)	They do apply the same IT system of DP. They added new services - e-Oil Billing, e-Certificate and e-Gate Pass systems – which are designed to introduce better economies for the supply chain and improve traffic flow. This new addition can save customers hours of precious time. They bring direct benefits to the customers by significantly reducing the time spent at Jebel Ali Port's terminals.	GEMA Model considers having professional personnel to run the system as at Rashid and Jebel Ali. However, Alexandria Port needs some years to reach the same stage. Moreover, if they want to apply the DP system, it has to be modified to suit the Egyptian environment. However, GEMA as an integrated e-business model is expected to have the same effects of these two ports that resulted in shortening the documentation cycle.

- **European Ports**

Table 7.4 below presents a comparison between the GEMA Model and some e-business system applied in ports of Rotterdam and Amsterdam.

Table 7.4 – A comparison between Rotterdam, Amsterdam port systems and GEMA

Rotterdam	Amsterdam	GEMA
Rotterdam port is used mainly for import, so the infolink port community system is focused on supporting the imports. The development phase (completed in 2006) is divided into three parts, the pre-project, project and implementation. Pre-project consists of (1) intake, (2) business case, (3) feasibility study and (4) project proposal. Project consists of (1) analysis, (2) technical design, (3) building, (4) testing and (5) pilot. In the implementation phase, the product (application) is operational and then the management is done by Port infolink. It connects the port authority and the port community. It also connects the road and rail operators to the system.	It focuses successfully on the development and use of ICT in the port to enable both public and private sectors to exchange electronic data in a reliable way.	None of the two systems give any value to the culture as an element that should be considered within the application of e-business. Referring back to Barcelona's failure in applying their successful model in Alexandria Port, considering this element is crucial. GEMA highlights the importance of this element. The culture as an element plays a decisive role in gaining the collaboration of the parties involved and eliminates the reluctance to change in the port community. This in turn gives the chance to GEMA Model to achieve its objectives i.e. reducing the process steps and related time.
The users of Port infolink are agents, shipping lines, terminal operators, the port authority, customs, the veterinary		Users are shipping lines, freight forwarders, customs clearance and agents; all the parties involved.

Rotterdam	Amsterdam	GEMA
authority, banks, barge operators, rail operators, road hauliers, and forwarders. The functions of the PCS for these users are: -Easy exchange of messages - Re-use of data - Archive - Easy access (as it is web based) It increases the competitive edge by improving the information flows and accordingly the work processes of the stakeholders.		The GEMA Model is also expected to have an accurate and timely information and easy access and also to have an easy way to electronically exchange documents.

It merits mention that Dubai from the Arab region and Rotterdam from Europe developed e-business (port community system) gradually over the years (Dubai 1995 – 2009) and (Rotterdam 2001 – 2006) and this is one key element for success because it prepares both employees and stakeholders to accept and cope with the changes. It is important to highlight the importance of tradition in the Arab World. This was the main reason for DP World to use an approach that is measured in years not months. While Alexandria Port does not have this privilege, it is under pressure to adapt the e-business to cope with technological trends otherwise it will be obsolete and loses its competitiveness. However, since it started late, it has the chance to think in more depth about what the port really needs and to get the advantages of different models.

Although the port community system of Port Rashid and Jebel Ali Port is considered one of the successful systems (description and benefits of this port community

system are detailed in chapter 2), it cannot be applied in Alexandria Port without some modification to overcome the environmental peculiarities. This raises again the Spanish failure issue (see chapter 5) in trying to apply their successful model in Alexandria Port.

The same concept applies to the European and the other international ports mentioned in chapter 2. Accordingly, the GEMA Model highlights the culture issue and how to deal with it, by creating the necessary awareness of the IT application in port. Specific training courses and hiring IT professional staff are crucial.

7.4.2 Comparison between the GEMA and the other Systems Applied in Different Sectors

The following section compares the GEMA Model components with other e-business models from the literature. Table 7.5 compares the main components of each of the applied e-business models mentioned, explained and discussed in chapter 2 and the proposed GEMA Model:

Table 7.5 – Comparison between the GEMA Model and the existing E-Business Models in different sectors

Applied Model Components	Additional Components considered in the Proposed GEMA Model	Scope of the Applied Model and Comments
E-Business Model Framework **Author: Bertolazzi, et al. (2001)**		
- Infrastructure Management - Product/Service Management - Customer Relationship	- E-Security - Local Strategies and Policies - Local Culture and Regulations - Logistics & ICT	This applied model focuses only on the infrastructure management required and the product management, which will maintain the customer relationship. It does not consider any strategies and policies that might be required to organize the whole processes neither the regulations that govern the e-business.

	Skills	Meanwhile e-security, that is the security for the e-transactions and both data and information, is essential for any business model. That is not mentioned in the Bertolazzi (2001) model. These elements give the opportunity to GEMA Model to achieve its objectives, namely the reduction in the process steps, eliminating the paper documents and the reduction in the overall process time as mentioned earlier.
E-Business Market Entry Strategy Model **Author: Marten & Thomas (2001)**		
- Ship Operation Management - Asset Applications - Cargo Sourcing - Port Community - News & Information	- E-Security - Local Strategies and Policies - Local Culture and Regulations - Logistics & ICT Skills - Customer Relationship	This model is about the shipping industry but is only concerned about booking space in the port or on board ship for a container; however, they considered the information and the operation management. However, this model is expected to reduce the documentation flow time; the same is expected of GEMA.
E-Business and Digital Adoption Model **Author: Canada Transport Act Review (2001)**		
- Supply Side (Carriers) - Demand Side (Shippers) - Marketing Structure	- E-Security - Local Strategies and Policies - Local Culture and Regulations - Logistics & ICT Skills - Customer Relationship	This model demonstrates the e-business and the digital adoption as two sides; the demand side which represents the shippers and focuses on supply chain management and the online business. On the other hand, the supply side which represents the carriers and focuses on the process improvement. Then both demand and supply sides are linked to another two factors which are: marketing structure and market exchanges. This model was designed to shorten the

		documentation process within the entire supply chain processes. The GEMA Model was also designed and theoretically tested (above) to reduce the documentation flow time.
Shipping and Logistics E-Business Model **Author: Visvanathan (2001)**		
- Costs - Customer Preparedness - Interoperability - Legacy System	- E-Security - Local Strategies and Policies - Local Culture and Regulations - Logistics & ICT Skills - Customer Relationship	This e-business model evaluates e-business in the shipping and logistics industry from a different perspective. Cost, customer preparedness, interoperability and legacy systems are the main components for this model. The model focuses more on cost especially for medium sized container shipping players. The GEMA model focuses on reducing the number of steps associated with each operation and to achieve this; all partners' preparedness is required.
Aspects of E-Business Model **Author: Bakker (2001)**		
- Ubiquity - Market Entry - Customer Centric - Hubs and Portal Centric - Cost Efficiency - Dynamic Pricing - Partnership and Channels	- E-Security - Local Strategies and Policies - Local Culture and Regulations - Logistics & ICT Skills	This model mainly focuses on customer relationship, the customer satisfaction, and customer distribution channels. It also emphasises the associated costs and the pricing of providing e-services. Bakker believed that doing business using the internet offers services everywhere, and maintains customer service. He also mentioned that an e-business system should be flexible to adapt to change. He discussed how e-business reduced costs through eliminating time. Although the GEMA Model focuses on more components, the expected outcome of it will still maintain the customer relationships as well as documentation flow reduction. Furthermore, Bakker

		model can be criticised (see chapter 2).
The Main Components of the E-Business Model **Author: Pigneur (2002)**		
- Product Innovation - Customer Relationship - Infrastructure Management - Financial Aspects	- E-Security - Local Strategies and Policies - Local Culture and Regulations - Logistics & ICT Skills	This model concentrates on infrastructure management and considered the customer relationship. The GEMA Model considered these two elements; infrastructure in the port needs to be upgraded and customer relationships will be maintained through providing a better and faster services by reducing the documentation flow time and transfer it to an e-flow.
E-Business Framework and Adoption Model **Author: Vassilopoulou, et al. (2003)**		
- Organizational - Societal - Individual - Technical	- E-Security - Local Culture and Regulations - Logistics & ICT Skills	This model focuses on the changes in the structure that should be done and the new types of communities that will be created. The model mentioned that new skills and technical adoption are required as using an e-business model will affect employment. It merits mention that this is one of the Egyptian employees' fears, employment changes. However, the GEMA Model seeks more in upgrading the skills for the current employees to successfully run the e-system. It also seeks to transfer the paper based document into a web based document. This in turn reduces the number of steps for the port operation and the related time.
Knowledge Organisation E-Service Business Model **Author: Sprundel (2003)**		
- Strategies and Policies - Client Services	- E-Security - Local Culture and Regulations	This model concentrates on providing e-medical services through three centres; strategies and policies centre, client services centre, and an ICT centre

- ICT	- Logistics & ICT Skills - Customer Relationship	relying on the action teams. Strategies and policies have been considered in the GEMA Model which positively affects achieving its objectives.
The Benefits of E-Business-Framework within the Supply Chain **Author: Auramo (2005)**		
- Strategies - Information - Transaction	- E-Security - Local Culture and Regulations - Logistics & ICT Skills	This e-business model evaluates e-business from three benefits; transactional, informational, and strategic benefits. The model considered communication efficiency and information access with the competitive advantages and the customer relationship. It is expected by using the GEMA Model the number of steps for all of the port operations is reduced and accordingly the operations time enhances the competitive advantages of the port.
E-Business Model for the Logistics Industry in Taiwan **Author: Lin, et al (2006)**		
- E-Marketplace -Information System -Organization Analysis - Logistics	- E-Security - Local Culture and Regulations	This model focuses on the product and information exchange. It comprises the culture but the organization culture and not the employee's culture and background. The GEMA Model considers the employee's culture to reduce the obstacle during the implementation phase. This has a positive return on the usefulness of the e-business model.
E-Business Model in the European Maritime Industry **Author: Hart (2007)**		
- Digital Network - Business Process	- E-Security - Local Strategies and Policies - Local Culture and Regulations	This model for the maritime industry is divided into two main components: the digital network and the business process, each of which contains sub components. The digital network contains the e-business itself, while the business process contains

	- Logistics & ICT Skills	enterprise resources, business information, the supply chain, and e-commerce. Hart suggested that all of these components should co-operate to enhance the customer relationship without mentioning e-security to build the trustworthy environment as a prerequisite for e-business. Neither the culture, nor the skills are put into consideration. The GEMA Model guarantees the co-operation and security of information at the preparation phase through collaboration with all the parties involved. This in turn encourages and increases the use of the e-business. The collaboration during the preparation phase also increases the GEMA Model to achieve its expected results. The Model's design has a noticeable effect on the documentation flow (discussed earlier).
Components of E-Business Models **Author: Song (2008)**		
- Business Model - Internet - Environment - Performance	- E-Security - Local Strategies and Policies - Local Culture and Regulations - Logistics & ICT Skills	Song believes that the business model should depend on the customer value, business scope, the price and the company resource. The internet component represents the infrastructure element. The compatibility with the environment is also considered. The GEMA Model considers all of these elements which increase the opportunity to achieve the reduction in the documentation processes, the number of steps and the related time.

The above table shows the differences between the components included in the GEMA Model and other existing or applied models. This comparison clarifies that no existing model includes all the components together that are developed in the

GEMA. Some of the models overlooked the culture (Bertolazzi, et al. 2001, Martin and Thomas, 2001, Canada Transport, 2001, Visvanthan, 2001, Bakker, 2001, Pigneur, 2002, Vassilopoulou, 2003, Sprundel, 2003, Auramo, 2005, Lin et al. 2006, Hart, 2007, and Song, 2008). Others did not give the IT skills the needed consideration (Bertolazzi, et al. 2001, Martin and Thomas, 2001, Canada Transport, 2001, Visvanthan, 2001, Bakker, 2001, Pigneur, 2002, Vassilopoulou, 2003, Sprundel, 2003, Auramo, 2005, Hart, 2007 and Song, 2008). The entire e-business model mentioned in table 7.2 did not mention e-security as an element in their e-business models. They also did not consider regulations and this could be because the revised e-business models are from the developed countries that already have a set of regulations related to e-business and the e-security element comes naturally with the application of any e-business model.

7.5 Alternative Theoretical Scenarios regarding the GEMA Model

Using a 'what if' scenario can help in identifying the weaknesses and strengths of an e-business model. It can also measure the flexibility of the model to adapt to changes and new business trends. 'What if' scenarios are more about statistics, values and costs thus, it is more suitable for quantitative research (Gordjin, et.al, 2001). Due to the introduction of the Web-Based system after this research started is considered one of the limitations of this research. The GEMA Model did not have the chance to be applied in Alexandria Port; neither fully nor partially. This section discusses the 'what if' scenario to the theoretical application of the GEMA Model and accordingly no values or costs can be shown in this analysis.

Theoretically, some assumptions can perform 'what if scenarios' for the GEMA Model; some of them are listed below:

Increased load of operations: what if there is an increased load of activities in the port? The GEMA Model recommended a highly skilled and professional team to run the system. It also recommends that training courses to upgrade the current port employees' skills should be provided. However, increased loads also mean that the scalability of the system is in question i.e. to what extent the hardware and the

software can be able to process and handle a growing amount of work. Other ports practice the same problem (see chapters 2 and 6) and outsourcing would be an optimum solution for the port to overcome this scenario.

Does the e-business meet tomorrow's demand: as discussed in chapters 5 and 6, this could be a real problem in the port as the system needs to be upgraded as required and there might not be sufficient funds on the part of Alexandria Port authority.   Applying an outsourcing contract might also solve this scenario.

Security breaches: a security policy that is updated on a regular bass is required. The most important is to have an intrusion detection system as a security guard to the entire system is one of the successful solutions. Risk management and insurance coverage are strategies that should be considered at the preparation and implementation phase.

Technical problem or server failure: when the GEMA Model has the chance to be applied, this would be a real problem. However, backups, alternative power supply, and understanding the business network and its objectives are highly required. Synergy is a key element in this situation.   However, further research is needed on this part to evaluate the opportunity for the GEMA Model and the possibility to merge with systems of other Egyptian ports such as Sokhna or East Port Said Port as a backup. (See chapter 2, Rotterdam an Amsterdam merged systems).

Moreover, reference to figure 7.4 in this chapter that represented the vessel entry and 7.6 the process of the imported cargo. The same figures are redrawn below using a 'what if scenario' i.e., if the server for any reason or another has a failure.

Assuming that this scenario occurred at the stage of immigration, then the agent has to return back to use the manual system, and figure 7.11 below reflects the changes required.
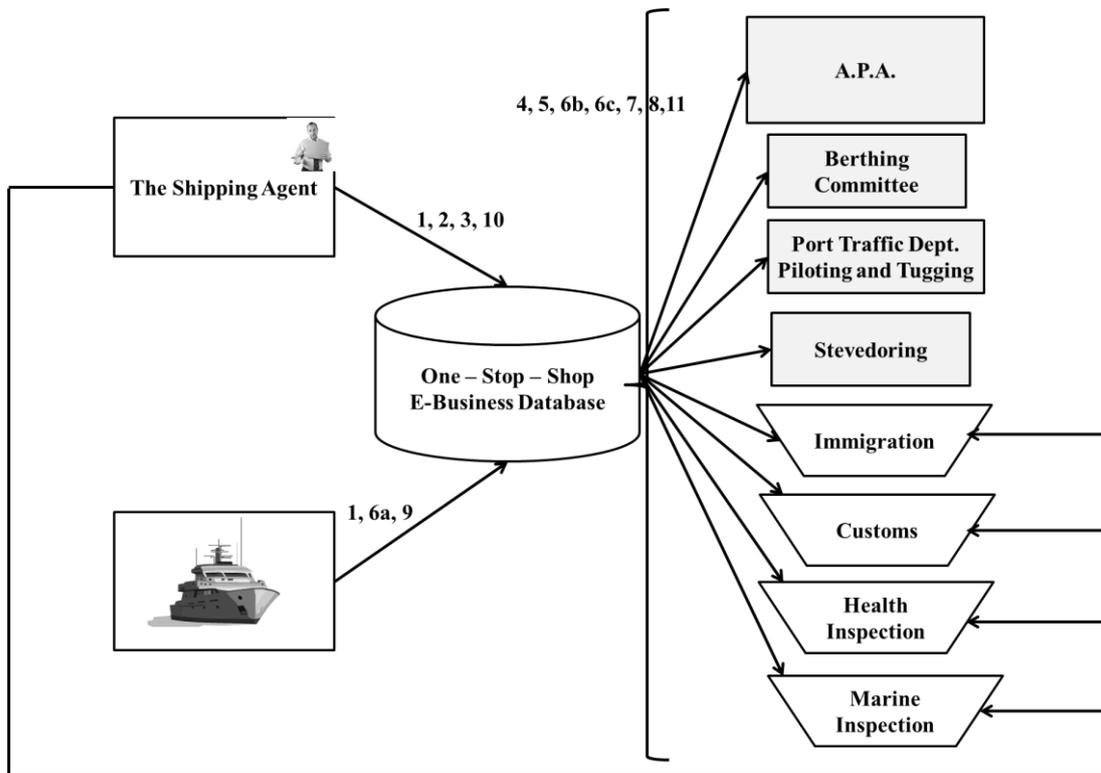
Figure 7.11 – The Documentation Flow for the Vessel Entry using Different Scenario

The vessel entry operation requires 11 steps using the current two systems of the port, and requires 3 steps using the GEMA Model. But what if there is a server failure, the number of steps for the same process raised up to 7 steps by an increase of 4 steps. The agent refers back to different authorities in the port and provides the documents required manually to finalise the operation.

Reference to figure 7.6 above is the processes for imported cargo; the expected scenario is as shown in figure 7.12 with the assumption that the failure occurred at the bank stage.
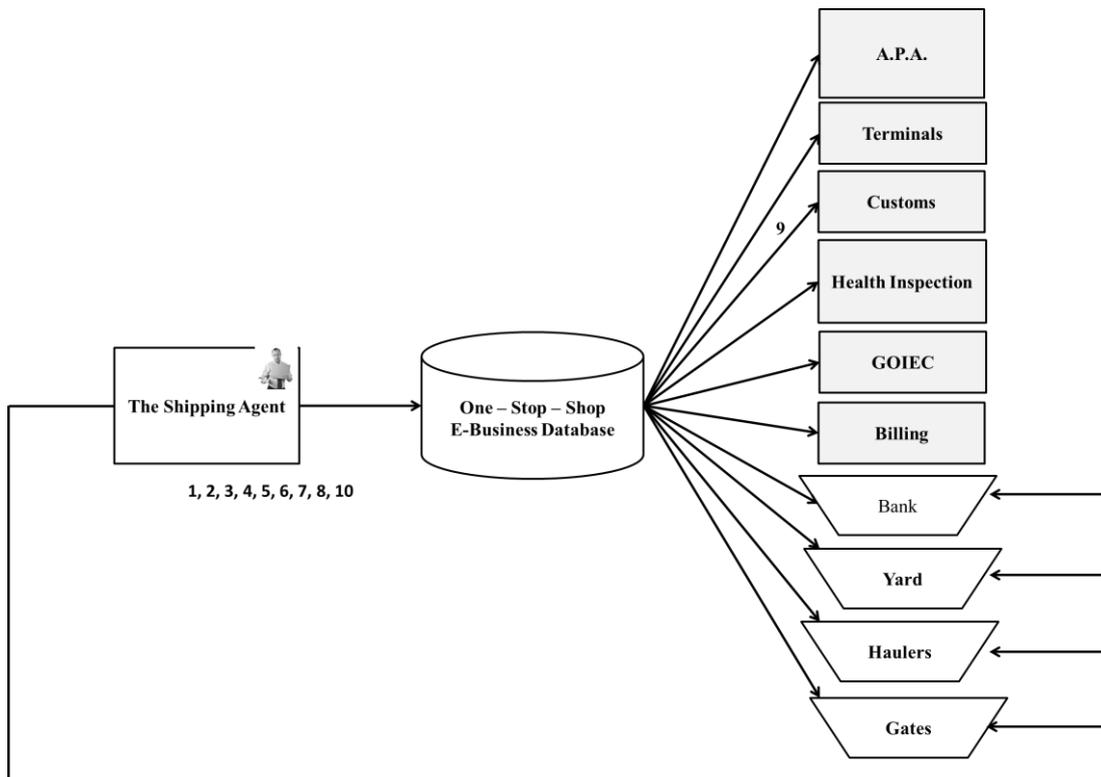
Figure 7.12 – The Documentation Flow for Imported Cargo using Different Scenario

Using the current two systems of the port, this process required 10 step and came down to 2 steps using the GEMA Model, but with a different scenario of system break down, rose up again to 6 steps.

The expected outcome of an integrated e-business system such as GEMA is a better outcome due to the re-engineering and the new processes. People have better skills after training, the red tape is expected to be less and speedy processes can be provided with the collaboration of all parties involved.

7.6 Conclusions

Port community systems, e-business, e-transaction, and e-document exchange are in a way or another synonymous to each other, meaning replacing the paper document with an electronic document. This research has focused on developing and implementing an e-business model with an emphasis to eliminate the paper

documents. The main objective is to reduce the number of steps related to the documentation flow cycle in ports. In maritime ports, paper documents are often required in multiple copies (see chapters 5 and 6) that are exchanged around the port. Agents and shipping lines, freight forwarders and brokers, ports/terminal operators and transport operators, government authority and customs are reliant on information from each other to effectively perform their tasks. Activity in each sector has an impact on the others. This emphasises the importance of e-business application to provide the timely and accurate information to the partners in a speedy manner and without any paper or documents carried around the port. The GEMA E-business model like any other model provides the e-document exchange that enhances the whole operations efficiency and increases the port throughput and productivity. The GEMA Model is expected to reduce the consumed time as discussed above

Further evaluation of the validity of the GEMA Model was also looked at in relation to the duplication of work, human factor, time, cost and security see table 7.6 below

Table 7.6 – The GEMA Model's Responses to some E-business Applications in the Port

Observation & Interviews Data	Duplication of work	Human Factor	Time	Costs	Security
Using the two available systems in the port is considered as an obstacle related to the documentation flow and creates duplication of work.	GEMA is a single integrated system that expected to overcome the duplication of work; one paper document and another automated				
Loading requires many documents and stamps. Many copies of each document need to be exchanged with more than one place and more than one entity in the port. The documents are exchanged between the stevedoring company, the container terminal, the shipping agent,			Using a one-stop shop or a port community system should assist in reducing the number of documents and reduce the time consumed. **This is good practice and evidenced in other**		

the transport company and the master of the ship. The port authority, the customs, the export and import inspection department are also involved.			**ports around the world as discussed in chapter 2.**		
Figures, 5.1, 5.2, 5.3, and 5.4 have showed clearly that the manual documentation system requires long procedures and many steps for each operation i.e. 11 steps for the vessel entry, 7 steps for loading instruction and 8 steps for vessel departure. These steps reflect the import procedures that represent a total of 25 days. Documents are also repeatedly shown such as having the departure application signed and stamped by the customs; the agent should also have a request letter of departure to be submitted with the application to the A.P.A., which consumes time. This clearly reduces Alexandria Port's global competitiveness.			A system change was required to improve the quality of services provided by the port through minimizing the flow of documents and reducing time. It can also be estimated that reducing the time required for these activities will ultimately have an effect on reducing the overall costs. The effects of this analysis are reflected in considering the time and the related costs element in the GEMA Model		

Within the manual documentation system of Alexandria Port, the export procedures require the following duration in days to finalise the whole cycle and are as follows:
Preparation of documents
     13 days
Customs clearance and technical control document
     1 day
Handling in port and terminal document
     3 days
Handling related to Inland transportation document
     3 days
The total documentation cycle time for the exported cargo is **20 days** which affects the smooth movement of vessels in the port and in turn affects port
			Reference to figure 7.2 and figure 7.3 shows that when implementing the GEMA Model, the number of steps can be reduced from 15 to only 5 steps.	Each document creates additional fees which are expected to be also reduced as a result to reducing the number of document and procedures.	

productivity and revenue. It also increases the congestion of vessels in port. For imports the time duration is as follow: Preparation of document **19 days** Customs clearance and technical control document **3 day** Handling in port and terminal document **1 days** Handling related to Inland transportation document **2 days** The total documentation cycle time for the imported cargo is **25 days.**					
The problem with the IT team that has a lack of the necessary shipping background.		Reflecting the need for a professional IT team and necessitates the need for training courses. Hiring a professional IT team to run the system is highly recommended with the necessary shipping background to apply the GEMA Model to minimize the operators' deficiencies which was one of the obstacles of applying the Web Based system as evidenced in chapter 5.			
The Egyptian habits and norms of doing business	Customised strategies and polices should be set right from the beginning to overcome all negative attitudes like routine and red-tape, duplication of work and delays.				
It has been observed that the web-based system did not achieve its expected	GEMA is one automated system		Overcomes red tape and reduce time consumed	Reduces the fees related to each document	

objectives due to the system applied being a semi-automated system. It has a partial effectiveness only with the customs procedures rather than providing services to the whole port.				
E-Security has been observed and analysed as an obstacle to the application of e-transactions.		Creating the awareness of the importance of applying the e-business is crucial through training courses is needed at the preparation phase which in turns highlights the importance of the collaboration between the parties involved.		E-Security should be offered and guaranteed to encourage the parties involved to use the e-transaction and to overcome two issues; 1) hesitating to apply the e-technology, 2) being reluctant to change.

The data collected from the interviews and the observations showed that the time, security, cost and human factor elements are crucial and required to be considered in the GEMA Model, therefore the above table shows how the GEMA Model responded to some of these issues.

A 'what if' scenario requires a real world application of the GEMA Model to get better and more accurate results, this cannot be achieved in this research as there is no chance for the researcher to control or change any variable in the port. However, further research is needed to be considered in this area.

Chapter 8

Discussion and Conclusions

8 – Discussion and Conclusions

8.1   Introduction

International business success, in general, and e-business success, in particular, depends on how effective and efficient supply chain management is, and how organizations can deliver the right product/services to the right market/client at the right time for the least cost possible (Auramo, 2005). The complexity involved in managing supply chains in cross border trades is about having systems that are responsive, adaptable, and easy to use (Simchi-Levi, 2000).   Managing the traditional supply chain has its own difficulties and challenges due to the different attitudes, norms and habits of doing business which also causes this complexity. Additionally, managing the electronic supply chain has more challenges because the interaction and the exchange of all documents needed between the parties involved occur electronically and that has its own complications (Christopher, 2005).

E-business is a technique that develops and improves communication between trade partners. The exchange of information between trading partners, suppliers and customers is facilitated by the use of e-business through eliminating the barriers that limit and hamper how they communicate together and how they do business with each other (IEEE Network Magazine, July/August, 2000).

This final chapter presents the different parts of the research. It highlights the main findings and evaluates how the stated aims have been achieved.   It also discusses the limitations of the research and suggests areas for further work and future development.

8.2   The Main Outcomes

Different forms of research methodology have been used throughout the research, including a literature review (Chapters 2 and 3), direct participation and initial evaluation (Chapters 5, 6 and 7), a case study approach (Chapters 3 and 5), preliminary analysis and assessment (Chapter 5 and 6), a sample survey through structured and semi-structured interviews (Chapters 5 and 6).   These have underpinned the introduction of the conceptual GEMA Model that reflects the importance of having an integrated e-business model which incorporates elements that requires local customisation (Chapter 6). This research has developed an e-business model with the scope to reduce the documentation flow sets and associated time. This wide ranging methodology provides the following template for a successful application for the e-business model for the chosen case study.

1. Respondents from different types of companies and stakeholders stated that one integrated e-business model with customised element was the best solution to suit the local environment particularities (as evidenced in chapter 6).

2. Respondents also complained about the problems that arose using the currently adopted systems in the port. This necessitates the introduction of one integrated e-business model that eliminates the barrier of using two systems and long procedures that consume time (see Chapters 5 and 6).

3. The research introduced the GEMA Model (Generic E-Business Model for Alexandria Port) (see Chapter 6). Literature reviews and interviews included in chapters 5 and 6 bring up the need for each component included in the GEMA Model with the consideration of the local environment as a particular requirement and with the focus to reduce the number of steps of the documentation cycle.

4. Achieving the benefits offered by e-business, organizations must find ways to effectively address information security implications which require appropriate management in the preparation and the implementation stages. However, whatever precautions are taken, security risks will always be associated with computer systems as their 100% security is not guaranteed (as mentioned by Microsoft Corporation, 2000). Building a trustworthy relationship with the customer is a key element for e-business success. To achieve this kind of relationship and to overcome the security concerns, the e-business could have a customer friendly site that deploys a privacy policy and provides a secure online process and a secure e-transaction system. A trusted e-business relationship is essential to overcome the information exchanged security problem. Using secure e-transactions can help secure e-payment (Brecht, 2010). According to this, e-security is one of the main elements that successful e-business models should consider to overcome the reluctance to change and encourage using the system (see Chapters 5 and 6).

5. The e-business model could be of great economic benefit for the port community. It eliminates the paper documentation cycle, reduces the number of steps and time, minimizes transactions cost, increases productivity, enhances the efficiency of the entire supply chain and maintains the customer relationship (as proven in chapters 5 and 6). It also affects the quality of the services provided which is expected to exceed the customer expectation to build a loyal and reliable relationship and lead to gain the ability to compete globally.

6. IEEE Network Magazine, July/August, 2000 mentioned that faster, less cost, and more accurate information are the natural result of using the technique of e-business when it is well planned for (see Chapters 2, 5 and 6).

7. Egyptian culture should be given great consideration since it has specific characteristics and it is transferred from one generation to another, whether it is right or wrong, it affects the way of conducting business. The individual and the society culture is an essential element in the e-business model to set the adequate strategies, policies and rules. Employees and operators should learn to cope with the international changes and adopt new systems. They also should practice the team work. The research considered the local culture as one of the important elements in the e-business model to achieve its objectives i.e. reduce the documentation flow. The cultural importance was verified to some cases (see Chapters 2-7) although it has been over looked in most literature (see Chapter 2).

8. Logistics and ICT skills are also vital for the e-business model. Alexandria port needs to adopt an e-business model to speed up processes, eliminate routine, increase efficiency and productivity, and most of all, cut down process time through reducing the steps required. The port also needs to cut the transactions cost to the minimum in relation to the supply chain to be able to compete globally. Training courses are required (discussed in detail in chapter 6) to upgrade all employees and operators skills and to create the necessary awareness of the importance of e-business. Creating this awareness helps in changing the Egyptian mentality and habits of doing business and creates the opportunity for the e-business model to achieve its targets.

9. Using an adequate e-business model also helps to increase the clients' satisfaction which in its turn increases the benefits for any business unit (as evidenced in Chapter 2).

8.3   Evaluation of Research Quality

Qualitative research always creates an argument for judging the quality of research (Seale, 1999). Madill et al. (2000) argued that there are four criteria to judge the reliability and the quality of qualitative research. These are: credibility, transferability, dependability and confirmability.

Richardson (2000) argued that there are a further five criteria that test the validity of qualitative research.   These five criteria are: aesthetic, merit, reflexivity, impact and expression of reality. Lately, Finlay (2006) claimed that there are other qualitative research criteria for evaluation called the **4C's**.   These are: clarity, credibility, contribution and communicative resonance. The latter has been chosen to evaluate this research as it suits more the case study research approach (Finlay, 2006).   Table 8.1 shows the 4 C's that are required to evaluate the research quality. Another C will be added representing creativity as used by Lincolin and Guba (1985). Table 8.1 therefore shows the **5C's.**

Table 8.1 – The research 5 C's Quality Criteria

Research Quality Criteria	Measured Quality	Evaluating the Outcomes
Clarity	This criterion measures or evaluates to what extent the research is coherent and clearly describes the situation to be investigated.	The research used a number of methods like observations, interviews, process mapping and modelling to clearly describe the supply chain documentation flows in Alexandria Port and developed the appropriate e-business model and its verification with the stakeholders.

Credibility	This criterion evaluates if the researcher's interpretations are justified and if it is clear.	Observations and process mapping tools have been used to simplify supply chain documentation flows in Alexandria Port in real practice. This was followed by interviews to provide accurate information to ensure that the responses match the observation.
Contribution	This criterion evaluates to what extent the research adds to knowledge in terms of change in a certain situation for the better.	The research developed an e-business model (the GEMA Model) that is one integrated system for a better and faster documentation flow in the port of Alexandria. It aims to reduce the number of steps related to any operation in the port.
Communicative Resonance	This criterion evaluates whether the findings have been argued in dialogue with others in the wider community	The researcher has provided two conference (presented and published) papers that gave the chance for wider argument and exchange of experience which positively affected the research.
Creativity	This criterion evaluates whether the research provides something new or just presents an old idea in a different way.	The research developed a generic model that can be a locally customised e-business model with the scope of validating the Model to reduce the number of steps within the documentation flow and the associated time. (chapters 5, 6 and 7)

Source: (Based on) Finlay (2006) and Lincolin and Guba (1985)

8.4   Realizing and Achieving the Research Aims and Objectives

The main aim of this research has been to investigate the importance of e-business to the port of Alexandria and its operational documentation flows and accordingly to its competitiveness. It was also to investigate the adequacy of applying an e-business model at Alexandria Port in order to determine how the supply chain documentation flows could be enhanced through transforming the paper documentation cycle to an electronic cycle in order to reduce process time and accordingly cut the paper document transactions costs. The research aims were as follows:

1. **To evaluate the benefits of using e-business models in ports with respect to the documentation flow.**

Aim 1 was to identify the benefits of using e-business model within ports in relation to reducing the documentation flows. This aim was achieved through the literature review and later in the research through the primary sources of data collected. It has been shown that adopting e-business enhances the supply chain documentation flow in an efficient way. Chapter 2 defined the relationship between supply chain documentation flows and e-business and concentrated on the importance of applying e-business models and port community systems. E-business application maintains the reduction of the number of documents and steps.

2. **To investigate the documentation flow using the current systems applied in Alexandria Port.**

Aim 2 was to analyse the supply chain documentation flows in Alexandria Port and explore the usefulness of the two available systems currently applied in the port. This helped to determine the main features and highlighted the weakness and strengths of each system.   This aim was achieved through investigating the chosen case study of Alexandria Port, direct and participant observations and the interviews

survey. Chapter 5 presented the actual procedures that should be taken by the port's clients using the two systems; the manual documentation system and the Web-Based system using the observations technique. Chapter 5 also presented the data collected and the analysis of these two systems through conducting face-to-face interviews after the observations.

3. To design a generic e-business model that can be applied to ports such as Alexandria to reduce the steps within the documentation flow.

Aim 3 was to develop an appropriate e-business model for Alexandria Port to overcome the documentation flow as a barrier to trade in the port. It highlighted that the application of e-business reduces document exchange, time and cost (chapter 6).

These aims were realized when the following objectives have been achieved:

1. *To explain the relationship between e-business models and supply chain documentation flow:* the literature review has been investigated to identify how e-business models affect the efficiency of the supply chain documentation flow (chapter 2).

2. *To examine the effect of the port community systems on maritime ports documentation cycle time:* the literature has been reviewed to explore how port community systems can shorten the maritime ports' documentation cycle time and accordingly increase port productivity (chapter 2).

3. *To analyse the present situation of the chosen case study of Alexandria Port of Egypt:* literature review and direct observation have been carried out to identify the importance of Alexandria Port in the region and its volume to trade. It also investigated the trade barrier faced by the port that included the documentation flow (chapter 3).

4. *To analyse the current supply chain documentation flow in Alexandria Port using the two available systems and to describe how the port provides this service:* direct observations, structured and semi-structured interviews have been carried out to identify the strengths and weaknesses of each system (chapter 5).

5. *To design a generic e-business model for Alexandria Port that can potentially reduce the steps in the documentation flow process:* this objective concentrated on developing an e-business model for Alexandria Port that can result in reduction in the documentation flow steps and time (chapter 6).

6. *To validate the GEMA model's effect on the documentation steps and flow in Alexandria Port:* a comparison between the existing models and the GEMA Model was discussed to verify the originality of each component included in the GEMA Model.

A comparison with some of the existing port community systems has been carried out to verify the effects of the e-business model on documentation. It highlighted the theoretical application of the GEMA Model and discussed the expected outcomes using before and after approach to realise the reduction in the documentation steps, flow and time (chapter 7).

8.5   The Research Structure and Methodology

This research started by defining the research problem which was to investigate the efficiency of the supply chain information and operations in terms of reducing the documentation flow and the related time in Alexandria Port. A new generic e-business model (GEMA Model) has been developed to reduce the documentation flow steps and consumed time and accordingly reduce the transactions cost. Time

delays and increasing transactions costs are considered barriers to the international trade operations in the port. A selection of existing e-business models and port community systems from the literature has been reviewed to verify the effects of e-business on documentation flows. Structured interviews were conducted to identify the critical issues in the manual documentation system of the port. During the investigation of the case study, Alexandria Port introduced a semi-automated system called the Web-Based system that only concentrates on the customs procedures, and it was later applied to Alexandria Container Terminal in the port. Accordingly, further semi-structured interviews were conducted to evaluate the usefulness of this newly adopted system and the necessity for a system change. This interview also played a significant role in verifying the expected outcome of GEMA Model.

The final research methodology phase was the analysis of the data collected from the first hand interviews and the quantitative and qualitative analysis of the information gathered to verify the components and the usefulness of GEMA.

This case study investigates the documentation flow as an international trade barrier that hampers the supply chain operations in the port. This type of research tool is appropriate for such research which is based on studying the actual situation as a first step. This approach enabled the researcher to determine the missing parts which, when realized, changed the actual position into an optimal position.

In this research, observation surveys have been undertaken during visits to Alexandria Port (see chapter 5), and structured and semi-structured interviews have taken place with the parties involved. Both approaches were conducted via face-to-face interviews which is the most common interview type used (Achasoso, 2003). These interviews can be also called in-depth interviews due to the fact that the interviewer works directly with the respondent and has the opportunity to ask follow up questions. Interviews were selected as the appropriate means for data collection

for this research (see chapter 4) and consisted of interviews with the key personnel and managers and/or owners of:

1. Shipping lines in Egypt.
2. Shipping agents and the customs clearance agents in Egypt.
3. Freight forwarders in Egypt.
4. Key persons in Alexandria Port Authority.

- ***The first sets of interviews were*** conducted with the managers of one chosen company in each category (shipping lines, shipping agents and customs clearance agents and freight forwarders). The choice depended on the volume of business in the Egyptian market (see chapter 4).

- It was conducted by the researcher and was in the form of structured interviews designed to investigate the manual documentation flow system of Alexandria Port and evaluate its suitability (see chapter 5).

- ***The second group of interviews*** were conducted with the freight forwarders staff and/or managers/owners (see chapter 5). These were in the form of structured interviews with the aim to investigate the newly adopted Web-Based Semi-Automated System.

- ***The third set of interviews*** was conducted with the managers/owner of all the companies mentioned (thirty companies – see chapter 5). These were in the form of a semi-structured interviews with the respondents covering three main areas: (1) knowing the views of the respondents concerning the importance of having one integrated E-system; (2) assessing the Web-Based customs system (semi-automated system), and (3) verifying the elements of the GEMA Model.

The interview technique, especially the semi-structured interview, is a critical technique for acquiring knowledge and gives flexibility to ask subsequent questions

(Yin, 1994). The questions for a semi-structured interview are ideally constructed before the interviews. This allows time to ask additional questions to clarify points and ask for more detail where necessary. Each interviewee was given a brief idea and verbal explanation about the research and asked if he/she would be interested in taking part in such research.

The benefits of using the technique of face-to-face interviews are many. It enables the researcher to elicit more in –depth response and record the data. The researcher filled in information when the participant does not fully understand the question which was convenient for the respondents. It also increased the certainty about who answered the questions (Flower, 2002).

This interview investigated if the stakeholders would be happy with applying a readymade e-business model or if they were in the favour of having a locally customised e-business model is appropriate to the Egyptian environment (see chapter 6).

These interviews produced sound responses that helped in assessing the actual procedures of the two systems of Alexandria Port and ascertained the accuracy of the data collected through the direct and participant observations. It also helped in verifying the GEMA model components.

8.6   Contribution of the Research to Academic Knowledge

It has been observed and concluded that the development of Alexandria Port needs to be built up. The application of an e-business model can help in upgrading the port development upgrading and to ensure that the services provided by the port are competitive. The lack of skills and the other obstacles discussed in chapters 5 and 6 may prevent the authority from making the decision to apply an integrated e-business system. However, this research does not claim to cover all the issues but it can be

used as a preliminary study and to shed light for further work to better understand other issues that might increase the port's competitiveness.

Weaknesses of the currently applied systems have been identified and are expected to be overcome through the application of the GEMA Model as one integrated e-business model. The literature review carried out through the research and at later stages the original surveys and investigations, have led to the identification of the knowledge gaps. However, the contribution to knowledge mainly falls into two areas:

1. Demonstrating a conceptual model developed for documentation processing in Alexandria Port for the import and export of cargo was able to reduce the number of steps required as compared with manual and web-based procedures currently existing in the port.

2. Establishing the document processing procedures and steps required for the cargo input/output operations in Alexandria Port. At present, there has not been much research in this field to describe the steps for document flows associated with inbound/outbound vessel movements and import/export flows in ports in the Middle East.

The research has investigated how Alexandria Port can achieve competitive advantage through the application of an integrated e-business model (GEMA) by reducing the documentation flow steps and time. Transferring the documentation flow from paper based into an electronic based system has proved to help much in this matter.

However, GEMA Model as an integrated e-business model can be generalised in any similar ports that have similar characteristics.

8.7 Contribution of the Research to Operational Practice

This research has presented a range of useful outcomes and some contributions to operational practice. These are listed below:

- Increased knowledge of an original nature, based on empirical research and the use of a wide range of research methodology.

- An opportunity to evaluate the entire supply chain documentations flow of Alexandria Port and identify its weaknesses and strengths.

- Increased knowledge of the importance of management skills, such as communication which could lead to collaboration and co-operation and provide a greater opportunity for employees and operators to develop their skills.

- A better understanding of the usefulness of the change management approach which offers an easier way to adopt the new technology that in turn creates a competitive advantage.

- Increased awareness of the importance of applying e-business to participate in the digital economics world with the scope to positively affect reductions in the process steps and time.

- Distribution of the research outcomes through conference presentations in Hungary – Budapest, (El-Miligy, 2007) and Turkey – Istanbul (El-Miligy, 2009). In addition two posters have been made at the University of Huddersfield posters' festival. This has helped in enhancing the research's development.   There is further opportunity for publications, as well as for

more of the findings to be used in developing training courses and creating awareness of the e-business technology.

8.8   Limitations of the Research

It is to be noted that this research has some limitations which are listed below:

- This research commenced when the port was only applying the manual documentary system. A year later it was followed by the application of the semi-automated system.   This changed the focus and direction of what had to be carried out in this research.

- More investigation and more interviews were added to evaluate the new system of the port and a further comparative study between the semi-automated system and the developed model of this research was carried out to assess its usefulness.   This was not expected at the time the research project started.

- Although Alexandria Port Authority had promised to provide all the support needed for this research, the actual application of the GEMA Model has not been possible. This was due to the existence of some variables and environmental factors which could not be controlled by the researcher, e.g., such factors as controlling the approach of a vessel to the port or controlling the procedures that any ship has to go through or processing of a shipment. This was another limitation of this research. However, a theoretical application to validate the GEMA Model was done through highlighting the duplication which occurred in the application of the Web-based system (Chapter 7).

- One of the limitations was related to the literature as not many e-business models are published to be reviewed, studied and/or criticized.

- Difficulties in collecting data during the survey, the interviews and the case study exercise were further limitations of this research. A difficulty in obtaining the names of companies and detailed personal contact data for the potential respondents is a weakness. This was not seen as an issue at the time the research commenced.

- A low rate of response from the interviews was initially due to limited co-operation from some of the respondents and a lack of understanding on their part of the issue to be investigated.

- The introduction of the semi-automated system of the port and misunderstanding of the situation on the part of the port authority created a conflict of interests and an unhealthy will to co-operate or even to participate in this research.

- A negative attitude was sometimes shown from potential interviewees that resulted in refusal to answer the interview questions. This negative attitude and the low response rate meant that generalising the outcomes and the findings more widely should be taken with caution.

- The size of companies was another related limitation of the case study research. The number of companies in the Alexandrian society is quite limited. This is also similar to the problems encountered during data collection and the interviews. The difficulties in the data collection process and the low rate of understanding and refusal of representatives from some companies reduced the number of managers that could be interviewed.

- A lack of understanding and limited recorded data that were requested was another limitation of the research. Sometimes the respondents had limited scope of their operations or had no time to be devoted to this research. Another limitation was that the research project involved more issues than the

ones covered in this research for example, e-business regulations and legislation that sometimes was raised by the interviewees and resulted in reducing the time given to the original interview questions. Thus it is recommended to be investigated in further work.

8.9   Opportunities for Further Research

Further research can be carried out in three main areas:

1. In the light of the limitations discussed earlier, the GEMA Model application could still take place if there is no conflict of interest with the web-based system.

2. A more in depth quantitative analysis could be undertaken to develop relative weights and values of the GEMA Model's implementations. Moreover, the application could be extended one step further to redesign the whole supply chain of the port.

3. Due to its flexible nature resulting from having customised elements, the GEMA Model could be applied in other ports in Egypt and/or in the emerging economies countries' ports. These countries have similarity in their cultures, thoughts and organisational behaviour.

4. Following from 3 above, to extend 'what if' study to evaluate whether any lessons for the further development of the GEMA model can be learned from the experience of Rotterdam and Amsterdam which have a merged documentation system.

E-business implementation is not an easy process; it involves business processes, strategies, organisational changes and the related technology (Jackson and Harris, 2003). The biggest challenge is that the organisation/port has to adopt an on-going assessment for the technology available and their competitiveness position if they seek a successful e-business application.

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Appendices

Appendix A

The 23 questions of the questionnaire

The questions were divided into 5 different groups as follows:

Group 1: The E-Business System

1. To what extent do you think the Web-Based System is useful in Alexandria Port?

2. To what extent do you think using a fully e-business system (A Fully Automated System) will positively affect the documentation flow in Alexandria Port?

3. To What extent do you think it will be useful to have a tailored e-business model especially for Alexandria Port?

Group 1 of the questions was scaled as; no use – little use – useful – very useful.

Group 2: The Components of the Developed GEMA Model

4. Having a proper and a fully automated system in the port is creating an infrastructure management problem.

5. The infrastructure creates cost that is considered another related problem.

6. Data security is one of the constraints when applying a proper automated system.

7. Reliability and continuity of the service are negatively affecting the automation process.

8. Local customised strategies and policies that suit the local environment affect the application and the use of the system.

9. Culture is another factor that affects the implementation of a fully automated system.

10. Computer and information and communication skills are considered one of the obstacles.

11. Logistics skills constitute another constraint.

Group 2 of the questions was scaled as; strongly disagree – disagree – agree – strongly agree.

Group 3: Societal Aspects

12. To what extent do you think the Egyptian regulations that govern the e-business affect the implementation?

13. Do you think the legal issues associated with applying e-business in Egypt require a change?

14. To what extent do you believe that the port community collaboration affects the process of applying a fully automated system?

15. To what extent do you think specialized training programme for all the involved parties affects the usefulness of this system?

16. Do you think Alexandria Port has technological difficulties which hinder the application of a fully automated system?

Group 3 of the questions was scaled as mentioned in the first group.

Group 4: The Expected Result

17. Do you think the proposed model is expected to reduce operations' time and cost in Alexandria Port?

18. Do you think such a model would increase the global competitiveness of Alexandria Port?

19. To what extent do you think e-business enhances customer's services?

20. To what extent do you think e-business maintains customer relationships?

Group 4 of the questions was scaled as the above mentioned scales.

Group 5: Other Considerations

21. What other barriers might impede the implementation of a fully automated system?

22. Are there any other elements you would have liked to include?

23. What other benefits do you hope will result from such an automated model?

Appendix B

الملحق ب

نص الاستبيان باللغة العربية

تنقسم الأسئلة إلى خمس مجموعات مختلفة كما يلى:

المجموعة الأولى: نظام الأعمال الالكترونى

1. ما مدى إقتناعك بأن النظام القائم على استخدام الشبكة المعلوماتية نظام مفيد فى ميناء الاسكندرية؟
2. ما مدى إقتناعك بأن استخدام نظام الكترونى بحت (أى نظام آلى بحت) سيؤثر تأثيراً ايجابياً على تدفق المعلومات بميناء الاسكندرية؟
3. ما مدى إقتناعك بأنه من المفيد استخدام نموذج أعمال الكترونى مصمم خصيصاً لهذا الغرض بميناء الاسكندرية؟

تم استخدام القياس التالى فى تحليل أسئلة المجموعة الأولى: لا فائدة / فائدة قليلة / مفيد / مفيد جداً

المجموعة الثانية: مقومات نظام GEMA الذى تم تصميمه

4. يؤدى استخدام نظام آلى بحت سليم فى الميناء إلى خلق مشكلة إدارية تتعلق بالبنية التحتية.
5. تخلق البنية التحتية تكلفة تعتبر مشكلة أخرى ترتبط بالمشكلة الأولى.
6. يعتبر أمن البيانات أحد قيود تطبيق نظام آلى بحت.
7. تؤثر موثوقية واستمرارية الخدمة تأثراً سلبياً على الآلية.
8. تؤثر الاستراتيجات والسياسات المصممة خصيصاً لغرض محدد والتى تناسب البيئة المحلية على تطبيق واستخدام النظام.
9. تشكل الثقافة الفردية عاملا آخراً يؤثر على تطبيق نظام آلى بحت.
10. تعتبر مهارات استخدام الحاسب الآلى والمعلومات والاتصالات أحد المعوقات.
11. تعتبر المهارات اللوجيستية معوق آخر.

تم استخدام القياس التالى فى تحليل أسئلة المجموعة الثانية: لا أوافق بشدة / لا أوافق / أوافق / أوافق تماماً.

المجموعة الثالثة: العناصر الاجتماعية

12. ما مدى إقتناعك بأن القواعد المصرية التى تحكم الأعمال الالكترونية تؤثر على عملية التنفيذ؟
13. تتطلب القضايا القانونية المرتبطة بتطبيق الأعمال الالكترونية بمصر تغييراً.
14. ما مدى إقتناعك بأن مشاركة مجتمع الميناء تؤثر على تطبيق نظام آلى بحت؟
15. ما مدى إقتناعك بأن عقد برنامج تدريبى متخصص لكل الأطراف المعنية يؤثر على فائدة النظام؟
16. يواجه ميناء الاسكندرية صعاب تكنولوجية تعوق تطبيق نظام آلى بحت.

تم استخدام القياسات السابقة المستخدمة في المجموعة الاولى فى تحليل أسئلة المجموعة الثالثة.

المجموعة الرابعة: النتيجة المتوقعة

17. من المتوقع أن يخفض النموذج المقترح وقت وتكلفة العمليات بميناء الاسكندرية.
18. يمكن أن يؤدى مثل ذلك النموذج إلى زيادة القدرة التنافسية العالمية لميناء الاسكندرية.
19. ما مدى إقتناعك بأن الأعمال الالكترونية ترفع مستوى خدمات العملاء؟
20. ما مدى إقتناعك بأن الأعمال الالكترونية تحافظ على علاقات المؤسسة بالعملاء؟

تم استخدام القياسات السابقة فى تحليل أسئلة المجموعة الرابعة.

المجموعة الخامسة: إعتبارات أخرى

21. ماهى العوائق الأخرى التى قد تعوق تنفيذ نظام آلى بحت؟
22. هل هناك أى عناصر أخرى كنت تود أن تدرج فى هذا الاستبيان؟
23. ما هى الفوائد الأخرى التى تأمل أنها ستتحقق من مثل ذلك النظام الآلى؟

Appendix C

Process Mapping Protocol Symbols

Symbol	Meaning
	Start
	Process
	Predefined Process
	Manual Operation
	Delay
	Preparation
	Document
	Data
	Store
	Decision
	Database
	Inspect
	Transport
	Operation
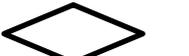
(Source: Egan, 1998)