

***ELECTRONIC COMMERCE AND THE STRATEGIC MANAGEMENT  
OF DEEP-SEA CONTAINER SHIPPING COMPANIES:  
AN EXPLORATORY STUDY***

by

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Submitted in partial fulfillment of the requirements  
for the degree of Doctor of Philosophy

at

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**To Alexandra, Rocio and Carmen.**

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## ABSTRACT

Despite the increased adoption of electronic commerce (EC) among container shipping companies, very little is known about the effects of EC practice on their strategic management. This study takes an interdisciplinary approach to examine the uses, motivations and barriers associated with EC in the container shipping industry at two time periods- 1992 and 2002 and explores whether the strategic relevance for its use has changed over time, and if so, how and why. The thesis' *central hypothesis* predicted that over time EC would become more relevant for the identification of business goals, as the main motivation for its use becomes increasingly customer-oriented. Secondary hypotheses predicted that EC uses, motivations and barriers would become increasingly commercial, rather than operational.

In order to test the hypotheses, a combined research methodology was adopted. Four companies were selected for case study and convergence and divergence of perceptions amongst interviewees were analyzed at two levels: within- and across-cases. In addition, a 41-question survey was sent to 297 shipping companies, yielding an 11.1% response rate. Surveys were analyzed using various tools, including correlation and regression analysis.

This research found that the role of EC during the period under examination became more strategic than tactical. This change, however, could not be explained solely by the desire of companies to exploit EC externally with clients as foreseen in the *central hypothesis*. Companies' ability to master the use of EC within their own organizations also plays a critical part. As a result, hypotheses explaining how key EC-related aspects interact over time were elaborated for future testing.

This research found consensus among interviewees that EC will become the standard for operational and commercial transactions in container shipping in the near future, as EC will enhance their ability to achieve hard savings, greater efficiencies and access new geographical markets. Companies recognize, however, that the full potential of EC can only be realized once the shift from paper-based to electronic practices is well underway, for which further support from government agencies is critical. Deeper understanding of the fundamental management, legal, technical, operational and social impacts of EC in this industry would benefit from interdisciplinary research frameworks.

## LIST OF ACRONYMS

ANL:	Australia National Line
ANZDL:	Australia New Zealand Direct Line
APL:	American President Lines
B2B:	Business-to-Business EC
B2C:	Business-to-Consumer EC
B2G:	Business-to-Government EC
B/L:	Bill of Lading
C-PTAT:	Customs-Trade Partnership against Terrorism Program
CA:	Certification Authority
CEO:	Chief Executive Officer
CGM:	Compagnie General Maritime
CMA:	Compagnie Maritime d’Affretment
CMI:	Comité Maritime Internationale
Compfacts:	Group of survey variables measuring other competitive factors
COSCO:	China Ocean Shipping Company
CRM:	Customer Relationship Management System
CSAV:	Compañía Sud-Americana de Vapores
E-B/L:	Electronic Bill of Lading
EC:	Electronic Commerce
ECBarr:	Group of survey variables measuring electronic commerce-related barriers
ECExpt:	Group of survey variables measuring electronic commerce-related expectations
ECMot:	Group of survey variables measuring electronic commerce-related motivations
ECSR:	Group of survey variables measuring the strategic relevance of electronic commerce
ECUse:	Group of survey variables measuring electronic commerce-related uses
EDI:	Electronic Data Interchange
EFT:	Electronic Funds Transfer
G2C	Government-to-Consumer EC
ICT:	Information and Communication Technologies
INTERTANKO:	International Association of Independent Tanker Owners
IO:	Industrial Organization
IT:	Information Technology
MIS:	Management Information System
NOL:	Neptune Orient Lines
NYK:	Nippon Yusen Kaisha
OOCL:	Orient Overseas Container Line Limited
OT:	Organizational Theory
PIL:	Pacific International Lines (Pte) Ltd.
PKI:	Public Key Infrastructure
P&O:	P&O Nedlloyd
RBV:	Resource-based View of the Firm
SES:	Socio-economic Status System
SM:	Strategic Management
SPSS:	Statistical Package for Social Sciences

TCE:	Transaction Cost Economics
TEU:	Twenty-foot Equivalent Unit
TMM:	Transportación Marítima Mexicana
UNCTAD:	United Nations Conference on Trade and Development
UNICTRAL:	United Nations Commission on International Trade Law
VIF:	Variance Inflation Factors

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## CHAPTER 1

### INTRODUCTION

In the last decades there has been a significant rise in the use of computers, networks, communications and information technology. These technological advances have had tremendous impacts on the way business is conducted in many industries. Some examples of how profoundly external changes in the commercial environment have affected traditional businesses areas are seen in the manufacturing, retail and air transportation industries, where intense competition enabled by electronic commerce (EC) has helped re-shape business models and supplier–customer supply chains, among others.

According to Turban *et al* (2000) EC has been broadly defined as the selling or buying of commodities, servicing of clients or exchange of information through computer networks. They further argue that the experience in the retail and air transport industries shows that some of the advantages gained by introducing EC applications in an organization are likely to include a reduction in operational and commercial transaction costs; the customization of products or services as a result of direct electronic interaction with clients; the opportunity to develop new markets and services; and an increased ability to strengthen or develop supply chain management (Turban *et al*, 2000). Indeed, a 1998 multi-industry survey determined that the single most popular use of EC among participating companies was associated with transportation services followed by order processing, procurement and relations with suppliers, and that about 90% of the respondents had in place some type of supply chain management program (Lancioni, *et al*, 2000).

The transportation of goods by sea, being an integral part of the movement of raw materials and semi and fully processed goods, is influenced directly or indirectly by the growing use of EC. To explore this issue further, the next section will identify the study's main objectives and discuss the interdisciplinary perspective and timeframe used.

## **1.1 ABOUT THE STUDY**

### **1.1.1 Rationale**

Besides efforts to sensitize customers to the new 'electronic jargon' and the constant advertisement of 'e-business' initiatives during the last few years, there has been very little in-depth scholarly research on the strategic management implications of EC for the maritime transport industry in general, and for deep-sea container shipping in particular. The literature available highlights current issues and achievements, without analyzing some of the most fundamental questions, such as how ocean carriers perceive EC in the context of the international transportation of containerized goods.

Indeed, the concepts of electronic business and electronic markets are as novel to many other industries as they are to the shipping industry. Accustomed to physical business components, the idea of having to deal with virtual players, products or processes is sometimes perceived as part of a whole new business line that has very little to do with the traditional ocean transport of containerized goods. Nonetheless, the reality suggests otherwise. Ocean container carriers are part of a supply chain or network of services in which they have to interact, among others, with shippers, consignees, customs, insurance companies, ports and financial institutions. Changes and innovations in this network of competence will undoubtedly affect deep-sea container carriers as well.



Thus, the focus of this study is to understand the changes, if any, in the strategic management of deep-sea container shipping companies resulting from the introduction of EC applications in organizations. More specifically, this exploratory research will look at the role of EC in business strategy formulation and implementation over time.

### **1.1.2 Objectives and Significance**

New technology is oftentimes a trigger for the revision of operational and business strategies. There is evidence showing that large deep-sea container shipping carriers have used EC applications for many years now. However, it is unclear whether EC is playing the role of a tactical tool in strategy implementation, or the role of a driver in strategy formulation. It is precisely in this context that the study aims to provide further reflections and contributions.

This study seeks to understand the changing impact of the use of EC on the way deep-sea container shipping companies formulate and implement their business strategies over a given period of time. The research aims to explore relationships between perceived expectations, motivators and barriers, and the evolution of the use of EC in the strategy formulation-implementation context. To this end, an exploratory analysis of the ten-year period between 1992 and 2002 was undertaken using a combined research methodology, i.e., (a) the case study of companies engaged in container shipping, and (b) the use of survey questionnaires directed to a greater spectrum of container shipping companies. More details on methodological considerations are provided in Chapter 4 of this thesis.

Thus, in the context of business strategy, the main objectives of this study are:

1. To understand the nature and relevance of EC uses, motivations and barriers for the deep-sea container shipping industry;

2. To identify the major EC policy-related factors, if any, hindering or facilitating the use of EC in deep-sea container shipping; and
3. To determine whether the relevance of EC has shifted over time, from its perceived role as a tactical tool in strategy implementation to a driver in strategy formulation.

From the academic standpoint, the results of this study will contribute to increasing the level of understanding of how new EC technology and commercial practices affect strategic management issues in container shipping companies. More specifically, this study aims to serve as a basis for further research on the topic by providing hypotheses that explain how, if at all, the strategic relevance of EC has evolved in this sector of the maritime transportation industry.

From a pragmatic perspective, the results of this research will be of interest to commercial organizations involved in this trade and to other service providers in the supply chain. In addition, it will provide governments with special interests in developing or strengthening specific markets and/or activities, with views on how their EC-related policies may, if at all, affect the container shipping trade. For individual countries where shipping constitutes a strong pillar of the economy, there are many considerations to take into account in order to take appropriate measures to promote, facilitate and encourage investment. Understanding the relationship between EC trends and the national shipping industry is vital for any country offering or facilitating these services in order to meet current and future trade demands.

### 1.1.3 Interdisciplinary Perspective

Clearly defined academic disciplines have been the dominant means of knowledge organization and discovery and, as such, they have greatly influenced not only academic research but also career development (Stember, 1991). Nonetheless, the progressive realization that discipline-based research can, in fact, benefit from the introduction of foreign <sup>1</sup> methodologies, perspectives and research experiences has encouraged interactions between traditional academic disciplines (Nissani, 1997). Furthermore, the fact that most societal problems giving rise to academic research are not restricted by the artificial academic division of knowledge, suggests the need for context-based interdisciplinary studies.<sup>2</sup> Despite the criticisms, limitations and scepticism associated with interdisciplinary research, it is widely acknowledged that the interdisciplinary analysis of complex social issues is not only on the rise (Stember, 1991; Nissani, 1997), but has already made tremendous contributions to society (Nissani, 1997). It is not the purpose of this section to present a comprehensive view of the pros and cons of interdisciplinary analysis, but rather to identify why such an approach was preferred for this study.

*What is interdisciplinarity?* A straightforward definition highlights the interaction of more than one academic discipline of study with particular knowledge and theories, educational perspectives and research methodologies (Stember, 1991; Nissani, 1997). In addition, Klein (1990) maintains that interdisciplinarity can be defined from various perspectives, among others by the interdisciplinary nature of examples, motivations, terminology hierarchy and principles of interaction. From a more pragmatic point of

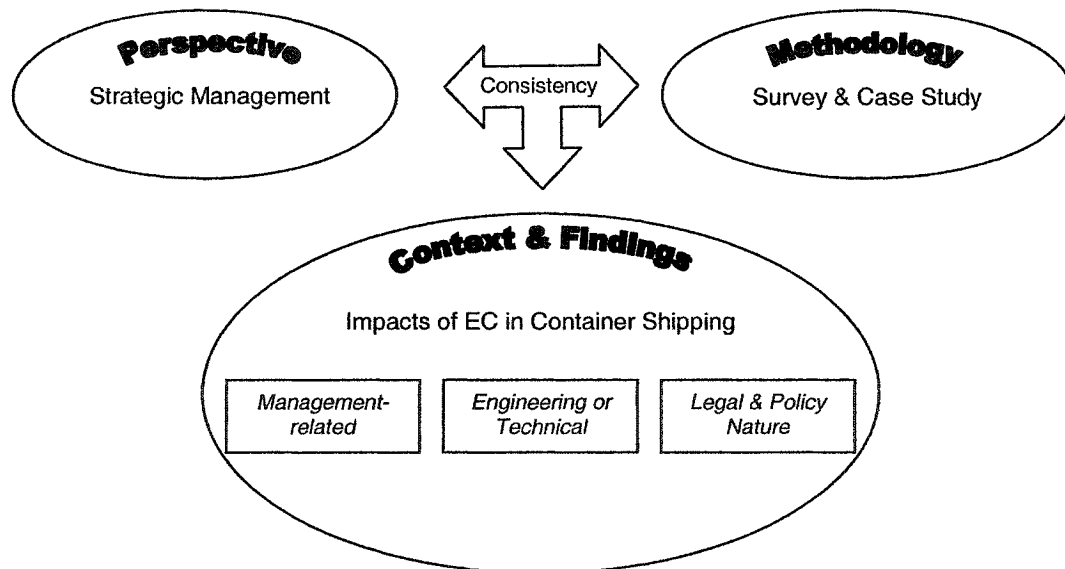
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<sup>1</sup> i.e., beyond-discipline or boundary-crossing.

view, however, Chircop (2000) argues that the essence of interdisciplinary fields relates to the premise that issues in these areas cannot be comprehensively explained by only one discipline but, instead, the explanation of events may be built on premises from the social, natural or engineering sciences. Consequently, Chircop (2000) argues that interdisciplinarity can be defined in terms of perspectives and methodologies, as well as in terms of the context and findings of the study.

Building on Chircop's views, the interdisciplinary approach of this research is substantiated primarily by the nature of the subject under study, as well as by the nature of its potential findings (see Figure 1-1). In other words, despite the use of a dominant management-related perspective (i.e., strategic management paradigm) and of a discipline-neutral methodology, the context, nature and potential findings of the problem under examination (i.e., EC) are interdisciplinary and require a contextual, workable and problem-solving approach to explain their effect on SM issues.

**Figure 1-1: Interdisciplinary Nature of the Study**



<sup>2</sup> As an example, Chircop (2000) argues that certain fields of research, such as coastal zone management, have encouraged the use of interdisciplinary views to address problems arising from the multiplicity of common users of the oceans.

Indeed, as an interdisciplinary field of research, EC presents the challenge that potential EC expectations, motivations and constraints faced by deep-sea container shipping companies could be of a management,<sup>3</sup> engineering,<sup>4</sup> legal<sup>5</sup> or policy nature.<sup>6</sup> Thus, findings will likely, but not necessarily, be interdisciplinary.

#### **1.1.4 Timeframe of the Study**

This study seeks to understand the relationships, if any, between variations in the strategic relevance of EC and changes in the uses, motivations and barriers associated with EC over time. Considering that the definition of EC is based on the generic purpose of EC applications and the type of computer network used<sup>7</sup> and since most EC applications rely on the networking capability available on the market, a set of dates with significant relevance in terms of the existence and adoption of network technology needs to be identified. To this end, a period of ten years seems adequate since network technology, as it pertains to the support of EC applications, would have been considerably tested, revised and updated in a decade.

According to the Internet Society (2001), it was not until the mid-1990s that most industry records showed an aggressive and exponential use of the Internet for commercial purposes (see Table 1-1 and Figure 1-2). Therefore, the ten-year period selected should necessarily encompass the year 1995.

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<sup>3</sup> Among them commercial, financial and organizational considerations.

<sup>4</sup> Mostly those computer science-related issues that enable the technical functioning of EC.

<sup>5</sup> These revolve around the formulation and implementation of legal frameworks compatible with transportation-related transactions in an EC context.

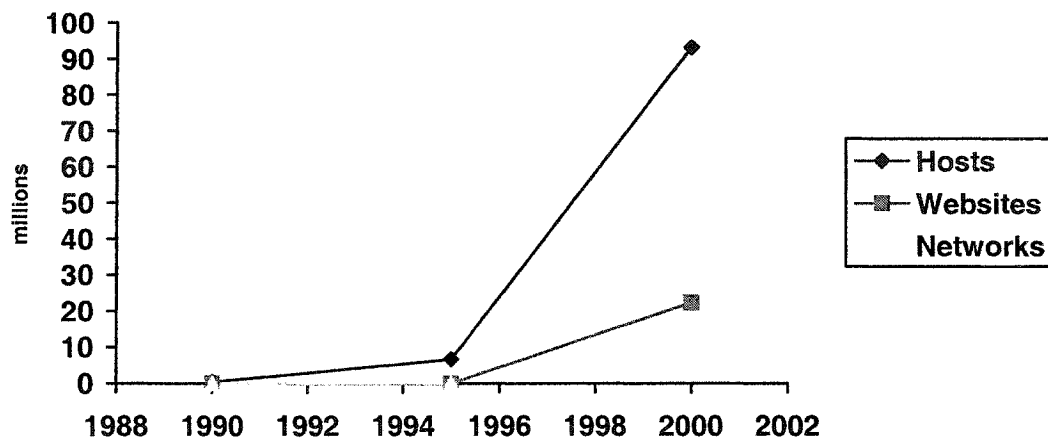
**Table 1-1: Exponential Use of the Internet**

<i>Year</i>	<i>Hosts</i>	<i>Networks</i>	<i>Websites</i>
1990	313,000	2,063	130 (June-1993)
1995	6,642,000 (June)	61,538 (July)	23,500 (June)
2000	93,047,785 (July)	Not available	22,282,727 (Oct)

Source: The Internet Society, 2001.

Figure 1-2 is a representation of the above data:

**Figure 1-2: Exponential Use of the Internet**



From the management point of view, a ten-year interval is also preferable in order to obtain relevant information on the state of implementation of EC applications and how they have affected the business strategies of deep-sea container shipping companies. The impact of strategic management decisions made by companies would normally be reflected over a period of a decade. During this time, most companies would have evaluated the immediate outcomes of any strategic decision, revised and amended them, if necessary. This time period, although mostly anecdotal, has proved to be adequate in connection with major strategic management studies (i.e., Rumelt, 1974), as reported by Harris and Ruefli (2000:587-588):

<sup>6</sup> These are mostly concerned with the adoption of international schemes for the use of EC as a tool for the facilitation of the international transportation of containerized goods.

*Rumelt's research design reported the strategy and structure of firms only at ten-year intervals... He implicitly made the assumption that firms held their strategy or structure through a significant enough portion of the period to evoke the associated performance results.*

To container shipping in particular, the early 1990s seem to represent a clear turning point in the use of EC by deep-sea container shipping companies. By then, electronic data interchange (EDI), which had been in use since the 1970s, was a very well known technology and commercial practice and was already well established among leaders in various industries (Kalakota and Whinston, 1996; and Sawabini, 2001). This argument is supported by the EDI orientation of the *1990 CMI Rules for Electronic Bills of Lading*<sup>8</sup> and by the standardization of the International Chamber of Commerce Incoterms in 1990 to an EDI-compatible three-letter norm for terms of trade. Despite these developments, however, the use of EC by deep-sea container shipping companies did not experience any major changes until the mid 1990s, when the introduction of the Internet as a public network made EC more accessible to all parties in the transportation chain. Therefore, to summarize, this research focused on the ten-year period between 1992 and 2002 because:

- (a) Within a ten-year interval, most companies would have reviewed and evaluated the impact of their strategic choices; and
- (b) This period includes points in time in which key network infrastructures and their associated EC applications were at a recognizable adoption stage.

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<sup>7</sup> For the main definitions see Chapter 2.

<sup>8</sup> The *1990 CMI Rules for Electronic Bills of Lading* were an early attempt to provide legal certainty to electronic transactions in international trade and shipping.

Although it is acknowledged that a longer time period may be more appropriate from the strategic management perspective, the short history of EC does not allow for greater, more meaningful, evaluation periods.

Having clarified important aspects framing this research, the balance of this chapter will first introduce the shipping industry in general and container shipping in particular, and then describe how this thesis is structured and the rationale linking its components.

## 1.2 THE SHIPPING INDUSTRY

*We now know that there were sailors before there were farmers and shepherds; that there were ships before people had settled in villages and made the first pottery... [the reason is simple:] The most efficient means for moving people and materials in any quantity is by flotation in some sort of craft in the water. (Gold, 1986:1-2)*

The maritime transport industry (also known as the *shipping industry*) is considered to be the oldest means of international movement of goods (Gold, 1986: Farthing, 1993). As such, there is no shortage of fascinating publications describing the history and development of shipping from ancient civilizations to modern times. These centuries of experience through periods of peace and war; bonanza and economic depression; and free trade and protectionism have shaped and enriched the legal,<sup>9</sup> management and operational principles used in the shipping industry today.

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<sup>9</sup> Principles of maritime law can be traced back to ancient times. While it has been argued that the *Code of Hammurabi* (2000 to 1600 B.C.) is the oldest sea code (Gold, 1996), to Gilmore and Black (1975) it was not until 900 B.C. that the Code of the Island of Rhodé in the Eastern Mediterranean provided strong evidence of some of the first maritime law principles. Subsequent maritime codes included *The Tables of Amalfi* (near Naples), *The Consolato del Mare* (Barcelona), *The Laws of Wisby* (Sweden), *Laws of the Hansa Towns* (Northern Germany), the *Guidon de la Mer* (Rouen, France) and the *Laws of Oleron* (Southern coast of France). Maritime law principles continued to be enriched over the next centuries (1000 to 1300 A.D.) as trading in



The management of shipping companies has evolved tremendously. According to Rinman and Brodefors (1983), two main types of shipping companies could be identified at the beginning of the nineteenth century, i.e., chartered companies and free traders. These types of companies, they argue, are regarded as the predecessors of liners and tramp companies, respectively.

While chartered companies operated in a semi-monopolistic environment, free traders operated wherever cargo was available for transportation outside protected markets. As protectionist measures eased, chartered companies were progressively replaced by dedicated shipping lines (Rinman and Brodefors, 1983), which by the end of the nineteenth century started to organize strategic cooperative arrangements known as 'shipping conferences', to bring freight stability to the marketplace (Brooks, 2000). Such arrangements were impractical for free traders, as they did not have scheduled routes. Instead, free traders relied heavily on the business expertise of key people onboard for the success of the enterprise.

*The skill, experience and business acumen of the supercargo and the [ship] master were decisive for the success or otherwise of the great adventure of a trading voyage...The shipping firm and the cargo owners received no news of the vessel for several years. All decisions were taken onboard... (Rinman and Brodefors, 1983:16)*

The shipping industry has come a long way and has evolved into a complex mode of transportation for both passengers (passenger shipping) and commodities (freight

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the Mediterranean Sea and in Northern and Western Europe flourished, and as judges documented their experiences. Although some sea codes gained more widespread acceptance (e.g., the *Laws of Oleron*), there was no uniformity in the application of maritime principles. Instead, different jurisdictions implemented them in combination with the wisdom gained by local courts. Eventually, however, the internationalization of maritime law principles progressively took place, greatly aided by the growth in power of some European nations and the fact that their maritime codes were consolidated and further transmitted to their colonies (Gilmore and Black, 1975).

shipping). Passenger shipping, however, will not be addressed any further in this study, as it is argued that it has more similarities with the air transportation and tourism industries than with freight shipping.<sup>10</sup>

Freight shipping is normally classified based on the type of cargo carried, i.e., containerized; dry-bulk; and oil cargo and its derivatives.

*Liner or Container Shipping*, as the name infers, concentrates on the carriage of containerized products by means of scheduled services between seaports. One traditional feature in liner shipping is the existence of shipping conferences<sup>11</sup> created in key trade routes in an attempt to control freight rates. Despite this, competition for containerized cargo is intense, not only among ocean carriers, but also between shipping lines and multi-modal operators.<sup>12</sup>

*Dry-Bulk Shipping* has a different type of operation than container shipping. The main cargo consists of dry raw materials in large quantities (e.g., grain, coal, iron ore, phosphate, sugar and coffee). The fact that bulk cargo requires less sophisticated

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<sup>10</sup> In the current passenger cruise sector, transport services tend to be seasonal and pleasure-driven, normally sold through tourism agents as part of recreational packages. As a result, the high standard accommodations and facilities provided by onboard cruise ships resemble those available at hotels and resorts, and the outsourcing of services such as on-board retailing, gambling and cultural shows is a normal practice on cruise liners. The shipping part of the business is largely confined to providing and operating high safety standard ships and keeping a pre-established schedule between sites or ports of recreational interest.

<sup>11</sup> A shipping conference is defined by UNCTAD in Chapter I of the Convention on a Code for Liner Conferences as follows: "a group of two or more vessel-operating carriers which provides international liner services for the carriage of cargo on a particular route or routes within specified geographical limits and which has an agreement or arrangement, whatever its nature, within the framework of which they operate under uniform or common freight rates and any other agreed conditions with respect to the provision of liner services" (UNCTAD, 1974). Shipping conferences were first created in 1875 for the UK-Far East trade. Their main objective was to promote freight stability, through membership arrangements such as freight fixing or cargo capacity pooling. Unlike in other industries and despite critical reviews by authorities in some jurisdictions, shipping conferences still enjoy antitrust immunity in most industrialized country markets. Nonetheless, partly due to declining membership, conferences' influence over competition has decreased in the last two decades (Brooks, 2000).

terminals than containerized goods broadens the range of possible loading and discharging ports around the world. Dry-bulk ships sail around the world in an unscheduled manner (i.e., 'tramp') constantly searching for cargo that suits their geographical position at a given time. This market is highly dependent on political, economic, climatic and agricultural developments as these may boost or weaken the marketplace.

*Tanker Shipping* is probably the most specialized of all the ocean freight markets, in terms of structure (ships and terminals) and trading processes. Tanker shipping is mainly divided into crude oil and refined products (i.e., chemicals, refined liquid fuels and liquefied gas), each requiring specialized ships and marine terminals. Despite a relatively well-defined set of loading terminals (i.e., major oil production areas and oil refineries), tanker shipping follows a tramp-type operation due to the practice of multiple re-selling of cargo while in transit. Thus, the freight rate structure is complex and includes a combination of potential ports of discharge.

While it is evident that there are operational differences among the various sectors of freight shipping, there are also fundamental common aspects that bring them together as an industry, as summarized in Table 1-2 below.

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<sup>12</sup> Nowadays, through the use of complex combined transportation networks (i.e., air, sea, rail and trucking), logistics service providers are able to complement and/or compete against regional and

**Table 1-2: Key Characteristics of the Shipping Industry**

<i>Characteristics</i>
It requires highly specialized ships and marine terminals; <sup>13</sup>
It is capital intensive and cyclical; <sup>14</sup>
It is a derived demand; <sup>15</sup>
Freight rates are market-driven; <sup>16</sup>
Differentiation of transportation service is a challenging task; <sup>17</sup>
There are no legal or natural restrictions to enter or exit the international marketplace; <sup>18</sup>
Cargo imbalance (i.e., unequal inbound and outbound cargo) is a constant concern; <sup>19</sup>

In summary, shipping is international, highly competitive, capital intensive, market-driven, but most importantly, it is a key component of the international chain of supply of raw materials and manufactured goods. It is evident, therefore, that in such an industry the introduction of EC by clients and competitors poses interesting challenges to ocean carriers. However, has EC impacted all sectors of the industry similarly so far? This is the central theme of the next section.

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local ocean feeder services.

<sup>13</sup> Technological advances have been one of the most important drivers for changes in the shipping industry. Over the last few decades, ship design and the degree of specialization have shifted from general purpose cargo ships to highly specialized, automated and expensive units. In fact, ships nowadays are so specialized that the flexibility to enter different cargo markets has been dramatically eroded. Shipbuilding technology also allows for the construction of better-sized ships to maximize economies of scale according to the particulars of trade areas. Onboard technology goes hand in hand with port technology as modern ship design oftentimes sacrifices self-cargo handling equipment to increase cargo capacity.

<sup>14</sup> Freight shipping is capital intensive and highly cyclical, with an average of 5, 12 and 30 years of short, medium and long term cycles, respectively (Anonymous, 1999a). Major factors increasing the risks for capital investment include economic conditions (regional and national), as well as freight rates, foreign exchange and bunker price volatility (Raghuran, 1998).

<sup>15</sup> As ocean transportation services represent a demand derived from one major transaction (i.e., a contract for the sale of goods between shippers and consignees), carriers face great limitations to influence the demand for their services (McConville, 1999).

<sup>16</sup> The existence of a large number of small shipping and cargo firms renders the control of freight rates ineffective. Government intervention is also minimal and governments do not regulate on freight rates, which are instead determined by supply and demand forces (McConville, 1999). Government policies, however, can either facilitate or exercise considerable pressure at the operational or commercial level. Some examples include the protection of national sea trade (cabotage), anti-trust issues regarding shipping conferences, and the provision of tax incentives by international open registries of vessels.

<sup>17</sup> As the basic ocean transportation service provided by carriers is essentially the same, strategies to differentiate services are challenging.

<sup>18</sup> McConville, 1999.

<sup>19</sup> Although it is common for ocean carriers to undertake the transportation of goods belonging to various customers simultaneously, cargo imbalance is a frequent concern. Developing countries in Asia and Latin America tend to export more raw materials than developed countries, while importing more finished or semi-finished products (UNCTAD, 2000).

### 1.2.1 Why Container Shipping?

The complexity, commonalities and differences among the above sectors require an early delineation of the boundaries of the study. There are three major reasons why this research will concentrate on the management of deep-sea container shipping companies:

- (a) *The requirements and intensity of EC use is greater in container shipping than in other sectors.*

Container shipping companies are leading the way in EC implementation because of the pressing need to provide a faster, yet cost-effective, way to interact with their numerous clients, and to achieve operational efficiency as a result of clients' increasing demands for integrated multi-modal<sup>20</sup> and logistics services (UNCTAD, 1998b). In fact, various members of the trading community have expressed their high expectations of EC becoming a means to alleviate current inefficiencies in the international container shipping trade (Marlin, 1999; Bradley, 1999; Bossley, 1999; Jessop, 2000; Anonymous, 2001). As a result, container shipping companies have actively either designed or implemented various intra- and inter-organizational EC practices currently available in the marketplace (see Section 3.2.1 for more details on the use of EC in container shipping).

- (b) *Container shipping is the most fertile ground for the implementation of EC initiatives in freight shipping.*

According to Stopford (2002a), revenue for companies operating in the dry-bulk sector depends on fewer cargo negotiations a year, while for container shipping it is the opposite, i.e., revenue comes from a large number of cargo-related negotiations. Put

another way, container shipping companies depend on a greater number of lower value contracts. Container shipping companies transport containerized cargo from thousands of different clients, which requires extensive interaction with clients,<sup>21</sup> as well as coordination to maximize resource utilization.<sup>22</sup> Companies engaged in dry-bulk, on the other hand, commonly negotiate contracts such that in each voyage the totality or the majority, of the ship's carrying capacity is used to service one customer, or a limited number of them. This results in a few high-value contracts per year, which in turn means less cargo-related documentation, as well as less demand for cargo booking and tracking compared to container shipping. The situation of tanker shipping in terms of intensity of EC use lies somewhere between the two, but is closer to dry-bulk operators;

*(c) The perceived legal uncertainty associated with the electronic transmission of documents in a commercial environment has produced comparatively fewer adverse effects in container shipping than in other sectors of the industry.*

According to Wilson (1988), the fact that containerized goods are rarely traded or negotiated while in transit has encouraged the use of non-negotiable sea waybills in container shipping. The electronic transmission of sea waybills in turn has posed fewer legal challenges compared to negotiable electronic bills of lading, since the latter requires a thorough revision and possible modification of legal regimes supporting the role of bills of lading (B/L) in the contract of sale and of carriage.<sup>23</sup>

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<sup>20</sup> According to Article I of the 1980 United Nations Convention on International Multimodal Transport of Goods, the essence of multimodal transport of goods lies in the utilization of at least two modes of transport, i.e., air, rail, trucking and/or water transport.

<sup>21</sup> Among others, cargo booking and tracking, as well as issuance of cargo-related documentation.

<sup>22</sup> For example to schedule cargo slot utilization in container ships, transshipment and storage areas in port terminals, as well as to track and reposition empty containers.

<sup>23</sup> The first attempt to establish an international scheme for the negotiation of electronic B/Ls came from the oil tanker shipping sector in 1986. It was known as SEADOCS. It has been argued

### 1.2.2 Key Competitive Factors and Developments in Container Shipping

For a brief but robust overview of the structure of an industry, analysts turn to *Porter's 5 Forces Model*<sup>24</sup> to depict those aspects of the external environment having a direct impact on competition strategies. The application of this model to container shipping provides an overview of the complexity of this industry and a good starting point for discussion.

**Table 1-3: Porter's 5 Forces Model in Container Shipping**

<b>Barriers to entry</b>	<ul style="list-style-type: none"><li>• High capital investment and fixed costs;</li><li>• Specialized know how to run services and to achieve cost-efficient balance between ships and their specific routes;</li><li>• Access to terminals, supply distribution and agency networks; and</li><li>• Existence of <i>shipping conferences</i> as a means to discourage low-priced entrants.</li></ul>
<b>Rivalry among competitors</b>	<ul style="list-style-type: none"><li>• High, with major players leading competitive trends (e.g., technical innovation and development of strong customer relationships as basis for competition);</li><li>• <i>Shipping Conferences</i> limit competition and capacity in certain routes; however, service differentiation between conference and non-conference operators is becoming increasingly difficult; and</li><li>• High barriers to exit result in over tonnage, thus increasing competition in the marketplace.</li></ul>
<b>Bargaining power of buyers</b>	<ul style="list-style-type: none"><li>• Moderate. It is route dependent and product-specific.</li></ul>
<b>Bargaining power of suppliers</b>	<ul style="list-style-type: none"><li>• The most relevant comes from land-based supply and distribution services, otherwise, very limited power by the majority of service providers including shipbuilding, labour- and flag-related service suppliers;</li></ul>
<b>Threat of substitutes</b>	<ul style="list-style-type: none"><li>• By air transportation carriers (high end or valuable cargo) and multi-modal carriers (low end cargo in coastal, as opposed to the deep-sea, markets).</li></ul>

Source: Summary of the analysis by Brooks 1993 and 2000.

In a nutshell, Table 1-3 suggests that while there are high barriers to entry and exit, high rivalry in the marketplace and moderate power of customers, the power of suppliers and the threat of substitutes is relatively low. A review of industry journals provides more context on competitive facts, that is (a) in the last 20 years container shipping has been the fastest growing sector in freight shipping; (b) volatile freight rates, tonnage surplus and the increasing levels of rivalry have resulted in market consolidation;

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that the perceived legal uncertainty was a major reason for the failure of SEADOCS (Chandler, 1998). In 1990, however, the *Comité Maritime Internationale* (CMI) produced the CMI Rules for Electronic Bills of Lading and the International Chamber of Commerce amended the Incoterms to make them EDI friendly. A legal cornerstone was achieved in 1996, with the adoption of the United Nations Commission on International Trade Law, UNICTRAL Model Law on Electronic Commerce.

and (c) new technology has played a significant role in optimizing resource utilization. The following paragraphs will explain these developments in more detail.

*(a) The volume of seaborne containerized cargo, as well as the complexity of its transportation has increased over time.*

Malcolm McLean's innovative idea of transporting cargo in standardized boxes or containers was first implemented by Sea-Land back in 1956 in the United States market. This practice progressively gave rise to a fundamental sector in the transportation of seaborne cargo: container shipping. Tangible benefits<sup>25</sup> derived from the transportation of cargo in standard boxes provided fertile grounds for the continual growth of cargo volume and the containerization of various break-bulk trades throughout the 1980s (Boyes, 1986a; Peters, 2001).<sup>26</sup> By 1974, less than 20 years after containerization was first introduced, the world's container trade was estimated to be 14.2 million twenty-foot equivalent units, TEUs, (Boyes, 1979). This increase continued to reach 48.41 million TEU in 1997 (UNCTAD, 1998b) and 75.8 million TEU in 2002 (UNCTAD, 2003).

The growth of container shipping is greater than in other sectors of the industry (Brooks, 2000) partly due to the regionalization and globalization of international trade (Kindred and Brooks, 1997) and the wider adoption of innovative production and distribution techniques re-engineered by manufacturing industries. The latter is largely credited for having given rise to new transportation concepts, such as just-in-time delivery (Brooks, 2000), where the multi-modalism facilitated by having standard

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<sup>24</sup> For more details see Section 2.2.2.3 *The Industrial Organization Paradigm*.

<sup>25</sup> For example, the standardization of transportation and cargo handling equipment, increased protection of cargo against damages and security against thieves, and cargo handling cost reduction (Brooks, 2000; Peters, 2001).

<sup>26</sup> In the early 1980s many ocean carriers found that profitability increased if they combined the transportation of certain commodities in bulk with the growing international tendency of container



containers plays a key role. By signing up to the idea of just-in-time delivery, major manufacturing firms were less interested in looking at the port-to-port transportation leg, but rather viewed transportation of containerized cargo from an integrated supply chain perspective, that is, from point-to-point irrespective of the transportation mode utilized to move cargo. This emerging form of transportation required greater operational coordination and exchange of documentation between various multi-modal players and created a greater demand for transportation integrators. As a result, although integration could be achieved by cargo parties themselves, outsourcing to trade facilitators (e.g., third party logistics service providers and container shipping carriers) increased significantly (Kindred and Brooks, 1997). Large ocean container carriers have moved beyond port-to-port services to provide inland and distribution services (Evangelista and Stumm, 2000), with some of them moving into global carriage, thus departing from ocean freight-based contracts to all modes of transport-based carriage contracts with major shippers (UNCTAD, 1998b).

On this basis, it is argued both that there has been a constant increase in the volume of containerized seaborne cargo, and that its movement has become more complex and can no longer be assumed to be port-to-port.

*(b) Stiff competition has resulted in market consolidation.*

According to Boyes (1984), while in 1974 shipping conferences moved an approximate 90% of cargo in most markets, by 1983 that share had fallen to between 50% and 80% on some routes. The build-up of overcapacity and stiff freight competition up until 1983 marked a turning point in competition strategies in liner shipping and led to the

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cargo carriage (Boyes, 1980), which by 1981 already accounted for about 60% of the world's general deep sea liner cargo (Boyes, 1981).

adoption of survival strategies<sup>27</sup> by ocean liner carriers (Boyes, 1984). In the mid 1980s, US Lines and Evergreen, two leading carriers, aggressively pursued benefits from economies of scale by ordering larger vessels and introducing cheap cargo slots in arterial transoceanic routes, which in turn triggered a race for more cost-effective operations (Boyes, 1985). Moreover, service contracts between shippers and carriers added significantly to the move toward price competition. More specifically, in a depressed freight market, service contracts quickly covered up to 70% of the transatlantic trade by October 1985 (Boyes, 1986b). This event was reported in the *Containerisation International Yearbook 1986* as follows:

*Many shippers are taking advantage of such low rates to secure favorable contracts. Carriers, in turn, are anxious to secure cargo where they can.*  
(Boyes, 1986b:17)

The industry outlook in the *Containerisation International Yearbook 1990* projected a slower growth on major routes worsened by over tonnage in the marketplace, global economic unification, deployment of larger container ships, development of more sophisticated electronic information and management systems, and further evolution of customer demands towards integration of transportation systems (Boyes, 1990). Moreover, despite some buyouts to consolidate or exercise more control,<sup>28</sup> the early 1990s were characterized by decisive moves toward the rationalization of resources. Some companies invested in powerful and complex information systems in an attempt to secure cost advantages and to differentiate services in order to gain a competitive advantage over competitors (Boyes, 1994).

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<sup>27</sup> Among others, diversification and rationalization strategies, as well as slot sharing agreements and intense operational innovation.

In the early 1990s cooperative arrangements or strategic partnerships for operational cost-cutting and carriage capacity reduction (Phillips, 1991; Boyes, 1992 and 1993) were common.<sup>29</sup> Some specific examples can be seen in the formation of cargo sharing agreements between global carriers, such as Maersk, Sealand and P&O Containers (Anonymous, 1993c), as well as among niche operators, such as Mediterranean Shipping Company and Atlantic Container Lines (Anonymous, 1993b). The need to control operational costs and differentiate services lead not only to the formation of cooperative agreements, but also to the revision of management structures<sup>30</sup>, mergers and acquisitions.

During the second half of the 1990s the industry witnessed an unprecedented consolidation in container shipping. Brooks (2000) argues that various forms of strategic alliances involve different degrees of cooperation and organizational interdependence among participants.<sup>31</sup> The experience of the second half of the 1990s, however, suggests an intensive implementation of growth strategies such as mergers, acquisitions and takeovers (see Table 1-4).

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<sup>28</sup> For instance, Wilhelmsen Lines and Sweden's Transatlantic Group (including Atlantic Container Lines) acquired former partners. P&O Containers did likewise with Overseas Container Limited (Phillips, 1991).

<sup>29</sup> According to Peters (2001), when ocean carriers realized that freight rates were unlikely to improve substantially, they implemented cost reduction initiatives. First they opted for strategic alliances through which they could reduce ship-related costs which accounted for about 30% of carriers' expenditures. If however, further cost-containment was needed, mergers and acquisitions (hostile or friendly) would follow to tackle service-related costs (which accounted for roughly 70% of the remaining expenditures).

<sup>30</sup> For example, Royal Nedlloyd, Hapag-Lloyd and Orient Overseas Container Lines undertook a closer revision of the relationship between market opportunities and core competencies in order to determine to what extent their organizational structure was appropriate (Anonymous 1993a, 1993d, 1994).

<sup>31</sup> For Brooks (2000), participation in traditional conferences and equity joint ventures are at opposite ends of competitive choices in container shipping. Thus, organizational interdependence tends to increase when participants move from the traditional conference to equity joint ventures.

**Table 1-4: Key Mergers, Acquisitions and Takeovers During the 1990s**

<i>Strategic Moves</i>
<ul style="list-style-type: none"> <li>• P&amp;O Containers acquisition of part of ANL (1996)</li> <li>• CMA acquisition of and merger with CMG (1996)</li> <li>• P&amp;O Containers and Nedlloyd merger (1997)</li> <li>• Neptune Orient Line acquisition of APL (1997)</li> <li>• Evergreen acquisition of Lloyd Triestino (1998)</li> <li>• Compañía Sud Americana de Vapores acquisition of Companhia Libra de Navegacao and Montemar Marítima (1999)</li> <li>• Maersk Line acquisition of Safmarine Container Line (1999);</li> <li>• Maersk Line acquisition of and merger with Sealand (1999); and</li> <li>• CP Ships acquisition of Canada Maritime (1993), Cast Lines (1995), Contship Containerlines (1997), Lykes Lines (1997), ANZDL (1998), TMM (1999 and 2000) and Italia Line (2002).</li> </ul>
Source: Boyes (2000), Brooks (2000) and companies' public websites.

These strategic efforts changed the make-up of the top 20 players, also increasing their TEU capacity.

**Table 1-5: Top 20 Ocean Container Carriers in 2002\***

<i>Company</i>	<i>Ranking in 2002</i>	<i>Ranking in 1992</i>
Maersk-Sealand	1	1 (Maersk) - 2 (Sealand)
Mediterranean Shipping Co.	2	18
P&O Nedlloyd	3	6 (P&O) - 9 (Nedlloyd)
Evergreen Group	4	3
Hanjin – DSR Senator	5	8 (Hanjin) - 20 (DSR)
COSCO	6	14
NOL-APL	7	13 (NOL) - 11 (APL)
CMA-CGM Group	8	**
Mitsui OSK Line	9	5
CP Ships Group	10	**
NYK	11	4
K Line	12	7
ZIM	13	10
OOCL	14	16
China Shipping	15	**
Hapag Lloyd	16	12
Hyundai Marine	17	19
Yangming	18	15
PIL Group	19	**
CSAV	20	**

\* Source: Containerisation International Yearbook 1993 & UNCTAD Review of Maritime Transport 2003.

\*\* This company was not ranked among the top 20 container carriers in 1992.

In the late 1980s, the top 20 ocean carriers accounted for about 38.8% of the world's TEU capacity (Boyes, 1990), progressively increasing to 50% in 1992 (Boyes, 1993) and 61.8% in 2002 (UNCTAD, 2003). Similarly, fewer players within these top 20 carriers controlled more cargo capacity over time. The top five players increased their

Slot charter, equipment sharing, coordinated services and consortia with joint marketing,

stake of the world's TEU capacity between 1992 and 2002 from 18.8% (Boyce, 1993) to 29.9% (UNCTAD, 2003), respectively.

It is evident therefore that stiff competition in the marketplace influenced the consolidation of the market, which enhanced the ability of a small group of large carriers to set the bar for competitive and technological innovation. Moreover, as large container lines have increased their stakes in ancillary services such as port management, stevedore, cargo handling, and hinterland and logistics transportation services (Heaver *et al*, 2000), competitive innovation in this industry is no longer limited purely to the ocean leg.

(c) *New technology has played a significant role in optimizing resource utilization.*

There is little doubt that over the years, technological improvements have been key elements for operational cost reduction and the streamlining of ocean container transportation processes. Frankel (1991), who analyzed the economics of technology in the shipping industry,<sup>32</sup> argues that by the early 1990s, not only had the rate of technological development accelerated, but new technology had acquired a paramount role in transportation and cargo interface activities.<sup>33</sup>

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however, fall between these two ends.

<sup>32</sup> Frankel (1991) questions the apparent fascination in the shipping industry with larger and larger ships in order to achieve economies of scale, which indeed may be one of the more noticeable technological changes in shipping over time. This view is shared by Stopford (2002b), who, in analyzing aspects of economies of scale suggests that the typical cost breakdown of a transatlantic round voyage is as follows: 23% ship-related (operation, capital investment and bunkers); 18% container-related (including container maintenance); 21% port and terminals (including stevedoring); 25% inland transport (logistics); and 13% others (including empty container repositioning). Thus, Stopford (2002b) cautions that the use of larger ships does not necessarily translate into scale economies, since market dynamics may render their deployment too inflexible as specific trades mature. Furthermore, not all of the above-mentioned cost categories are sensitive to size economies. Thus, Stopford (2002b) argues, the average size of new container ships has increased conservatively from 900 TEUs in the 1970s, to 3100 TEUs in 2003.

<sup>33</sup> For example, Talley (2000) reports that specialized container terminals have invested heavily in developing technology and engineering practices to reduce time and costs of ship calls as a way to remain competitive and attractive to shipping lines.

Container shipping companies were pushed to constantly seek cost-efficiency, economies of scale, as well as a basis on which to differentiate their services.<sup>34</sup> Thus, innovations included refinements in the actual transportation boxes, container handling equipment and container ships, and most importantly for the purposes of this research, the design and introduction of sophisticated computer systems and communication networks (Boyes, 1988). The trend towards integrated transportation drew the attention of top executives to ensuring reliable ocean services and to acquiring comprehensive electronic information systems, the achievement of which eventually widened the gap between top-tier ocean carriers and the rest (Boyes, 1989).

After this brief overview of the shipping industry in general, and container shipping in particular, the role of EC in the strategic decision-making process of container shipping companies remains unclear. The following will describe how this thesis has been structured to address this issue.

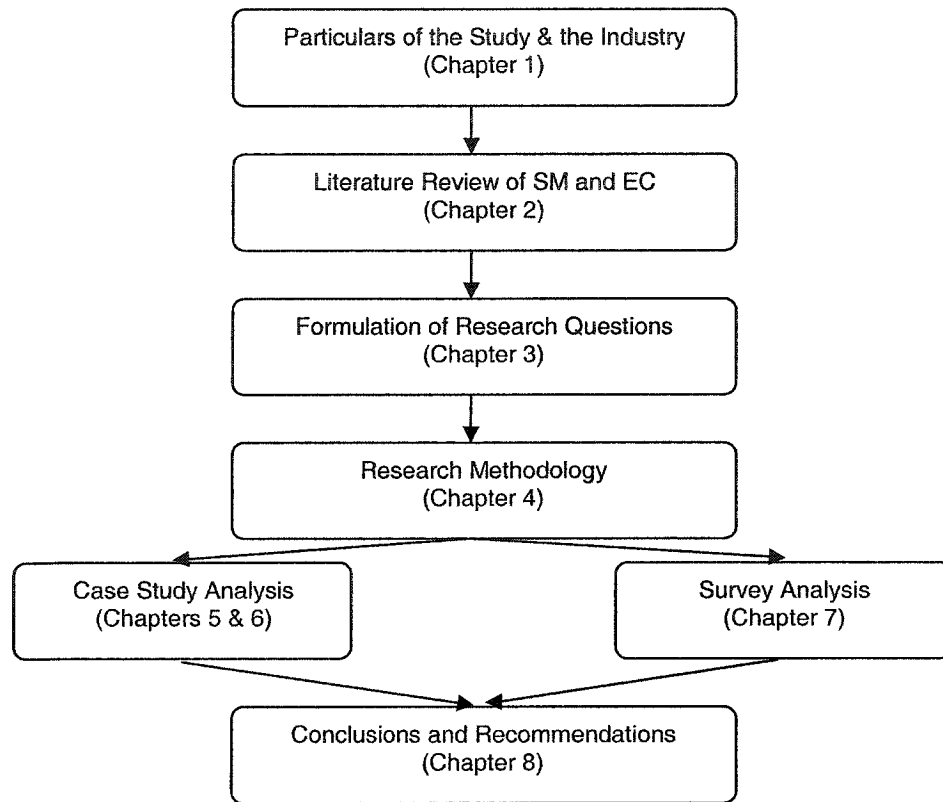
### **1.3. STRUCTURE OF THE THESIS**

This thesis has been organized to sequentially address the key components of scholarly research, namely literature review, research methodology, data analysis and conclusions. Figure 1-3 shows the sequence in which these key subject matters are addressed in this thesis.

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<sup>34</sup> Not all benefits of technological innovations were directed to provide cheaper services to customers. Counter balance strategies to drift away from price competition were taken by a selected number of ocean carriers, noticeably American President Lines and Maersk, which offered customers in the high end of the market value-added packages (e.g., faster and customized services) for a premium (Boyes, 1986a).

**Figure 1-3: Thesis Structure & Sequence**



Chapter 1 provides a robust introduction to the study by explaining its rationale, objectives, perspective and timeframe, as well as the main characteristics of and competitive developments within the industry under examination.

Chapter 2 reviews and introduces the key EC and SM concepts and terminology to be used in the rest of the thesis. First a definition of EC for the purpose of this study is developed and the generic types of EC uses by container shipping companies are identified. This is followed by a review of the seminal work that served as the underpinning of SM as a field of research, and the identification of key SM concepts and definitions that will guide the formulation of the research questions. Finally, recognizing the richness of perspectives in the SM field, the researcher provides a brief overview of

the main sociology- and economics-based SM paradigms to arrive at the perspective of choice for this study.

Chapter 3 builds on Chapters 1 and 2 to formulate the research questions of this study. It examines previous studies that collectively or independently scrutinized relevant issues in the fields of EC, SM and the shipping industry. The objectives of this chapter are to tie previous work to this specific research, to link theory to the variables of this study, and to formulate hypotheses for testing. As a result, one central and four supporting hypotheses are formulated to explain the dynamics and relationships guiding the strategic use of EC by deep-sea container shipping companies.

Chapter 4 takes up the very critical issue of the research methodology used in this study. It starts by building the basis for the utilization of a research approach that combines qualitative (case study) and quantitative (survey) methodologies. The chapter identifies elements, definitions, and validity and reliability safeguards common to both methods. It further defines the framework and procedures specific to both case study and survey analysis, including population criteria, data collection instruments (see appendices 4-1 and 4-2 for Interview and Survey Questionnaires, respectively), survey data matrix (see Table 4-5), data collection considerations, analytical procedures, as well as limitations found.

Chapter 5 is concerned with the independent case study of four shipping companies engaged in the international transportation of containers. Case studies disclose information gathered through personal interviews with senior managers about companies' EC experiences during the period under study. Findings are first presented by themes (i.e., EC uses, motivations, barriers and strategic relevance over time) and then dominant inter-theme relationships over time and their meaning to the companies are explored.



Chapter 6 builds a cross-case perspective by exploring commonalities, differences and patterns observed in the four cases analysed in Chapter 5. Patterns for inter-case consistency are sought by examining companies' approaches to the adoption of EC, its uses, motivations, barriers and relevance over time, as well as inter-theme relationships that might explain prevalent views on EC matters. These findings are then scrutinized to address this study's hypotheses.

Chapter 7 is concerned with the analysis of data collected through the survey questionnaire. In its introduction, the chapter uses descriptive statistics to provide an indication of the main characteristics of the group of participating companies. The balance of the chapter, however, deals with hypotheses testing, first by examining four supporting hypotheses (1 through 4) and then by tackling the central hypothesis. For the latter, the assessment of an initial and revised model for the interaction of variables leads to the identification of several relationships that help to explain how companies perceive the EC phenomenon.

Chapter 8 summarizes the main findings from case studies and survey analyses and discusses their differences, commonalities and, implications. The chapter addresses the central hypothesis and further explains how and why the strategic relevance of EC is perceived to have increased over time. In addition, this study's academic and practical contributions, the main topics for future research and the road ahead for EC are discussed.

## **CHAPTER 2**

### **LITERATURE REVIEW**

In the process of building the case for this interdisciplinary study, this chapter will present some fundamental views and definitions about electronic commerce and strategic management as fields of research. How views in these fields fit together in the context of the shipping industry and eventually translate into the research questions is the central topic of Chapter 3.

#### **2.1 ELECTRONIC COMMERCE**

##### **2.1.1 A Working Definition**

Turban *et al* (2000) define EC as selling and buying, servicing customers and collaborating with partners electronically. This definition is broad enough to accommodate practices in various industries, and is therefore a good starting point for analysis. It is necessary to keep in mind that the novel and evolving nature of EC is one of the reasons limiting a standard and widely accepted definition of EC. Indeed, some authors are of the opinion that arriving at a common definition is somewhat controversial (May, 2000; Westland and Clark, 1999). For instance, while some business practitioners see EC as the automation of the exchange of resources, goods and obligations (Westland and Clark, 1999), accountants define EC mostly as a function of the commercial activities producing direct revenues (Krishna, 1999). This perceived disparity of approaches suggests that arriving at a working definition that includes relevant EC practices in container shipping requires a closer look at the development of EC.

Although EC means different things to different people, there is widespread recognition that it is associated with the transmission of data over electronic networks (Sokol, 1995; Kalakota and Whinston, 1996; Kalakota and Whinston, 1997; OECD, 1997; Timmers, 1999; Westland and Clark, 1999; Buffam, 2000; May, 2000; Kalakota and Robinson, 2000; and Rayport and Jaworski, 2001). Therefore, it is understood that EC is not exclusively related to the contemporary use of the Internet and the World Wide Web. According to Westland and Clark (1999), EC as such can be traced back to the 1960s, when AT&T and Federal Express leased network access to General Electric, IBM and McDonnell Douglas. Similarly, Kalakota and Whinston (1997) maintain that the history of EC includes the considerable utilization of Electronic Funds Transfer (EFT) in the 1970s as well as EDI and electronic messaging technologies in the 1980s. In fact, by the early 1990s EFT was commonly employed within banking institutions and EDI between major suppliers and customers, via proprietary communication networks, as a way of improving operational efficiency and lowering transaction costs (Sokol, 1995). This suggests the initial use of a form of EC between corporations, a concept later coined as business-to-business EC (B2B). B2B primarily implies the collaboration and conduct of transactions between business partners.

Until the early 1990s, the high costs associated with the development and maintenance of proprietary software and communications networks restricted the use of electronic data transmission, both at the intra- and inter-organizational level, to organizations with substantial resources (Vanroye and Blonk, 1998). However, the combined effects of the advancement of Information and Communication Technologies (ICT), the reduction of costs associated with them and the explosive public access to the Internet changed the nature of electronic transmissions. This new reality enabled the

development and adoption of applications to reach consumers at large, irrespective of geographical boundaries (OECD 1997), therefore facilitating what Turban *et al* (2000) regard as buying, selling and servicing customers online. This is known as business-to-consumers EC (B2C).

EC is also defined in terms of its potential for governments to conduct their affairs with corporations and the public interest at large. For instance, the Canadian Government has launched the Government On-line, which by 2005 aims to further eliminate unnecessary bureaucracy, facilitating services and encouraging interactivity with the public and corporations by using the Internet to provide government information and services.<sup>35</sup> This concept is referred to as government-to-business/consumers EC (B2G and G2C, respectively).

The pattern of evolution of EC to date shows a movement from inter- and intra-organizational interactions (B2B) towards a wider scope, to include B2C, B2G and G2C, and more recently extending to the formation of multi-party online marketplaces. Based on this pattern, two key considerations for a definition of EC are evident: (1) the communication networks in use, and (2) the intended use of EC.

#### *The Communication Networks in Use*

It would be restrictive to link our definition of EC to the changing technical characteristics of communication networks, especially with the onset of mobile networks and their potential for EC (May, 2001). Instead, a definition of EC must be based on users' granted access to networks. This criterion allows for a point of comparison

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<sup>35</sup> See Report–Government On-Line and Canadians, available online <[http://www.gol-ged.gc.ca/rpt/gol-get-rpt02\\_e.asp](http://www.gol-ged.gc.ca/rpt/gol-get-rpt02_e.asp)> (accessed on June 7, 2002).

between early and modern technology. Therefore, communication networks can be classified as:

*Intranet:* Access restricted to partners only.

*Extranet:* Access restricted to partners and authorized parties; and

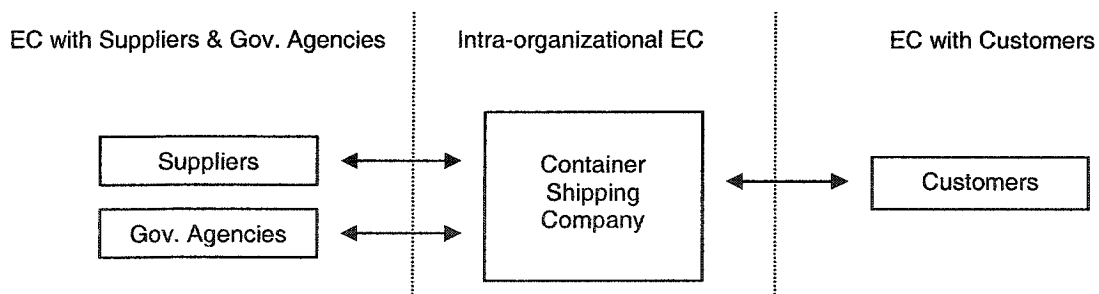
*Internet:* Unrestricted, or generally unrestricted, access;

Defining communication networks in the terms proposed here also provides the added benefit of enabling the pre- and post-Internet eras to be considered on equal terms.

### Uses of EC

EC is enabled by sophisticated ICT, which in its own right is a fast developing field. Trying to classify EC applications based on specific hardware and/or software will prove inadequate given the accelerated pace of ICT innovation. Consequently, in the context of this study, EC applications will be classified based on their intended purpose; therefore the initial classification will include the use of EC for: (a) intra-organizational purposes; (b) customer-related EC and the electronic contracting of transportation services; (c) buying, selling and collaborating with suppliers; and (d) EC with government agencies. This is clearly represented in the following figure:

**Figure 2-1: Company Generic EC Applications**



*Intra-organizational EC:* The use of EC in this category seeks to improve coordination and achieve intra-organizational cost and operational efficiencies, primarily

through the reduction of communication costs, and streamlining of administrative, fleet maintenance and cargo-related operations within companies. In the context of this study, a container shipping company's organization is composed of the company's headquarters, its regional offices and its fleet. Some examples of the use of EC in this category are the electronic exchange of cargo documentation, distance learning, and systems to manage seafarers and ship-shore relationships.

*EC with customers:* This refers to the use of EC for the servicing or maintenance of existing customers and/or gaining new ones, as well as for the electronic negotiation leading to the establishment of electronic contracts for the provision of transportation services. In this category, the electronic interaction can be either real-time online negotiation, or governed (at least as far as remuneration and transaction costs are concerned) by already existing contractual agreements between the parties. In the context of this study the term customer includes shippers, consignees, brokers, manufacturers and freight forwarders. Examples of the use of EC with customers in the container shipping industry include EDI, EFT, supply-chain management with customers, cargo monitoring and tracking by customers, online rates and quotes, electronic account settlement, participation in ship and cargo exchange portals and contracting for the provision of transportation related services.

*EC with suppliers:* This is the use of EC for the interaction with suppliers of products and transportation-related services. In the context of this study, the term supplier includes ship managers, ship chandlers, classification societies, shipyards, protection and indemnity clubs, marine insurance providers, crew agencies, bunker suppliers, procurement companies, banks, and other financial institutions, as well as stevedores and other sub-contractors of transportation-related services. Examples of the use of EC in this

context are EDI, EFT, supply chain management with suppliers, electronic procurement, and the sub-contracting of transportation services. As in the case of EC with customers above, EC interaction can be regulated by pre-existing contractual arrangements between parties to the transaction.

*EC with government agencies:* This refers to the use of EC for interaction with government agencies leading to compliance with ship operation-related mandatory provisions, as well as the clearance of ship and cargo in port areas. Government agencies include maritime, port, health and customs authorities.

Considering all the above factors, a working definition of EC for the shipping industry should consider all the actions identified by Turban *et al* (2000), the concept of exchange of obligations introduced by Westland and Clark (1999), as well as EC's use for regulatory compliance. Accordingly, EC in the context of this study refers to:

*The electronic buying or selling, servicing of customers, collaboration with business partners, conduct of transactions, exchange of contractual obligations, and facilitation of and/or compliance with statutory requirements in a B2B, B2C or B2G context, over the Internet, intranets or extranets.*

## **2.2 STRATEGIC MANAGEMENT**

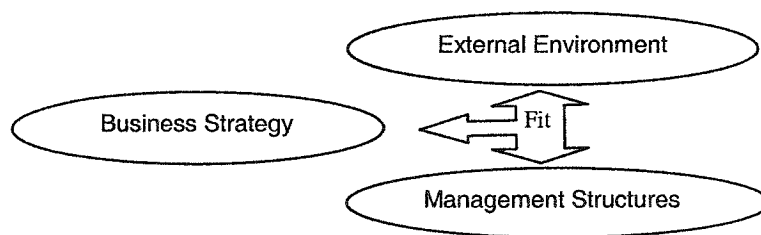
### **2.2.1 Strategic Management as a Field of Research**

In the field of management there are two major views that aim to explain decision-making in organizations, namely *Organizational Theory* (OT) and *Strategic Management* (SM). While there are substantial similarities between OT and SM, a key difference is that while OT suggests that the external environment influences the firm to the extent that it determines the way in which firms are organized and structured internally, SM, for the most part, rejects the idea that a firm's external conditions determine its internal running

and organization. SM theory argues that the firm has a choice about how to compete in the marketplace and, consequently, maintains that the firm's internal organizational structure is dependent on that choice or strategy. These two main perspectives have resulted in a variety of SM paradigms, which will be briefly outlined later in Section 2.2.2. Before that, however, the fundamentals of SM will be addressed.

According to Rumelt *et al* (1994), SM is a relatively new field of research. Chandler's (1962) work in the early 1960s provided the conceptual underpinning of SM; however, it was not until the 1970s and the 1980s when substantial conceptualization and testing shaped it as a field of research (Rumelt *et al*, 1994). Thus, the origins of SM can be traced back to a handful of seminal works between the 1960s and 1980s by Chandler (1962), Child (1972), Rumelt (1974), Miles and Snow (1978), Porter (1980 and 1985), and Mintzberg (1987a, 1987b and 1989). These works lay the conceptual foundation for key premises in SM. First, they underline three principle elements of SM, which are the firm's *external environment*, choice of *strategy* and *management structure*. These elements are closely related to one another and their consistency or *strategic fit* can be assessed (see Figure 2-2);

**Figure 2-2: Key Elements of Strategic Management as a Field of Research**



Second, the study of SM can be viewed in terms of the process of how strategy is developed (*strategy formulation*) and how it is deployed (*strategy implementation*)



(Rumelt *et al*, 1994). Third, the literature on SM makes a clear distinction between *business and corporate strategy*, where the former is concerned with the way a single business entity, or a business unit of a large corporation, competes in the marketplace, while the latter deals with how a large corporation manages its bundle of individual businesses or units (Bowman and Helfat, 2001).

This said, the seminal works of Chandler (1962), Child (1972), Rumelt (1974), Miles and Snow (1978), Porter (1980 and 1985), and Mintzberg (1987a, 1987b and 1989) will now be used as a basis for the review of key SM concepts, i.e., external environment, strategy, management structures and strategic fit.

#### **2.2.1.1 The External Environment**

A straightforward definition of the external environment ought to highlight that:

*External Environment refers to all the relevant factors outside the organization's boundaries affecting, or having the potential to affect, the identification and accomplishment of organizational goals and objectives.*

It could be argued, however, that one of the central views differentiating OT and SM is the level of determination that the external environment is deemed to exercise on the organization. Although SM defends the notion that, in principle, the external environment is not deterministic over the organization, economics- and sociology-based views differ regarding the degree of influence exerted by the external environment on the organization.

Strategists with an economics perspective, such as Chandler (1962), Rumelt (1974) and Porter (1980) perceive the external environment as dynamic, heterogeneous and uncertain, but not as deterministic over strategy. While Chandler (1962) and Rumelt

(1974) address a wider range of external environmental components, Porter (1980) limits them to the industry's competitive forces. Despite this, all of these theorists consider that external factors define the opportunities (O) and threats (T), which when compared to the organization's internal capabilities help define the firm's strengths (S) and weaknesses (W). This conceptualization has given rise to the utilization of a popular evaluation tool known as SWOT, which is indeed regarded as amongst the most influential in SM (Mintzberg *et al*, 1998).

It is evident that for SM authors with an organizational sociology perspective, such as Child (1972), Miles and Snow (1978) and Mintzberg (1989), the concept of external environment shows great similarities with the views of Chandler (1962), Rumelt (1974) and Porter (1980), insofar as it is considered to be dynamic and uncertain. However, Child (1972), Miles and Snow (1978) and Mintzberg (1989) believe that certain characteristics of the environment constrain strategic management decisions. Child (1972) argues that the immediate external environment influences the process of perception and evaluation by decision-makers. Miles & Snow (1978) are of the opinion that traditional perspectives of adaptation between the environment and the firm (i.e., natural selection,<sup>36</sup> rational selection<sup>37</sup>) do not fully explain how strategic management decisions are made. Instead, they propose the *strategic choice perspective*, and argue that although external variables play a minor role, it is the top-managers' choices that largely determine the efficacy and performance of organizations. Mintzberg (1989) suggests that certain conditions of the environment (such as technology, complexity and dynamism) exercise a

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<sup>36</sup> Based on the principles of evolution, natural selection argues that organizations develop, mostly by chance, better-performing structures for emerging environmental conditions.

<sup>37</sup> Argues that external variables largely determine structure, however, managers can improve efficiency by selecting key structural and process components.

degree of constraint or tend to induce certain structural characteristics (e.g., organic vs. mechanistic, centralized vs. decentralized).

In the context of this study, the concept of external environment can be seen both in terms of its content and its characteristics. With regard to its content, there has been a great deal of research by OT theorists about what the external environment involves. The researcher shares Daft's (1998) views on a dynamic and uncertain external environment made up of different sectors,<sup>38</sup> and on the notion that some of these sectors are more relevant than others to the firm, yet disagrees with the assumption that the external environment fully determines how firms behave and how they are organized, and instead argues that this is the essential role of strategy. Certain factors of the external environment may diminish, or increase, the ability of managers to follow preferred strategic choices. This kind of strategic constraint gains relevance in highly dynamic and information-intensive industries, where access to intangible assets may be a cause for the redefinition of industry boundaries (Sampler and Short, 1998; Eisenhardt and Martin, 2000).

Finally, it should be mentioned that the notions of strategic motivations and barriers are closely related to the perceived reality of, and constraints in, the external environment.<sup>39</sup> Consequently, since this research seeks to understand the effects of motivations and barriers on the adoption of EC practice, to make the preliminary assumption that technology-related factors cannot impose a certain level of strategic constraint would be inconsistent with the objectives of this research.

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<sup>38</sup> Namely: industry, raw materials, human resources, financial resources, market, technology, economic conditions, government, socio-cultural and international sectors.

<sup>39</sup> A study by Heracleous and Barret (2001) suggests that despite the general commitment of collaborating parties to the adoption of ICT-related strategies, their perception of considerable external resistance to change may have influenced the failure of such strategies.

### 2.2.1.2 Strategy

In one of his most relevant contributions, Mintzberg (1987b) argues that strategy can be seen as a plan (missions and goals to achieve outcomes), a pattern (of decisions and behaviour over time), a ploy (to outsmart competitors), a perspective (a way of doing things or seeing the world), and a position (relative to its product and market). Mintzberg *et al* (1998) argue that although the conceptual variety and richness of the work undertaken in the field of SM can be classified in ten schools of thought,<sup>40</sup> most definitions of the concept of strategy have evolved from Chandler's (1962) pioneer views, which considered business strategy in terms of:

*... the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals. (Chandler, 1962:13)*

Chandler (1962), Rumelt (1974) and Porter (1980) agree that strategy is a dynamic concept, which can be separated into formulation (an analytical process) and implementation (an action-oriented process). These authors see strategy as representing the way a company has consciously decided to compete and to grow. They further argue that strategy should respond to the external economic opportunities and threats based on firms' strengths and weaknesses. One distinction among these authors is that while Chandler (1962) and Rumelt (1974) conceptualize strategy as a plan and pattern of decisions and behaviours, Porter (1980) sees it mainly as a position relative to other competitors. All of these authors agree that the success of strategy implementation is measurable in economic terms and that performance measurement is an indication of how

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<sup>40</sup> Namely, the Design, Planning, Positioning, Entrepreneurial, Cognitive, Learning, Power, Cultural, Environmental and Configuration Schools.

the three elements of SM fit together (more detailed views on strategic fit are presented in Section 2.2.1.4).

Child (1972), Miles and Snow (1978) and Mintzberg (1989) regard strategy as the fundamental link between the external environment and the organization and agree that strategy is also influenced by the values and preferences of influential members of the organization. This influence, they argue, facilitates the identification of the organization's social and political goals. Although these authors view strategy primarily as a pattern of behaviour<sup>41</sup> with clear analytical and implementing components, they argue strongly against the separation of such components (i.e., strategy formulation and implementation), as their strong interdependency would render any arbitrary division meaningless.

For the purpose of this study:

*Strategy is a plan for the identification of a firm's commercial goals and objectives, and a pattern of strategic decisions implemented to that end.*

Consequently, the central role of strategy is to link the firm's competitive choice to its external context (i.e., environment), by identifying and implementing a value-creating proposition that builds on the firm's resources and capabilities to respond to opportunities and threats in a dynamic external environment. Like Chandler (1962), Rumelt (1974) and Porter (1980), the researcher shares the views that strategy can be divided into formulation and implementation, whereby the former is the analytical process for the identification of the firm's goals and objectives, while the latter is concerned with the execution of strategy.

### Strategy Formulation and Implementation

As mentioned earlier, Miles & Snow (1978) and Mintzberg (1989) do not agree with an artificial separation between these concepts. Although Miles & Snow (1978) make a conceptual differentiation between strategy formulation<sup>42</sup> and strategy implementation,<sup>43</sup> they merge the two concepts and develop a typology anchored in firms' strategic behaviour. This typology (defenders,<sup>44</sup> prospectors,<sup>45</sup> analyzers<sup>46</sup> and reactors<sup>47</sup>) describes what firm structure and processes are likely to be according to their strategic intention. Similarly, although Mintzberg agrees in principle with the existence of strategy formulation and implementation, through his crafting strategy metaphor he argues against their separate study since they constitute an interactive and dynamic process greatly affected by experience with, and learning about, the organization (Mintzberg, 1987a). He further argues that it is this close interaction between formulation and implementation that is fundamental to the discovery of emergent and realized strategies and to the promotion of creative ones.

On the other hand, authors with economics-based views are of the opinion that formulation and implementation can and should be differentiated for analytical purposes. Chandler's (1962) definition of strategy entails two aspects, one of strategic

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<sup>41</sup> Although Mintzberg (1987b) argues that strategy can generally be analyzed as a plan, pattern, ploy, position and perspective, in his 1989 publication, he clearly expresses a preference for viewing strategy as a plan and a pattern.

<sup>42</sup> Strategy formulation refers to the 'intention or entrepreneurial challenge' of the organization, in other words, the process of visualization of objectives and definition of commercial goals.

<sup>43</sup> Strategy implementation is concerned with technology and process-related actions.

<sup>44</sup> Firms in this category have narrow product and market scope and do not tend to search for new opportunities.

<sup>45</sup> Firms in this category are permanently in search of new opportunities, and tend to create challenges and uncertainties among their competitors.

<sup>46</sup> Firms in this category tend to combine defenders' and prospectors' behaviours, that is, they tend to operate in two spheres, one stable and one changing.

<sup>47</sup> Although firms in this category perceive change and uncertainty, they are unable to articulate and implement responses effectively.

conceptualization and identification of goals (formulation), and one of tactical action or execution (implementation). Rumelt (1974) argues that the execution of a diversification strategy (one way of expressing strategic movement) *per se*, “is neither a goal nor plan” (Rumelt, 1974:1), because to be so it must be linked to an analytical process or rationale to diversify (formulation).

Considering the above views, for the purpose of this study strategy formulation and implementation are defined as follows:

*Strategy formulation refers to the rationale associated with the identification of the company's goals and objectives, while strategy implementation refers to the allocation of resources for the achievement of the goals and objectives identified during the strategy formulation stage.*

It is evident, that while strategy formulation denotes the rather strategic phase of conceptualizing and defining where a company would like to go and what it would like to achieve (i.e., business goals), strategy implementation relates to the more tactical phase (i.e., structure and processes) necessary to execute or realize strategic goals. It is argued, therefore, that decisions or actions have an intrinsic strategic relevance, whether this intention is deliberately or unconsciously envisaged or sought. For the purpose of this study this is defined as follows:

*Strategic relevance refers to the intrinsic tactical or strategic significance, purposely or inadvertently attached to the company's decisions or actions.*

#### **2.2.1.3 Management Structures**

Management structures, also known as organizational structures, are generally seen as administrative arrangements for the achievement of strategic goals. From the organizational sociology perspective, while Child (1972) and Miles and Snow (1978) see organizational structures mostly as administrative, technical and information systems,

Mintzberg (1989) sees them as the interaction of people, who, individually or collectively, learn about the organization and exert influence on its pattern of behaviour. Similarly, from economics-based SM perspectives, while Chandler (1962) and Rumelt (1974) highlight the authority, control and information system aspects of the firm, Porter (1985) argues that organizations are about value-chain activities, which in turn are the basis for the achievement and maintenance of competitive advantage. For the purpose of this study:

*Management structures refer to firm-wide organizational configurations, arrangements and procedures conceived and implemented to achieve the firm's strategic goals.*

The dynamic relationship of 'strategy - management structure' has been the subject of much academic debate. The main question revolves around whether strategy follows structure or vice versa. Regardless of this ongoing debate, it would appear that a far more relevant question is how effectively management structures complement each other to achieve the firm's commercial goals and objectives. This strategic consistency is really about how well the three elements of SM research (i.e., external environment, strategy and management structure) fit together. The concept of strategic fit will be addressed next.

#### **2.2.1.4 Strategic Fit**

By arguing that firm expansion and growth are the result of top-management strategic decisions, which in turn require the reconfiguration of firm organizational structure, Chandler (1962) maintains that strategy and management structures should be consistent.



Chandler's work provided the conceptual seed, which was further cultivated by practitioners, such as Ansoff (1965), who approached Chandler's views in a more pragmatic manner and concluded that a firm's strategy should aim at achieving 'synergy' or 'strategic fit' between the environment and the firm's resources in order to obtain a competitive advantage for its product and market position. Similarly, scholars like Andrews (in Learned *et al*, 1965) expanded Chandler's concept to develop a framework, known as SWOT analysis, to determine firms' competence by assessing how their internal *strengths* and *weaknesses* fit the external *opportunities* and *threats*. Porter (1980) builds on Andrews' (in Learned, 1965) close account of firms' *strengths and weaknesses* and the external *threats and opportunities* and links them through consistency tests (e.g., internal consistency, environmental fit and resource fit). Thus:

*Strategic fit is part of a conscious process in strategy formulation and aims to provide the best match between the firm's resources and the changing conditions of the external environment in order to achieve the firm's commercial goals and objectives.*

To summarize, in the last sections, the underpinnings of SM as a field of research (i.e., *external environment, strategy, management structures and strategic fit*) have been reviewed, and key SM terminology has been defined (see summary of definitions in Table 2-1). This conceptual platform will be used in Chapter 3 to build this study's research questions.

**Table 2-1: Summary of EC and SM Definitions**

<b>Term</b>	<b>Definition for the purpose of this study</b>
Electronic commerce	<i>Refers to the electronic buying or selling, servicing of customers, collaboration with business partners, conduct of transactions, exchange of contractual obligations, and facilitation of and/or compliance with statutory requirements in a B2B, B2C or B2G context, over the Internet, intranets or extranets.</i>
External environment	<i>Refers to all the relevant factors outside the organization's boundaries affecting, or having the potential to affect, the identification and accomplishment of organizational goals and objectives.</i>
Strategy	<i>Strategy is a plan for the identification of a firm's commercial goals and objectives, and a pattern of strategic decisions implemented to that end.</i>
Strategy formulation	<i>Strategy formulation refers to the rationale associated with the identification of the company's goals and objectives</i>
Strategy implementation	<i>Refers to the allocation of resources for the achievement of the goals and objectives identified during the strategy formulation stage.</i>
Strategic relevance	<i>Strategic relevance refers to the intrinsic tactical or strategic significance, purposely or inadvertently attached to the company's decisions or actions.</i>
Strategic Fit	<i>Strategic fit is part of a conscious process in strategy formulation and aims to provide the best match between the firm's resources and the changing conditions of the external environment in order to achieve the firm's commercial goals and objectives</i>
Management structures	<i>Refers to firm-wide organizational configurations, arrangements and procedures conceived and implemented to achieve the firm's strategic goals.</i>

A literature review on SM, however, would be incomplete without outlining the tremendous work resulting in the creation of various SM paradigms over time. This will be undertaken next.

### **2.2.2 Overview of Key SM Paradigms**

To explain the basis upon which companies make strategic decisions, theorists built SM paradigms by importing principles from other disciplines, notably from economics (SM as a rational response to changes) and sociology (SM as a result of social interaction). The following three sections will outline the principles behind the main SM paradigms in order to build the theoretical context of this study and to introduce the *industrial organization paradigm*, the principles of which have guided various parts of this research.

### 2.2.2.1 *Sociology-based SM Paradigms*

In sociology-based paradigms SM is seen in the context of the stability of social structures, whereby authority and social interaction become dominant factors in organizational behaviour. During the second half of the 1900s, organizational sociology departed from its traditional focus on the legitimization of authority and dysfunctions of bureaucracy to explain organizational behaviour in terms of external factors (Rumelt *et al*, 1994). The most influential emerging view at the time was *contingency theory*, which dominated organizational sociology thinking until the late 1970s, when it was challenged by new emerging paradigms, such as resource dependence, organizational ecology and new institutionalism (Rumelt *et al*, 1994). According to Carroll (1988), *contingency theory* argues that organizations are flexible social units with the ability to adapt relatively quickly to environmental, social and technological changes. Since there is a direct link between organizational structure, performance and the external environment, organizations whose management structures are constantly adapting to fit external changes are more likely to endure over time than less dynamic ones.

#### *Resource Dependence*

This paradigm is based on the argument that since organizations are not self-sufficient, they depend on those controlling the access to, provision or flow of the scarce resources that organizations need to deliver their core business. *Resource dependence* can be studied with two focuses: first, the need to respond to the external constraints posed by those controlling scarce resources, and second, the need to manage responses to external constraints to ensure resources and to possibly gain more autonomy or independence (Pfeffer, 1982).

Pfeffer (1982) argues that responses to external constraints highlight a competitive or symbiotic relationship depending upon three critical considerations: (a) the importance of the resources to the organization, (b) the level of resource allocation or control by external parties over those resources and (c) how many alternatives to external parties exist. In order to manage responses and gain independence, management decisions concentrate on insulating or minimizing dependence, or securing access to, or control of, scarce resources.

### Organizational Ecology

Organizational ecology examines the behaviour of companies at the group or population level, rather than at the level of each individual organization. Hannan and Freeman (1977) support the argument that the external environment greatly affects the population of companies. However, contrary to most SM paradigms, organizations are not seen as adapting, but rather, some of them flourish, some die and some new organizations are created. Thus, Hannan and Freeman (1977) argue that the ability of organizations to adapt is seriously impaired (structural inertia) by internal barriers (e.g., transferability of assets and technological investments, internal resistance to change the fixed structural and political status quo and restrictions posed by organizational culture and history), as well as external factors (e.g., legal and fiscal barriers to enter and exit markets and accessibility of information in new markets).

Structural inertia, Hannan and Freeman (1977) argue, is one of the main obstacles to accepting the notion that major organizations' features and core competencies are derived from a process of organizational learning and adaptation. Hence, organizational ecology sees strategy as a fixed element (strategic inertia), whereby organizational

strategic change over time is seen as the exception, rather than the rule (Rumelt *et al*, 1994).

*New Institutionalism:*

The *new institutionalism theory* provides an alternative to traditional perspectives about organizational behaviour. For the most part, traditional perspectives tend to explain organizational behaviour in utilitarian terms, that is, management decisions and organizational structures are the result of either survival strategies or efficiency or technological needs. The *new institutionalism theory*, however, argues that the survival of organizations can be explained in terms of legitimate socially expected behaviour, as opposed to merely rational utilitarian motivations. In other words, organizational behaviour may not be the result of the complicated decision-making schemes normally assumed by many SM theorists, but simply guided by industry practice, standards, rules, expectations or even roles (DiMaggio, 1988). The essence of the *new institutionalism theory* is illustrated by Rumelt *et al* (1994:35) with the following example:

*... whereas an economist might see a joint venture as an arrangement for efficiently dealing with certain forms of co-specialized assets in a context of opportunism, the (new) institutionalist would see it as a currently accepted (or rationalized) activity. Joint ventures are undertaken, it might be argued, because other firms have done them and because academics have rationalized them. Hence more firms undertake them.*

According to DiMaggio (1988), the *new institutionalism theory* is at its best when exploring the evolution of the 'taken-for-granted' organizational behaviour or activities, where purpose-driven behaviour is oftentimes assumed obvious or irrelevant, e.g., the binding nature of contracts or the rationale for highly institutionalized, but technically weak, aspects of organizational life.

It has been argued that the most relevant contribution of the *new institutionalism theory* is precisely the source of many of the criticisms against it, that is, its attempt to analyze organizational behaviour from a utilitarian-free standpoint.

Having outlined some of the most influential sociology-based SM paradigms, the following section will summarize economics-based views, largely based on the assumption of the rational and utilitarian behaviour of organizations.

#### **2.2.2.2 Economics-based SM Paradigms**

Traditional economics-based paradigms initially explained SM as a rational human choice in a 'perfect competition' and uncertainty-free context. However, concepts such as uncertainty, information asymmetry, bounded rationality, opportunism and asset specificity have emerged and new paradigms that address them to varying degrees of depth (such as industrial organization economics, transaction cost economics, game theory, agency theory and the resource-based view of the firm), have been developed in an attempt to better reflect market imperfection in the traditional economics perspective (Rumelt *et al*, 1994).

##### **Transaction Cost Economics (TCE)**

The roots of TCE can be traced back to 1937 when Ronald Coase described markets and firms as governance structures with different transaction costs, whereby those costs, when conducted in the market, may be higher than if the exchange were conducted within the firm (Coase, 1937). Williamson, one of TCE's firm supporters, argues that the key postulates of TCE are that markets and hierarchies governance arrangements are determined by transaction costs, as opposed to technology; that said,

transactions should be made where it is more economical to do so (i.e., markets<sup>48</sup> or hierarchies<sup>49</sup>). For Williamson, transaction costs are influenced by the combination of key assumptions (i.e., bounded rationality<sup>50</sup> and opportunism<sup>51</sup>) and two dimensions (i.e., asset specificity<sup>52</sup> and information asymmetry<sup>53</sup>). Critics argue that Williamson's assumptions about bounded reality and opportunism cannot be generalized and under-represent human behaviour (Ghoshal and Moran, 1996). Critics include Rindfleisch and Heide (1997), who argue that modern organizations have acceptable mechanisms to control and minimize transaction costs, such as measurement and reward of behaviour and outputs, as well as the ability to create convergent goals among parties to the transaction to reduce opportunism. Moreover, they are of the opinion that, provided that the firm maintains the ability to reduce transaction costs, economic forces will favour market governance when transaction costs are low, but their internalization in the firm when they are higher than the production cost advantages of the market (Rindfleisch and Heide, 1997). Despite criticisms, TCE provides a framework to understand how variations in the characteristics of transactions produce organizational or governance arrangements.

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<sup>48</sup> Market transactions are exchanges between autonomous economic entities (Williamson, 1975).

<sup>49</sup> Hierarchical transactions are those taking place within a single administrative entity (Williamson, 1975).

<sup>50</sup> Bounded rationality considers that human behaviour is primarily rational, but limited to the ability to process and communicate information (Williamson 1975).

<sup>51</sup> Opportunism refers to self-interest sought with guile, and includes making false or empty promises (Williamson, 1975).

<sup>52</sup> Asset specificity refers to the situation where a firm's assets cannot readily be used by other firms and includes site, physical, time and human assets (Ojala, 1994).

<sup>53</sup> Information impactedness, as Williamson terms it, is linked to prevalent uncertainties in a transaction, or exists because relevant information is known by one party to the transaction, but is not fully disclosed to the other (Williamson, 1975).

### Game Theory

Game Theory is based on asymmetry of information and commitment of asset specificity over a period of time. The central thesis of Game Theory is that a reasonable balance in non-cooperative markets with asymmetric information is explained by the assumption that rational competitors take into account other players' competitive decisions when making theirs (Rumelt *et al*, 1994). This was demonstrated by Kreps *et al* (1982), who, based on the widely known 'prisoners dilemma' showed how in cases where asymmetry of information is present, beliefs about competitors' values, motivations and behaviour may lead to some measure of cooperation to avoid destructive competition. In other words, the opponents adjust their strategy according to what they believe other competitors are doing.

The central thesis of Game Theory is more closely related to the SM field through the concept of 'commitment', which is better exemplified in the work of Ghemawat (Rumelt *et al*, 1994). Ghemawat (1991) argues that commitment to strategies, seen in terms of irreversible investments over a period of time (i.e., asset specificity), constrains the SM choices of firms, and should thus be an indication of strategic persistence. In summary, the key postulate of Game Theory is that in non-cooperative scenarios, rational competitors make their competitive decisions by closely taking into account their rivals' competitive moves and signals.

### Agency Theory

Agency Theory studies the relationship between two parties, the principal and the agent. It builds on the assumption that the principal is unable to do a certain job and therefore decides to hire someone to do it on his/her behalf (the agent). Agency Theory looks at the best arrangement that would govern this relationship and has focused on the



continuous search for the optimal contract that would include all probable contingencies and that would achieve a balance between the conflicting interests of these two parties by effectively linking rewards with efforts (Rumelt *et al*, 1994).

By using the metaphor of a contract (which becomes the unit of analysis), Agency Theory aims to resolve two main problems: the fact that it is expensive or unfeasible for the principal to closely supervise the agent, and the need to consider the goals and expectations of both the principal and the agent (Eisenhardt, 1989a). Eisenhardt argues that since the overall postulate of Agency Theory is that parties will tend to opt for the most efficient contract, the question becomes should the contract be behaviour or outcome-oriented?

Agency Theory has led to two main streams of research: Principal-Agent and Corporate Control. The former could involve employer-employee, buyer-supplier and any other agency relationship, while the latter concentrates on the relationship between shareholders and their CEOs (Rumelt *et al*, 1994; Eisenhardt, 1989a).<sup>54</sup> In summary, this paradigm aims to provide a framework for studying principal-agent interactions and how contingencies derived from these relationships can be better addressed in contractual terms.

#### *Resource-based View of the Firm (RBV)*

RBV builds on Schumpeter's perspective of 'creative-destruction,' which argues that technological innovations bring new rents to firms, but these rents diminish as

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<sup>54</sup> The corporate control stream seems to be of more interest to the SM field. Jensen (1986) studied the relationship between shareholders and CEOs, building on the assumption that these parties have conflicting interests. Shareholders' goals revolve around regular dividends on their investment, while the organization's size is a parameter for the remuneration of CEOs. By this token, CEOs will make use of available resources (i.e., free cash flow) to grow the firm beyond the optimal size, even if this involves low-return investments. Jensen's theory of the free cash flow

innovations are copied or are established as common practice in the marketplace (Amit and Zott, 2001). RBV's main hypothesis is that competitive advantage can be achieved through the implementation of strategies that exploit firms' unique resources, which in turn must be idiosyncratic and costly to copy (Barney, 1997), in other words, value-creating strategies that cannot be easily duplicated by competing firms (Conner, 1991; Eisenhardt and Martin, 2000).

One of the most influential defenders of the RBV is Jay Barney. He maintains that there are similarities between RBV and Porter's (1980, 1985) industrial organization views. Both paradigms consider firms' strengths, weaknesses and external opportunities and threats as central axis for competitive advantage (Barney, 1991). However, he also identifies some major differences with Porter's postulates. First, for Porter the primary source of competitive advantage lies in external factors (opportunities and threats in the industry), while for RBV the source of competitive advantage is the firm's internal characteristics and performance (Barney, 1991). Second, Porter's model considers that firms are identical and that resources and strategies are highly mobile (i.e., they can be bought and sold on the market). For Barney, on the other hand, firms are different (they are heterogeneous with regard to the resources they manage and control) and resources are not perfectly mobile across firms (Barney, 1991).

In a nutshell, RBV's main thesis is that firms obtain and maintain competitive advantage by configuring their 'unique resources' in value creation strategies that exploit their internal strengths and market opportunities, while neutralizing external threats and avoiding internal weaknesses (Barney, 1991).

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of leverage and takeovers highlights the existence of conflicting interests among parties which can be resolved by proper governance arrangements (Rumelt *et al*, 1994).

After this brief introduction of various sociology- and economics-based SM paradigms, it is important to recognize that their existence *per se* is evidence that no standard framework for the analysis of organizational decision-making exists, but rather fundamental principles are sculpted by perspectives and beliefs. This said, it is also fair to conclude that the most influential current series of SM thought is predominantly economics-based, grown and promoted by the Harvard Business School. Among its key promoters is Michael Porter, credited for shaping the industrial organization (IO) SM paradigm, which has guided important parts of this study. The following section summarizes key aspects of Porter's work.

#### **2.2.2.3 The Industrial Organization Paradigm**

In 1980 Porter published his book *Competitive Strategy* wherein he builds a significant bridge linking the emerging SM as a field of study with IO economics using the notions of market power and profitability to explain market competition and the strategy choices available to firms (Rumelt *et al*, 1994). In a nutshell, Porter (1980) argues that industries can be analyzed in terms of their competitive forces and that companies can choose among generic competitive strategies to survive and maximize profits in the marketplace. Porter's *Competitive Strategy* was followed by a 1985 publication, *Competitive Advantage*, in which Porter addresses implementation issues. Both works will be considered in this section.

##### *IO on Strategy Formulation*

In *Competitive Strategy*, Porter (1980) clearly concentrates on the strategy formulation part of the SM equation and his major achievements are the development of a

framework for the analysis of the industry and a conceptual classification of the competitive strategies available to firms.

Porter's framework for the structural analysis of the industry is based on the notion that to formulate competitive strategy the firm should pay close attention to industry forces. This knowledge, he argues, provides the firm with the opportunity to choose a position, from which it can either influence or defend itself from such industry forces. He believes that the intensity of the competitive dynamics in an industry and its profitability are fully represented in an analytical model that considers five forces: barriers to entry; intensity of the rivalry among existing competitors; threats of substitute products and services; bargaining power of suppliers and bargaining power of buyers. This model is widely known as 'Porter's five forces model' and is recognized as a key tool for the analysis of industry competition.<sup>55</sup>

For the purpose of this study however, Porter's (1980) views on generic competitive business strategies are more relevant. He argues that under any competitive market conditions there are three generic competitive strategies that a firm may implement: cost leadership, differentiation and focus.

A *cost leadership strategy* refers to price competition, in other words, concentrating efforts and resources on achieving lower costs than competitors. This strategy demands emphasis on efficiency and requires the gaining of large market shares (Porter, 1980).

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<sup>55</sup> Although fully in agreement with the relevance of Porter's model, Rugman and Verbeke (2000) have argued that in order to apply this model in the international arena, a "sixth force" should be added, i.e., government regulation/deregulation, in view of the increasing public environmental and social awareness that tends to result in more regulations by national governments.

A *differentiation strategy* is concerned with competing by offering a unique service or product and it is normally associated with the need to offer value-added services to complement the basic service or product. Since a company implementing this kind of competitive strategy does not usually offer the lowest rates, the combination of basic and value-added services must be attractive enough to justify charging clients a higher premium. Firms applying this competitive strategy may have more difficulties achieving large market shares.

A *focus strategy* is about concentrating on, and servicing better than competitors, a segment of the market using a differentiation or cost leadership strategy or both. Porter uses the term *stuck in the middle* to describe the disadvantageous position in which a company has failed to formulate and deploy any of the three above-mentioned generic business strategies.

#### *IO on Strategy Implementation*

In 1985 Porter addresses the other part of the SM equation, strategy implementation, thus providing guidance into how his previous work on strategy formulation could be applied. He argues that in order to build and maintain a competitive advantage over competitors, a firm should look inside the organization and divide its activities into smaller, yet significant parts. Analyzing and improving this chain of processes, or *value chain*, is the basis for differentiating products or achieving cost leadership. Porter (1985) argues that a company's value chain is at the heart of both organizational structure and, more importantly, business strategy.

#### *Application of IO Premises in this Study*

Porter's work on strategy formulation and strategy implementation influenced the SM framework used in this study in two ways. First, Porter's (1980) categorization of

generic competitive strategies was used as a set of control variables. Second, as the actual management of deep-sea container shipping companies varies from company to company, there was a need to identify common ground for the analysis of this sector. To this end, Porter's (1985) concept of *value-chain processes* served to identify generic processes likely to be present on a sector-wide basis. Indeed, it was found that other doctoral studies have successfully employed value-chain processes in the assessment of the SM effects of EC in other industries (see Tallon, 2000).

For the purpose of this study, it became clear that value chain processes needed to have the potential to reduce operational costs and/or to provide a basis upon which to differentiate products and services if EC were to be used by the company. On the other hand, *value activities*<sup>56</sup> were ruled out, as they were deemed to be too specific to serve as common ground across companies, since at that level of detail each firm was likely to manage its affairs differently.

Consequently, the following strategic high-level processes were chosen as a common basis for analysis: (1) strategic decision-making; (2) marketing and sales (including cargo contracts and booking); (3) relationships with suppliers; (4) cargo documentation and monitoring (i.e., operational aspects of the transportation of goods); (5) fleet operation, maintenance and deployment (including seafarers' management); and (6) account settlement. These processes were likely to be common to all container shipping companies, to have strategic consequences to all companies, and to be part of the value chain process related to EC.

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<sup>56</sup> The value chain can be broken down into yet smaller units called *value activities*. The level of detail of these *value activities* depends on their effect on the differentiation of products and proportion of overall costs (Porter, 1985).

To recap, Chapter 2 served first to examine what electronic commerce is, its principles and its definition in the context of this study; and second, to review the conceptual underpinnings of strategic management as a field of research, to arrive at the main SM definitions used in this study and to identify the SM paradigm guiding this research. Chapter 3 will now crystallize the research questions driving this study by addressing how the EC and SM concepts blend together to give rise to the research questions, as well as the hypotheses and variables of this study.

## CHAPTER 3

### THE RESEARCH QUESTIONS

#### 3.1 PREVIOUS RESEARCH

##### 3.1.1 Previous Research Linking Electronic Commerce to Strategic Management

Although the impact of EC on conventional businesses is still not fully understood, there is evidence to suggest that EC is changing existing business models. Turban *et al* (2000) and Feeny (2001) argue that as EC *per se* is a major factor affecting the environmental domain of organizations, it will influence how conventional organizations do business. This is consistent with previous findings by Sampler (1998) and Timmers (1999). Sampler (1998) claimed that the availability of new information and communication technology tools, such as the Internet, radically changes competition patterns and may even re-define the boundaries of certain industries. Timmers (1999) examined EC benefits and experiences in various industries and concluded that these benefits constitute the key elements fuelling emerging electronic business models. As to how EC affects the strategic management of companies in various industries, Amit and Zott (2001) are of the opinion that no economics- or sociology-based SM paradigms thoroughly explain how EC adds value to the firm and how the competitive advantage derived from the use of EC is sustained. They found, however, that value creation in EC revolved around how electronic transactions improved efficiencies, offered complementary services and products, prevented the migration of customers and strategic business partners, and challenged traditional business processes and transactions. Amit and Zott (2001) suggest that although more research is needed to more thoroughly



understand how EC adds value, one impact seems evident: as EC practice intensifies in an industry, the key value of EC is not firm-, but network-based.

Whatever the source of value, it is apparent that EC is having an impact on strategic thinking, but *does EC change the fundamental principles of strategic management?* Porter (2001) claims that despite emerging views that EC and the Internet determine the way businesses should be run, the reality of the global adoption of such technology does not override traditional strategic thinking. On the contrary, under such circumstances the basic principles of strategy conceptualization, formulation and implementation gain more relevance, since organizations can use EC as a tactical tool either for cost competition, service differentiation, or a combination of both. In any case, Porter (2001) believes that EC *per se* should be seen as a supporting tactical element, rather than a replacement of competitive strategy.

### **3.1.2 Strategic Management and Electronic Commerce in the Shipping Industry**

Although limited research has addressed the impacts of EC on the SM of deep-sea container shipping companies, some studies have analyzed these issues separately, thus making possible the following arguments:

*(a) Strategic management and innovation are by no means novel concepts in the shipping industry.*

In fact, while its underpinnings were being shaped, strategists were already relating SM theory to practice. For instance, in the late 1970s, Rich (1978a & 1978b) examined strategic decisions by British shipping companies and reported that, although a clear-cut decision-making methodology was not always identifiable, British companies incorporated SM principles into their diversification strategies.

*There is evidence – albeit tenuous- to suggest that the British shipping company tends to have incremental rather than entrepreneurial strategic management. (Rich, 1978b: 49)*

The effects of strategic decisions on the competitive advantage of shipping companies continue to attract the attention of researchers. In the early 1990s, Brooks (1993) examined the market structure of the container shipping sector and argued that while the main reasons for competitive disadvantage were the loss of market identity and service homogeneity, potential sources of competitive advantage included cost containment and asset utilization, service differentiation, agency networks, access to capital investment and vertical integration into input supply. This assessment proved accurate as in the 1990s the industry experienced an unprecedented consolidation and resulted in an increasing homogeneity of services. It was evident that the rationale behind alliances, mergers and acquisitions revolved around cost efficiencies and service differentiation. Indeed, Slack *et al* (2002) examined the effects of alliances in container shipping at different points between 1989 and 1999 and found that alliances helped to integrate transportation services,<sup>57</sup> but tended to make the transportation services more homogeneous, thus making service differentiation even more challenging.

A separate study by Jenssen and Randoy (2002) looked at elements likely to support or facilitate strategic and technological innovation in shipping companies. They initially identified various aspects likely to affect innovation,<sup>58</sup> but testing of 63 shipping companies headquartered in Norway revealed that despite the fact that various organizational and inter-organizational variables played a role, the existence of an explicit

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<sup>57</sup> For instance, enhanced transportation services, frequencies and ports of call, as well as increased number and size of ships.

strategy coupled with commitment by top management were crucial factors in achieving innovation. They also suggested that innovation is strategy-sensitive, as it was noticed that a company with a differentiation strategy will likely concentrate innovation efforts on its product and services, while a company with a cost-leadership focus will tend to innovate its production methods.

*(b) Information and communication management has provided fertile ground for innovation by container shipping companies.*

Rich (1978a) reported that in the 1970s, the rapidly changing commercial environment of the shipping industry made computational capability an important tactical planning tool. Information management systems were commonly used for commodity and competitive market analysis (Ronen, 1980), as well as for routine shipboard and shore-based management functions (Frankel, 1982). As the complexity of the commercial environment increased in the 1980s,<sup>59</sup> more sophisticated databases were developed to support strategic decision-making (Frankel, 1989). By the early 1990s, the rate of technological change in the area of information management became a dominant factor in shipping (Frankel, 1991) and was examined with respect to the competitive focus of shipping companies. Brooks (1993) reported that while conference members perceived EDI and other EC initiatives<sup>60</sup> as tools to add value, differentiate service and increase loyalty and switching costs, low cost carriers saw EC as a tool to increase efficiencies and reduce costs. In addition, researchers have argued that as external competitive forces oblige container shipping lines to offer integrated transportation services, EC becomes

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<sup>58</sup> i.e., company culture, organizational structure, communication arrangements, strategic commitment and incentives to innovate, and inter-organizational relations.

<sup>59</sup> Partly due to the increasing specialization of shipping operations and the progressive involvement of public and private entities in shipping-related affairs.

crucial as a value-adding tool (Slack *et al*, 1996; Evangelista and Stumm, 2000), and that EC will likely become the next battleground in the quest to improve efficiencies within container shipping and the multi-modal transportation chain (Peters, 2001).

As a result, it is argued that innovation has been an element of competition in container shipping for some time, and some studies have identified EC technology and practice as being at the center of innovative competitive efforts by companies in this sector. This said, it is often pointed out that a factor hindering EC practice in shipping is how well existing legal frameworks support electronic transactions. The next section introduces key research and developments on this topic.

### **3.1.3 Legal and Policy-related Challenges of EC in Container Shipping.**

The evolution of EC in container shipping suggests that as EC becomes more transaction-oriented, its regulatory framework becomes increasingly relevant. Wilson (1988) argued that the widespread use of non-negotiable sea waybills favoured the adoption of EC in container shipping. During the 1990s, however, when the focus of EC shifted to the transmission of negotiable documents, questions about the adequacy of the supporting legal regimes arose (Nilson, 1996; Mottley, 1997).

In international maritime transportation, centuries of practice have shaped a paper-based system for commercial transactions whereby a written, original, and signed document provides the assurance and flexibility required in this endeavour. It would appear that the same level of confidence in the electronic transmission of transportation and trade documents is still lacking, despite the enormous efforts of international

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<sup>60</sup> Some examples include electronic cargo booking, cargo tracing and cargo documentation systems, as well as electronic systems designed to manage customer- and cargo-related data.

organizations, such as the CMI, UNCITRAL, and the UNCTAD (Chandler, 1998; Gliniecki and Ogada, 1992; Kindred, 1992; Kozolchyk, 1992; Pejovic, 1999; UNCTAD, 1998a; UNCITRAL, 1996; Yiannopoulos, 1995).

Gronfors (1991) argues that in the 1960s, large container shipping companies developed company-wide electronic document distribution systems for the streamlining of cargo delivery operations through the use of non-negotiable sea waybills. Not surprisingly, cost considerations<sup>61</sup> and the potential reduction of cargo processing time motivated the revision of international trade practices to encourage electronic transmission practices<sup>62</sup> and a more EC-friendly environment. The perceived imminent movement towards the electronic negotiability of B/Ls prompted the revision of international trading guidelines, such as the 1990 International Chamber of Commerce INCOTERMS (which made them EDI-friendly), the 1990 CMI Rules for Electronic Bills of Ladings, the 1996 UNCITRAL Model Law on Electronic Commerce, and the 1999 Bolero Rulesbook, among others. In 2001 UNCTAD convened a meeting of experts in maritime transportation, who agreed that of the three fundamental functions of the B/L, its function as a document of title and its inherent 'negotiability or transferability' were the major sources of concern for practitioners when considering the wide-scale use of electronic B/Ls (UNCTAD, 2001). They argued that as the existing 'paper-based' framework was already vulnerable to maritime fraud, the introduction of electronic B/Ls would need to ensure that authentication and electronic integrity matters were prioritized.

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<sup>61</sup> Kozolchyk (1992) argues that in the early 1970s an international shipment of goods to or from the US required an average of 45 documents, increasing to about 100 by the early 1990s, representing up to 10% of the invoiced value of goods.

<sup>62</sup> The first attempt to establish an international exchange of electronic B/Ls (called SEADOCS) was orchestrated by the International Association of Independent Tanker Owners (INTERTANKO) in 1986 for tanker shipping. Unfortunately this initiative did not prosper due to high insurance

They further concluded that one of the major challenges for the electronic negotiability of B/Ls revolves around the perceived legal uncertainty of the recognition of electronic transactions on a global basis,<sup>63</sup> often seen as a grey zone of liability for practitioners.

The UNCTAD 2001 report highlights the principle of ‘functional replication’ of the characteristics of B/Ls<sup>64</sup> to accommodate electronic exchange, thus emphasizing that legal developments should not be construed as changing the fundamental characteristics of B/Ls and/or their relationship to the contract of carriage, but instead, as ‘cloning transferability of rights and liabilities electronically’ as previously suggested by experts in maritime law such as Pejovic (1999). It remains to be seen, however, how courts will interpret the principle of functional equivalence of the B/L which has guided the EC legal guidelines and instruments thus far. For the time being, as a great number of jurisdictions

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premiums for participants, high transaction costs for carriers and the challenge of the electronic negotiability of the B/L, among other factors.

<sup>63</sup> Worldwide online negotiation and related electronic transmission of trade and transportation documents demand the implementation of effective frameworks for the identification of interacting parties. The most popular framework is known as public key infrastructure (PKI), which utilizes a combination of asymmetric encryption, digital signatures and digital certificates to ensure that a party is who it claims to be (Turban *et al*, 2000). However, there is significant scepticism regarding the implementation and interoperability of this framework. This is not based on PKI’s technical adequacy, but on its reliability in a regional or international scenario. In a national context, the identification of individuals and corporations is usually supported by documents or certificates issued by government agencies. In the case of electronic identification, a Certification Authority (CA) issues a digital identification certificate to a user after the verification of identity by various means according to government rules and guidelines (Garfinkel and Spafford, 1997).

Nonetheless, since there is currently no internationally recognized standard regulating such practices, the CA could be a government agency in country A, and a private agency in country B. This problem is exacerbated by the practice of mutual recognition among CAs, which opens a wider window for the uncontrolled chain of misidentification and fraud (Ford and Baum, 1997).

<sup>64</sup> This perspective is embedded in Article 6 of the CMI Rules for Electronic Bills of Lading and Article 17(6) of the UNCITRAL model law for EC, which states that any treatment embodied in international conventions and/or national laws that would apply to a paper-based B/L, should also apply to an electronic B/L. It is understood then that the main objective of both legal instruments is to lay down basic principles for the recognition of the functional equivalence of electronic data messages in contractual relationships. To this end, the 1996 UNCITRAL Model Law on Electronic Commerce’s provisions addresses critical issues such as the testimonial value of electronic data exchange, recognition of ‘electronic signatures’ as well as the electronic transfer of rights embodied in an electronic B/L.

have not enacted EC-friendly legislation, parties willing to use electronic B/Ls have been forced to do so on a contractual basis.<sup>65</sup>

Undoubtedly, the harmonization of national and international statutory principles will facilitate a more effective implementation of the electronic transferability of B/Ls. Other EC-friendly government policies (e.g., the simplification of bureaucratic processes and further standardization of electronic information requirements by government agencies) would also have a favourable effect on promoting the use of EC in maritime transport (Flemming *et al*, 2001).

In a nutshell, findings from previous research show EC as a trigger for the re-thinking of how business is conducted in various industries in general. For the shipping industry in particular, previous research highlights efforts to compete through innovation and to use EC to innovate. Moreover, previous research suggests that EC is compatible with all generic competitive strategies in container shipping and that in order to realize its full potential, EC legal and policy-related constraints need to be overcome. This said, previous research is inconclusive in distinguishing between ‘*tactical*’ and ‘*strategic*’ uses of EC. This gap leads to the formulation of this study’s research questions.

### **3.2 THE RESEARCH QUESTIONS**

Porter (2001) argues that some of the effects of EC in most industries include: a possible expansion of the size of the market; dis-intermediation of traditional distribution channels; reduced differentiation of services among competitors; and migration to price competition. *But does EC really increase competitive advantage?* This question lies at the

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<sup>65</sup> Despite the eagerness of cargo parties to electronically transfer B/Ls on a wider basis, existing EC guidelines and industry initiatives place greater responsibilities and potential liability on

heart of a great debate. Venkatraman (1994), Feeny (2001) and Porter (2001) argue that EC *per se* does not provide a competitive advantage since EC systems are widely available and can be easily imitated by competitors. Furthermore, the proliferation of such systems makes it more difficult for companies to differentiate their services. Porter (2001) is of the opinion that the use of EC applications to reduce operational costs and to gain and maintain price leadership is questionable, because when technology is available on an industry-wide basis, it makes it harder for a company to continuously improve operational efficiency in relation to its competitors.

A theoretical interpretation of Porter's (2001) views in the context of container shipping would lead to the hypothesis that EC increases rivalry in the marketplace,<sup>66</sup> increases the power of buyers<sup>67</sup> and increases sensitivity to EC-related facilitation policies by governments.<sup>68</sup> In other words, despite EC's potential to improve business efficiency, lower communication costs and expand global reach, EC intensifies competition in the marketplace without affecting the fundamental nature of the transportation service, i.e., 'shipping as a derived demand'.

Thus far, it is not clear whether the adoption and use of EC by container shipping companies has primarily been a reaction to immediate market pressures or a proactive measure to take advantage of market opportunities, and whether EC practice has been considered a means or a driver from the strategic management viewpoint. The determination of how EC affects, if at all, the competitive advantage of container

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carriers for the mishandling of electronic B/Ls than on cargo parties, thus increasing carriers' scepticism on this matter.

<sup>66</sup> Further operational efficiency achieved by using EC would emphasize migration to price competition.

<sup>67</sup> Through the use of EC cargo owners would have access to more transportation service providers.



shipping companies is a highly attractive research topic; nonetheless, the central question of this research will focus on a far more fundamental question, and indeed a building block to answer competitive advantage-related issues, that is, *has the strategic intent for the use of EC by container shipping companies changed over time?*

This study foresees that the changes in the use of EC over time are linked to changes in the perceived strategic relevance of EC. Moreover, it is argued that at the beginning of the period under study, deep-sea container shipping companies used EC as a *tactical tool* for the execution of their business strategies; however, by the end of said period, the strategic intent for the use of EC had changed to become a *driver* in the formulation of their business strategies. Thus, the *central hypothesis* reads as follows:

***H<sub>C</sub>:** As the main motivations for the use of EC by deep-sea container shipping companies became more customer-oriented, the perceived role of EC shifted from being a tactical tool in the implementation of business strategy to being a strategic driver in its formulation.*

It is also hypothesized that changes in the strategic relevance of EC over time are not only related to the uses of EC in the company, but also to the barriers<sup>69</sup> and motivations leading to the adoption and use of such technology and practice. Thus, the following sections will introduce the supporting hypotheses of this study, as they deal with EC uses, motivations, constraints and strategic relevance.

### **3.2.1 Uses of EC by Deep-sea Container Shipping Companies**

It should be mentioned that industry journals tend to report mostly developments in large companies, thus implying that large companies set technological and competitive

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<sup>68</sup> Global adoption of EC requires international standardization as well as facilitation by national governments.

standards in container shipping. This said, the review of secondary sources of data suggests that since containerization became internationally commercially feasible, technological advances have been used to gain and maintain competitive advantage. Some examples are the building of larger cellular container ships with more carrying capacity to provide economies of scale on longer routes (Stopford, 2002b) and the creation of electronic systems to optimize intra-organizational cargo document handling in busy container ports (Talley, 2000). The focus of this research is on the latter use.

Due to problems associated with the frequent late arrival of documents for the maritime transportation of goods, in the 1960s large container shipping companies developed company-wide electronic document distribution systems (e.g., electronic sea waybills), the primary purpose of which appears to have been to streamline cargo, transshipment and delivery operations, and to maximize resource utilization by tracking empty containers (Wilson, 1988; Gronfors, 1991). In the 1970s EDI, an early form of EC, and other information systems were developed by corporations from a proprietary perspective and tailored to their specific internal needs and for some degree of interaction with key customers. However, technology costs and the required pre-existing commercial relationships and terms of agreement among business partners, among other factors, restricted their widespread public use (Vanroye and Blonk, 1998; Evangelista and Stumm, 2000). In the late 1980s, EDI interaction through private communication networks appeared to be used as a tool to achieve both operational and cost efficiencies for intra-organizational distribution of the huge quantities of cargo-related documentation (North, 1988), as well as for operational coordination with key business partners in the

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<sup>69</sup> In the field of SM, the terms 'barriers' and 'constraints' are synonyms. Thus, they will be used interchangeably in this thesis.

multi-modal transport of containers (Anonymous, 1988). To a lesser degree, applications such as transmission and management of documentation, equipment monitoring and cargo book and trace were used to address emerging demands for just-in-time transportation by manufacturers (Boyes, 1988). Non-negotiable sea waybills were also exchanged with customers; however, it would appear that intra-organizational communication was the key use of EDI by carriers (Crichton, 1993).

Progressively, carriers realized the potential of EDI in carrier-customer relationships and pursued it more intensively. By 1995 companies at the forefront of EC further developed EDI-based customer-oriented applications, either individually<sup>70</sup> or collectively.<sup>71</sup> The idea of the electronic transfer of documents of title had been addressed in the 1990 CMI Rules for Electronic Bills of Lading. To this end, CMI proposed the creation of a central registry, which should be kept by ocean carriers; however, lack of enthusiasm by the proposed registry keepers prompted Baltic and International Maritime Council (BIMCO) to suggest the creation of an independent third party as registry keeper. Industry initiatives resulted in the Bolero Project, which aimed to analyze the feasibility of the electronic transfer of documents of title (Ashford and McDowall, 1995).

The exchange of EDI messages over private communication networks continued well into the 1990s and only shifted during the second half of the decade to public communication networks, such as the Internet. Undeniably, it was the Internet that triggered the use of EC applications at a larger scale. This is confirmed by a study by the European Commission, Directorate General of Transport (1998), which found that by the

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<sup>70</sup> For instance, OOCL bought and implemented EDI-based customized shipping schedules (Knee, 1995).

<sup>71</sup> As an example, a group of nine leading carriers created and promoted the use of EDI-based software for, among other purposes, electronic booking, arrival notices and bills of lading (Bonney, 1995b).

mid-1990s there was a tendency to use EC applications for the streamlining of intra- and inter-organizational operations among business partners in the transportation industry, and that specialized EC applications began to be used more extensively over public networks for management, communications, cargo monitoring and even marketing and negotiations.

Indeed, industry journals report that by 1996 APL and OOCL had moved some of their EDI-based EC applications to the Internet (Menon, 1996). Thereafter, the uses of EC became more sophisticated with companies which used the Internet as a marketing tool (Menon, 1996); considered EDI through web-based virtual private networks (Beddow, 1999); participated in common electronic information and interaction portals for customers (Boyes, 2001); redesigned their websites to be more transaction-oriented (Damas, 1999; Boyes, 2001); supported remote B/L printing (Damas, 1999) and supply chain management (Evangelista and Stumm, 2000); as well as enabled electronic invoicing (Peters, 2001) and 24-hour online customer support (Beddow, 2001).<sup>72</sup> In addition, it is important to note that web-based EC applications have been used to satisfy a variety of government requirements, among them, maritime safety,<sup>73</sup> antitrust issues<sup>74</sup> and maritime security legislation.<sup>75</sup>

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<sup>72</sup> Evangelista and Stumm (2000) are of the opinion that the Internet has facilitated supply chain management, since leading ocean container carriers have developed electronic portals to connect directly with shippers and suppliers (vertical integration), as well as with other multimodal carriers (horizontal integration).

<sup>73</sup> e.g., aspects related to the International Safety Management Code and the 1995 amendments to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (Patraiko, 1998).

<sup>74</sup> The US Ocean Shipping Reform Act of 1999 required shipping lines operating in the US to make tariffs available online (Jeffery, 1999).

<sup>75</sup> The terrorist attacks in the United States of America on September 11, 2001, triggered a series of security measures, such as the US Container Security Initiative, US Customs 24 Hours Rule, and the Maritime Security Protocol.

Of particular interest is the introduction, in the late 1990s, of innovative negotiation-oriented EC applications, whereby trusted third parties aim to provide secure, common and commercially-neutral electronic platforms to further facilitate international trade and to be eventually recognized as the substitute for traditional paper-based commerce (Marlin, 1999). However, despite flourishing EC applications for online commercial transactions, ocean carriers had not yet fully embraced online purchasing for the bulk of their corporate procurement by the year 2000 (Prince, 2000).

Table 3-1 provides a summary of the most common applications of EC by shipping companies in the 1990s, as well as more current uses of EC, as reported in specialized industry journals and proceedings of industry conferences.

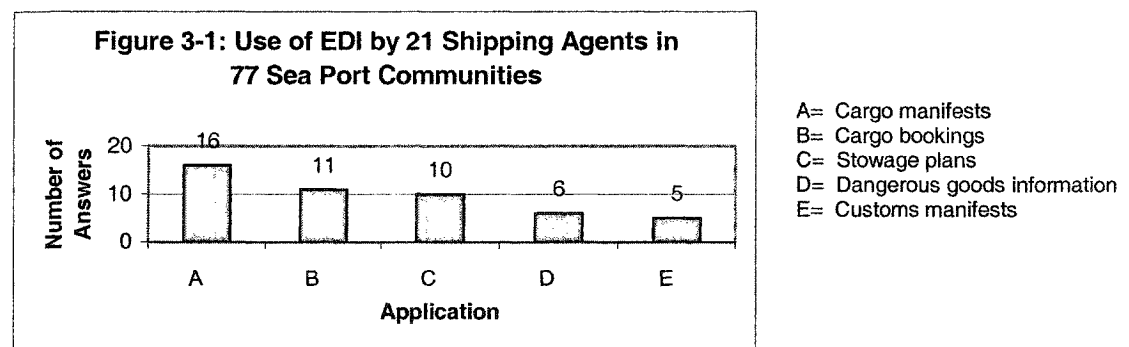
<b>Table 3-1: EC Applications Available to Container Shipping Companies</b>	
<i>In early 1990s*</i>	<i>In 2001 / 2002**</i>
<u>Intra-organizational integration</u>	<u>Intra-organizational integration</u>
<ul style="list-style-type: none"> <li>• Transmission of cargo documents</li> <li>• Cargo tracing</li> <li>• Cargo booking</li> </ul>	<ul style="list-style-type: none"> <li>• Ship-shore management systems</li> <li>• Cargo monitoring and tracking</li> <li>• Transmission of cargo documents</li> <li>• Management of empty containers</li> <li>• Fleet monitoring and tracking</li> <li>• Transmission of weather and navigational information</li> <li>• Seafarers management (certificates and accounts)</li> <li>• Distance learning (training)</li> <li>• Telemedicine</li> </ul>
<u>Inter-organizational integration</u>	<u>Inter-organizational integration</u>
<ul style="list-style-type: none"> <li>• Coordination with long term partners, customers and suppliers</li> <li>• Account settlements</li> <li>• Supply chain management</li> </ul>	<ul style="list-style-type: none"> <li>• Cargo booking</li> <li>• Cargo monitoring and tracking</li> <li>• Transmission of cargo documentation</li> <li>• Coordination with subcontractors of transportation-related services</li> <li>• Account settlement</li> <li>• Port and customs declarations</li> <li>• E-clearance of ships and cargo</li> <li>• E-procurement</li> <li>• Supply chain management</li> <li>• Logistics</li> <li>• Online crewing</li> <li>• Electronic markets with charterers, brokers and freight forwarders</li> </ul>

\* Based on three industry magazines *Containerisation International*, *Cargo Systems* and the *American Shipper*.<sup>76</sup>

\*\* Based on the proceedings of five industry conferences organized by *Digital Ship* during 2001 and 2002.<sup>77</sup>

<sup>76</sup> This review included, among others, Canna (1990), Von Stempel (1990), Verspeek (1991), Bonney (1992), Crichton (1993) and Fossey (1995).

A study undertaken by the European Commission, Directorate General of Transport (1998) evaluated the level of information-sharing and interconnectivity among selected port communities in Europe in the mid 1990s. The study included large container ports, where container shipping companies are major players. The study concluded that port communities conceptualized and further utilized EDI as a tool to improve the efficiency of interdependent operations and, furthermore, with the advancement and availability of public networks, a significant number of players were planning to make their EDI systems Internet-based. The study also found that within port communities, the major uses of EDI applications by shipping agents and companies in 1995 were intra-organizational.



Source: Chart 4.3.9, EDI Use in Document Exchange, 21 Shipping Agents Using EDI, 77 Sea Port Communities (European Commission, Directorate General of Transport, 1998, p. 100)

The finding that EC continues to play an important role in intra-organizational tasks is corroborated by two independent industry reports published (see Jeffery, 1999; and Forward, 2001), and is also suggested by the results of two pilot interviews carried out by the researcher with a manager of a mid-sized container shipping company and

<sup>77</sup> These conferences are *Internet in Shipping: Make it Work*, London, February 27, 2001; *Digital Ship Hong Kong*, Hong Kong, Sept 17-18, 2001; *Digital Shipbroking London: Electronic Tools for Brokers, Owners and Charterers*, London, Oct. 18, 2001; *Integration in Maritime Operations*, London, Nov. 29, 2001; and *Maritime Knowledge Management Technology*, London, May 7, 2002.

government officials on the occasion of the 2001 General Assembly of the International Maritime Organization in London, United Kingdom.<sup>78</sup> The interviewees were asked to describe the uses of EC by container shipping companies both during the early 1990s and in the year 2001. Table 3-2 shows a summary of the results.

**Table 3-2: Uses of EC by Container Shipping Companies: Results of Pilot Interviews**

In the early 1990s	In 2001
EC used as a tool for streamlining and cost reduction of cargo-related operations.	EC used as a tool for streamlining and cost reduction of cargo-related operations within a growing maritime transport-related community;  EC seems to be progressively used for more marketing and commercially-oriented activities.

There is therefore some evidence that intra-organizational EC was the key use of EC at the beginning of the period under study; however, industry sources also suggest that companies are progressively placing more attention on the potential uses of EC with customers. In other words, it would appear that customer-oriented uses outweighed the streamlining of intra-organizational operations as the main use of EC (in terms of importance, as opposed to intensity) by the end of the period under study.

Consequently, the first complementary hypothesis of this study is:

*H<sub>1</sub>: At the beginning of the period under study, deep-sea container shipping companies primarily used EC for intra-organizational purposes; however, by the end of the period, EC with customers emerged as the most important use of EC.*

### **3.2.2 Motivations for the Adoption and Use of EC by Deep-sea Container Shipping Companies**

Secondary sources of information point to an increasing level of competition and overcapacity in the late 1980s, which in turn highlighted the need for innovative ways to improve operational efficiency and reduce operational costs. Carriers perceived EDI and

<sup>78</sup> These interviews were conducted in November 2001 and were aimed at assessing the

other information management systems as tools to achieve such objectives (Boyes 1984, 1985 and 1988). These motivations persisted, with varying degrees of intensity, throughout the 1990s into the present (Boyes, 1990; Van Bergen, 1994; Jeffery, 1999 and Boyes, 2001).

In the wake of the Internet and with increasing demands for more integrated transportation systems, EC applications were used to ensure compatibility of ocean transport services with inland distribution, multi-modal transport, just-in-time delivery and global logistics progressively becoming a component of ocean carriers' differentiation strategies (Boyes 1990; Crichton, 1993; Boyes, 1994; Fossey, 1995; Ashford and McDowall, 1995; Menon, 1996; Eller, 1997; Anonymous, 1999b and Boyes 2001).

From the mid 1990s onwards, industry journals also report that the rationale for the use of EC included:

- (a) To market products and better service customers through web-based EC (Van Bergen, 1994; Menon, 1996; Eller, 1997; Anonymous, 1999b; and Boyes 2001);
- (b) To satisfy government requirements (Patraiko, 1998; and Jeffery, 1999); and
- (c) To gradually reduce paperwork, as members of the international trading community pay increasing attention to how EC can alleviate inefficiencies embedded in the traditional paper-based system of commercial transactions (Ashford and McDowall, 1995).

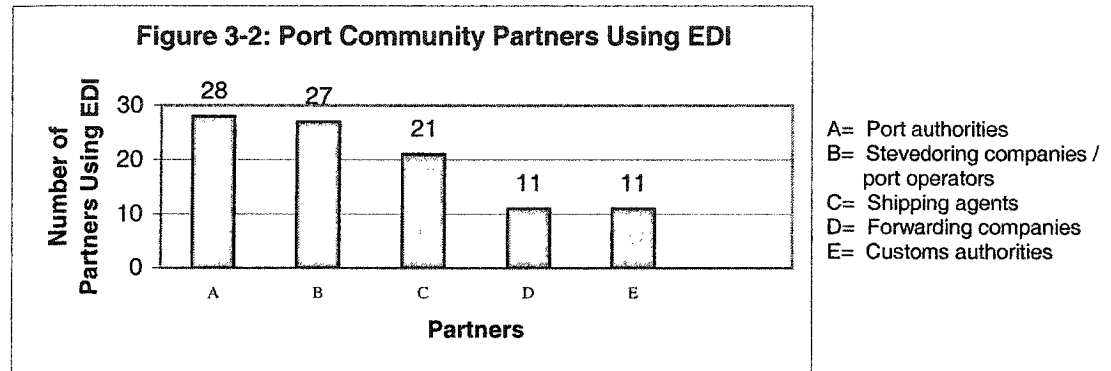
Very few studies are available to compare EC motivations over time in container shipping. One of the few studies attempting to provide a more complete picture of the use of EC was focused on port communities in Europe. The predominant EDI

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appropriateness of personal interviews as a research tool for this doctoral dissertation.



interconnections among partners in such communities (see Figure 3-2 below) lead to the assumption that a key motivation for the use of EC continues to be increasing operational efficiencies within the transportation chain.



Source: Chart 4.3.1, Use of EDI. All Partners, 77 Sea Port Communities, Railways and Customs in 19 Countries (European Commission, Directorate General of Transport, 1998, p. 95)

In addition, results of the pilot interviews mentioned earlier also provide an indication that EC motivations have progressively changed over time to address pressing market demands (see Table 3-3).

**Table 3-3: Main Motivations for the Use of EC by Container Shipping Companies:  
Results of Pilot Interviews**

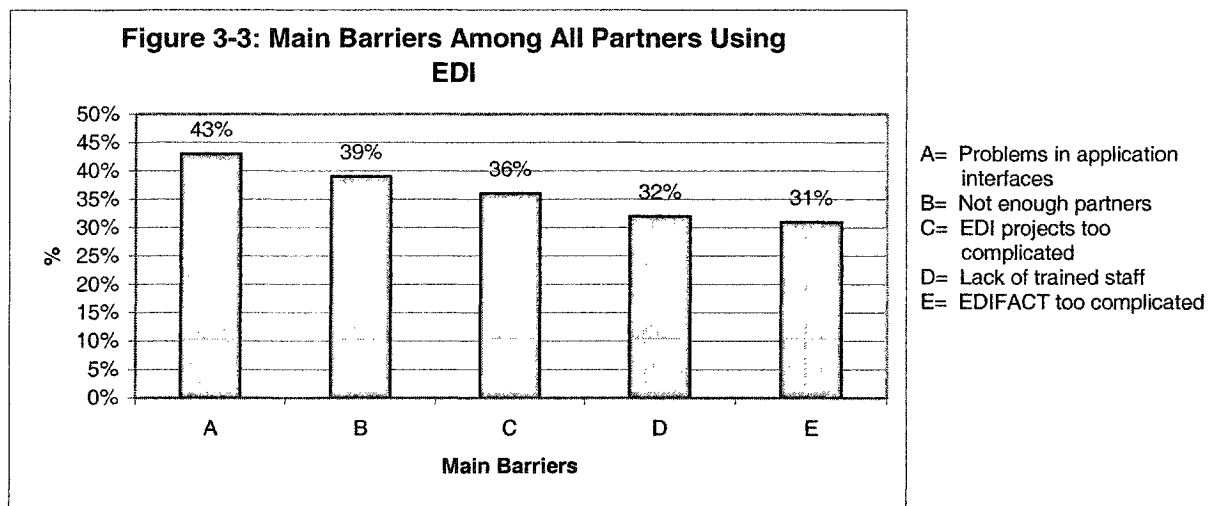
In the early 1990s	In 2001
Mostly internal & reactive concentrating on cost reduction and efficiency of operations;	Mostly external & reactive to focus on competitiveness and survival in the marketplace, whereby prevailing motivations of the early 1990s have become a 'must do';
Reactive to the external demands of customers.	Possibly proactive towards exploiting new opportunities.

Although there is little research on this matter, it is predicted that the dominant motivations varied over time, as stated in *Hypothesis 2*:

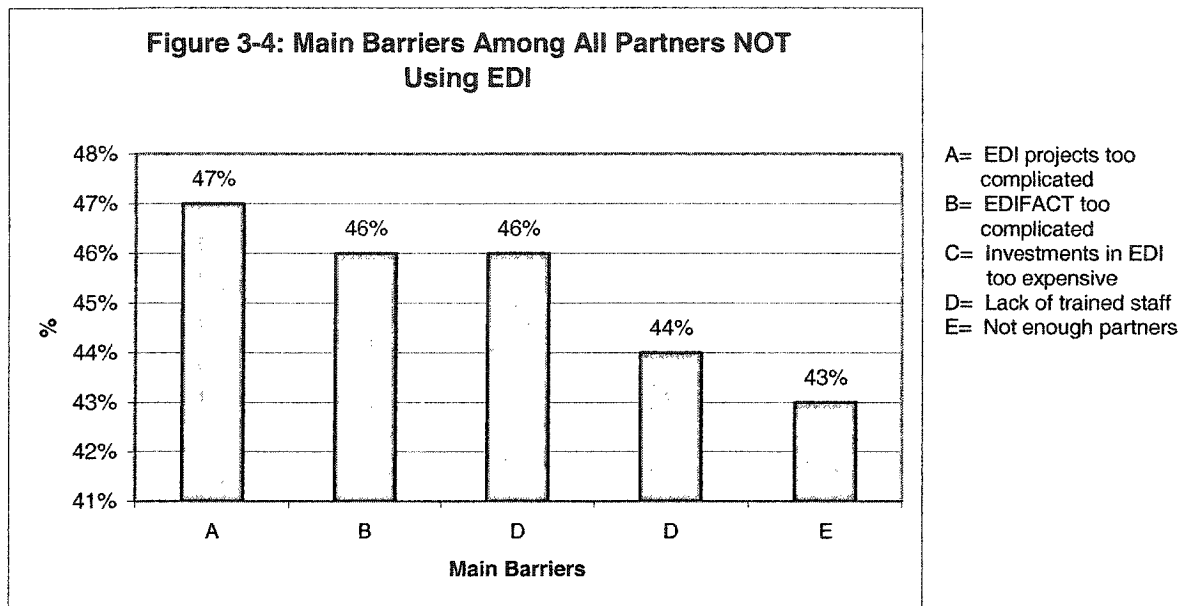
*H<sub>2</sub>: The main motivation for the adoption and use of EC by deep-sea container shipping companies changed over the period under study. The initial focus was on the achievement of cost and operational efficiencies; however the main motivation later became customer-oriented.*

### 3.2.3 Barriers for the Adoption and Use of EC by Deep-sea Container Shipping Companies

Software and infrastructure costs, as well as the lack of industry-wide standards for electronic information exchange were listed as the main EC constraints by the mid-1990s (Buttom, 1988; Booker, 1991; Bonney, 1991, Knee, 1993; Bonney, 1995a). Similarly, Figures 3-3 and 3-4 suggest that at the time the most common EC-related barriers experienced by port communities (including container shipping companies) were predominantly technical or cost-related.



Source: Chart 4.3.21, Main Problems in Message Exchange, All Partners Using EDI, 77 Sea Port Communities, Railways and Customs in 19 Countries (European Commission, Directorate General of Transport, 1998, p. 105)



Source: Chart 4.3.22, Main Problems in Message Exchange, All Partners NOT Using EDI, 77 Sea Port Communities, Railways and Customs in 19 Countries (European Commission, Directorate General of Transport, 1998, p. 106)

It is apparent that some of these problems persisted until the early 2000s. Indeed, Stopford (2002a) argues that although the cost of maintaining an EDI and legacy system has dropped over time, maintenance costs can still easily add between 10 to 15 million US dollars to the annual budget, thus costs remain a significant barrier to many shipping companies. An assessment of the Canadian maritime transport industry in 2000 came to similar conclusions. It found that the most common EC barriers in the late 1990s still included cost-, technical- and security-related issues, as well a marked reluctance of practitioners to change or abandon old paper-based business practices (Chow, 2001).

Although it cannot be denied that technical, security and privacy-related matters are still of concern, it is apparent that legal and policy-related constraints have gained greater relevance (see Section 3.1.3 on page 62), and may even outweigh other barriers to the use of EC, as government commitment to overcoming EC challenges is increasingly identified critical to successful EC initiatives. This is consistent with findings by Lee *et al*

(2000), who studied EDI experiences in terminal areas<sup>79</sup> in Singapore, Japan and South Korea from the mid 1980s to the mid 1990s. Although the study revealed some of the EC barriers mentioned earlier,<sup>80</sup> it specifically identified government support as a key success factor in scenarios where local technological conditions and private entrepreneurial involvement are not seen to facilitate the development and implementation of EDI systems.

The above-mentioned views support the results of the pilot interviews (see Table 3-4), which suggest that constraints for the use of EC by container shipping companies have progressively changed from technological and cost-related issues to EC-related international policy aspects.

**Table 3-4: Main Constraints for the Use of EC by Container Shipping Companies: Results of Pilot Interviews**

In the early 1990s	In 2001
Cost of infrastructure;	Cost of infrastructure and technology-related constraints seem to be decreasing, while constraints related to policy aspects and international frameworks for the facilitation of EC-enabled trade become more critical;
Technological issues;	
Immature EC business practices.	For government agencies, bureaucracy and socio-economic aspects seem to become an issue hindering the potential in-house exploitation of EC practices.

Thus, the researcher hypothesizes that, unlike at the beginning of the period under study, legal and policy-related constraints for the utilization of EC became the perceived dominant obstacle for the wider use of EC in this sector of the industry.

*H<sub>3</sub>: The most relevant barriers for the adoption and use of EC by deep-sea container shipping companies changed over the period under study. They shifted from infrastructure and investment costs at the beginning of the period under study, to the inadequacy of EC-enabling government policies and legal aspects at the end of the period under study.*

<sup>79</sup> These EDI initiatives linked a variety of business partners including shipping lines, freight forwarders, cargo parties and port and customs authorities.

### **3.2.4 The Strategic Relevance of EC and Theory-based Dominant Relationships**

Considering the competitive panorama in the late 1980s / early 1990s, it would appear that EDI-based systems were being used as tactical tools to achieve cost and operational efficiency and to ensure a smooth exchange of cargo information with multi-modal transportation partners (Boyes, 1989 and 1990). Large organizations are believed to have adopted a more strategic and proactive view in the use of EC, while smaller players reacted at a slower pace to EC market pressures. Industry analysts argue that despite its strategic value (realized or potential) at the time, EC matters were left to more junior and technical staff to handle, since these matters were considered too technical for decision makers to deal with (Verspeek, 1991). In addition to cost benefits, it is also apparent that EC applications were considered to be instrumental in connection with the implementation of differentiation strategies, such as just-in-time transportation services (Crichton, 1993). As time passed and as the industry became more Internet literate, EC applications seem to have taken on a more relevant role, not only to improve marketing and customer service strategies (Menon, 1996), but also to continue to push the operational and cost efficiency limits.

It is believed that the strategic relevance of EC continued to increase and that a turning point was reached around the end of the 1990s, when industry journals reported that the use of EC had changed from being an option to a business necessity (Anonymous, 1999b; Beddow, 1999). Analysts argued that the use of EC is having significant impacts on container shipping since it enhances the ability of niche competitors to compete against global carriers (Beddow, 1999), allows medium-sized operators to provide more

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<sup>80</sup> i.e., resistance to abandon traditional paper-based practices, investment costs and inadequate technology.

value-added services without complex overheads (Anonymous, 2000a; Stopford, 2002a) and helps reach new markets through the development of logistics capabilities (Anonymous, 2000b).

Based on the limited information presented above, the researcher is of the opinion that there has been a change in the strategic relevance of EC, which is in turn associated with a period of widespread adoption of EC applications by other organizations including suppliers and customers.

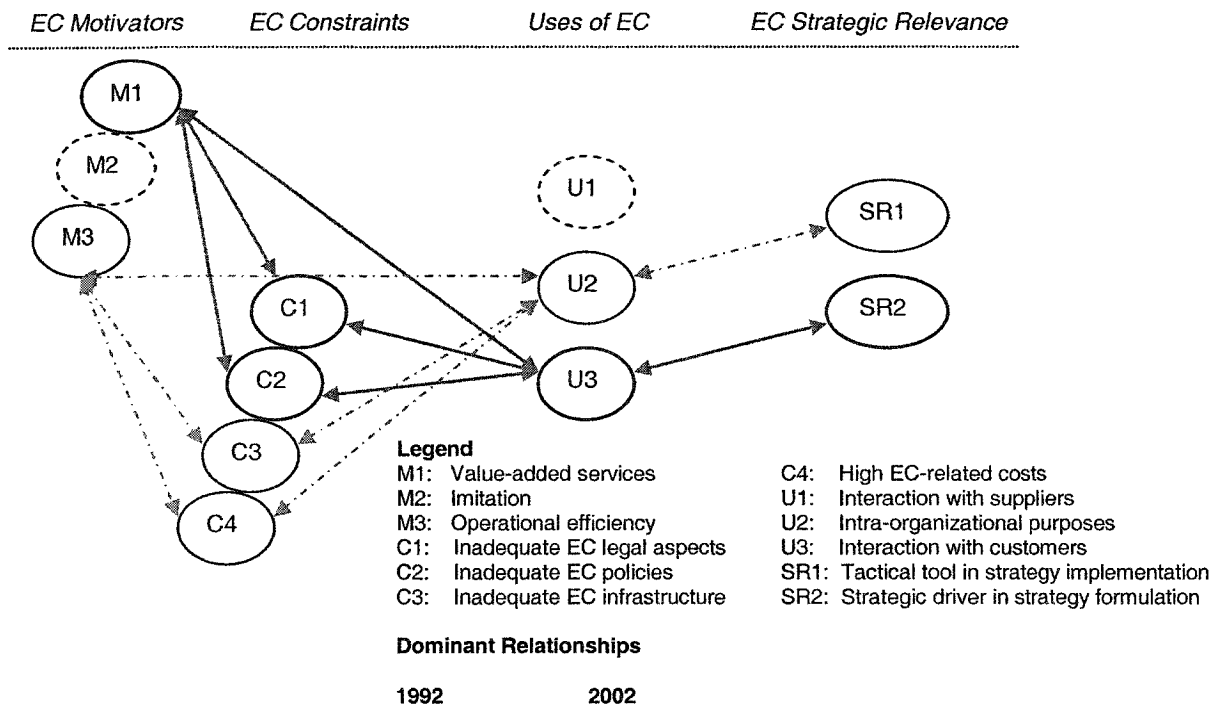
In Chapter 2, the terms *strategy implementation* and *formulation* were defined, whereby the former was primarily linked to structure and process issues, while the latter was directly related to the identification of business goals and objectives. Similarly, ‘*strategic relevance*’ was defined as the intrinsic tactical or strategic significance, purposely or inadvertently attached to a company’s decisions or actions. Thus, on this basis it is hypothesized that:

*H<sub>4</sub>: At the beginning of the period under study, firms viewed EC as having limited strategic relevance in the definition of business goals; however, this relevance progressively changed to become an important consideration by the end of the period under study.*

Figure 3-5 below integrates the central and supporting hypotheses thus far defined. It shows the main uses of EC, its motivations and barriers at two points in time and further suggests that the dominant relationships have changed over time and that the strategic relevance of EC for deep-sea container shipping companies can indeed be explained in terms of these variables. However, this theory-based diagram does not include some specific factors (e.g., the role of imitation as a motivator) that may have played a key role in explaining changes in the strategic relevance EC over time. This should not be construed as an oversight, but instead, suggests a lack of reliable literature

addressing the matter. It is precisely in the context of the empirical demonstration of how reality relates to this theory-based diagram that this study will make one of its major contributions.

**Figure 3-5: Theory-based Dominant Relationships Over Time**



To recap, this chapter has summarized relevant findings about the impacts of EC on the SM of companies in general and container shipping companies in particular. Previous research indicates that there has been limited work on the strategic intent for the use of EC and the differentiation between its tactical and strategic uses. Thus, this chapter attempts to link theory to practice by crystallizing the hypotheses of this study. The researcher argues that there has been a change in the strategic relevance of EC over time and that this relevance is explained by the increasing customer focus motivating the use of EC over time. This said, the next chapter will examine the methodology used to test the hypotheses and report the study's findings.

## CHAPTER 4

### RESEARCH METHODOLOGY

It has been argued that research is paradigm-based,<sup>81</sup> as the selected analytical approach shapes the fundamental research assumptions, the interpretation of previous research and the nature of the research questions (Gioia and Pitre, 1990). The objectives and exploratory nature of this study call for an interpretativist analysis of findings and the utilization of research tools to examine longitudinal content-rich data about companies' EC experience over time. Consequently, this study will use a research methodology that combines quantitative surveys and qualitative case studies, since neither method on its own can fully address the research questions.

Quantitative research helps to draw a numerical and objective picture of reality, but it provides a limited platform for exploratory analysis (Silverman, 2000). Quantitative methods normally involve deductive processes of research that are better suited for problems where there is a substantial body of literature to build theories, and where variables are known, sampling can be random, cause-effect hypotheses can be tested, and findings can be generalized to a larger population (Creswell, 1994). Various factors work against a complete reliance on survey analysis for this research, namely:

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<sup>81</sup> Gioia and Pitre (1990) argue that the study of modern organizations in social science has been guided by principles derived from the natural sciences, which are mostly anchored in the *positivist or functionalist* paradigm. In other words, natural science studies tend to be guided by the conviction that the reality out there is objective and compatible with impartial measurements and deductive processes. However, these authors also recognize that there are other, probably less popular, paradigms, such as the *interpretativist* one, which holds that "*the reality out there becomes much related to interpretations made here*" (Gioia and Pitre, 1990:587). The interpretativist paradigm allows for the construction of reality according to the prevalent perspectives within each organization. It also implies a more inductive and qualitative-based analysis, compatible with non-rational business strategic decision-making.



- (a) The process for the deductive identification of fundamental research premises and assumptions is restricted by the limited body of knowledge about the novel concept of EC and its effects on the maritime transport industry. Most scholarly studies addressing EC in depth concentrate on industries where the effects of EC have been more noted such as the automotive, computer, retailing and courier industries (Turban *et al*, 2000); and
- (b) To answer the research questions, i.e., to explain the how and why of changes in the strategic management of deep-sea shipping companies, a descriptive qualitative method needs to be included. This said, quantitative data obtained through industry surveys will help define EC patterns and relationships in the larger population of container shipping companies.

With regard to qualitative methods, both Creswell (1994) and Silverman (2000) agree that the inductive analytical process of the qualitative approach is of great help in explaining and describing a phenomenon. Moreover, although results cannot be generalized to the larger population of container shipping companies, qualitative case study analysis is critical in explaining how and why EC patterns and relationships exist in a specific context. Case study enables the use of a selective, rather than a random, group of participants. This is particularly important since industry journals suggest that the larger the deep-sea container shipping company, the more intense the use of EC, therefore the EC experiences of at least one large company need to be studied.

It is important to note that quantitative and qualitative research methods are not considered substitutes for each other; but rather their use is a function of the nature of the research questions embedded in the study itself (McCracken, 1989). In the case of this

doctoral study, surveys and case study analysis are complementary as they will be used to investigate different aspects of the same research questions.

The balance of this chapter will outline how survey and case study methods fit in the overall context of this study. Common operational aspects to both survey and case study analysis will be summarized first, after which more specific features of each method will be explored.

#### **4.1 THE COMBINED RESEARCH METHODOLOGY DESIGN**

This multi-method research strategy is also known as triangulation, which is based on the premise that:

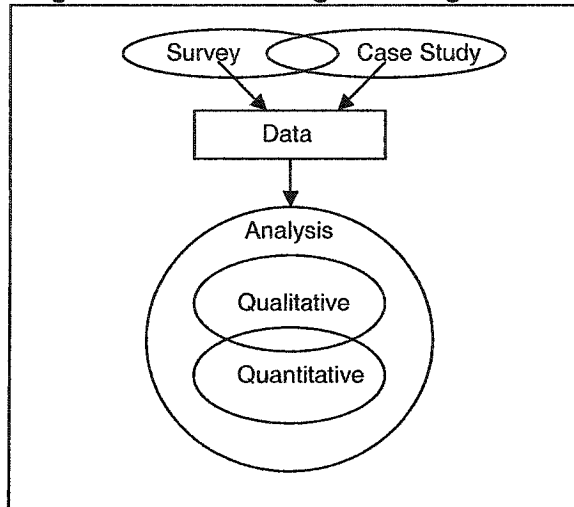
*The weaknesses in each method will be compensated by the counter-balancing strengths of another. (Jick, 1979:604)*

The principle of complementarity of research tools is summarized by Jick (1979:608) as follows:

*The process of compiling research material on multi-methods is useful whether there is convergence or not. Where there is convergence, confidence in the results grows considerably. Findings are no longer attributable to a method artifact. However, where divergent results emerge, alternative, and likely more complex, explanations are generated.*

Triangulation has been reported as a successful research approach for studies of strategic management-related issues in logistics and transportation, such as the study by Anderson (1995), who utilized a combined method that he illustrated as follows:

**Figure 4-1: Methodological Triangulation**



Source: Figure 4.1, *Methodological Integration* (Anderson 1995:54).

The following sections will indicate specific operational aspects common to both survey and case study methodologies.

#### **4.1.1 Research Question and Hypotheses**

Although these aspects were defined in Chapter 3, they will be briefly summarized here due to their importance for methodological purposes.

The main research question, i.e., *has the strategic intent for the use of EC by container shipping companies changed over time?* leads to the formulation of the *central hypothesis* of this study:

*H<sub>C</sub>: As the main motivations for the use of EC by deep-sea container shipping companies became more customer-oriented, the perceived role of EC shifted from being a tactical tool in the implementation of business strategy to being a strategic driver in its formulation.*

The *central hypothesis* in turn, serves as the basis for the construction of the study's complementary hypotheses, which highlight key aspects that must be analyzed in order to explore and answer the main research question:

- H<sub>1</sub>: At the beginning of the period under study, deep-sea container shipping companies primarily used EC for intra-organizational purposes; however, by the end of the period, EC with customers emerged as the most important use of EC.*
- H<sub>2</sub>: The main motivation for the adoption and use of EC by deep-sea container shipping companies changed over the period under study. The initial focus was on the achievement of cost and operational efficiencies; however the main motivation later became customer-oriented.*
- H<sub>3</sub>: The most relevant barriers for the adoption and use of EC by deep-sea container shipping companies changed over the period under study. They shifted from infrastructure and investment costs at the beginning of the period under study, to the inadequacy of EC-enabling government policies and legal aspects at the end of the period under study.*
- H<sub>4</sub>: At the beginning of the period under study, firms viewed EC as having limited strategic relevance in the definition of business goals; however, this relevance progressively changed to become an important consideration by the end of the period under study.*

#### **4.1.2 Data Collection**

This research concentrated on the 1992 – 2002 time period. According to Menard (1991), for longitudinal analysis, real time data may be collected, or alternatively, data at two points in time can be gathered at once. Since the research project includes the analysis of a situation in the past, data needed to be collected at a single point in time for both 1992 and 2002 through surveys and qualitative interviews. Both methods are complementary to each other, thus no sequential order was imposed during the survey or case study data collection stages. This allowed quantitative and qualitative data collection to occur simultaneously.

#### **4.1.3 Units of Analysis and Measurement**

There was a need to clearly define a unit of analysis that not only tackled the research questions, but that also allowed for complementary interpretation of survey and

case study findings. In this case, the unit of analysis was the deep-sea container shipping company. However, within this unit of analysis, the measurement units vary for each hypothesis, as summarized in the following table:

**Table 4-1: Units of Analysis and Measurement**

<i>Unit of analysis = Container shipping company</i>	
<i>Hypothesis</i>	<i>Unit of measurement</i>
1	Uses of EC
2	EC motivations
3	EC barriers
4	Strategic relevance of EC

The units of measurement for *hypotheses 1* through *4* are quite straightforward. For *hypotheses 1, 2* and *3* there is a limited number of EC uses, motivators and barriers experienced by participating companies. The operationalization of *hypothesis 4*, however, required a specific criterion to assess whether EC was being perceived as a tool in strategy implementation or as a driver in strategy formulation. To this end, it should be remembered that in Section 2.2.1.2 on page 41, strategic relevance was defined as *‘the intrinsic tactical or strategic significance, purposely or inadvertently attached to the company’s decisions or actions’*. The rationale behind this definition is that *strategic* actions or decisions are those perceived to play a more significant role in the identification rather than the achievement of commercial goals. When the opposite is true, the actions or decisions are construed to be of a *tactical* nature. Thus, it is argued that:

*The more significant EC is to the identification of commercial goals, the more ‘strategic’ it becomes.*

#### **4.1.4 Company Size Categories**

As mentioned in Section 3.2.1 on page 67, industry journals suggest that large companies guide technological and competitive innovation, thus company size is expected to play a factor in the adoption of EC in container shipping. The criterion for

company size categorization in this study is similar to that used in reports from inter-governmental agencies<sup>82</sup> and industry journals,<sup>83</sup> in which the size of companies is based on their total TEU carrying capacity.<sup>84</sup> Based on data summarized by *Containerisation International*, the following table divides companies by their TEU capacity.

**Table 4-2: Size Categories for the World's Ocean Container Carriers\***

Size categories	TEU capacity range	Number of companies	
Large companies	75,001 - 700,000	20 (4.1%)	
Medium-sized companies	30,001 - 75,000	16	63 (13.0%)
	20,001 - 30,000	16	
	10,001 - 20,000	31	
Small companies	< 10,000	401 (82.9%)	

\* The total number of companies (484) and their TEU capacity are based on data compiled by *Containerisation International*<sup>85</sup>

Categories in Table 4-2 have uneven intervals, i.e., 625,000 TEUs, 65,000 TEUs and 10,000 TEUs for large, medium and small size brackets. The rationale for this uneven distribution is explained as follows:

- (a) *Containerisation International* has been reporting on the top 20 companies consistently for more than 20 years. Thus, the larger category size is composed of the world's 20 largest container shipping companies;
- (b) The capacity of the company ranked as 20<sup>th</sup> by *Containerisation International* has a TEU capacity of 75,163 TEU. This sets the dividing line between large and medium-size companies at 75,000 TEUs; and

<sup>82</sup> The annual reports on maritime transport by UNCTAD.

<sup>83</sup> Categorizations made by *Containerisation International* have become the recognized industry standard, as reflected in various reports by UNCTAD, the United Nations' specialized agency dealing with commercial transportation issues.

<sup>84</sup> The total TEU carrying capacity refers to the aggregate TEU capacity of companies' own fleets, and time & demise-chartered vessels.

<sup>85</sup> Fleet Statistics by *Containerisation International*, available to subscribers online: <<http://www.ci-online.co.uk/default.asp>> (accessed on September 2, 2002).

- (c) The dividing line between medium and small companies is more arbitrary as 82.9% of companies are under 10,000 TEU in size.

It should be noted, however, that not all of the companies in Table 4-2 fulfilled the definition of deep-sea container shipping companies as set out in this study. More details follow.

#### **4.1.5 Initial Population of Container Shipping Companies**

According to *Containerisation International*, as of September 2002 the total known number of container shipping companies worldwide was 484. However, based on the research questions, the eligibility criteria to assess the suitability of companies for this study were established as follows:

- (a) Companies must have been in existence and in operation both in 1992 and in 2002, either on their own, or as members of a merged company;
- (b) Shipping management companies and non-vessel owning common carriers are excluded from this study; and
- (c) Companies must be involved in deep-sea shipping and committed to at least one trading route in which they undertake cargo management decision-making.

A detailed review of the characteristics of the ocean container carriers listed by *Containerisation International* was undertaken to ensure eligibility. This review was not limited to the information provided in *Containerisation International's* database, but also included information available on the companies' websites. As a result, of the 484 companies listed in *Containerisation International's* database, only 297 satisfied the eligibility criteria. The breakdown by size categories indicates that while all 20 large

shipping companies satisfied the population criteria, five medium-size companies were eliminated because they failed to comply with the 10-year longevity criterion and 182 small companies were removed because they were not involved in commercial decision-making or were solely dedicated to the technical operation of ships. The population of companies was therefore adjusted as follows:

**Table 4-3: Initial Population of Container Shipping Companies**

	<i>Companies listed in database</i>	<i>Companies not fulfilling eligibility criteria</i>	<i>Initial population</i>
All Companies	484	187	297
Large Companies	20	-	20
Medium-sized Cos.	63	5	58
Small Companies	401	182	219

This was the population of companies at the beginning of the data collection stage. However, as a result of survey data collection, this population was further modified giving rise to a modified population of companies (for more details see Chapter 7, *Survey Analysis*).

#### **4.1.6 Data Analysis**

It is widely acknowledged that qualitative and quantitative analyses must be undertaken separately. Thus, what is important to note at this stage is that qualitative data from personal interviews, archival data and other documents will be analyzed by themes and examined for convergence of findings. The results will provide content-rich elements to explain observed EC trends. Separately, quantitative data from survey questionnaires will be analyzed using a combination of t-test, Chi-Square and regression analysis. The results will outline companies' EC trends and experiences and will complement findings from case studies.



#### 4.1.7 Validity and Reliability Issues

Cook and Campbell (1979) have identified four research reliability concerns, which are statistical conclusion, construct, internal and external validities. Yin (1994) agrees that the quality of research depends on four main criteria: trustworthiness, credibility, confirmability, and data dependency, and further suggests specific controls in case study research. The following are the safeguards implemented in this study:

##### Statistical Conclusion

This is concerned with “*whether the observed co-variation between variables is due to chance*” (Cook and Campbell, 1979:491). It is mostly applicable to instances where a statistical link among variables is to be demonstrated through their connected value variations. As such, this is relevant for our survey analysis. Cook and Campbell (1979) maintain that in non-experimental or quasi-experimental research, that is, where no treatment control groups (i.e., pre-test and post-test control groups) exist, the best way to enhance statistical conclusion validity is to increase the study sample size and to use statistically powerful analysis techniques. The statistical tool used in this study was regression analysis of the Statistical Package for Social Sciences (SPSS); however, as will be shown in Chapter 7, the survey response rate limited the scope of the results.

##### Construct Validity

Construct validity refers to “*the validity with which cause and effect operations are labelled in theory-relevant or generalizable terms*” (Cook and Campbell, 1979:491). Construct validity is primarily about establishing the right operational measures that unambiguously identify the types of changes to be studied over time and their co-variation (Yin, 1994). In addressing this concern clear measures were identified earlier in this chapter, (see Section 4.1.3 on page 86). These measures are considered to be broad

enough to incorporate various potential causal relationships that might explain co-variation, addressing in this manner two of the most common threats to construct validity: the inadequate preoperational explication of constructs and mono-operation bias.

Cook and Campbell (1979) identify other threats to construct validity in the context of quasi-experimentation;<sup>86</sup> however, these are not applicable to this study, since this research did not involve the manipulation of variables or the application of treatments. The major threat to construct validity, however, relates to the comprehensive explanation of an observed co-variation. To this end, the main safeguard revolves around the triangulation of results from the combined research methodology, and from the views and opinions of industry experts.

#### Internal Validity

Internal validity is concerned with “*whether the co-variation implies cause*” (Cook and Campbell, 1979:491). In other words, a robust causal relationship should not only be determined by a strong co-variation between dependent and independent variables, but also requires a comprehensive description of the theoretical cause-effect links.

This kind of validity is relevant for exploratory studies (Yin, 1994) and for surveys (Fowler, 1993) where a cause-effect relationship is established. Consequently, care should be taken in controlling other factors that may explain observed changes. In the context of this research, factors likely to produce changes in the strategic relevance of EC were carefully defined to accommodate a wide range of EC uses, motivations and constraints. Although no clear cut cause-effect relationships could be established by either

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<sup>86</sup> i.e., diffusion or imitation of the treatment, compensatory equalization of treatment and resentful demoralization of respondents receiving less desirable treatment (Cook and Campbell, 1979).

survey or case study analyses, internal validity controls played important roles when the EC models for the interaction of variables were interpreted. These controls included:

- (a) The introduction of competitive strategies as important control variables in survey analysis;
- (b) The identification and control, during case study research, of other possible sources of changes to the strategic relevance of EC; and
- (c) The clear definition and documentation of pattern-matching techniques (for case study) and survey analysis procedures that explain how conclusions were reached.

#### *External Validity and Reliability of Results*

External validity is concerned with the ability of a researcher to generalize study results to the larger population, that is, to establish the domain of the findings (Yin, 1994; and Cook and Campbell, 1979). In the case of surveys, findings are linked to the full population of container shipping companies under study. This said, it should be noted that the survey response rate hindered statistical inferences by size categories (i.e., stratified analysis).

One of the most common criticisms of case study as a research method revolves around the numbers of cases chosen by researchers (Yin, 1994). This aspect will be addressed in more detail later under Section 4.2, *Multiple Case Study Methodology*, where the issue of generalizing results to theory (also known as analytical generalization), as opposed to generalizing to a larger population of companies is taken up. For analytical generalization, the main external validity and reliability threat is concerned with the replication of results. This threat is reduced through the documentation of the analytical process leading to case study conclusions, as well as the documentation of the patterns of comparison among various case analyses (Yin, 1994). These steps include:

- (a) The utilization of standard interview protocol for data gathering, as well as a protocol for the analysis and comparison of results;
- (b) The triangulation of survey and case study results; and
- (c) The creation of a case study database.

The balance of this chapter will address methodological aspects specific to case study and survey analyses separately.

## **4.2 MULTIPLE CASE STUDY METHODOLOGY**

As the qualitative method of choice for the analysis of longitudinal data in this research is multiple case study, this section outlines its rationale and design.

### **4.2.1 Adequacy of Case Study Methodology**

Yin (1994:13) has described case study as follows:

*A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.*

Both Yin (1984, 1994) and McCracken (1989) have argued that case study research provides a good research platform to explore how a phenomenon takes place. One of the key strengths of case study research is to explain causal links to real life where other research methods, such as experiments and surveys, prove inadequate given the complexity of the phenomena (Yin, 1994). Furthermore, Yin (1994) is of the opinion that the use of this methodology is not appropriate to answer all research questions, but is better suited to those instances where:

- (a) The objective of the research is to explain *how* and *why* an event has occurred;

- (b) The phenomenon under analysis is a contemporary issue; and
- (c) The researcher has little or no control over behavioural events surrounding the subject being studied.

It seems clear that the research questions in this study seek to answer *how* and *why* EC development occurred. With regard to the control over behaviour criterion, Yin (1994:8) argues that it refers to the investigator's ability to manipulate "*directly, precisely and systematically*" certain variables and to isolate the subject of study from its real-life context as an attempt to more effectively examine it. These kinds of control measures are often successfully applied in laboratory environments, and to a lesser extent, through 'social experiments', whereby groups of people are exposed to various situations to analyze their reaction and behaviour. Clearly, this is not the case for this research. The nature of the research questions allows for very little control, if any, of subjects. First, the time frame of this study, 1992 - 2002, suggests that the phenomenon has for the most part already taken place. Thus, the spirit of the study is one of analyzing the event, as opposed to stimulating it. Second, the control variables of this study do not seek to induce the phenomena, but to better understand it through some type of group categorization. Based on the above, the researcher is of the opinion that this study fulfills the basic criteria identified by Yin (1994) for the use of this research tool. This said, the balance of this chapter will provide some views on the case study research design.

Yin (1994:19) regards case study design as "*the logical sequence that connects the empirical data to a study's initial research questions and ultimately, to its conclusion.*" In other words, the research design should take reasonable steps to ensure that collected data logically address the research objectives, and that related validity and reliability threats are dealt with. The logical sequence identified by Yin (1994) includes study

questions, hypotheses, units of analysis and measurements, and criteria for interpreting findings, which have been explained earlier in this chapter. For case study analysis, other research parameters requiring more elaboration include the criteria to determine companies to be studied and operational procedures dealing with interview protocols, data collection and analysis.

#### **4.2.2 Criteria for Case Studies**

This research does not aim to generalize its findings to the larger population of shipping companies, but instead to generalize its findings to theory. To Yin (1994), case study research is not about statistical generalization, but instead it leads to theory creation or to the comparison of empirically obtained findings to theoretically-based models. This he regards as analytical generalization. In this aspect, case study and grounded theory show tremendous similarities. Glaser and Strauss (1967) believe that, in the context of the discovery of grounded theory, the sample groups need not necessarily be representative of the population at large, but most importantly must have theoretical relevance to the subject matter under study. Eisenhardt (1989b) also agrees with the concept of selective choice of case studies and she states that random selection is neither desirable, nor recommended, because it provides little safeguard to ensure the replication of results.

Building on these concepts, the companies for case study were carefully selected, to ensure that they were either theory or category relevant. Company size is important in order to provide a comprehensive overview of the perceived relevance of EC over time. The rationale for company size categorization (i.e., large, medium and small) lies in the premise that companies' resources and volume of cargo carried may have played key roles in the adoption and use of EC over time. Similarly, EC technological effects,

particularly the widespread use of the Internet and the reduction of EC technology and infrastructure costs suggest that medium-sized and small container shipping companies may have experienced considerable EC-related changes in a shorter period of time. On this basis, at least one company in each size category needed to be studied. Thus, in addition to the eligibility criteria identified in Section 4.1.5 on page 89, one criterion was added for case study research:

1. Case study must include

- (a) At least one large deep-sea container shipping company;
- (b) At least one medium-sized deep-sea container shipping company; and
- (c) At least one small deep-sea container shipping company.

A thorough examination of the eligible companies' websites and of other industry-based secondary sources of information resulted in a list of 25 potential companies for case study. The candidate companies not only satisfied the eligibility criteria set forth previously, but also had high standards of commitment and professionalism in this sector of the industry. These companies were approached between December 2002 and February 2003 and asked to collaborate. Of a total of six companies (i.e., 2 large, 2 medium-sized and 2 small companies) that initially accepted to join the study, only four were analyzed as case studies. A large company decided to withdraw from the study due to time constraints and the researcher decided against the inclusion of a small company when it was clear that it actively operated in two sectors of the industry and container shipping was not its core business. It was felt that EC demands from a large passenger base in the ferry business would bring undesirable confusion and distort findings. As a result, only four companies were case studied.

#### 4.2.3 Interview Protocols and Data Collection, Codification and Organization

In case study research, a variety of data sources are normally used including, among others, personal interviews, archival data and industry news, assessments, and reports in specialized industry journals.<sup>87</sup> Archival information was complemented with data gathered through qualitative interviews, which proved to be a critical source of primary data for describing EC-related experiences over time.

Building on Sutcliffe and Huber's (1998) findings, which demonstrated that there is significant commonalty and consistency amongst high ranking managers' perceptions of both organizational matters and the industry environment, personal interviews were directed to senior and middle managers responsible for business and strategic management issues, sales, marketing and customer service, as well as information technology matters. Personal interviews were also carried out with a handful of key experts from industry organizations to obtain their perspectives on the past, present and future of EC in this sector of the industry.

The table below summarizes the sources of data and the interview protocol associated with them.

**Table 4-4: Sources of Case Study Data**

	Source of data and interview protocols
Container shipping companies	<ul style="list-style-type: none"><li>• Industry journals</li><li>• Company archives</li><li>• Personal interviews (Appendix 4-1)<ul style="list-style-type: none"><li>○ Interview questionnaire for general managers</li><li>○ Interview questionnaire for sales, marketing and customer service managers</li><li>○ Interview questionnaire for operation managers</li><li>○ Interview questionnaire for information technology managers</li><li>○ General information form</li></ul></li></ul>
Industry experts	<ul style="list-style-type: none"><li>• Interviews with experts (Appendix 4-1)<ul style="list-style-type: none"><li>○ Interview questionnaire for industry experts</li></ul></li></ul>

<sup>87</sup> i.e., *Containerisation International*, *Cargo Systems*, *Lloyd's List*, *Lloyd's Ship Managers*, *Lloyd's Shipping Economist*, among others.



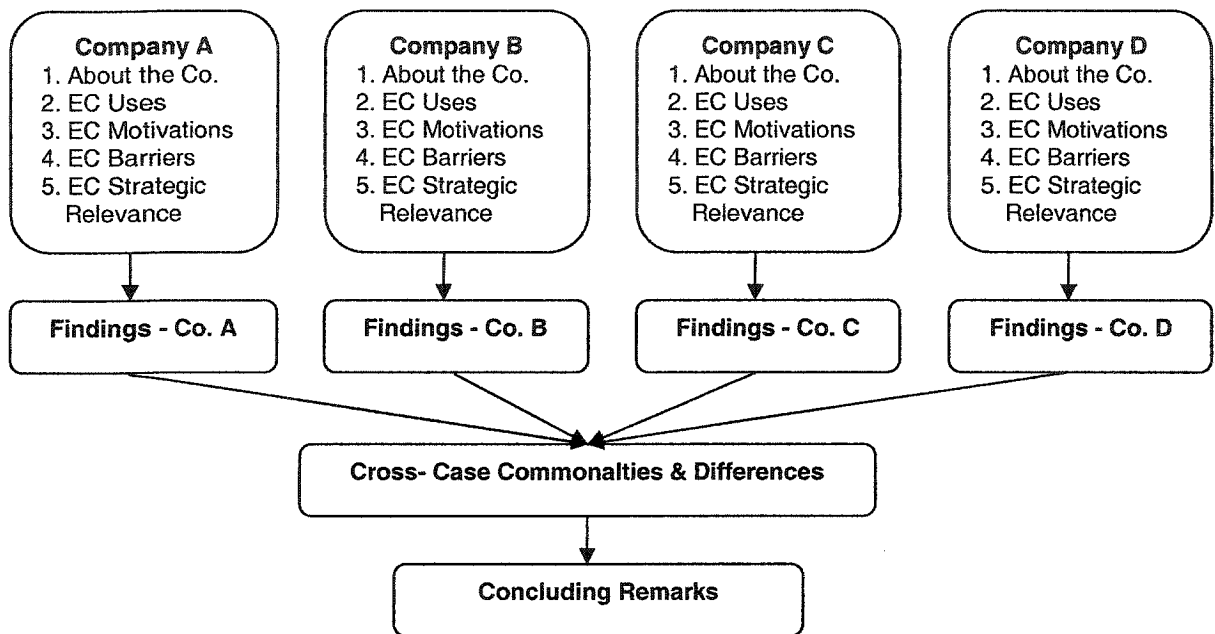
In-person interviews took place at company premises during the months of February and March of 2003. With the prior consent of interviewees, interview sessions were recorded to minimize on-site data collection errors. Interviews were transcribed and coded for analysis. The accuracy of responses was cross-checked against industry-based secondary sources of information to avoid or explain major inconsistencies.

Confidentiality and ethical issues followed the guidelines of Dalhousie University's Ethics Committee. Non-public information made available by container shipping companies under study (during interviews with employees) was considered to be confidential and only used in the context of this study. Moreover, the case study write-up and results reveal no personal details or company features that could lead to their identification.

#### **4.2.4 Data Analysis**

The analysis of data from multiple sources is one of the underpinnings of case study, since convergent empirical perceptions add credibility to the validity of hypotheses and propositions (Eisenhardt, 1989b).

**Figure 4-2: Case Study Analysis Procedure**



According to Eisenhardt (1989b), the convergence or divergence of perceptions must be made at two levels: within-cases, and across-cases. The former will reveal certain relationships that must be examined at the latter level. If convergence or divergence occurs, then patterns arise.

Consequently, for within-case analysis, data gathered from various sources (interviews, archival review and industry journals) was coded and then analyzed by themes for patterns of theme interconnection (see Figure 4-2). This progression is consistent with McCracken's (1989) sequential description of the analytical process of qualitative interviews. McCracken's (1989) argues that such an analysis is likely to show a sequence of general steps and an increasing level of generality. These steps are: development of observations and evaluation of theme interconnections for individual interviews, and determination of collective inter-theme consistency and contradiction. Although McCracken's views are directly related to the analysis of qualitative interviews,

the same logic holds for other sources of qualitative data. The results of within-case studies were then compared across-cases to establish inter-case patterns or contradictions.

#### **4.2.5 Limitations**

There were two main limitations to this multiple case study research. The first was related to resources. As container shipping companies were located in different parts of the world, considerable resources for travel during the data collection stage were required. Unfortunately, the researcher obtained very limited research funding, thus having to self-finance the majority of the data collection stage. It is believed that greater financial resources would have both enabled the inclusion of companies chiefly operating in more remote geographical areas and opened the possibility of spending more time observing how participating companies went about using EC on a routine basis.

The second and more relevant limitation is associated with the concern of undertaking interviews to address perceptions about the past. Despite the enormous contribution of qualitative interviews to the analysis of current EC-related matters, personal interviews become somewhat less reliable when analyzing events that took place ten years ago. This should not be construed as an attempt to diminish the value of personal interviews, but to be aware of their limitations. The premise is built on the following practical reasons and concerns:

- (a) Interviewees might not have been associated with the company during the period they were asked to describe and even if they were, they might not have been dealing with the matters on which they were asked to comment. Fortunately, the great majority of interviewees, including all general and senior managers with strategic

decision-making responsibilities, were actively involved in their area of expertise and with their respective companies ten years ago;

- (b) Interviewees may not remember the events accurately or may experience a degree of bias when describing an event in the past from today's perspective. This constraint was attenuated by comparing interview results with overall EC developments in container shipping, as reported in reliable industry journals.

### **4.3 SURVEY METHODOLOGY**

In a nutshell, the fundamental objective of survey research is to make statistical description and/or inferences regarding a defined population using data primarily collected through questionnaires completed by a statistically representative fraction of that population (Fowler, 1993). Thus, although a key aim of this study is to establish relationships between EC-related variables and make inferences thereof, equally important is the statistical description of EC-related experiences and trends by container shipping companies. The following sections will clarify specific survey design features.

#### **4.3.1 Survey Population Criteria**

The statistically representative fraction of the population, or sample size, is an issue at the heart of survey research. Although Lohr (1999) and Fowler (1993) recognize that researchers tend to achieve survey credibility based on the size of the overall population and a percentage of said population, they argue that more often than not, there is no "best way" to determine how large a survey sample size should be.

As this study has a finite initial population of  $N=297$ , a census was preferred, that is the administration of survey questionnaires to all container shipping companies in the

initial population. However, the question remains as to how many responses would reasonably represent this finite initial population. Considering the complexity of ocean container carriage operations, its international scope and the traditional reluctance of ocean carriage companies to participate in studies of this kind, an anecdotal 10% response rate was thought to enable the researcher to undertake an exploratory analysis. The actual response rate and how it breaks down into size categories is part of Chapter 7, *Survey Analysis*.

#### **4.3.2 Data Collection, Codification and Organization**

The data collection strategy included the administration of the survey questionnaire by mail, e-mail and facsimile. A letter of introduction explaining the context and objectives of this doctoral study, as well as a survey questionnaire (Appendix 4-2) were sent to all 297 companies between December 2002 and January 2003. In this letter companies were asked to complete the survey questionnaire and to return it to the researcher by facsimile or regular mail, or to complete the online version of the survey questionnaire. As an incentive to encourage participation, companies were offered a copy of the survey findings. Second and third batches of letters and survey questionnaires were sent in mid March 2003 and late April 2003, respectively, to companies that had not yet responded. In addition, random e-mail and telephone contact and follow-up with company officials was also undertaken to request their participation.

In order to organize and monitor the administration of survey questionnaires, a database was created. By using a randomly assigned control number for each survey questionnaire, this database enabled accurate tracking of contacts made, as well as of which companies returned the survey.

In survey research, the essence of codes is to create a system that translates concepts into numbers for examination, in other words, “*to create categories that are analytically similar and to differentiate between answers that are different*” (Fowler, 1993:129). Consequently, after the last round of letters to companies was sent out, completed surveys were reviewed, coded and stored in the database for analysis. The objectiveness of responses was controlled by sending the survey documentation to the general manager’s office, where decision-making is conventionally concentrated, and by comparing the overall direction of answers with information made available on participants’ public websites.

For ethical and confidentiality purposes, created databases did not link participants’ identification details to their participation status or their responses. Moreover, the presentation of survey results provides no features that could lead to the identification of participants.

#### **4.3.3 The Survey Questionnaire**

The questionnaire (see Appendix 4-2) was, for the most part, comprised of closed-ended questions designed to obtain information about the variables of the study, i.e., EC uses, barriers and motivations, the perceived relevance of EC, as well as information to ensure that participating companies indeed complied with the qualifying criteria.

Before the administration of the survey to container shipping companies, two individuals familiar with container shipping operations (i.e., a shipping service provider and a port administrator) were asked to complete and evaluate the survey questionnaire to ensure consistency, objectivity and clarity of questions. The results of these pilot

interviews were satisfactory, as no substantive changes to the questionnaire content were recommended.

#### **4.3.4 Level of Measurement**

The analysis of the data collected requires some ranking and categorization among the variables previously identified. In this context, the level of measurement plays a paramount role, since it defines how variables relate to each other. According to De Vaus (1996), there are three main levels of measurements: nominal, ordinal and interval or ratio.

The nominal level of measurement is used to distinguish the attributes of variables, but these features cannot be ranked in any order. At the other end of the spectrum, interval or ratio level of measurement allows one to single out not only the attributes of variables, but also the precise numerical interval among categories of variables. The ordinal level of measurement is positioned between the previous two. Ordinal measurement allows for attribute distinction and further permits a non-quantifiable ranking amongst variables. That is, ordinal variables can be graded relative to each other based on the strength of association with a particular statement or attitude; however, such a ranking is by definition non-quantifiable. For the purpose of this study, ordinal measurements are preferred since the categorization of variables is based on their attributes (i.e., various EC uses, motivations, barriers and strategic relevance), but their ranking relative to one another need not be precisely quantifiable. For instance, a company may have had various strong and moderate motivations for adopting EC; however, knowing and understanding the importance that a company places on each motivation relative to the others is far more critical than quantifying the exact interval

separating each motivation from the other. The same principle applies to the other variables.

For the analysis of surveys containing ordinal data, special attention must be given to the dimensionality of the scale used. It is clear that since a linear scale is primarily used with interval or ratio data, in order to replicate some of the characteristics of linear scales for ordinal data, some assumptions need to be made.

Oppenheim (1992) argues that an underlying continuum scale for ordinal data can be delineated by utilizing a five-point classification of socio-economic status system (SES) for rating attributes, whereby each status is not independent of the others, but has a rank embedded in it from first to fifth. In our case, such a scale is defined as *strongly disagree*, *disagree*, *undecided*, *agree* and *strongly agree*. A linear dimension from low to high and associated linear values with each classification (i.e., strongly disagree=1; disagree=2; undecided=3; agree=4 and strongly agree= 5) are assumed for this scale. Questions that were not answered were excluded from the analysis and did not affect any calculation. This continuum scale not only enabled attitudes to be consistently measured, but also permitted the scoring of ordinal answers, resulting in more reliable measurement. This research assumption is widely used by researchers in social studies, since it enables the measurement of attitudes and their statistical treatment using scale values (Oppenheim, 1992).

#### **4.3.5 Statistical Procedure for Analysis**

This section will describe the procedure used in Chapter 7, *Survey Analysis*, to relate survey data to the research questions, that is, the logic by which the former provides answers to the latter.



The analysis follows a simple rationale: it is hypothesized that changes to the main or most common EC perceptions over time account for changes in the strategic relevance of EC over time. Thus, the analytical procedure will first address *hypotheses 1* through 4 to examine the main or most common EC uses, motivations and barriers (*main* independent variables), as well as the perceived strategic relevance of EC over time (dependent variables). These *main* independent variables will then be introduced into a model and tested to confirm whether they indeed explain changes to the dependent variables better than any combination of other independent variables measured in the survey questionnaire (see Section 7.6, *The Central Hypothesis*).

Before describing the hypothesis testing procedure, some clarifications are necessary. First, Table 4-5 identifies which questions in the survey questionnaire measure the various variables of the study.

<b>Table 4-5: Variables of the Study</b>	
<b>Variables</b>	<b>Survey questions addressing variables</b>
<u><i>Independent variables</i></u>	
EC uses over time	(4 through 7)*
EC motivations over time	(21 through 30)*
EC barriers over time	(31 through 39)*
Current EC expectations	(14, 15 & 16)
Competitive influence of EC over time	(41)*
Strategic planning	(40)
<u><i>Dependent variables</i></u>	
Current strategic relevance of EC	(8, 9, 12 & 13)
Strategic relevance of EC 10 years ago	(10, 17 & 18)
<u><i>Control variables</i></u>	
Current # of ships	(1)
TEU capacity over time	(2)*
Competitive strategy over time	(3)*
Change of EC relevance over time	(11, 19 & 20)

\* Series 'a' and 'b' measure variables for current and past times, respectively.

Second, it must be mentioned that the following testing procedure and statistical tests are based on the assumption of equidistance between non-parametric attributes in a

SES scale (see Section 4.3.4 on page 105). This assumes that the distance between each value in the 1 to 5 SES scale is equal, i.e., the distance between the values 1 and 2 representing the qualifying attributes 'strongly disagree' and 'disagree' respectively, is the same as the distance between the values 4 and 5, accounting respectively for 'agree' and 'strongly agree', and so on.

Third, since the response rate was 11.1%, the survey analysis will be used as an exploratory tool to search for key relationships that might help explain the EC phenomenon in container shipping companies. To this end, the  $p$  value is set at .10 to broaden the scope of potential explanations, thus minimizing the potential for type II errors (i.e., the acceptance of null hypothesis when the opposite is true). This is possible as the  $p$  value acts as a personalized level of significance through which the researcher determines when null hypotheses will be rejected (Aczel, 1999; McBurney, 1998).

Finally, it should be clarified that the statistical package to be used for hypotheses testing is Version 11.5 of SPSS and that throughout the description of the analytical procedure, reference will be made to Figure 4-3 on page 109.

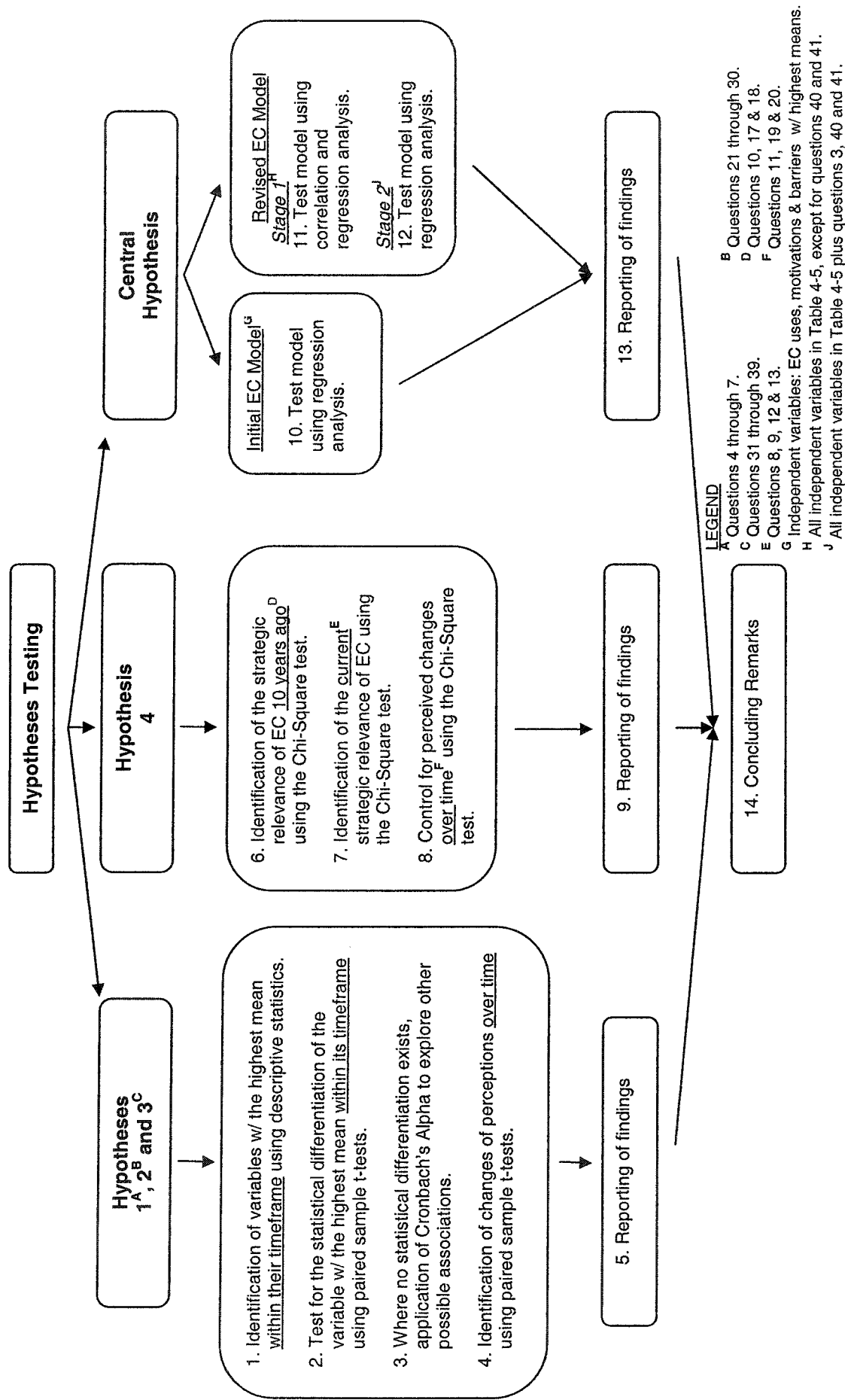
#### Analytical Procedure

*Hypotheses 1, 2 and 3* seek to identify the main or most common EC uses, motivations and barriers over time, as they are believed to explain changes to the strategic relevance of EC over time.<sup>88</sup> Although each of these hypotheses measures different concepts, their testing procedure is similar and consists of tests to determine the variables with the highest means over time and to explore whether such variables are indeed statistically different from others within their timeframe. This is important as the main

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<sup>88</sup> Later in the *Initial EC Model* of the *central hypothesis*, this postulate will be tested for.

Figure 4-3: Survey Analysis Hypothesis Testing Procedure



perceptions should present both the highest means and be different from all the remaining variables in their group. Finally, each variable will be checked for changes over time to discover whether it has increased or decreased its importance over time. To this end, the statistical tools and procedures shown in steps 1 through 4 of Figure 4-3 are as follows:

1. *Identification of variables with the highest means over time:* EC uses, motivations and barriers with the highest mean values for both periods of time will be determined using simple descriptive statistics;
2. *Tests for the statistical differentiation of the variable with the highest mean within its timeframe:* Version 11.5 of SPSS offers a variety of tools for the comparison of means. For this study the paired-sample t-test was the preferred statistical tool due to its simplicity and reliability. This statistical tool sequentially compares the mean of a variable against all others in a group and tests whether the average is different from zero. Thus, in the context of *hypotheses 1, 2 and 3*, the paired-sample t-test will be used to compare variables with the highest means against each variable in their respective groups. Statistical difference exists if significance indicators are below 10%.
3. When no clear statistical difference could be established between a variable with the highest mean and other variables in the same time period, Cronbach's Alpha will be applied, the main purpose of which is to seek associations between independent variables for potential exploratory purposes. The results from Cronbach's Alpha, however, should be regarded as indications of, as opposed to assertions.
4. *Identification of changes in perceptions over time:* Although not explicitly needed for hypothesis testing, the direction of changes over time will be tested for.

Paired-sample t-tests at the 10% significance level will compare the means of each EC use, motivation and barrier at the beginning and at the end of the period under study. If the means over time of the same variable are statistically different, then the perception of that variable would have changed over the period under study. Statistical difference exists if significance indicators are below 10%; and

5. *Reporting of findings*: After each of the hypotheses is tested, preliminary findings will be reported accordingly.

The testing procedure used for *hypothesis 4* is slightly different than for the previous hypotheses. Unlike for *hypotheses 1, 2 and 3*, the objective in the case of *hypothesis 4* is not to isolate the variable with the highest mean, but rather to understand the collective meaning of answers to three sets of variables measuring participants' views on the strategic relevance of EC over time. This will be done in three stages using Chi-Square test.

Testing of the first two sets of variables will provide an indication of the perceived strategic relevance of EC at the beginning (step 6) and at the end of the period under study (step 7). The third set of variables will serve as a control of any perceived change over time (step 8). The statistical tools and procedures shown in steps 6 through 9 of Figure 4-3 are as follows:

- 6, 7 & 8. *Identification of the strategic relevance of EC over time*: These steps will indicate whether respondents, as a group, either agreed or disagreed with the statements in three sets of questions. To this end, Chi-Square tests will examine respondents' level of agreement or disagreement with each set of questions, and therefore determine the strategic relevance of EC over time. Chi-Square tests will tabulate answers to the sets of questions under examination into three categories

i.e., 'in agreement', 'in disagreement' and 'undecided' and test whether these three categories are equally distributed or otherwise.

9. *Reporting of findings*: Findings will be reported accordingly.

The *central hypothesis* predicted links between independent and dependent variables which will be tested using two models, i.e., *Initial* and *Revised EC Models* for the interaction of variables. The *Initial EC Model* is based on the assumption that independent variables depicted as the *main* or *most common* EC uses, motivations and constraints account for changes to the strategic relevance of EC over time (step 10). The *Revised EC Model*, however, does not assume that changes to the strategic relevance of EC are solely explained by the *main* or *most common* EC perceptions. Instead, the *Revised EC Model* searches for relationships between dependent variables and all independent variables listed in Table 4-5 on page 107 (steps 11 & 12).

Both models will be tested using the backward method of linear regression analysis at the 10% significance level. Regression analysis will estimate the coefficients that best predict the behaviour of a dependent variable in a given model. The results of regression analysis will be assessed for soundness by a model residual diagnostic.

Since the independent variables to be input in the *Initial EC Model* will be derived from testing *hypotheses 1, 2 and 3*, regression analysis will be applied directly to the model (step 10).

For the *Revised EC Model*, however, correlation analysis will first be applied to all independent variables listed in Table 4-5 to identify those likely to predict the behaviour of dependent variables. In so doing, multi-collinearity issues among independent variables will be addressed by eliminating redundant ones when collinearity

factors larger than 2 so suggest. Testing of the *Revised EC Model* will take place in two stages. *Stage 1* (step 11) will explore whether the inclusion of EC-related independent variables generates higher prediction rates than the *Initial EC Model*. *Stage 2* will further test whether other competitive variables play a role in the strategic relevance of EC over time (step 12). Commonalties and differences between the two EC models will be reported (step 13) and will lead to the summary of the main results from the survey analysis (step 14).

#### **4.3.6 Limitations**

There were three main limitations. Firstly, despite substantial efforts to convince container shipping companies to participate in this study (i.e., three rounds of mail-outs for the whole population plus random follow-up by e-mail and telephone), companies were reluctant to do so. Secondly, companies' dispersed location around the world substantially increased costs associated with the administration and follow-up of survey questionnaires. It is felt that limited financial resources constrained the implementation of more aggressive data collection and follow-up strategies. Thirdly, there was also a concern that answers to the survey questionnaire would provide less reliable information about the EC situation ten years ago. However, this was minimized by comparing survey results with the state of EC matters ten years ago, as reported by various industry journals.

## **CHAPTER 5**

### **CASE STUDIES**

The case study methodology is being used in this dissertation in order to answer several fundamental questions, namely:

- (a) Are there commonalties or differences of findings within and across case studies?
- (b) Are there patterns observed? and
- (c) How can these patterns be explained?

This will be done in two chapters. Chapter 5 will provide individual case studies of four shipping companies of various sizes (within case study) and will report the following:

- (a) A concise description of each company and its experiences with EC, to the extent that details provided do not affect its anonymity;
- (b) Relevant information from interviews with various managers organized by themes (i.e., EC uses, motivators, constraints and strategic relevance) to discover common perceptions; and
- (c) A summary of findings including commonalties and differences among primary sources of information, evidence supporting and opposing the hypotheses of this study and key relationships over time.

Chapter 6 will address findings collectively (cross case study), including commonalties, or lack thereof, amongst the four cases studies, as well as critical issues and emerging themes.



## **5.1 CASE STUDY 1: COMPANY 'A' - THE CASE OF A LARGE DEEP-SEA LINE**

### **5.1.1 Brief Description of Company A and its EC Strategy**

Company A is a global carrier with a strong presence in major markets. It has grown through a merger and acquisition strategy, which in the last decade has further strengthened its position as one of the leading competitors in the container shipping sector. Company A currently operates a worldwide network of liner services with its own vessels, as well as with the utilization of cargo space accessed through either strategic partnerships with other liner operators or membership to major shipping conferences. According to the company, its long standing commitment to quality of services and excellent customer service combined with a fair amount of technological investment to re-engineer cargo, administration and business processes have helped them improve profitability and maintain market shares. Despite having stakes in shipping-related ventures, company A has always identified liner shipping as its core competence. The company considers its forwarding, consolidation, inland distribution and a range of logistics-related services as value-added services, to which it has allocated high priority in response to global shippers' demands for more integrated and seamless transportation services.<sup>89</sup>

During the 1990s, increasingly harsh financial conditions in the industry, market pressures and consolidation of major players obliged company A to embark on major structural changes in order to maintain its competitive position and improve cost efficiency. During the second half of the 1990s, the company implemented an ambitious cost-cutting plan and committed to further develop web-based electronic commerce

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<sup>89</sup> This diversification strategy is mirrored among some top industry competitors to counter-balance declining profit margins in container shipping.

practices as a means to gain further efficiencies. These measures were later credited for considerable cost savings, particularly in 2000 and 2001.

Company A has pursued the incorporation of EC into its business processes for over twenty years. In the late 1980s, company A's investments in research and development already included negotiability of electronic B/Ls, as well as participation in industry-wide initiatives, which aimed to create and promote standards for EDI, an early form of EC.<sup>90</sup>

In the early 1990s, company A welcomed the 1990 CMI draft rules for B/L (on which it later based its non-negotiable B/Ls) and further invited other industry participants to embrace EDI technology and non-negotiable B/Ls in order to migrate to paperless trading.<sup>91</sup> During the 1990s, the company continued to use EDI-based applications internally (e.g., for the transmission and control of cargo data such as bayplans information) and externally, with shippers, manufacturers and forwarders (i.e., in support of the just-in-time transportation concept). One example of the latter was company A's involvement, together with other large carriers, in the development of EDI-based computer programs enabling shippers and forwarders to book, send shipping instructions and track cargo shipments electronically.

Around 1996, due to increasing demands for integrated transportation services and the more widespread use of the Internet among shippers and other business partners, company A allocated close to 2% of its revenue to further develop its EC applications and upgrade its legacy systems to make them client-server environment compatible. The

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<sup>90</sup> Although company A experienced changes in terms of its organization and brand during the 1990s, its involvement in EC initiatives can easily be traced back to the period before these changes occurred.

company believed that the Internet would further boost the use of its customized electronic services,<sup>92</sup> which at the time were already used by about 10% of its large customers in 80% of the countries in which the company operated.

By the early 2000s, company A committed to further incorporate EC into business processes for both core and value-added services. As a result, EC applications with customers<sup>93</sup>, as well as intra-organizational EC<sup>94</sup> were further strengthened and pursued. Furthermore, the company's quarterly reports since then have consistently linked EC technology and practice to the successful implementation of the company-wide cost-reduction program, which helped the company successfully navigate through periods of economic uncertainty.

Finally, in addition to EC being heavily used to improve cost-efficiency and reduce operational costs, industry analysts point to other potential strategic implications of EC to the company, namely:

*(a) EC may provide value-added services and strengthen the company's position as a service provider.*

At the beginning of the 2000s, leading analysts interviewed a company's senior managing director about the impacts of an increasing number of electronic portals on the industry and in particular on the company. The director argued that the proliferation of electronic portals and auction sites tended to portray container shipping as a commodity

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<sup>91</sup> The main objectives for the incorporation of EC technology into business processes included alleviation of industry problems such as cargo arriving before its documentation, cargo being delivered against letters of credits and maritime fraud.

<sup>92</sup> These systems included EDI messages for port-to-port shipments; PC windows-based consignment tracking systems; and EDI-based logistics support tools incorporating purchasing and order management options.

<sup>93</sup> Among them, sophisticated web-based global supply chain solutions and membership to industry developed electronic portals.

and not as a partner in transportation. Thus, in order to avoid the spread of this misconception and to continue to shape their own destiny, a group of leading carriers created a carriers' sponsored electronic portal.

*(b) EC enables new business ideas.*

A top executive of company A argued that EC is supporting the introduction of new business ideas or products in container shipping, such as the notion of discount liners, mirroring the airline passenger industry.

*(c) External factors may further boost the relevance of EC among container carriers.*

The terrorist attacks of September 11<sup>th</sup>, 2001 in the United States of America generated a series of US-led actions to enhance maritime security. For container lines, the size and relevance of the US market make it imperative to fully comply with such rules. Thus, by 2002 company A became an accepted partner of the US Customs C-PTAT (Customs-Trade Partnership Against Terrorism Program), which requires a great deal of electronic exchange of information. The impacts of C-PTAT are not yet known, but it is believed that they will be far reaching.

### **5.1.2 Company A's EC Philosophy**

The next sections present findings from personal interviews carried out with four managers at the company's headquarters early in 2003. These interviews revealed a high level of consistency on major issues among interviewees; however, subtle differences in views were also found.

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<sup>94</sup> To, among others, centralize and transfer cargo documentation functions to lower cost locations.

The quotation from a senior general manager illustrates the company's EC vision as follows:

Senior General Manager:

*Wherever you are, whatever [systems] you operate, you can do EC with us.*

In order to deliver this policy, the company had to undertake a thorough review of how EC matters were managed. EC was a responsibility of the department in charge of information technology, and its development was primarily reactive and largely unstructured. Around 2001, a team was created in the headquarters to review, modify and oversee the implementation of a company-wide EC policy and practice. The key objective of this new group went beyond promoting good coordination and optimal resource utilization from a global standpoint, to encouraging the acceptance of EC as an integral part of the company's business. Meanwhile, implementation fell largely to regional offices.

The EC development team has a technical and a business component. Although some outsourcing was needed in relation to the former, the latter has primarily been staffed by experienced personnel from the business shipping division. Regional EC managers are responsible for the smooth application of the global EC strategy regionally, that is, selling EC products to regional customers, obtaining feedback from them and ensuring proper EC training and integration in the sales strategy.

The manager of the EC development team pointed out that the first stage of the program concentrated on getting EC applications right, selling them and getting new customers. This often meant giving priority to user-friendliness rather than to the system integration characteristics of EC applications. Subsequent stages are focusing, however,

on back-end integration and the fine tuning of global and regional business plans for each EC channel (i.e., Internet site, electronic portal and EDI).

In order to obtain the hard savings enabled by EC, a critical mass of users is needed. To this end, the company is committed to boosting the number of electronic cargo-related transactions from slightly under 10% in 2002 to 20% and 30% by the end of 2003 and 2004, respectively.

The company also aims to obtain savings and efficiencies by using EC internally within the organization. Since EC is changing business practices in the industry, the company felt that it was important to use EC to review and standardize its business processes. Company A is also currently conceptualizing the future of its global structure in terms of electronic regions, as opposed to physical ones. This will probably entail further revision of internal business practices.

Data gathered during the interviews confirmed that company A has utilized various forms of EC for many years. The following sections of this paper will provide details about EC uses, as well as perceived EC motivations, barriers and strategic relevance.

### **5.1.3 Uses of EC**

#### *Uses of EC 10 Years Ago*

Only one of the interviewees was not an employee of the company ten years ago, and declined to comment on previous uses of EC. The uses of EC ten years ago were mostly operational and intra-organizational, as confirmed by a senior general manager as follows:

Senior General Manager:

*EC was basically not on the map 10 years ago. At best we internally communicated via bespoke e-mail systems, via fax to the outside world, and on rare occasions via EDI to customs [authorities] in a very few countries.*

The interviews provide evidence that:

- (a) Proprietary EDI systems supported intra-organizational interactions, as well as interaction with a limited number of government agencies; and
- (b) Although the use of these systems was fairly limited compared to the total company information exchange at the time, EC was more heavily used intra-organizationally for cargo-related coordination and exchange of documentation.

#### Current Uses of EC

By the end of the period under study, company A had clearly defined various electronic commerce channels (e-channels), namely proprietary EDI, Internet (through its own website), electronic portals (web-based EC channels developed in collaboration with other industry partners) and offline channels. These channels host various EC applications, defined by the company as transactional<sup>95</sup> and informational<sup>96</sup> EC applications.

These channels are designed to suit a large variety of users, though it should be noted that the largest target group is 'customers'. Customers are recommended to use different e-channels according to their regional location, business relationships and systems characteristics. For example, the web-based electronic portal would be

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<sup>95</sup> i.e., those directly related to or necessary to perform a shipment, e.g., bookings, shipping instructions, shipping reports, B/L creation and review, remote B/L printing, track and trace and electronic arrival notification, electronic invoices and electronic payments.

<sup>96</sup> i.e., those providing information not necessarily related to a particular shipment, e.g., voyage and vessels scheduling.

recommended to customers working with various carriers with a high volume of cargo; the website would be for customers using company A as the only carrier; while EDI-based systems would be for larger customers with more sophisticated transportation requirements (e.g., just-in-time or logistics), trading in more mature markets. The offline option has been designed for customers operating in regions where issues of access to communication networks make it unfeasible to use any of the previous options.<sup>97</sup>

This rather broad choice of e-channels suggests that the company's vision for the use of EC is geared mainly towards customers.<sup>98</sup> The electronic interaction with other groups of users (i.e., suppliers of transportation-related services, government agencies and intra-organizational users) is based on a less flexible choice of e-channels: largely, but not limited to, EDI-based systems. This appears to follow rather straightforward reasoning: the company's backbone system is EDI-based. Information fed through various channels would have to be converted and made compatible by an interface layer. It would make sense then, to require suppliers of transportation-related services to provide information through compatible electronic systems, largely EDI. Intra-organizationally, EDI is the channel of choice as well.

Interviewees pointed out that the most popular EC applications in use were (in descending order): B/Ls, shipping instructions and bookings, closely followed by the use

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<sup>97</sup> Roughly speaking, the offline e-channel enables customers to provide information to the company by means of sophisticated 'pdf' files, which can later be converted and fed into the company's main system.

<sup>98</sup> By 2001, the company's web-based applications enabled its customers to track past and future port calls of any voyage; make port-to-port schedule enquiries for future sailings; track cargo in real time by container, B/L or booking reference number; make bookings and enter shipping instructions; view details of current bookings and proposed B/Ls (with the possibility of remote printing); and use various EC solutions through the company's sponsored electronic portal.



of electronic portals.<sup>99</sup> Nonetheless, when asked about the most relevant use of EC, interviewees were of the opinion that pinpointing one single set of uses would be inappropriate. The company runs an integrated EC system, interviewees argued, where every piece of information fed by internal users, customers and suppliers is relevant in its own right in terms of delivering company A's business service. Although from time to time one set of uses may appear to gain relevance over the others (e.g., interaction with government agencies as a result of new US container security legislation), at the end of the day in an integrated EC system all uses have equal relevance. Interviewees agree, however, that EC development currently shows a clear customer-oriented focus<sup>100</sup> and that the biggest effort is put into selling the company's EC packages to clients.

When comparing the EC applications currently in existence with those in use ten years ago, a progression is evident:

- (a) As time passed and EDI standards were implemented by business partners, EDI-based communication with suppliers of transportation-related services<sup>101</sup> increased;

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<sup>99</sup> This choice suggests that customer-oriented EC applications are the current main focus of the company's EC strategy.

<sup>100</sup> When asked what they currently perceived as the most relevant use of EC, interviewees responded that the uses were 'integrated'. Does this mean that all uses are equally important? Not necessarily. During the interviews, the researcher learnt that about 80%-90% of the interactions with suppliers are already made through EDI systems, compared to slightly less than 10% of transactions with customers. It is also known that the company has achieved substantial savings by centralizing cargo-related documentation (an intra-organizational use). Therefore, if the relevance of EC were to be judged based on the quantity of transactions, EC with suppliers or intra-organizational EC would rank at the top of the list. Instead, the more holistic view adopted by company A suggests an implicit main customer focus, since in order to deliver end services to customers, tight coordination of all EC uses is required.

<sup>101</sup> i.e., terminals, stowage warehouses and feeder services, as opposed to procurement suppliers.

- (b) Around 1997 or 1998, informational web-based applications (e.g., shipping schedules and cargo track & trace) were implemented. This was followed by frequent upgrades and new EC products; and
- (c) During the early 2000s, company A intensified its participation in cooperative arrangements with other carriers, which resulted, in the creation and launching of an Internet-based industry portal. The above is partly explained by a senior general manager as follows:

Senior General Manager:

*... back in 1997 and 1998, we had track & trace through the Internet ... and simple shipping information applications. Then one thing after the other: shipping instructions, bills of lading, and so on ... things evolved!*

Interviewees felt that future developments will further enhance the role of EC in customer service and satisfaction.<sup>102</sup> Future EC uses will be more sophisticated and interactive (to possibly include live support features) and will be engineered to provide customers with the information they request, as opposed to overloading them with unwanted details. For instance, new and more flexible electronic invoicing and payment applications will be launched by the company in 2004. These new EC applications will enable customers to approve and contest parts of their invoices electronically. Electronic payment options however, will be largely shaped by regional business practices and banking restrictions.

To sum up this section, company A's main use of EC seems to have shifted from an intra-organizational and operationally-driven context ten years ago, to a more integrated and customer-oriented one nowadays.

#### 5.1.4 Motivations for the Use of EC

##### Motivations for the Use of EC 10 Years Ago

There is a general perception among interviewees that the main trigger for the use of EC ten years ago was to enhance internal efficiency and, in so doing, reduce operational costs. However, there is also evidence suggesting the presence of other external motives such as competitive imitation and satisfaction of customer demands. As stated by a senior general manager:

Senior General Manager:

*Before, the main drivers were customers' demands, but also [the desire] to improve internal efficiency. At the beginning, it [i.e., motivation] was a competitive driver. Some companies started to do it, so you needed to be there! Other carriers had track & trace, so that is what we did.*

##### Current Motivations for the Use of EC

Progressively, in a more technological and competitive industry, the use of EC became more widespread. Although the initial motivations remained valid and very much sought after, the intensity with which they were pursued changed.

Senior Marketing Manager:

[Talking about changing motivations over time]

*Most definitely they have changed. Today the competitive environment has squeezed our costs so much and [the] industry is so fragmented that we have to concentrate on areas that we can control, that is, the cost side of the equation. So, the intensity of the initial motivators has changed.*

The sense is that main current motivations revolve around improving internal efficiencies and cost reduction,<sup>103</sup> as well as satisfying customer demands:

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<sup>102</sup> Future applications are thought to enable: monitoring of inter-modal cargo movement in real time; receiving automatic event notification and schedule information by email or EDI; and contesting and settling invoices online.

<sup>103</sup> The motivations include the streamlining of business processes, reduction of errors, company-wide standardization, simplification and centralization of document-related processes, and manpower-related cost reduction.

Senior Marketing Manager:

*The demands for efficiency and time efficiency are more pronounced and focused now.*

*Customers demand a certain [EC] product and what such products should contain or deliver. We invest in EC knowing that that is what the market wants.*

Senior Regional EC Development Manager:

*Today EC is a requirement in most tenders. If you cannot do this [i.e., apply EC capabilities], then you cannot participate in the tender, especially when you deal with some of the Fortune 500 companies.*

Furthermore, benchmarking the company's own EC capability against other class

A competitors is an important motivator:

Senior Regional EC Development Manager:

*When we started to develop EC solutions, we compared our position in the market relative to other class A carriers such as [names given]. Most of what we have developed in the last 2 or 3 years was done with an eye on what they had done and what they do. Some of our products are very unique, but development in this area is fast, [and] 3-6 months after you release a product, one of your competitors will release one that will put them back ahead of you again.*

Interviewees were asked whether demands from suppliers and/or governments were perceived as key motivations. They concurred that suppliers of transportation-related services were of key importance in the company's integrated electronic systems; however, they did not constitute a source of motivation. Quite the contrary, for the most part suppliers are being required to use predetermined formats and protocols for electronic interactions. With regard to government agencies, there is little doubt that electronic interaction with government agencies will increase both in volume and in relevance as a direct consequence of the September 11<sup>th</sup> 2001 attacks. At this stage government demands are not yet perceived as a dominant motivation, though their potential effect in fuelling EC use across container shipping is very well acknowledged.

Senior Marketing Manager:

*In some ways, that equation has moved dramatically over the last 2 years... Particularly, because of some of the US container security initiatives. In fact, some of the demands the US is placing on us as an industry, will have far reaching and fundamental impacts on the way customers perceive EC...*

Summing up, it is clear that no substantial changes in the nature of motivations have occurred in the last ten years; nevertheless, their intensity has increased.

### **5.1.5 Barriers for the Use of EC**

#### *Barriers for the Use of EC 10 Years Ago*

Interviews suggest both internal and external sources of constraints, which seem to be interlinked.

Externally, barriers tended to concentrate on an apparent resistance to change business practices, even if the changes are of form, rather than of substance. This is described by a senior marketing manager as follows:

Senior Marketing Manager:

*Barriers were more present at the beginning... We had to get customers used to this new idea of transmitting information [electronically]. The way of doing business is not necessarily the same in EC.*

However, the resistance was probably not entirely due to the assumed traditionalism of the shipping industry or to a lack of awareness about EC, but rather due to a more concrete combination of factors, such as a lack of standards for transmitting electronic information and communications networks.

Senior Regional EC Development Manager:

*Now we have more standards. Ten years ago there were not many standards to communicate electronically... Without standards it is way harder to implement EC.*

Besides technology-related factors, insufficient in-house managerial direction and knowledge on EC matters was singled out as a main constraint as well.

Senior Regional EC Development Manager:

*Ten years ago there was not a lot of technology. So this technological barrier has lowered... [Likewise] senior managers now have to be more aware of this technology and have to embrace it, unless you are a very, very traditional company!*

Senior General Manager:

*Maybe the most difficult one [constraint] was to get consensus within the company on what needed to be done. Perspectives varied on this issue.*

The lack of managerial experience had impacts on the development of web-based EC applications. For instance, web-based EC was initially unstructured and too technically-driven, resulting in complicated products that met with very limited acceptance among customers.

Senior General Manager:

*We started to design our EC products so they would evolve [to be] quite well-connected [to our systems]. It became very complicated and not very user friendly. It became evident that our customers, dealing with us through the web, were not particularly impressed with our products. ... Basically, nobody bought it [i.e., EC products], nobody used it!*

Time, experience and technology helped to overcome some of these barriers, however, others would emerge.

#### Current Barriers for the Use of EC

External barriers are seen as having a major impact. Having overcome, for the most part, problems associated with technological standards and formats to undertake electronic communication, currently the biggest restriction pertains to the imbalance among regional communication infrastructures, commonly referred to as the 'digital divide'.

Senior Regional EC Development Manager:

*Technology is the biggest [barrier]. Do they [i.e., customers] have systems through which we could do EC? ... The biggest disadvantage is associated with location, that is, what part of the world you are in. ... [In some regions] EC is not that easy, because the Internet is expensive, local calls are expensive, PC skills are not what they should be. So advantages and disadvantages differ from country to country.*

Participants also agreed that another main problem at the present time is related to human attitudes towards changing established business practices. Although chiefly external, this has internal implications as well.

Senior General Manager:

*[A major barrier is] resistance to change! It has to do with achieving a critical mass until it [EC] is a well-established practice. We have a problem of practice... it would take time because you have to demonstrate to the customer that the [EC] system will be better than the telephone one.*

It is argued that the fundamentals of the shipping business remain unchanged by EC; however, the struggle to accept electronic versions of paper-based procedures is becoming increasingly evident. This fluctuates from region to region, and from country to country, and has proven to be a major difficulty for a global carrier. In company A's experience, resistance to change is clearly linked to at least two non-mutually exclusive factors: process indoctrination and lack of computer technology penetration. The former is mostly people-based and heavily felt in countries/areas with long-established business traditions:

Senior Regional EC Development Manager:

*[People in less traditional maritime countries] they have not been indoctrinated in old methods, so they are open to change and you get advantages faster. It is easier to change processes and to take advantage of new practices.*

The insufficient penetration of computer technology tends to be a more conventional barrier, strongly influenced by the technical and managerial experience of an organization:

Senior General Manager:

*We developed our [web] system geared towards the United States, but the major uptake has been in China, because they have the best and most modern equipment. In North America computers have been in use for a while, so the current systems are not necessarily the newest. The opposite situation is true in China and other developing countries.*

Another major barrier comes from inside the organization, where the perceived main constraint is associated with investment costs. This does not refer to the investment needed to set up the initial EC infrastructure, but rather to cost-benefit considerations in an environment where incremental investments in EC are clearly yielding diminishing returns.

Senior General Manager:

*[A major barrier is] always monetary, because you have to justify the project.*

Senior Marketing Manager:

*The principal constraint is what our [existing EC] systems are capable of, vis-à-vis, what customers expect us to do. There is a certain mystique around EC. To replicate manual processes with systems is very difficult and requires costs, time and investment.*

Looking ahead, participants were of the opinion that, as EC evolves, future constraints are likely to revolve around the following matters:

- (a) Back-end integration will be required to reap the full benefits of EC front-end applications;
- (b) Security and legal aspects will become major barriers when the potential for a wider electronic acceptance of negotiable documents is realized; and
- (c) Resistance to changing business practices will be a constant.



Some conclusions are possible. Firstly, resistance to change business practices (both internally and externally) has been a constant issue throughout the adoption of EC, and it is foreseen to continue to be a major constraint in the near future. Secondly, other main barriers over time can be said to be internal and external. Externally, technology has been the major source of barriers throughout the last decade. Ten years ago, it was the lack of standards for electronic communication. Today, problems associated with the world's digital divide limit the company's further development of EC. Internal barriers in turn, have concentrated around managerial issues. Past barriers were argued to be the lack of experience in providing adequate direction for the development and adoption of web-based EC, while today they center around cost-benefit investment considerations. In summary, in company A's experience, the fundamental barriers for EC adoption and development have changed very little over time.

#### **5.1.6 Strategic Relevance of EC**

##### *Strategic Relevance of EC 10 Years Ago*

At the time, electronic systems were viewed more as a technical matter than a strategic management one. On this basis, it is evident that EC functioned as a tactical tool in achieving strategic goals. This said, data from the interviews also suggest that as EC usage increased, so did its appeal in the eyes of strategic decision-makers.

##### *Current Strategic Relevance of EC*

In order to understand the perceived strategic intent for the use of EC technology and practice, various related questions need to be addressed.

*What is the current relevance of EC?* A mix of answers suggests that today EC is more often an item on executives' agenda than it was before. Some managers are of the

opinion that the main role of EC remains the achievement of commercial goals. EC is seen as a means to improve cost-effectiveness and as a value-adding mechanism:

Senior General Manager:

*EC plays a more important role in achieving commercial goals and has always been like that ... To us, EC does not change the fundamentals of our shipping business, but seems to be a means to deliver our services better and faster. In doing so, EC also adds value to the customers.*

Human interaction with customers continues to be fundamentally important, forming the basis upon which business contracts are negotiated, obtained and maintained. EC is then used to execute such contracts or deliver such services.

Senior General Manager:

*EC will never substitute personalized sales contacts / attention. Trust is gained through the personal touch. Most people would like to see us face to face, know who we are and what we stand for! We use people / personal attention to get the sale and EC to execute the contract, paperwork and all of that.*

From this perspective, EC is clearly regarded as a tactical tool for the achievement of commercial goals. However, a slightly different view is presented by another senior manager, who believes that EC may have become more instrumental in the actual definition and identification of commercial goals, as well as in their achievement.

Senior Regional EC Development Manager:

*EC today is decisive for both identification of commercial goals and their achievement... Probably 10 years ago there were not so many goals related to EC. Today we have a target to achieve. We have identified cost-savings as our goal and EC will help us to get there. Ten years ago, [EC] was more for the achievement of our customers' goals, as opposed to ours.*

Although both interviewees concur that EC is a tactical tool, they differ in their view on the extent to which EC has become a key consideration in the identification of commercial goals.

During these interviews the researcher learnt that company A has recently launched a new business initiative. The pilot project seeks to test market acceptance of the concept of discount liner services, similar to *no frills* schemes implemented in the passenger airline industry. This new venture (although under a different brand name) utilizes company A's vessels and other resources to execute carriage contracts, but offers no personal interaction for negotiation of agreements. Interaction with customers is fully automated by means of EC front-end applications which are independent of the company's main EC system. This initiative and its rationale are described as follows:

Senior General Manager:

*We have a new initiative... It is a different brand... [and] a different website. We don't know where this is going, but we want to see how this fits with our business.*

*It is running in one mini-trade. You can buy space online, get rates ... rates are published. When you book, you get an automatic confirmation with a reservation number, which is ensured. You need to register before you use it. It is only a website, it is not integrated at all with our back-end systems, but it is hooked up with banks because it accepts e-payments by credit and debit cards.*

*The motivation is to see what comes out of it... It will probably be good for small customers. We [also] want to see how the branding issue plays out.*

Although it is too early to measure the market response to this new EC project, it provides some evidence of an escalating role of EC in the identification of new commercial goals.

*Has the relevance of EC changed compared to ten years ago?* The general perception is that EC is more relevant today than it was previously.

Senior Marketing Manager:

*It [the relevance of EC] is increasing by the day, because of cost demands. Ten years ago EC was not there and now the emphasis is on re-engineering business processes to make them more efficient. Ten years ago it was not on the map. In the last 3, 4, or 5 years the significance of EC commercially, with our customers, has hit us more because of the globalization of trade, supply chain and others.*

Interviewees also suggested that EC is no longer an optional feature as it was before, but is now a business necessity.

Senior General Manager:

*Before it [EC] was played as: maybe we can get a higher rate or premium for EC. Not anymore. The difference is that now it [EC] is a requirement, as opposed to an option.*

*What triggered the change from a business option to a business necessity?* Data from these interviews suggest that EC was pushed mainly by external market forces, such as complex transportation schemes required by large and global customers:

Senior Marketing Manager:

*The more sophisticated the supply chain is, the more requirement there is for EC... We have all types of customers, including [those requiring transportation from] A to B, as well as logistics. It is not a black and white picture, but generally speaking, EC has more use with more sophisticated customers.*

Companies' desire to keep abreast of competitive trends and marketing tools also played an important role in making EC a competitive necessity:

Senior Marketing Manager:

*In relationship to our competitors, we think we are among the top three to four carriers in terms of penetration of EC... We are among the top four carriers that are developing EC more aggressively with customers.*

Senior Project Manager:

*Having a website is a must. If we don't, the perception our customers get from us is not that good.*

The strategic relevance of EC appears to have changed. The question is, when did EC cease to be an option and become a necessity? Data from the interviews and other primary sources of information indicate that this transition might have taken place around 1997 or 1998, as identified by a senior general manager and confirmed by another manager who related this date to a sequence of EC achievements by company A.

Senior Regional EC Development Manager:

*About five to six years ago, we recognized the benefits of EC. About two years ago, we started to deliver EC more intensively, but really, about one year ago we started to really deliver and achieve what we wanted. It is not to say that we did not deliver at all during those years - we indeed delivered pieces-, it is that the learning curve now permits us to deliver [new EC products] every four months.*

In addition, company officials are of the opinion that external events, such as the US Container Security Initiative, will push EC even further as a requirement.

Senior Marketing Manager:

*The war on terrorism and issues like [the US] Container Security Initiative are major turning points in our industry. Purely because, due to new time constraints for cargo information to be ready prior to loading, the most efficient way to conduct business to achieve these goals now is through EC channels.*

*Say a cargo from Singapore to Long Beach. Before, we had to submit cargo information about three days - this might not be completely accurate- before the vessel arrived in Long Beach. Now, that information has to be given to US Customs 24 hrs prior to departure from Singapore. This is forcing customers to think 'well, if the information is around in our systems, let us link electronically to our shipping company'. Some of our customers have made this shift very quickly.*

What is the perceived future of EC in this company? All interviewees concurred on the following:

- (a) EC has the potential to become more sophisticated and in so doing, further boost efficiency and improve customer service; and
- (b) EC will become an integral part of the way company A does business, and indeed will eventually become a standard in this sector of the industry.

Company A's latest EC strategic assessment highlights the following conclusions, forecasts and commitments:

- (a) It is unlikely that both industry electronic portals and carriers' web-based products will create more revenue or lead to increases in cargo volumes. However, the company's use of EC may make it the first choice among customers;
- (b) In more mature markets and with large customers, the Internet will not drive the company's B2B strategies; instead they foresee less web-based, but more EDI interaction;
- (c) Company's EC efforts will focus on creating new EC products to achieve excellent customer service;
- (d) It is becoming more and more difficult to justify financing costly new EC products, without obtaining significant benefits from previous ones. This puts the stress on achieving hard savings through a critical mass of EC users;
- (e) Critical success factors to deliver the company's EC strategy include having excellent customer service; emphasizing marketing and product innovation; and enhancing regional EC capability through specialized EC managers and support personnel.

The perceived relevance of EC for strategic management purposes has indeed changed compared to ten years ago. Before it was considered a mere tactical tool for achieving commercial goals; however, nowadays it has become a business necessity. Moreover, interview findings suggest that EC has started to drive new business ideas within the company's domain or core competencies.

An extensive amount of primary information about uses, motivations, barriers and the relevance of EC for company A has been presented in the previous sections. The focus of the analysis will now be on understanding how these pieces of information fit together.

### 5.1.7 Summary of Findings

The fundamental issues needing clarification concentrate around the following key issues: *are the findings from the primary sources of information complementary?* and *what seem to be the key relationships among findings over time?*

#### Commonalties & Differences among Primary Sources of Information

When interview findings are compared with information from the survey form completed by company A, a great deal of similarity and complementarity is evident. While perceptions about the main EC uses and constraints over time are similar, views about motivations and strategic relevance are complementary.

**Table 5-1: Company A - Complementary Perceptions from Two Primary Sources of Data**

	Motivations		Strategic Relevance	
	Survey Form	Interviews	Survey Form	Interviews
<b>10 Years Ago</b>	<u>Main</u> <ul style="list-style-type: none"> <li>• Improve efficiencies and meet customers demands</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• Improve efficiencies and meet customers demands</li> </ul>	<u>Main Role of EC</u> <ul style="list-style-type: none"> <li>• EC as a tactical tool</li> </ul>	<u>Main Role of EC</u> <ul style="list-style-type: none"> <li>• EC as a tactical tool</li> </ul>
<b>C u r r e n t l y</b>	<u>Main</u> <ul style="list-style-type: none"> <li>• Improve internal efficiencies and cost reduction</li> <li>• <b>Change scope of services</b></li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• Improve internal efficiencies and cost reduction</li> <li>• <b>Meet customer demands</b></li> <li>• <b>Competitive imitation</b></li> </ul>	<u>Main Role of EC</u> <ul style="list-style-type: none"> <li>• <b>EC as a strategic driver in strategy formulation</b></li> </ul>	<u>Mixed Views</u> <ul style="list-style-type: none"> <li>• <b>EC as a tactical tool and as a strategic driver</b></li> </ul>

The use of EC as a *'means to change the scope of services'* is complementary to interview findings, since providing new or modified products is commonly either a reactive measure to changing market conditions (demands and/or imitation) or a proactive action, in which case EC would be a driver in developing new products. The latter lends

support to EC's key role in strategy formulation. Moreover, the notion of EC as a driver for strategic purposes is also consistent with the view expressed in both primary sources of data, that is, that the strategic value of EC is increasing both over time and with customers. On this basis, the researcher is of the opinion that the findings are complementary and that this increases the reliability of interview findings.

### Perceived Key Relationships over Time

The analysis of company A so far has been theme-oriented, that is, it has focused separately on the identification of EC uses, motivations, barriers and strategic relevance over time (see Table 5-2).

**Table 5-2: Company A's Perceived EC Uses, Motivations, Barriers and Strategic Relevance**

	10 Years Ago	Currently
<b>EC Uses</b>	<u>Main</u> <ul style="list-style-type: none"> <li>Intra-organizational (operations-driven)</li> </ul> <u>Emerging</u> <ul style="list-style-type: none"> <li>B2B with a limited number of customs authorities</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>Integrated and customer-oriented uses</li> </ul> <u>Emerging</u> <ul style="list-style-type: none"> <li>B2B with customers, suppliers and government agencies</li> </ul>
<b>EC Motivations</b>	<u>Main</u> <ul style="list-style-type: none"> <li>Improvement of internal efficiencies and cost reduction</li> <li>Meeting of customer demands</li> </ul> <u>Emerging</u> <ul style="list-style-type: none"> <li>Competitive imitation</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>Improvement of internal efficiencies and cost reduction</li> <li>Meeting of customer demands</li> <li>Competitive imitation</li> </ul> <u>Emerging</u> <ul style="list-style-type: none"> <li>Demands of government agencies</li> </ul>
<b>EC Barriers</b>	<u>Main</u> <ul style="list-style-type: none"> <li>Resistance to change (external)</li> <li>Lack of standards and adequate EC technology (external)</li> <li>Deficient in-house managerial EC experience (internal)</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>Resistance to change (external/internal)</li> <li>Digital divide (external)</li> <li>Cost-benefit considerations (internal)</li> </ul>
<b>Strategic Relevance of EC</b>	<u>Main</u> <ul style="list-style-type: none"> <li>EC as tactical tool in strategy implementation</li> </ul>	<u>Mixed views</u> <ul style="list-style-type: none"> <li>EC as a tactical tool in strategy implementation &amp;</li> <li>Increasing role, as a strategic driver for the identification of new business ideas and products.</li> </ul>

The balance of this case study, however, will look at the inter-theme dimension of the findings, that is, how findings in Table 5-2 relate to each other over time and why. To



this end, the longitudinal perspective will be broken down into three parts: key relationships ten years ago, thematic changes over time and current key relationships.

*(1) What seems to have been the dominant inter-theme relationship ten years ago?*

Ten years ago, the main motivations for the adoption and use of EC were varied (i.e., meeting customer demands, competitive imitation and improving cost efficiencies). It is apparent, however, that out of the three identified motivations, improving cost efficiencies within the organization provided the most fertile grounds for achievement, since its accomplishment was not hampered by major constraints, and those that existed were successfully overcome. Company A probably found it easier to use EC company-wide and in operational aspects under its control, than to try to implement EC externally where the lack of industry standards for electronic exchange of data and significant resistance to change from paper-based practices were beyond its control. This situation would have made EC uses primarily operational and intra-organizational,<sup>104</sup> which in turn would have translated into EC being used as a tactical tool to achieve commercial objectives.

*(2) Were there any changes in the main perceptions over time?*

Information summarized in Table 5-2 suggests that some changes have occurred over time:

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<sup>104</sup> Although this central use of EC did not preclude the use of EC to a lesser extent in interactions with key business partners and clients (e.g., to support just-in-time transportation), it is argued that its main utilization was associated with the exchange of operational information in general, and of cargo documentation in particular.

*EC Uses:* The focus of the main EC uses changed from intra-organizational EC to EC with customers. As a result, in its quest to deliver services to customers, company A currently views EC usage from a more integrated and holistic perspective.

*EC Motivations:* Evidence suggests that the main motivations have remained similar, but the intensity with which they are being pursued has increased. Interfacing electronically with government agencies is emerging as an important motivation.

*EC Barriers:* There has been a change in the barriers experienced by company A. Although the main barriers continue to be related to technology and resistance to change, the cost of upgrading EC systems or producing new products is a significant constraint, which was not felt as strongly ten years ago.

*Strategic Relevance of EC:* There are two main changes. First, EC became a business necessity and a more relevant issue with customers compared to ten years ago for company A. Second, there is evidence to suggest that EC is increasingly playing the role of a driver in strategy formulation, a significant change from ten years ago.

### *(3) What seems to be the current dominant inter-theme relationship?*

Over time, immediate external technical barriers lowered and EDI became somewhat more popular with suppliers of transportation-related services. However, the main use of EC in company A changed from an intra-organizational to a customer-focused one, because the spread of the Internet increased the appeal of EC to a larger group of customers. Customers' curiosity about the Internet seems to have triggered a race among top carriers to provide web-based EC applications, which in turn increased benchmarking and imitation measures. Company A worked to satisfy customer demands

for EC services and benchmark against other top competitors more vigorously than before.

What explains the relevance of EC as a driver in strategy formulation? If we look at claims of massive savings achieved by centralizing documentation company-wide and of increased efficiencies by interacting electronically with suppliers, then there is little argument against EC continuing to serve as a tactical tool in strategy implementation. However, the emerging role of EC as a driver in strategy formulation cannot be denied, and is evidenced by EC being a driver in:

- (a) Achieving strategic initiatives to avoid being commoditized by third party initiatives;
- (b) Better servicing existing markets;<sup>105</sup> and
- (c) Exploring new business variants within the scope of the company's core competency.<sup>106</sup>

To conclude, as the customer focus embedded in company A's EC strategy starts to find more fertile grounds for growth (i.e., an increasingly EC-friendly industry), EC became a more important element in strategy formulation. So far, evidence suggesting this trend includes the launching of an initiative to test the acceptability of the 'discount carrier' concept in container shipping. Finally, it is also apparent that despite the existence of considerable EC barriers both at the beginning and at the end of the period under study, EC uses and motivations seem to have exerted greater influence on the strategic relevance of EC.

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<sup>105</sup> Company A has implemented four different e-channels to accommodate every possible customer wanting to practice EC with them.

<sup>106</sup> Company A is attempting to introduce the concept of discount liner services.

## **5.2 CASE STUDY 2: COMPANY 'B' - THE CASE OF A MEDIUM-SIZED DEEP-SEA LINE**

### **5.2.1. Brief Description of Company B and its EC Strategy**

Company B is a niche operator with decades of experience serving its core route and has participated in shipping conferences operating in this trade. In recent years, company B has expanded its container services to two more regional markets through strategic alliances negotiated by its principals.

According to industry analysts, in the early 1990s serious concerns were raised about the company's future commercial survival as a result of the unhealthy combination of a sluggish shipping industry and controversial management decisions. Its poor performance and almost non-existent profitability called for serious management and operational revisions, and by the mid-1990s, cost-cutting and streamlining policies had turned around company B's balance sheet. By then it had made significant progress towards streamlining operations, reducing operational costs, increasing resource utilization rates and flattening organizational structure. Industry analysts argued that the company's recovery was positively influenced by developments leading to the company becoming increasingly responsible for its own management.

By the early 2000s, company B had managed, not without considerable performance and financial drawbacks, to increase market shares in its core container trade, control cargo imbalances and largely stabilize cargo capacity utilization at around 75%. Most importantly for the bottom line, it had also achieved an impressive return on capital investment. For the purpose of this study, the question remains: *Did EC play any role in this turn-around?*

As it will be seen in subsequent sections, company B started to become familiar with EDI technology over twenty years ago. During the 1970s and 1980s, with the support of external technical expertise, the company implemented a series of innovative EDI-based systems for the electronic transmission of cargo documentation. Great reliance on external EDI know-how continued into the early 1990s, when industry journals reported the successful negotiation of a key contract between the company and an industry service provider to further develop documentation management and support systems. By the mid 1990s, the company had already stopped relying on external expertise and created its own Management Information System department, which has been credited ever since for various upgrades to the company's proprietary EDI system.

Then came the onset of the Internet era in the shipping industry. The company called the attention of the industry with its easy-to-navigate website, which enabled customers to complete online, and print onsite, cargo-related shipping instructions. By the end of the 1990s, this website was noted for its outstanding user-friendliness and good functionality. By the beginning of the century, the company launched its version of original B/Ls transmitted electronically, which required business partners to sign on to a set of terms and conditions prior to the use of these electronic B/Ls. To the company, the challenges ahead revolve around progressively making its proprietary EC system completely Internet-compatible.

The next sections will use data from primary sources of information to address the fundamental questions of this study.

## 5.2.2 Company B's EC Philosophy

This section presents findings from personal interviews conducted with four managers early in 2003.

Throughout the interviews, it was clear that, to company B, the use of EC technology has played an important competitive role for many years now. Interviewed managers consider company B to be a front runner in the use of EC technology, which has enabled it to survive and remain competitive in the marketplace. Consequently, they argue, company B has been a strong promoter of EC practice in the industry and has seen its business processes evolve with changing EC standards and practices.

Company B's learning curve with respect to EDI technology dates back to the 1970s. These initial steps relied heavily on external expertise; however since then, the company has not only developed its in-house Management Information System department, but also continuously upgraded its own proprietary EDI system. As a result of years of effort and commitment, company B is now able to provide various EC channels to interface with customers, suppliers and government agencies. This is described by a senior manager as follows:

Managing Director:

*The [EC] technology to do the job is actually there. The expertise we have, because we worked it ourselves. Our [EC] system is proprietary. We developed it ourselves and we don't let people benchmark against it... It works very, very well for us. We paid the price both financially and the pain of working through it.*

Despite many advantages of EC in the facilitation of business processes, the company recognizes the importance of balancing automation with the personal touch that has characterized the shipping industry for many decades.

Managing Director:

*So, we want to give you [customers] as many technological advances as we possibly can, but we want to keep in personal touch with you, because if we don't have that personal contact, we don't really know much about you... People need to occasional feel that there is some humanity to the equation and I think that the way we set up our organization is ideal in that sense. We do physically stay in touch with people.*

The next sections will provide more detail about the main perceptions associated with EC over time.

### **5.2.3 Uses of EC**

Three of the four interviewees have significant experience with early versions of the company's EC system and all agree that the company has come a long way since EDI was first introduced.<sup>107</sup>

#### *Uses of EC 10 Years Ago*

EC was practiced by means of a proprietary EDI system, the main purpose of which was largely intra-organizational (i.e. to coordinate cargo movement and equipment repositioning operations, make and confirm bookings, transmit cargo documentation within company's branches, and be the repository system from which other documentation-related operations were enabled). To a lesser degree, EDI was used with a handful of business partners who at the time were technically and managerially prepared to interface electronically. The main aim of this second tier usage was to enhance coordination and expedite movement of cargo. EDI was implemented through dedicated private lines.

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<sup>107</sup> Codification was largely based on protocols that interpreted physical holes punched into a card. This required extra employees to interface with the system, which in turn increased chances

### Current Uses of EC

Today, to accommodate the increasing use of EC with customers, suppliers and government agencies, company B provides two main channels to interface with them, namely EDI through dedicated private lines and a public website. These two major channels are intended for different audiences, as the following explains:

- (a) The company's website enables real-time electronic interfacing with business partners at large, especially with smaller and occasional customers and suppliers of transportation-related services (vendors); and
- (b) EDI is intended for intra-organizational communications, B2B with larger and long-established customers and vendors, and B2G with a limited number of government agencies.

Through an enhanced version of the original EDI system, the main use of EC continues to be intra-organizational. According to a senior IT manager, the great majority (over 90%) of all internal communication is channelled through the company's EC systems. This is confirmed by a senior manager's comments when asked about the degree of relevance of various EC uses today. He had no hesitation in indicating that intra-organizational EC continues to rank at the top of the list, followed by EC with customers:

Managing Director:

*[The] first [use of EC is with] ourselves [intra-organizational EC], then [with] our direct customers, those people who are shippers and consignees. The third [use] would be [with] our major vendors, particularly the railway which has done a very good job at EDI, and our terminal operators. To a lesser degree would come probably government organizations.*

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of error and inaccuracy of information. Today, each user controls his/her own information feeding and retrieval operations, which has both reduced chances of error and improved their productivity.



So the question becomes, how is EC used? The very essence of intra-organizational EC uses remains very similar to that of ten year ago (i.e., intra-company communications and optimization of equipment and other resource utilization). Since then however, in order to improve cost-efficiency, company B has gone a few steps up the ladder and today information recorded through the EDI system is analyzed in connection with two fundamental managerial objectives: to ensure freight rate consistency (e.g., freight and cargo intelligence and account management) and to assess the company's effectiveness in delivering services (monitoring routine performance and identification of systematic nuisances). According to the documentation manager, this approach has triggered various reviews of the company's internal practices, which has resulted in the re-engineering of its intra-organizational processes around the company's EDI system.

Customer Service Manager:

*The system now allows us to be fully aware of what happens in our overseas offices with respect to quoting mutual cargoes, so that if our office here puts a quote on file, the mirror image is viewable on the other side [of the continent] and our colleagues can rate it for us, if that is something going Eastbound. If they [on the other hand] put a quote on file, we can rate it for them, if it is something that is moving Westbound.*

Managing Director:

*Internally, we book our cargo, we do our billing, we track & trace, ... we do everything electronically.*

EC use with customers has increased. Interviewees concurred that great efforts have been made to interface electronically with clients, who are encouraged to make full use of the EC alternatives that company B provides. As a result, the company has now established partnerships with large clients for the use of EC to the extent that clients feel comfortable with it, provided that suitable synergies are found with participants.

Managing Director:

*We would encourage them [i.e., customers] to do as much as they are comfortable doing, and we are very comfortable with them doing almost anything. As I said, we have worked out these partnerships with some of our major customers, where everything from payments and all kinds of things are all automated and done through EDI. But with others, for whatever reasons, they are not ready to move down that line; they feel more comfortable with hard copies ... So they sign up for things that they see are beneficial to them, but not necessarily all the things in the package that would enable us to form a great partnership and that we are totally able to do electronically.*

A prominent use of EC with clients includes the electronic transmission of what the documentation manager calls negotiable B/Ls.

Documentation Manager:

*Yes, particularly in the last couple of years we are getting into more EC. Original bills of lading are now being sent out electronically to customers... we send an e-mail with an attached 'pdf' file that contains the original B/L and an electronic signature.*

The increasing use of EC with clients raises the question of whether companies would support industry-wide EC initiatives for real-time negotiation. In this context, interviewees were asked to comment on the extent to which the company supports a more interactive use of EC, such as participation in electronic platforms for online negotiation of freight rates or other services. The managing director was of the opinion that although the company sees various benefits in mirroring real-time electronic contact with customers, the notion of open electronic platforms for the negotiation of rates tends to be detrimental for business, and therefore has been avoided.

Managing Director:

[Are you in favour of real-time online negotiation?]

*We do and we don't. Rate instantly, yes. But negotiating that rate, usually we use the phone for negotiation... There was a period of time, my mind fails me... about 4 years ago, there were all sorts of companies, like E-bay, for freight rates online and we avoided that. We felt that, like water, the freight would seek the lowest level. You would be trading online, you would put your rate out there and somebody would underbid you. No*

*longer could you differentiate based on terms of quality of service, when the ship sails, availability of equipment, all those things get thrown out the window ... We are already [at a point] where the rates drive the industry, where you can't do anything unless you are relatively close to your competitors' rates. So we didn't want to see that exacerbated in any way, so we avoided [online negotiation platforms].*

To the company's managers, it is unclear whether membership to such platforms would further improve the relationship with end-customers, as opposed to with new intermediaries. In company B's experience, a significant number of customers still like to negotiate and close deals in a more personal fashion: over the phone. This is confirmed by the customer service manager who was of the opinion that despite increasing acceptance of EC by their customer base, it is estimated that about 60% of requests for freight rate quotes and actual cargo bookings are still made by telephone.

The interviewees were of the opinion that the use of EC with suppliers of transportation-related services and government agencies is on the rise. This is particularly evident with government agencies (i.e., customs, agriculture and port authorities), as they seem to be moving towards introducing the electronic exchange of cargo-related documentation as a trade requirement in their jurisdictions.

In conclusion, it is apparent that to company B, intra-organizational EC has been consistently the main focus of the use of EC over time; nonetheless, the emerging use of EC to interface with customers, suppliers and government agencies is noticeable.

#### **5.2.4 Motivations for the Use of EC**

##### *Motivations for the Use of EC 10 Years Ago*

The major motivations for the use of EC systems ten years ago were two-fold.

First, EC helped the company gain a competitive edge to differentiate services from competitors.

Managing Director:

*Well, at that time it was an opportunity to solve various serious problems for [company B] ... [Furthermore], everybody was of the opinion that EDI would bring financial advantages... it would bring two [kinds of] advantages. It would bring commercial advantage, that would be the first one, because in our industry you are always looking for an edge that your competition does not have... and with that [commercial advantage], financial advantage to the company, because you would need fewer people to do the job, you would do it more efficiently, you would make fewer errors, less non-conformances and all of that. Those were probably the main motivators.*

Second, this competitive edge would have in turn translated into economic advantages derived from the efficiencies gained from the re-engineering of internal processes and from customers' perceived willingness to pay a premium for an EC-based value-added service. With time, company B achieved these expectations, but realized that the idea of receiving premiums would not materialize, since customers welcomed EC advantages, but were not willing to pay an extra charge for them (see complementary comments under *Strategic Relevance of EC 10 Years Ago* later in this section).

#### *Current Motivators for the Use of EC*

The interviews show a great deal of consistency among participants with respect to the perceived motivations for the use of EC today. Interviews also showed that these motivations can be viewed as internal and external.

It is evident that the main internal driver continues to be cost-efficiency; that is, to further maximize effectiveness of efforts and resource utilization.

Managing Director:

*So the big thrust we saw is two-fold. One, is speedy flow of information and therefore things were reacting in real time, and you could be more prepared for changes ... and of course, the big motivator, along with*

*efficiency in the whole process, is that there is an economy that comes with that. That you are no longer bogged down with the traditional way of doing business, and the economy also in the way of how you can develop your organization.*

Company B's use of EC helped re-design traditional business practices and deal with the organizational challenges that these changes brought about.

Managing Director:

*[EC is extensively used, among others] for customer service, for documentation and for accounting. By developing our own proprietary software we were able to go to a Customer Service Center concept in all the countries that we operate. So there is an economy to that. A very good one!*

*Our employee base is half what it was in those days [ten years ago] and our efficiency is much better. Our employees are happier. You know, this is another factor that people don't consider, but we don't work overtime... I mean, they [i.e., employees] go home every night and they have the weekends off. Their quality of life is better.*

Coupled with implementing efficiency gains is the company's intention to differentiate its services based on quality and reliability. To this end, company B has linked EC to its performance evaluation. This is described as follows:

Managing Director:

*[Are there any other key motivations?]*

*Monitoring your performance! You can gather information successfully, and you can find out if there are systemic causes to problems... Part of our quality program is tied in to [EC] technology as well, because our system records all our actions and we do audit reports based on exceptions. Our errors and omissions are relatively small, 97.7% [error free] in 2001. And in 2002, I think we were even better than that!*

Interviewees made reference to a number of other efficiencies, for instance those derived from standardizing company-wide processes, monitoring the commercial behaviour of customers (so forecasts and proactive measures can be taken) and providing timely information to suppliers (so cargo moves faster).

With regard to external drivers, interviewees identified the following key motivations to further spread EC usage industry-wide. According to the documentation manager, who is a key person directly involved in the use and acceptance of original or negotiable B/Ls, despite the initial cloud of doubt about the functionality of negotiable B/Ls, clients are now exerting pressure on banks and other financial institutions to recognize the negotiability of original B/Ls transmitted electronically. As a result, banks are more inclined to work with the electronically transmitted original B/L, thus facilitating its use industry-wide.

Documentation Manager:

*[The customers] were very worried about using this document [i.e., electronically transmitted negotiable B/L] to send overseas until they could find out whether [they] would receive [their] cargo or not. We've proved to them that it works. So the more and more they use it, the more comfortable they become with it. Their banks were not accepting the [electronically transmitted] original B/L. They are now... I think the pressure was put on [the banks] by shippers, consignees of the goods and freight forwarders.*

In addition, the majority of interviewees concurred that another external motivation is derived from the new requirements introduced by government customs agencies in various countries, which will facilitate the spread of EC among industry participants.

Documentation Manager:

*Not all players in [name of a country] currently have the same capability that [company B] has. Wide range EC will be in place very shortly, because of the requirement of [name of customs authority] that all players become electronic, that all interchanges be electronic. There will be no more paper-passing. Somewhere along the line EDI will become compulsory. So every [shipping] line is under the obligation now to gear up their systems to be EDI compliant. If not they will have to hire a vendor that would provide that service on their behalf.*

Managing Director:

[Talking about the impact of new customs and maritime security legislation]

*So I think the impact we'll see is that customers will be regulated. We could not force them to it as a company, because they probably saw very little incentive because we want their business ... But the government isn't hampered by that caveat, they can sort of legislate things. So, in effect this legislation will help us. Clients will either have their cargo and documentation in order in advance and on time or we can't lift their cargo, because if we do, we'll be fined. So in that sense [adoption of EC in the industry], I think it will help.*

In summary, it is evident that the main motivation for EC use by company B has changed very little, as it continues to be the internal drive to improve the cost-effectiveness of operational measures and to offer value-added services to clients. Nonetheless, some important emerging motivations have surfaced to boost EC usage in this sector of the industry and widen the company's opportunities for EC partnerships. These motivations are the increased acceptance of electronically transmitted original B/Ls and the progressive introduction by government agencies of requirements for the electronic transmission of cargo-related information and various documents.

#### **5.2.5 Barriers for the Use of EC**

Having presented the perceived uses and motivations, this section will now look at the main constraints experienced by company B over time.

##### *Barriers for the Use of EC 10 Years Ago*

When asked about the main barriers experienced by company B ten years ago, the manager responded that these were related to the company's position as a front-runner or innovator in the EC area.

Managing Director:

*The difficulty we had at that time, of course, was that when you are at the forefront of any industry, you are kind of developing relationships with customers that perhaps are not so far advanced as you are, also there are not standards set within the industry... So, we were in this cutting edge with EC, that was not doing all that much cutting, because standards weren't there, customers weren't ready and we were working with people who probably were not quite [technically] capable themselves. They had an idea, but they could not formulate it.*

The main past barriers were a combination of a lack of standards and inadequate technology, which in turn made EC a very expensive proposition:

Managing Director:

*So we spent a number years sort of floundering with EDI, because we were ready, but no one else was ready to work with us, or our standards were not necessarily those that certain large companies were ready to commit to, because they did not know where the industry was going... Also in the beginning there was the possibility that you might have seen different standards from different companies and some of our major clients thought that they had to have a different PC on the desk for each of the tenders they dealt with... [As a result,] we dedicated our own MIS [management information system] department to work specifically on our software systems. We were able, over time, over a period of four years, to put together a system that works very, very effectively. That wasn't without headaches. We had many releases [or new versions of the C system]. We had people working four to five hrs overtime everyday, because the releases weren't functioning as well. But that was the early 1990s and in the last five to seven years the releases have each been better than the one before, and as I said, now the great challenge is to go on an Internet-based [EC] system.*

In addition to these constraints, a lack of understanding of the potential benefits of EC and associated challenges was strongly felt at the time by top managers.

Managing Director:

*If I look back, probably more of the senior management didn't really have a handle on EDI ... they said: we have no control over this and we don't understand it. We were told that [it] is a magic wand that can help us, but we can't control it.*



The managing director argued that shortly after the beginning of the 1990s, some of these barriers were either lowered or overcome. So, what is the situation nowadays?

*Current Barriers for the Use of EC*

The current perceived limitations also seem associated with those of an EC pioneer. As mentioned by the managing director, the shipping industry in general does not have a high level of technological sophistication compared to other industries, which is evident when trying to sell the idea of integrating EC into shipping operations. Company B's managers feel that they have the EC technology and the experience, but given the modest number of partners using EC in this industry, the full benefits beyond internal efficiencies have yet to be achieved.

Managing Director:

*There isn't a high level of sophistication within our industry in general, that is a limitation.*

Customer Service Manager:

*We find that our customer base is not as [EC] sophisticated as we are.*

Company B has been forced to maintain dual systems (i.e., paper-based and sophisticated EC systems), because implementation of EC with business partners is still a challenging matter both in less developed and more developed countries.

Managing Director:

*But for people who deal, as we do, in the West African trade, some of the efficiencies we have in technology in Europe and North America, really don't fall through that trade at the moment. So that is one of the disadvantages... you cannot move your entire organization to an EDI based operation... [Even in developed countries in North America and Europe] you do have vendors who are not quite capable of operating with this [EC], so I guess the draw back is that you must maintain some dual systems. We have a lot of small customers too, who will never be in a position that they would want to do some of this [EC].*

Linked to the technological gap described above, the other main barrier is the incremental cost of upgrading current systems in an industry that is moving relatively slowly on EC-related matters. This is explained by the managing director as follows:

Managing Director:

*[The main barrier today] would be basically: How much would it cost us? and what is the next step? What more can we do? I am not a 'techy' person, so I don't know where we can go from here. Have we gained most of the efficiencies that we can from it? ... What is the incremental cost of going the next step? Is it going to be too much? Would the financial burden be too high to move another step?*

Finally, although not considered a barrier, but a caution, company B's managers believe that there must be a fundamental balance between modern EC technology and the ever important personal touch that has characterized this industry for many years, and warns against automation of the whole organization.

Managing Director:

*A lot of the business is done ... based on whether you have a 'simpatico' with the person you are dealing with. A lot of this is based on personality and that is one of the things you lose in this [electronic commerce], unless you can make your system sort of personal... At least that is what I believe and, again, I have been around for 30 years. Who knows what the future may hold. It could be something entirely different.*

In summary, it is apparent that the nature of the main constraints has changed very little over time. Ten years ago technology and cost-related external barriers (i.e. lack of standards, inadequate EC technology and high implementation costs) limited the rate of development of the company's EC system. Nowadays, a different combination of external technical constraints (i.e. the digital divide, as well as the slow rate of EC adoption by business partners and facilitators in regions where EC technology is readily available) is evident. As a result, company B's main barrier is related to the high costs needed to

further enhance its EC capabilities. Company B's managers refer to these as barriers inherent to being an EC innovation.

#### **5.2.6 Strategic Relevance of EC**

##### *Strategic Relevance of EC 10 Years Ago*

Answers provided by interviewees consistently suggest that EC was used ten years as a tactical tool for accomplishing commercial goals. With the use of EC technology, company B sought primarily to increase efficiencies and to provide grounds for differentiating their services from those of their competitors, as described by the managing director:

Managing Director:

*What we had hoped initially was, that if we developed an extraordinarily high level of service, clients would be able to differentiate it and pay for it, but we quickly found out that clients wanted the service, but they were not prepared to pay for it in any way or fashion... So there was no way to take the advantage we had in terms of service to clients and to translate it into a contribution to the bottom line. So that was one of the things that we had to change.*

So, the question becomes, to what extent has this strategic intent changed, if at all, compared to ten years ago?

##### *Current Strategic Relevance of EC*

Interviewees were asked to identify a date when, in their opinion, EC experienced a significant increase in usage or turning point. Interestingly, they related the turning point to two external events. One was the ability of government agencies (i.e., customs authorities, 1992; and port authorities, 1992-1993) to begin exchanging limited amounts of electronic documentation with the company. This is illustrated in the following two citations:

Managing Director:

*Locally, around the early 1990s the port [name of port] decided that they were moving towards EDI. They had EDIPORT [name] and they were trying to develop the port as a forerunner in EDI which would enable the speedy handling of commerce... everybody was in [companies were using] that format and the technology itself sort of jumped in its level of efficiency and simplicity more and more... I think that all happened around 1992, 1993 when everybody suddenly said, hey I can do this.*

Documentation Manager:

[When asked about when was that turning point]

*I would say ... When we started sending out EDI to Customs. Probably 10 years ago.*

However, the second and apparently more significant event was related to an internal technological breakthrough. Internal EC systems became very user friendly, thus, easier to understand company-wide. One interviewee suggested that this happened around 1996.

Managing Director:

*But then, when technology became very simplistic, everybody said, hey, my old granny can do this! That was the big lifting of the veil, and everybody said, yes, we can all do this!*

Documentation Manager:

*Then again, when the [name of EC system] program came out, which is an in-house program developed by [company B], it changed everything again, because this is so much easier to use... That would have probably been 6 years ago.*

In the last decade, company B also realized that EC technology and practice has had very little impact in terms of enabling new transportation services or penetrating new markets:

Managing Director:

*But I can't think of a new product or a new idea to sell, because we are selling a very basic service, which is transportation. So it is hard, in the sense of the container, the hardware, the ship, the vendors... to go too much beyond that, because it is a pretty basic service.*

Instead, EC is relevant as a tactical tool for improving efficiencies, reducing operational costs and better servicing existing markets.

Managing Director:

*I think it [i.e., EC] provides us information more readily. The overriding factor that governs the movement of marine transport is price. So, as I said before, you cannot get a premium for service, but once we get a client into our fold and we provide them with the high quality service we do, then we tend to keep them. Then, in that sense, I think [EC] provides us with an avenue, because once they have an opportunity to work with us versus many of our competitors, they see the advantages that our electronic systems provide in the process.*

To the company, there is a fine line separating the optional from the necessary implementation of EC. Managers believe that the company has increasingly become so dependent on its intra-organizational EDI system that it is practically impossible to operate without it.

Managing Director:

*I think today, [EC] is like opening a Pandora box: Once you go down that route, you are forced to continue on it! So I think that one of the differences in the motivators today is that we have no choice, we can never go back. There is no going back on this. We are totally fully committed to [EC]. So the idea of keeping on top -providing at least as good of a product, and in many cases better products in many ways, than our competitors, is the objective.*

According to the managing director, to company B, the competitive edge gained through the innovative use of EC has meant commercial survival, especially in an industry increasingly dominated by global players.

Managing Director:

*They [i.e., large deep-sea lines] had billions of dollars of turn-over and our turn over was [amount given], but when you looked on the far column, percentage of return on investment, we were the only people on the 'plus'. We were [percentage given]. Everybody else was in the 'negative' in 2000, 2001, and we should add 2002, as well... I think EC has been a great advantage for us, because we have been able to get a hold of a lot of clients that otherwise would not have looked at us, because we provided a*

*very competitive level of service. That, I think has been the greatest advantage to us and the efficiencies we derive in downsizing our own organization and surviving all those tumultuous bad times you read about. Without EC technology, we would have been sunk, for sure.*

*Has the relevance of EC changed compared to ten years ago?* Evidence suggests that although EC is still primarily considered a tactical tool in strategy implementation, nowadays EC is used and pursued more intensively compared to ten years ago. This is based on the following:

First, the EDI system has become the backbone for organizational interaction and is progressively seen as the building block on which the ability to interface with customers, suppliers and government agencies is built. Interestingly, however, as the full benefits for EC usage are derived from a cross-over of EC applications, the division between intra-organizational EC and the use of EC with customers, suppliers and government agencies seems increasingly irrelevant.

Second, a competitive reason for the use of EC over a decade ago was to develop a superior service for which to charge a premium.<sup>108</sup> However, since the idea of premium gained no acceptance among customers, the company's management turned its attention to mastering the use of EC as a means to achieve the much needed cost savings and efficiencies to remain in business. As stated by the Managing Director, without EC as a tactical tool, the ability of company B to stay in business would have been seriously compromised. As a result, today EC is sought more intensively by the company.

*What is the perceived future of EC in this company?* The Managing Director is of the opinion that the company has reached a limit in terms of what it can achieve with EC.

However, should external conditions change, EC could contribute to further efficiencies and costs savings.

Managing Director:

*[EC should help us] to find a way to reduce the cost of operations... [provided] that vendors, and those people that are part of our transportation chain, live up to their part, so we can work more closely with clients.*

The reporting of findings by EC themes provided a good picture of Company B's handling of EC matters; however, to understand the strategic implications, inter-theme relationships will be analyzed next following the procedure used for Company A.

### **5.2.7 Summary of Findings**

#### *Commonalties & Differences among Primary Sources of Information*

In the context of this case study, this section will make use of relevant information from another primary source, i.e., the survey questionnaire completed by company B's managers. Key answers to the questionnaire show a great degree of similarity with interview results, thus increasing the reliability of interview findings. For the most part, company B's answers to the survey questionnaire complement interview findings. Nonetheless, as shown in Table 5-3 it is also apparent at first sight that the main barriers identified in the questionnaire and in the interviews differ in the degree of intensity.

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<sup>108</sup> Company B's experience later showed that although EC proved to be an effective tool to differentiate services, the use of EC *per se* was not perceived by customers as providing enough basis for which to charge a premium.

**Table 5-3: Company B – Key Complementary Perceptions from two Primary Sources of Data**

	Barriers		Strategic Relevance	
	Survey Form	Interviews	Survey Form	Interviews
10 Years Ago	<u>Main</u> • <b>Resistance to change</b>	<u>Main</u> • See Table 5-4 To a lesser degree • <b>Resistance to change</b>	--	--
Currently	<u>Main</u> • <b>Resistance to change</b>	<u>Main</u> • See Table 5-4 To a Lesser Degree • <b>Resistance to change</b>	<u>Main Role of EC</u> • <b>EC as a driver in strategy formulation</b> (EC is very relevant for the identification of commercial goals)	<u>Main Role of EC</u> • <b>EC as a tactical tool in strategy implementation</b>

The interviews indicated that, although it was never singled out as a main barrier, resistance to change was, and still is, a source frustration for company B. This is denoted by the managing director's comments that business partners at large have been slow to adopt EC. Even customers with whom the company has had a long established EC partnership have yet to embrace the full breadth of electronic services offer by company B. Similarly, he argues, although government agencies have been vocal in promoting the use of EC, they have been considerably slower than company B in implementing EC themselves.

Managing Director:

*Governments have been very vocal in moving the concept of EDI, but are not always quick in putting systems in place. We find that they are not bad. We don't want to portray them as dragging their feet too much... but we still feel that some of the things that we think we should be able to do, we are not. I have been there about every week and they are full of paper, For what reason? I have no idea, except that we have clients and governments that insist that we print things for them. Sometimes to print one thing you end up with a lot left over.*

Information in Table 5-3 also points to subtle differences between interview and questionnaire results concerning the perceived current strategic significance of EC. While



company B's survey form suggests that EC is emerging as a driving element in the identification of the company's commercial goals, findings from the interviews suggest otherwise.

Overlapping views between the survey form and interviews include, among others, the fact that EC has become a business necessity and the recognition that over time the strategic role of EC has increased, as has the relevance of EC with customers. So, why is EC considered a driver in strategy formulation in the survey form while in the interviews, a tactical tool? There is no clear answer to this question. It can only be said that interviews suggest that gains from current EC uses are becoming increasingly marginal and the cost of system upgrading in relation to the benefits, harder to justify.

Managing Director:

*I don't think it [EC] generates at the present time anything too new to the [transportation] process, unless they [customers] are the kind of people who want to work online and if we can convince them that time is as essential to them as it is for us... [if] they [participate fully] in the process, the better off they are, the more time they have to dedicate to other functions within their own organizations.*

However, interviewees also suggest that there is a chance that EC's strategic role could become more important if business partners are willing to use EC more intensively to reap the benefits of faster interaction and response within the whole transportation chain. In this way, EC could become a breeding ground for the identification of new commercial goals and/or new markets.

Managing Director:

*So, I think that the big carrot for the industry in the future would be real time on the Internet and the clients will be able to do a lot of proofing and work themselves.*

Whether this will materialize in the near future or whether external factors, such as new government regulations will spark this change, remains a matter of debate. So far, however, the interview evidence indicates that EC remains primarily a tactical tool to implement strategy, with the potential, at best, of becoming a driver in accessing new markets, should conditions change.

#### Perceived Key Relationships over Time

The information presented thus far (see summary in Table 5-4) has been about EC themes.

**Table 5-4: Company B's Perceived EC Uses, Motivations, Barriers and Strategic Relevance**

	10 Years Ago	Currently
<b>EC Uses</b>	<u>Main</u> <ul style="list-style-type: none"> <li>Intra-organizational uses</li> </ul> <u>Emerging</u> <ul style="list-style-type: none"> <li>B2B with a handful of business partners</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>Intra-organizational uses</li> </ul> <u>Emerging</u> <ul style="list-style-type: none"> <li>B2B with customers, suppliers and government agencies</li> <li>Special emphasis placed on EC with customers</li> </ul>
<b>EC Motivations</b>	<u>Main</u> <ul style="list-style-type: none"> <li>Differentiation of services through value-added technological edge</li> <li>Gaining of financial advantage as a result of more cost-efficient processes</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>Internal drive to improve cost efficiencies</li> <li>Provision of value-added services to clients</li> </ul> <u>Emerging (External)</u> <ul style="list-style-type: none"> <li>Wider acceptance of negotiable B/L</li> <li>Government requirements for EC interface</li> </ul>
<b>EC Barriers</b>	<u>Main</u> <ul style="list-style-type: none"> <li>Lack of standards and technology (external)</li> <li>High investment costs (internal)</li> <li>Lack of in-house technical expertise and limited understanding of EC among top managers (internal)</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>Technological gap between the company and business partners, including, but not limited to the <i>Digital Divide</i> (external)</li> <li>High costs benefits of upgrades in relation to benefits</li> </ul>
<b>Strategic Relevance of EC</b>	<u>Main</u> <ul style="list-style-type: none"> <li>EC as tactical tool in strategy implementation</li> </ul>	<u>Mixed views</u> <ul style="list-style-type: none"> <li>EC as a tactical tool in strategy implementation</li> </ul> <u>Other Important Aspects</u> <ul style="list-style-type: none"> <li>EC as a business necessity</li> <li>Company has become dependent on its EC systems</li> <li>EC has helped the company survive periods of commercial turmoil</li> </ul>

This section will now focus on inter-theme issues and perceived key relationships over time by answering three questions:

(1) *What seems to have been the dominant inter-theme relationship ten years ago?*

Ten years ago, company B was experiencing particularly harsh circumstances. Depressed market conditions and weak performance company-wide led management to review, streamline and right-size the organization. To this end, EC, a technology already in use internally, provided a suitable avenue to simultaneously achieve the much needed cost-efficiencies and gain a desirable competitive edge. Internal barriers (i.e., investment costs and embryonic in-house expertise) were overcome; however, external ones (i.e., lack of industry-wide standards for EC interface) seriously diminished company B's ability to encourage wider EC adoption among business partners and reap the benefits of economies of scale. The main EC focus, and the more fertile grounds for EC development, continued to be intra-organizational, thus EC was predominantly a tactical tool for the implementation of company B's business strategy.

(2) *Were there any changes in the main perceptions over time?*

As shown in Table 5-4, the current main perceptions are fundamentally similar to those of ten years ago.

*EC Uses:* Though technological advances are credited for the considerable increase in external electronic interface felt in the last years, the main uses of EC remained essentially intra-organizational. This said, there is a growing view that as EC is used more intensively with external business partners, making a division between various

EC uses becomes increasingly irrelevant. In other words, under such circumstances the company's EC system becomes integrated and holistic.

*EC Motivations:* The use of EC over time has helped the company downsize and offer a very competitive service, which indeed has kept the company in business. However, when looking at the nature of the main EC motivations, they remain practically unchanged (achieve efficiencies and offer technological value-added service) over time. Company's officials feel however, that externally-borne conditions have started to play an increasing role in getting EC further adopted industry-wide.

*EC Barriers:* Company officials are of the opinion that although specific initial constraints may have changed, their essence is very similar. They believe that the EC gap between the company and its business partners, makes cost-benefit considerations the main current barrier. They argue that marginal gains from existing EC systems suggest that higher investments would produce only limited results.

*Strategic Relevance of EC:* It seems undisputable that company-wide EC has not only become a business necessity and the backbone which facilitates the company's performance, but moreover, has contributed significantly to the commercial survival of the company. Nonetheless, in strategic management terms, under past and current conditions EC continues to play the role of a tactical tool in strategy implementation.

(3) *What seems to be the current dominant inter-theme relationship?*

There is little doubt that the lowering of technological barriers, such as the wider availability of EC technology and transmission standards, has boosted EC adoption industry-wide. An incremental mass of users has in turn helped company B to partially achieve its main internal objectives. However, the main use of EC remains intra-

organizational, since the major benefits are currently derived from that focus. According to the company's managers, this may change if both the critical mass of users increases and participants commit to further exploit the potential of EC applications. In other words, despite EC being currently used extensively for (a) better servicing existing markets and (b) increasing the quality of services provided, EC is, and will continue to be, a tactical tool in strategy implementation until there is a change in the mindset of business partners to further embrace EC use.

### **5.3 CASE STUDY 3: COMPANY 'C' - THE CASE OF A SMALL DEEP-SEA LINE**

#### **5.3.1 Brief Description of Company C and its EC Strategy**

Company C is an experienced shipping line, which for decades has been committed to operating as a non-conference niche route carrier with a fleet of conbulklers to conduct business simultaneously in two different, yet compatible, markets: container and break-bulk shipping. Despite the difficulties of operating in these two markets,<sup>109</sup> company C has managed to provide a reliable container service and become a respected competitor in this trade. Company C identifies the maritime transportation of goods as its core competency; however, due to increasing pressure from shippers, during the late 1990s it expanded its core to provide logistics services inland, thus strengthening partnerships with multi-modal carriers.

The container/break-bulk service run by company C was the result of two separate companies working together in strategic partnership and with clear organizational links. However, in recent years an acquisition strategy allowed one company to buy out the

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<sup>109</sup> Break bulk cargo loading operations are highly dependent on weather conditions, which in turn challenge the ability to set and maintain container liner schedules.

other, ensuring company C's commitment to its core services. Under this new ownership scheme, the bulk of container shipping services continued to be fixed through a handful of agents at both ends of the trade, with which the company has grown and nurtured commercial relationships over many years. These agents market company C's services, fix cargo and do follow-up with cargo parties at large. This suggests that, for the most part, these key main agents become the company's main customers.

Company C has reaped the benefits of electronic communication technology for many years now, mainly through the use of EDI systems. In fact, evidence suggests that company C is going through a period of transition towards the more intensive use of new EC technology such as web-based applications; nonetheless, the key questions remain how and why?

The following sections present information from personal interviews conducted with three senior managers at the company's headquarters.

### **5.3.2 Uses of EC**

As previously highlighted, company C has substantial experience with electronic documentation systems. This section reviews its uses of EC over time.

#### **Uses of EC 10 Years Ago**

As early as the mid 1980s, company C introduced an EDI-based system for the transmission of cargo-related documentation between branches (intra-organizational) and later made this intranet accessible to key agents. By the early 1990s, the B2B system linked the company both internally and with major agents/clients for matters pertaining to cargo operations. Interviewees agreed that the system progressively incorporated more

sophisticated document management options and other customer focused applications, including the ability to modify contracts electronically.

### *Current Uses of EC*

Interviewees' general perception is that company C is behind other competitors in the use of EC in general. However, interviewees seemed to be referring to the use of web-based B2C applications, since over 75% of company C's internal and external communications with major clients are currently undertaken by means of a modified version of the EDI-based central system. This EDI B2B interaction (which includes booking of cargo space, cargo tracking and the exchange of cargo documentation) remains very reliable and is deeply rooted in, and shaped by, years of experience. Despite the fact that freight rates are agreed upon, and contracts are completed, electronically, interviewees argue that no online negotiation is practiced by company C. Instead, the EDI-based B2B system only allows for the electronic modification of terms and the electronic completion of documents, as opposed to real time online negotiation or use of negotiable B/Ls.

With the Internet, however, the majority of interviewees agreed that the focus of EC applications is undoubtedly moving towards the introduction of new, more sophisticated and customer-oriented web-based EC applications. Until now, however, the company's website presents primarily basic corporate information and restricted web-based applications. The implementation of more interactive applications thus far has been limited, and includes web-based cargo tracking applications with the overall view of improving flexibility and widening the scope of users to reach customers other than the main agents.

B2B applications in use by the company include supplier-developed applications for the verification of status, position and availability of leased containers. B2G interaction has recently been established to accommodate demands for container security information, as required by government agencies in the United States.

To summarize, the main uses of EC by company C have increased over time and consistently focus on providing a tool for cargo-related operations, first intra-organizationally and later with major clients. Though largely reactive and emerging, it is undeniable that the use of Internet-based customer-focused applications is on the rise.

### **5.3.3 Motivations for the Use of EC**

#### *Motivations for the Use of EC 10 Years Ago*

The majority of interviewees were of the opinion that the primary driver behind the introduction of EC measures in the past was the desire to improve operational and cost-efficiencies pertaining to cargo movement and the exchange of cargo documentation. This is expressed by a senior finance manager as follows:

Senior Finance Manager:

*Past motivations have been pretty much the same as our current motivations. Since you could not affect the market out there, our emphasis was on internal efficiency.*

#### *Current Motivations for the Use of EC*

Company C's drivers for the use of EC have not changed substantially from the initial operational efficiency and cost-cutting motives, on the contrary, motivations of ten years ago are now felt even more strongly and sought out more intensively in areas providing grounds for further improvement. The operations and logistics manager explains one example:



Operations and Logistics Manager:

*Having a more unified booking and scheduling electronic system helps to solve problems of coordination and efficiency. We had computing systems used for these functions before, but as they were not linked to each other, they were felt to be inefficient.*

As a result, the use of EC systems has been institutionalized in the company's business practices using the central EDI system as a backbone. This is described by the sales and marketing manager as follows:

Sales and Marketing Manager:

*We have to use EC because when you are talking [with clients] about rates you have to have that information in paper in the system. That is [stored] in our computer system so you can [print them off and] show what you have given for rates, and to make sure that the terms of contracts or agreements are clear both ways. So both parties have the same information and terms.*

New motivations have emerged to include the need to elevate the standard and the quality of information and support services provided to customers, as explained a senior finance manager:

Senior Finance Manager:

*... [EC] allows us to reduce manpower needs, and also it provides a tool to improve the quality of cargo information. The system operates 24 hrs around the clock. It allows us to back up vital information, such as cargo carried and contract details. We can also see immediately when the system is down to take adequate actions. [EC] allows us to increase the quality of the information that we need to deliver our services, as well as the information that we exchange with our agents such as profiles, statistics and reports of cargo carried.*

Motivations such as customer demands and competitive imitation also seem more important than ten years ago:

Operations and Logistics Manager:

*We are not in the forefront of technological innovation, but are greatly influenced by what competitors are doing and by customers' requirements.*

In spite of the operational usefulness of the use of EC with certain suppliers (e.g. container location and status tools), interviewees do not perceive EC with suppliers as a force likely to promote further EC adoption industry-wide. Maritime security requirements by government agencies, however, while embryonic, will prove far more effective in boosting EC adoption. This, they argue, is because the main promoter of the new set of maritime security rules (i.e., the United States of America), is the single largest mature container market in the world, consequently only a few companies, if any, may be in a position to challenge compliance with these new rules. Company C is clearly not one of them. Interviewees believe that with time, similar maritime security requirements will become the standard throughout this industry irrespective of the market. Consequently, it can be concluded that a powerful emerging motivation is compliance with government requirements.

To sum up, it is believed that the main motivation for the use of EC over time remains fairly similar, i.e., to improve cost-efficiency. However, new powerful motivations are emerging such as competitive imitation and demands by government agencies. Improving the quality of information to customers is also an emerging motivation despite the fact that the company only deals with a handful of major customers / agents, all of which are already electronically hooked up to the company.

#### **5.3.4 Barriers for the Use of EC**

##### *Barriers for the Use of EC 10 Years Ago*

To company C the main barriers to be overcome in the past revolved around two main themes: investment costs and infrastructure issues. According to interviewees, the former pertained to the cost-efficiency of maintaining and upgrading EDI based systems,

while the latter included communication networks, security standards and the perceived unfriendliness of existing electronic technology.

Senior Finance Manager:

*Systems were too slow, too costly and not too user friendly.*

With time and technological advances, some of these barriers became less important; however, cost-benefit considerations for EC investments continue to rank at the top of the list of barriers:

Operations and Logistics Manager:

*We are focused on trying to use as much EC as is financially reasonable.*

#### Current Barriers for the Use of EC

Nowadays, the main constraints have not changed considerably. Barriers continue to be very much a function of (a) the rationale and cost-efficiency of investing in EC technology and (b) technical difficulties encountered when upgrading old systems and maintaining extranet links with main agents. These main problems are identified by both the operations and logistics manager and the senior finance manager, respectively, as follows:

Operations and Logistics Manager:

*Before investing in new systems, we have to be relatively sure that the revenues will justify investments... [it is] really about being aware of the benefits that further adoption of EC would bring to the company.*

Senior Finance Manager:

*One of the big problems is to connect our systems with that of our agents... interoperability is a problem and [it] takes time and a lot of effort to get connected and transmit information at the level we want. Consequently, there is a closed list of companies with which we can exchange electronic information at that level.*

Emerging constraints also appear to be technical in nature, namely problems arising from having no control over the Internet as an EC channel (external), and the need for back-end integration (internal). The latter is recognized as follows:

Senior Finance Manager:

*We have come to realize that it would be preferable to have a consolidated EC system.*

To sum up, it is felt that the nature of the main EC barriers over time has not changed considerably. Barriers remain largely financial and technical.

### **5.3.5 Strategic Relevance of EC**

#### *Strategic Relevance of EC 10 Years Ago*

When asked about the strategic relevance of EC technology and practice in the past, the majority of interviewees felt that ten years ago the strategic role of EC systems was limited. It was valued as an operational tool to achieve coordination, efficiency and clarity of information, but it was not perceived as relevant enough to drive management decisions related to entering new markets or promoting new services. This said, interviewees agreed that with time and as the industry at large became more aware of EC, the internal view of EC changed and new strategic considerations emerged (such as competitive imitation and customers' expectations), which were of particular interest to the company's decision-makers. This is reflected in the next section.

#### *Current Strategic Relevance of EC*

The majority of interviewees agreed that the intra-organizational use of EC ranks as the most relevant use in the company, followed, in order of importance, by EC with customers, EC with suppliers and, lastly, EC with government agencies. They also agreed

that the importance of both EC with customers and with government agencies is growing. To them, the relevance of EC has definitively changed compared to ten years ago. The turning point when EC strategies became more critical was around 1999-2000, when the company underwent organizational changes and the new management progressively increased the emphasis on adopting web-based EC applications. But what strategic role does EC play for the company?

Operations and Logistics Manager:

*[To us] EC is relevant to achieving commercial goals, but [it] might not be all that critical to determine commercial goals and markets ... [EC] is a tool, not a driver, at least not yet...*

According to the operations and logistics manager, EC is considered to be an important tactical tool in strategy implementation; however, its potential as a driver in strategy formulation has yet to be realized. In other words, although EC has gained more visibility in the eyes of decision-makers compared to ten years ago, under current business conditions the company's use of EC comfortably fulfills its needs. This inference is consistent with the following factors. First, according to interviewees, company C has been characterized by its conservative approach to EC investments, which are nonetheless largely influenced by market behaviour, competitors' responses to EC trends, and customer demands. As a result, the company is adopting a reactive approach to external competitive conditions and is behind competitors in regard to EC innovation. Second, interviewees consider that the company's experience in the marketplace combined with the current level of operability, reliability and demands<sup>110</sup> for B2B EDI systems, do not

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<sup>110</sup> As previously mentioned, company C interacts extensively with only a handful of key agents, or customers, by means of B2B EDI. The practice is that these agents have direct contact with a great number of small cargo parties, which eventually means that company C's marketing and follow-up efforts must be largely focused on this smaller group of key customers.

yet encourage further, often expensive, upgrades of EC systems to achieve the potential edge that EC may bring to the company. This is expressed by the operations and logistics manager as follows:

Operations and Logistics Manager:

*We have been in this business for so many years, so we must be doing something good [well] ... Besides, old systems are still reliable, slower but very reliable.*

Based on the interviews, it is evident that from the company's perspective, the motivation for EC has revolved around improving operational and cost-efficiencies, thus its associated major strategic intent has been as a tactical tool in strategy implementation. According to the interviewees, in the near future EC will help the company not only to achieve further economies, but also to cope with the increasing expectations of both customers and government agencies.

#### **5.3.6 Summary of Findings**

This section will follow a similar format as the case study of the previous companies.

##### *Commonalties & Differences among Primary Sources of Information*

Information from company C's survey questionnaire show a great deal of similarity with major perceptions from the personal interviews. However, compared to the personal interviews, data from company C's survey form places more emphasis on customer-oriented uses of EC at the present time (e.g., the use of EC for marketing purposes, as well as to add value and change the scope of the company's services). In other words, according to the survey form, customer-oriented motivations are considered to be key motivations, as opposed to emerging ones (see Table 5-5).

**Table 5-5: Company C – Key Complementary Perceptions from two Primary Sources of Data**

	Motivations	
	Survey Form	Interviews
<b>10 Years Ago</b>	<u>Main</u> <ul style="list-style-type: none"> <li>Improve operational and cost-efficiencies</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>Improve operational and cost-efficiencies</li> </ul>
<b>Currently</b>	<u>Main</u> <ul style="list-style-type: none"> <li>Improve operational and cost-efficiencies</li> <li><b>Customer-oriented motivations</b> (Offer value-added services; improve marketing and change scope of services)</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>Improve operational and cost-efficiencies</li> </ul> <u>Emerging</u> <ul style="list-style-type: none"> <li><b>Improve quality of information flow</b></li> <li><b>Meet customers' expectations</b></li> </ul>

*Perceived Key Relationships over Time*

So far, it is clear that EC themes have experienced changes over time (Table 5-6); however, their interconnections have yet to be addressed.

**Table 5-6: Company C's Perceived EC Uses, Motivations, Barriers and Strategic Relevance**

	10 Years Ago	Currently
<b>EC Uses</b>	<u>Main</u> <ul style="list-style-type: none"> <li>Intra-organizational uses</li> <li>B2B with key customers</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>Intra-organizational uses</li> <li>B2B with key customers</li> </ul>
<b>EC Motivations</b>	<u>Main</u> <ul style="list-style-type: none"> <li>Improve operational and cost-efficiencies</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>Improve operational and cost-efficiencies</li> </ul> <u>Emerging</u> <ul style="list-style-type: none"> <li>Imitate competitors</li> <li>Meet government demands</li> <li>Improve quality of information flow</li> <li>Meet customers' expectations</li> </ul>
<b>EC Barriers</b>	<u>Main</u> <ul style="list-style-type: none"> <li>Investment costs (internal)</li> <li>Technical infrastructure (external)</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>Cost-benefits of EC investment (internal)</li> <li>Technical system interoperability (external / internal)</li> </ul> <u>Emerging</u> <ul style="list-style-type: none"> <li>Back-end system integration (internal)</li> <li>No control over the Internet as an E-channel (external)</li> </ul>
<b>Strategic Relevance of EC</b>	<u>Main Role of EC</u> <ul style="list-style-type: none"> <li>EC as a tactical tool in strategy implementation</li> </ul>	<u>Main Role of EC</u> <ul style="list-style-type: none"> <li>EC as a tactical tool in strategy implementation</li> </ul>

(1) *What seems to have been the dominant inter-theme relationship ten years ago?*

Ten years ago, the overriding motivation for the use of EC was to improve operational and cost-efficiencies. This resulted in EC being used mainly for (a) operational purposes at the intra-organizational interface, and (b) to a lesser degree communication with key agents or customers. As a result, EC was considered a tactical tool for the achievement of commercial goals. The main constraints at the time (i.e., insufficient EC infrastructure and EC-related investments) appear to have posed some difficulties, but not to the extent of completely impeding or jeopardizing EC initiatives.

(2) *Were there any changes in the main perceptions over time?*

Although technological changes and their impact on business practices suggest some degree of change over time, major perceptions over the past ten years remain essentially similar.

*EC Uses:* As seen in Table 5-6, the main uses of EC by company C have remained virtually the same over time. The main focus was first internal in order to standardize processes and build protocols for inter-branch coordination. This capability was then extended to major customers on a B2B basis, as opposed to customers at large.

*EC Motivations:* The main motivation remains the achievement of operational cost-efficiencies. It is worth noting that customer-focused motivations have been emerging strongly in recent years.

*EC Barriers:* No major changes over time are apparent; both major barriers continue to be either related to technological limitations (external), or funding issues (internal). The technical constraints were previously dominated by the lack of basic EC standards, while today they are mainly about system interoperability. The financial factor



continues to be a major constraint as company C's protocols require careful justification of any technology investment.

*Strategic Relevance of EC:* Although the intensity of EC use and the electronic interaction with customers have increased over time, the main strategic relevance for EC usage continues to be as a tactical tool in strategy implementation.

(3) *What seems to be the current dominant inter-theme relationship?*

There have been no major changes over time. First, constraints to the adoption and use of EC continue to be dominated by a combination of internal and external factors. The former is related to the rationale for investments in EC, while the latter are mostly technological. Second, there are great similarities in terms of the main motivations and uses of EC at two points in time (i.e., ten years ago and currently). Over time, company C has consistently used EC technology primarily for intra-organizational purposes, closely followed by interaction with customers. In turn, the motivations over time cluster in a theme: cost-efficiency of operations. As we get closer to the present time, emerging motivations draw heavily on external factors, such as the desire to satisfy customers (providing added value and satisfying their expectations), competitive imitation, and the need to fulfil government requirements. EC is still perceived as a strategic tactical tool, as it was ten years ago.

In summary, to company C there has been no substantial change in perceptions during the period under study. The main motivations appear to be strongly linked to the strategic intent for the use of EC, while constraints over time appear to have had little impact.

#### **5.4 CASE STUDY 4: COMPANY 'D' - THE CASE OF A MEDIUM-SIZED FEEDER LINE**

Although company D does not fully satisfy the case study selection criteria,<sup>111</sup> its experiences are of great relevance in providing a more holistic picture of the maritime transportation of containers. As an ocean feeder, company D is in fact a supplier of transportation services for deep-sea container carriers, which rely on company D's abilities to carry containers to and from major transshipment hubs. In the eyes of cargo shippers and consignees, however, the transportation of their goods by sea may appear to be trusted to the deep-sea carrier only.

In order to address the fundamental questions of this study, the next sections will review information from personal interviews conducted with four senior managers early in 2003 at the company's headquarters.

##### **5.4.1 Company D and its EC Strategy**

Company D has more than 25 years of experience in the short-sea transportation of containerized cargo to and from major container hubs. Company D's performance and expansion strategy have translated into considerable commercial growth. As a result, the company has for many years been considered a success story and a key player in a highly competitive and trade intensive region.

Company D's commercial activities include the short-sea container feeder business, as well as logistics and other transportation-related activities, as expressed by its general manager as follows:

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<sup>111</sup> Company D is not engaged in deep-sea shipping, but in the international short-sea feeder business. As such, it provides transportation-related services to deep-sea companies by means of a fleet of chartered in vessels.

General Manager:

*We have the shipping line, which is divided into two businesses: the feeder business and something that we call door-to-door business, whereby we are transporting goods between, for instance a shipper sitting in [name of a location] to a recipient in [name of a location], whereby we combine our own ships with lorries, rail or whatever... so it is a combined concept with different requirements for the control of containers... We also have the forwarding activity, which again has its own demands—customs and shipping-wise.*

Nonetheless, company D's main commercial activity continues to be the container feeder business, which accounts for over 90% of cargo carried. For feeder services, the company employs more than 50 people in its headquarters, and more than twice that amount company-wide, that is, in offices strategically located in close to ten countries in the region it serves.

Company D's main customers are deep-sea lines, which, as explained by the company's sales and marketing manager, require short-sea services.

Sales and Marketing Manager:

*Our main customers are all deep-sea lines serving [the region]. Some of them use us for 20% of their cargo volume while some use us for 90% of their cargo volume. Deep-sea lines are container lines, offering ocean container transport [in the region], doing transshipment in [name of the area] and then on their own, doing transportation from [name of the area] to overseas destinations or even to other [destinations in the region]. So we are only doing the short- sea part of the transportation...*

Company D follows a combined competitive strategy that is based on price and service differentiation. According to the general manager, this is an industry where freight rates are probably the key element. However, the company has highlighted service as a complementary and necessary part of its competitive strategy.

General Manager:

*Unfortunately, in our whole business there is only one thing that counts and that is price. Obviously, after you negotiate the price, of course ultimate service is an intrinsic [part of our business], afterwards [the*

*customers] would start asking what can we do about invoicing procedures, what can we do about information flow, can you send this kind of information and so on and so on.*

Sales and Marketing Manger:

*We compete on price and services. Of course we compete very much on price, but we want to bring the focus away from price and we have to compete on something else [as well].*

In a commercial environment with increasing time constraints (in the short-sea feeder business ocean transits often take less than 24 hours), the tight relationship between price and service sharpened the focus of company D's EC strategy, which is *to develop reliable tools for cargo information sharing*. Consequently, the company's proprietary EC system was crafted to streamline operations and save money, which in turn improves the reliability of the feeder services.

General Manager:

*We are a feeder company. That is, we are mainly working for other deep-sea lines, and obviously because of that our volumes are quite high, which again makes the use of IT concepts even more important. So I think it is important for you to know that [in this company] we are handling about [number given] TEUs. Bearing in mind the whole information flow, in principle we deliver the same information to the deep-sea line that they want to obtain from their local representatives. We of course have a huge need for information flow and I think this is quite interesting when we are discussing the kind of business we are. If you take a container number, maybe during a transport we will be needing the same numbers 6 or 7 times. So you can imagine if the IT system were not working properly, we could sit here day and night. So I would say it would not be possible with the number of people we are, to handle our cargo volume, without a good IT system.*

As a result, a senior IT coordinator argues that EC fits very neatly with the company's core competence, since:

*Sharing cargo information is almost as important as providing the transportation service.*

The general manager recalls that almost two decades ago company D started using EDI technology to facilitate the delivery of its business service. The company's EDI system was developed in a proprietary manner and has evolved over time.

General Manager:

*All the things we are doing now were not possible at that time. When we started over 25 years ago, [business communications] were all made by telex and fax... the fax was the next revolution. Then afterwards we started with IT and now we are on our third edition of the system.*

Today, the third version of the program is the backbone of the company's communication and coordination system and is regarded as comfortably living up to the expectations of various business partners in this industry. The manner in which company D's EDI system evolved is the subject of the next section.

#### **5.4.2 Uses of EC**

##### *Uses of EC 10 Years Ago*

Although the EDI system was initially implemented to improve efficiency of operations by strengthening intra-organizational coordination, since its early design stages, it was also conceived to progressively include all necessary parties to the transportation chain in so far as operational or cost-benefits would allow.

Senior IT Coordinator:

*When we created this [EDI] system, we were very aware that we didn't want it to be only one internal system for the [company D] organization. We wanted to prepare for the next steps...*

Thus, the first stage of development was intra-organizational. It considered the company's headquarters to be at the centre of the EDI system and connected other company's branches and agents to it. According to the senior IT coordinator, this was the

basic picture ten years ago. Nonetheless, since then, the EDI system has evolved in stages. First the EDI system enabled the sharing of cargo information with stevedores, terminal operators and customs authorities in 1994-1995. Second, interaction with key customers was put into practice around 1997 by giving them the alternative to book directly into the company's EDI system. Third, safety provisions involving dangerous cargo prompted increased information sharing with certain port authorities in the region back in 1999; however, it was the US security regulations that accelerated electronic information exchange with port and customs authorities in early 2003.

Despite the fact that ten years ago company D had already implemented intra-organizational EDI, a substantial amount of manual feeding (typing) of data into the EDI system was required since most of the cargo information was still received by conventional means, i.e., fax or telephone. In other words, to re-use data, it first had to be typed into the system. The use of EC by company D has evolved since then.

#### *Current Uses of EC*

According to a senior IT coordinator, while virtually all intra-organizational communications are done electronically, the volume of external electronic communications has also greatly increased. With stevedores it has reached approximately 25% of all communications, while with customs and port authorities the volume is thought to be between 50% and 75%. With customers however, the percentage is still the lowest—somewhere between 15% and 20%.

To interviewees, there is little doubt that internal and external communications are extremely complementary and that more electronic interaction will likely result in more noticeable improvements in operational and cost-efficiencies. However, they also feel that of all external electronic interactions, EC with customers is key to realizing further

benefits. In order to better appreciate this relationship, a summary of the main EC internal and external uses is required.

Internally, as soon as information is typed into the company's EDI system, network members company-wide can access cargo details to enhance cargo planning and monitoring activities. This is definitively a significant benefit given the company's short transit periods and the large volume of containers carried.

Senior IT Coordinator:

*[By using the company's EDI system] when a ship leaves port, [our people in] the next port could know exactly what cargo is on, what cargo is off in their port, print out manifests, B/Ls, etc.*

Moreover, the company's general manager is convinced that intra-organizational EC is currently an essential element to keep the company running. Given the intensive sharing of cargo information company-wide, intra-organizational EC is not really an option, but an operational necessity.

General Manager:

*I think that in principle, we cannot have the whole system working unless we have the IT network connecting all the ports, the stevedores and all the people working for us... We have to, because unless we have it, we would not be able to operate the number of containers we are doing. At the moment we are operating 35 ships. If you consider that each ship is calling at one port a day, you have more than 200 port calls a week, and if you multiply that per year you can understand that if [the IT network] is not working, we would have chaos. We would not be able to handle the number of containers we are doing.*

Currently, the use of intra-organizational EC is not limited to operational purposes only, but is also important to maintain and manage relationships with customers. The company has implemented a customer relationship management system (CRM) to facilitate internal invoicing, financial and follow-up protocols. According to the sales and

marketing manager, the CRM has been greatly beneficial in linking the customer profile with freight rates in the spot market.

Sales and Marketing Manager:

*Now, [the internal communication] is much more streamlined. Our local offices are connected. We have a system called CRM, where they put in the rate request, meaning that all the details of the customer are provided, the volumes, destination, etc. We internally just have to put in the freight rates... Spot business is when clients with no term contract with us request a rate, say forwarders, etc. We confirm to the customer via e-mail with information from or through our CRM system.*

Externally however, there is still room for improvement, especially in enhancing EC with customers. This is the area, interviewees argue, where the bulk of potential benefits lie. Currently, EC with customers is largely done with key clients and regulated by term service contracts, which provide for direct booking, track and trace and electronic invoicing.

Customer Service Manager:

*With three of our five biggest customers we have specially designed EDI solutions. They go and book into their system, which is transferred directly into our system. That is three of our five biggest customers, which account for approximately 25% of our cargo volume... So, put it this way, the share of three of our largest customers is about 25%, but not all the cargo they are handling with us is done through EDI. That is to say that not 25% of our cargo is done by EDI. That is too high. I would say between 15% and 20%.*

It is evident however, that the company has given priority to the enhancement of the external electronic interface with customers by means of private networks, as opposed to through public web-based applications. The website includes a limited variety of options, e.g., track and trace and sailing schedules, but not the provision of freight rates or bookings, for instance. For those clients without a term service contract, rate negotiations are undertaken through conventional communication lines.



Customer Service Manager:

*Getting our rates online is not possible. They [customers] have to pick up the phone and call one of our agents for that. We have [rate inquiries] internally, though. I suppose that is what you call internal EC. But from the customer side, they have to pick up the phone and contact one of our agents.*

When asked about the convenience or necessity of introducing negotiable electronic documents, the general manager felt that since the feeder business does not demand on-line negotiations, agreements for the use of non-negotiable electronic B/Ls so far suffice.

General Manager:

*Our B/L is actually non-negotiable because we are a feeder line, but what we are doing is that for all the lines that want to make use of the system, we are signing an agreement [saying] that we both agree that we are working according to our B/L, and then they get a copy of the contract of our B/L...*

The general manager believes however, that participation in other collaborative EC initiatives, such as industry-based electronic portals, might provide more benefits to the company than introducing negotiable B/Ls. He argues that the more sharing of cargo information, the more benefits business partners will obtain from EC practice. This was a very consistent view among interviewees, who had difficulty in identifying a current more relevant use of EC in company D. Instead, their sense is that EC's potential is quickly moving beyond intra-organizational EC to interconnect and interface with all key business partners.

### 5.4.3 Motivations for the Use of EC

#### Motivations for the Use of EC 10 Years Ago

There is little doubt that ten years ago the main motivation for the use of EC technology by company D was to improve operational and cost efficiencies. Time constraints associated with the feeder business demanded it.

General Manager:

*I think it has been approximately 17 years since we started with our first IT operational system... [it] was a purely operational system in order to keep things going... We realized that you would supply the same information three or four times. So if you have to do that in the conventional way, you could not do it... The next thing is also that being a feeder you have such short transit times... so it was also a matter of speediness.*

Key however, was the realization that in order to boost efficiency and avoid extra work, information needed to be shared organization-wide.

Sales and Marketing Manager:

*We have always been aware that price would be important, but in order to operate as cost-efficiently as possible, our management saw at a very early stage that it was important to also be efficient in information flow. In order for us to make the right decisions, we needed to have information available at a very early stage or as soon as possible.*

#### Current Motivations for the Use of EC

Have the main motivations changed over time? It is clear that in the course of accomplishing earlier EC goals, new goals arose. Interestingly, however, in this process company D has, to a great extent, become dependent on its ability to share cargo information more efficiently.

General Manager:

*So in principle, we cannot work without IT, at least today. Our current system does not allow it... so, we are dependent on our IT system, not 100% of course ..., but if things really happened to it, then we would have a big problem.*

Company D got a firm grip on intra-organizational EC, challenges and expectations and moved beyond the company's boundaries to embrace a new customer focus. For example, EC was used to strengthen the service-cost competitive relationship:

Customer Service Manager:

*[Currently] the main EC objective is to service customers better, and that would be an advantage for the [competitive] combination strategy of this company. Of course, cost is a must. If you are not competitive in freight rates, you can forget it.*

In addition, more customer and competition-oriented motivations included setting industry standards, providing value-added services and strengthening company-customer relationships, as highlighted by senior managers, as follows:

Sales and Marketing Manager:

*Because we are not that many feeder operators covering such a large part of [name of the trade area], we have been interested in developing a kind of feeder standard with our customers... if we were the first to set out these standards with our customers, then our customers would require the same from our competitors...*

*[Other key motivations include] to improve efficiency, to have information available at an early stage, to make it easier for us and for our customers, and of course to create stronger relationships between customers and us, so they find it easier to make use of us. So, they get some extra services when we offer EDI.*

Customer Service Manager:

*You are actually getting a closer relationship at the design stage, because you are going back and forth deciding how to do it [implement EC between the two companies], so you are developing a good relationship.*

In summary, company D's motivations for the use of EC have changed over time, from an operational to a customer and competitive orientation. The latter however, builds on the former.

#### 5.4.4 Barriers for the Use of EC

##### Barriers for the Use of EC 10 Years Ago

The main perceived barrier was associated with the novelty of EC technology and practice. In this case it was the lack of standardization for both electronic transmissions and the content of cargo information. Despite EC being primarily used for intra-organizational purposes ten years ago, the intent for its development and use included to feed and internally transmit cargo information that would eventually have to be handed over to external parties, normally by non-electronic means. It is a well known factor that port jurisdictions did not necessarily require the same cargo information. This fact combined with the embryonic state of EC practice, highlighted the need for the standardization of electronic transmission of cargo information and pushed companies to exercise creativity in the manner in which they dealt with such problems.

Senior IT Coordinator:

*Everybody was making their own standards to satisfy their own needs... Pretty much in all ports we were calling at, their standards would say do this, this and this, so we had to engage in a lot of conversations before we got to one standard... In essence, we used various standards [to transmit data]. So we put all relevant standards in our systems, and when we didn't use some, because it was impractical, we used a conversion table.*

##### Current Barriers for the Use of EC

The perceived main current barriers seem to be customer-related. The main barrier is the lack of critical mass for the electronic interface with clients. Poor electronic interfacing with clients holds back the realization of EC benefits by company D.

General Manager:

*So we are online with many of our clients, but not enough and no doubt one of the biggest problems we have nowadays is that up to 70% of the information we are receiving from our clients is handed over in a normal [fashion]... by e-mail, by fax or verbally, and we are receiving only 30% electronically.*

The lack of critical mass in turn points to some related barriers that reflect customers' technical difficulties, as well as some degree of resistance to change. The customer service manager is of the opinion that technical capability plays a large role in clients' reluctance to collaborate more intensively in an electronic fashion.

Customer Service Manager:

*[One barrier is] the customer's EC level. For many of our customers, their systems are not able to communicate with our EDI systems for the time being. At least that is what we are told... If we go down in our ranking system, the next ten of our largest customers are not in the state that they can use [our EDI system] right now.*

Company D's general manager argues that sharing electronic data with feeder providers does not necessarily rank highly on deep-sea companies' priority lists. The information flow from deep-sea companies down to feeder service providers is oftentimes inefficient, but the reverse flow (i.e., from cargo agents to feeder companies to deep-sea liners) is more workable. Put another way, while the company is required to feed deep-sea lines with electronic cargo information on a timely basis for planning purposes, the reverse does not occur consistently. The general manager is, however, hopeful that this is a temporary situation.

General Manager:

*[Deep-sea companies] have expanded so rapidly in their own organization that they have their hands full coping with their own systems. So, the energy used for feeders like [company D] is not enough. If they had feeders of their own, then they would be using their own systems. But the problem really is how to make them open up towards us...*

In addition, the sales and marketing manager claims that resistance to change on the part of customers is a barrier. Some clients have not approached the use of EC in a very systematic basis, which leads to unnecessary extra work.

Sales and Marketing Manager:

*We see some examples from deep-sea lines requiring EDI invoicing and in addition still requiring invoices on paper. They asked for an IT solution and we said, 'yes, we are ready to do that and to make our systems talk together, and then, we can avoid paper invoicing'. 'No, no -they said- 'we still need the paper invoicing!'*

*So, for one of our major clients we have an EDI invoicing system in addition to the paper invoicing, which we already had for years. They are claiming that they need the paper invoice for some other purposes... you have the feeling that the book-keeping system they are running is old fashioned, one where you need the paper invoice and that is the reason why they need the paper invoice... It is very disappointing to see something like that happening. We thought: 'when we have the EDI invoicing we will have some savings on our side', but we haven't. This has now been going on for two or three years.*

Interviewees mentioned that several other barriers have tended to lower over time.

They include the protocol standardization and security issues. What is interesting to note however, is that interviewees consider neither investment costs nor EC-related legal regimes or resistance to change within the company itself to be current barriers. Although investment costs are always a matter of importance, the company has been very consistent over time in committing considerable resources to developing and maintaining EC capability.

General Manager:

*We are not a big company, but we have three to four people here [in headquarters] working on IT matters only. In addition to that, we are also buying a lot from the outside.*

The legal regime governing the transmission of electronic documentation has not had a negative impact on the use of EC by company D. As expressed by a senior manager, the reason might be that potential commercial implications are limited by the use of non-negotiable electronic B/Ls.

Sales and Marketing Manager:

*People using our electronic system are used to it and they feel confident...  
Our B/Ls are non-negotiable, that of course makes it easier for us to send  
B/Ls electronically...*

Internal resistance to change is almost non-existent. Instead, what is seen is a normal adaptation or transition period from paper-based procedures to electronic ones.

Senior IT Coordinator:

*[resistance to change,] no I don't think so. Not in this company... But  
people need time to get used to it and to test the system...*

In summary, it is apparent that company D perceives that the main barriers over time have shifted from technical issues associated with the novelty of EC, to customer-related matters. The latter is felt more strongly given the advanced EC-capability of company D and its motivation to further exploit EC benefits with customers.

#### **5.4.5 Strategic Relevance of EC**

##### *Strategic Relevance of EC 10 Years Ago*

There is sufficient evidence in this case study to suggest that ten years ago, EC was a relatively new concept for the company, and was used as a tactical tool to achieve, or facilitate the achievement of, the commercial goals of the company. The interesting question, however, is whether this role has changed over the course of the last ten years.

##### *Current Strategic Relevance of EC*

Evidence confirms that although EC is still largely considered a tactical tool to achieve commercial goals, its strategic value has changed. Top management is ever more

aware of the company's dependence on EC systems, thus EC is pursued more intensively.

This is quite plainly outlined by the company's general manager as follows:

General Manager:

*If we want to keep our clients, maintain our present status and participate in the industry growth to the same extent that we did in the years before, then we definitively believe that one of the tools is to have a very good IT tool. If not, I am sure we would not be able to do what we want to do.*

As to the question of whether the relevance of EC has changed compared to ten years ago, it is apparent that it has, both to the company and the industry as a whole, from a value-added service to a commercial necessity. This is demonstrated by the following remarks:

General Manager:

*Definitively! Ten years ago many people would say it is nice to have such a thing [EC]. Now, most people are saying I must have such a thing [EC]. So the strategy has totally changed! In the past you could see it as a value-added service, but not anymore...*

Sales and Marketing Manager:

*Ten years ago, it [EC relevance] was maybe to say that we were among the first movers, but today we are realizing that if you want to be in this business at all, you have to have IT in place [either] when the customer requires it, or when the customer is ready for it.*

In addition, the company's general manager is of the opinion that the impacts of the new EC initiatives (e.g., the creation of industry-based electronic portals) on new transportation developments (i.e., logistics) can only be beneficial to the ocean feeder business. New transportation schemes demand even more cargo information sharing, one key struggle that the company has faced for years.

General Manager:

[Talking about some of the impacts of electronic portals]

*So, they [deep-sea carriers] have not considered the feeder service as being that important, but now that has changed... I think they cannot*



*exclude the feeder services if they want to have a true picture of the door-to-door transport.*

*What is the perceived future of EC in this company?* When asked about the opportunities that EC would bring to the company in the near future, the answers point to a combination of factors, namely: EC will help maintain company D's profitability (by boosting efficiency, thus controlling staffing needs) and EC will facilitate further door-to-door transportation of containers (a current and flourishing commercial activity for company D).

General Manager:

*[Talking about EC opportunities]*

*I think that if we were to add 20 or 30 more people [to do the job without EC applications], the question would be: would we be a profitable company?*

Customer Service Manager:

*If one should try to look ten years ahead, I believe we would have a limited number of offices. Maybe one per country, [as opposed to] two or three offices... We might have only one very concentrated booking center, but we would have many different EDI solutions for our customers. We wouldn't need a lot of people. So we can actually decrease the number of staff.*

Some managers also acknowledged that EC can help exploit new market opportunities; however, more investment in EC-related matters would be needed to fully understand EC's impacts on the marketplace.

Customer Service Manager:

*If we have the advantage of the deep-sea lines, we are covering pretty much the whole world... If we have got the EC solution already with a customer, we can go into a new market so it should be pretty easy for you [as a customer] to work with us.*

Sales and Marketing Manager:

*The number of customers on the feeder side is rather limited and we are only a few people doing it and I think we have quite good knowledge about it. EC is an area where we have to do some more studies and investment,*

*because no doubt further use of EC could help us to get better knowledge and better access to the market...*

Future challenges on the other hand, concentrate around convincing deep-sea lines to improve information flow downwards to feeder services and other suppliers, as well as addressing the potential and inadvertent disconnect with customers.

Customer Service Manager:

*... there is a risk that you may distance [yourself] from your customers. With all communications going through EDI, you might lose some personal relationships with customers, if you are not very aware of it.*

Interview findings suggest that despite EC being perceived as a tactical tool in achieving commercial goals over time, both the dependency of the company on this tool and the intensity with which EC is pursued have increased. Moreover, EC is facilitating the exchange of door-to-door cargo information, a prosperous service for company D.

Interviewees also foresee that EC will play an increasingly relevant strategic role in the future, and will possibly enable better access to the marketplace or entrance new markets altogether.

#### **5.4.6 Summary of Findings**

##### *Commonalties & Differences among Primary Sources of Information*

A comparison of findings from case study interviews and company D's responses to the survey questionnaire reveal similar and complementary views. First, as shown in Table 5-7, views on EC uses and its strategic relevance are similar.

- (a) Survey findings show intra-organizational EC and EC with suppliers as the primary uses of EC ten years ago. Interviews highlight intra-organizational EC as the main focus ten years ago, but also point to an initial desire to expand EC

externally with business partners. The practice of EC with suppliers was indeed at the heart of the first expansion efforts;

- (b) With regard to current uses of EC, the company's survey form confirms that all types of EC are currently very significant to company D. This is indeed what the term 'integrated EC system' refers which is the main EC use cited in the interviews; and
- (c) Perceptions about the strategic relevance of EC are similar, that is, data from both sources indicate that EC has remained a strategic tool over time; nonetheless, company D's ability to compete seems progressively associated with the more intensive use of EC. There is also a sense that EC will play an increasingly important role in the identification of commercial goals and markets in the future.

**Table 5-7: Company D - Similar Perceptions from two Primary Sources of Data**

	Uses of EC		Strategic Relevance of EC	
	Survey Form	Interviews	Survey Form	Interviews
10 Y. A G O	<u>Main</u> <ul style="list-style-type: none"> <li>• <i>Intra-org. EC</i></li> <li>• <i>EC with suppliers</i></li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• <i>Intra-org. EC</i></li> </ul> <u>Emerging</u> <ul style="list-style-type: none"> <li>• <i>B2B with other business partners</i></li> </ul>	<u>Main Role of EC</u> <ul style="list-style-type: none"> <li>• Tactical tool in strategy implementation</li> </ul>	<u>Main Role of EC</u> <ul style="list-style-type: none"> <li>• Tactical tool in strategy implementation</li> </ul>
C U R R E N T L Y	<u>Strongly Agreed</u> <ul style="list-style-type: none"> <li>• <i>EC w/ suppliers</i></li> <li>• <i>EC w/ gov. agencies</i></li> </ul> <u>Agreed</u> <ul style="list-style-type: none"> <li>• <i>Intra-org. EC</i></li> <li>• <i>EC w/ customers</i></li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• <i>Integrated EC system built on intra-organizational capability</i></li> </ul>	<u>Main Role of EC</u> <ul style="list-style-type: none"> <li>• Tactical tool in strategy implementation <ul style="list-style-type: none"> <li>◦ EC is pursued more intensively;</li> <li>◦ Increased dependency on EC; and</li> <li>◦ Potential to enable market opportunities</li> </ul> </li> </ul>	<u>Main Role of EC</u> <ul style="list-style-type: none"> <li>• Tactical tool in strategy implementation <ul style="list-style-type: none"> <li>◦ EC is pursued more intensively;</li> <li>◦ Increased dependency on EC; and</li> <li>◦ Potential to enable market opportunities</li> </ul> </li> </ul>

When answers to company D's survey form and interview results on barriers and motivations are compared, the results are not similar, but complementary. From the survey, a list of key motivations and barriers over time can be drawn up; however, this list

does not provide information as to their relative importance. Very little change is observed over time. Interviews on the other hand, distinguish the main EC motivations and barriers over time. This is not contradictory to the survey findings, but instead adds detail.

**Table 5-8: Company D - Complementary Perceptions from two Primary Sources of Data**

	Motivations		Barriers	
	Survey Form	Interviews	Survey Form	Interviews
<b>10 Y. A G O</b>	<u>Main</u> <ul style="list-style-type: none"> <li>• <b>Operational &amp; cost efficiencies</b></li> <li>• Customer-oriented motivations</li> <li>• Expectations of other external parties</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• <b>Operational &amp; cost efficiencies</b></li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• Lack of critical mass</li> <li>• Legal and policy-related barriers;</li> <li>• <b>Lack of technical expertise</b></li> <li>• Resistance to change</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• <b>Lack of standards for the electronic transmission of cargo information.</b></li> </ul>
<b>C U R R E N T L Y</b>	<u>Main</u> <ul style="list-style-type: none"> <li>• Operational &amp; cost-efficiencies</li> <li>• <b>Customer-oriented motivations</b></li> <li>• Expectations of other external parties</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• <b>Customer-oriented motivations</b></li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• <b>Lack of critical mass</b></li> <li>• Gov. policy-related barriers;</li> <li>• Lack of technical expertise</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• <b>Customer-related, barriers including</b> <ul style="list-style-type: none"> <li>◦ <b>Lack of critical mass; and</b></li> <li>◦ <b>Resistance to change</b></li> </ul> </li> </ul>

Based on the above, it is concluded that findings from both primary sources of information are similar and complementary.

#### Perceived Key Relationships over Time

Findings from interviews with four managers from company D are summarized as follows:

**Table 5-9: Company D's Perceived EC Uses, Motivations, Barriers and Strategic Relevance**

	10 Years Ago	Currently
<b>EC Uses</b>	<u>Main</u> <ul style="list-style-type: none"> <li>• Intra-organizational EC</li> </ul> <u>Emerging</u> <ul style="list-style-type: none"> <li>• B2B with business partners</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• Integrated EC system, which is built on intra-organizational capability</li> <li>• Special emphasis placed on EC with customers</li> </ul>
<b>EC Motivations</b>	<u>Main</u> <ul style="list-style-type: none"> <li>• Improve operational &amp; cost-efficiencies by improving cargo information flow.</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• Competitive and customer-oriented motivations (build on efficiencies)</li> </ul>
<b>EC Barriers</b>	<u>Main</u> <ul style="list-style-type: none"> <li>• Lack of standards for the electronic transmission of cargo information.</li> </ul>	<u>Main</u> <ul style="list-style-type: none"> <li>• Customer-related barriers including               <ul style="list-style-type: none"> <li>◦ Lack of critical mass; and</li> <li>◦ Resistance to change</li> </ul> </li> </ul>
<b>Strategic Relevance of EC</b>	<u>Main Role of EC</u> <ul style="list-style-type: none"> <li>• Tool in strategy implementation</li> </ul>	<u>Main Role of EC</u> <ul style="list-style-type: none"> <li>• Tool in strategy implementation</li> </ul> <u>Other important aspects</u> <ul style="list-style-type: none"> <li>• EC is a business necessity;</li> <li>• Company has become dependent on EC systems;</li> <li>• EC facilitates new services, i.e., door-to-door transport.</li> </ul>

The researcher will now review key relationships ten years ago, examine inter-theme changes over time, and finally summarize the perceived dominant inter-theme associations over time.

*(1) What seems to have been the dominant inter-theme relationship ten years ago?*

Ten years ago, EC was still a novel concept to company D, as it was to many other competitors and business partners. Short transit times and multiple jurisdictional requirements for cargo documentation in the commerce-intensive routes served by company D triggered management's desire to exploit other mechanisms to improve efficiencies. There is little doubt that the breakthrough in the use of EC by company D was due to the realization that the continuous facilitation of cargo information flow would result in considerable operational and cost efficiencies. According to the company's top management, EC would bring far-reaching consequences to both the company and the industry. Thus, despite pressing technical limitations at the time, the EC system was

conceived to achieve integration company-wide, and then to progressively link the organization with key business partners. The combination of motivations and barriers resulted in EC implicitly taking on a key role in strategy implementation.

*(2) Were there any changes in the main perceptions over time?*

As shown in Table 5-9, the main EC perceptions have changed over the course of the last ten years.

*EC Uses:* Ten years ago the main perceived use of EC by company D was intra-organizational. EDI progressively became the company's backbone for internal communication and coordination, and the foundation on which the external interface with key business partners would generate further benefits. These developments in turn led to the current integrated approach for the use of EC by company D.

*EC Motivations:* Ten years ago the main motivation for the use of EC by company D was to streamline operations as a way to mitigate short transit times and other inherent inefficiencies within the feeder business. Having achieved this, the key motivation then became how to use EC efficiencies to remain profitable and grow with the industry. Thus, motivations changed over time from an operational focus to a customer-oriented and competitive one.

*EC Barriers:* Barriers ten years ago were mostly technical. Technological advances and the increasingly mature practice of EC have resulted in a lowering of these barriers over time. However, a new set of barriers is currently troubling company D's managers. Although the new barriers have some technical components, they are overwhelmingly customer-oriented. That is, they pertain to the technical, administrative and behavioural issues that are limiting customers' ability to embrace EC more intensively.

*Strategic Relevance of EC:* Changes in the strategic role of EC over time are more subtle. Ten years ago EC was regarded as a tactical tool to achieve commercial goals. The effectiveness of EC as a tactical tool, however, has in turn given rise to a critical link between EC performance and the company's ability to compete. Thus it is perceived that the strategic value of EC has increased over time. Moreover, a number of interviewees foresee that in the future EC may have a more profound effect on the company's market and product scope.

*(3) What seems to be the current dominant inter-theme relationship?*

No doubt the overriding inter-theme relationship is the desire of the company to use EC to remain profitable and to continue to consolidate its position in the marketplace, which highlights the prominent role of EC as a tactical tool in strategy implementation and its effects on the bottom line. This also explains the top management's sense of disappointment regarding customer-related EC barriers.

## **CHAPTER 6**

### **DISCUSSION OF CASES**

Using the case study data in Chapter 5, this chapter will now address the fundamental question of this study: *has the strategic intent for the use of EC by container shipping companies changed over time?* If so, *how and why?* The literature reviewed for the preparation of this study suggested an ongoing change in the strategic use of EC in this industry. To examine this issue, the results of the preceding four cases will be reviewed for commonalties, differences, critical issues and emerging themes that could help to confirm theoretical links. Findings from cases 1 through 4 will be compared by themes and observed patterns will be reported accordingly.

#### **6.1 THE COMPANIES AND THEIR APPROACHES TO THE USE OF EC**

Companies A, B, C and D have incorporated EC into their business processes. The question remains: are EC patterns observed? To this end, Table 6-1 summarizes key EC-related features.

It is evident that besides the ocean transport of containerized cargo, all companies are currently engaged in logistics transportation schemes. In addition, companies A, B and D deal with large customer bases and with EC technological imbalances in their geographical markets. It is also apparent that all companies approached EC as a way to address their needs for efficient cargo coordination mechanisms.

Indeed, case study data indicate that common factors among all companies included the perception that EC has now become a business need as well as a continuous search for ways to leverage the utilization of EC. Two companies (A and B) admitted to



having initially approached the development of EC on a premium charge basis, but failed to convince customers to accept these charges. The same two companies have established and followed a formal EC policy. However, only company A has gone a step further to create concrete EC business plans, which seem to have indeed altered its product and market scope.

**Table 6-1: Summary of EC-related Views and Perceptions**

EC-related views and perceptions		Deep-sea companies			Feeder company
		A	B	C	D
Some business features	Offers logistics services	√	√	√	√
	Has a large customer base	√	√		√
	Faces EC technological imbalances in trade area	√	√		√
Company-wide EC approach	Searches to further leverage EC company-wide	√	√	√	√
	Perceives EC as a business necessity	√	√	√	√
	Tried to use EC as a basis for premium pricing	√	√		
	Has a formal EC policy	√	√		
	Has a formal EC business plan	√			
	Uses EC to modify its product & market scope	√			
About EC implementation company-wide	Has developed proprietary EC systems	√	√	√	√
	Uses EC as backbone for communications	√	√	√	√
	Offers a wide range of web-based EC	√	√		
	Offers EC alternatives to 'all' customers.	√	√		
	Offers EC alternatives 'only' to major customers			√	√
	Uses electronic B/Ls under contractual terms	√	√	√	√
	Uses EC with key suppliers and gov. agencies	√	√	√	√
EC in the industry	Is committed to setting EC standards industry-wide	√	√		√
	Is opposed to the use of EC in a manner that might commoditize the industry	√	√		√

In terms of the actual implementation of EC, case study data indicate that all companies have invested considerably in developing proprietary EDI systems, which in turn have become the backbone for the intra-organizational interface. Only two companies (A and B) have invested substantially in the development of Internet-based EC applications, chiefly to facilitate electronic exchange with their customer base. Companies A and B have also enabled multiple electronic channels to interact with all customers regardless of the volume of cargo they bring to the company. All companies however, encourage their large and key customers, as well as suppliers and government

agencies, to interact with them through EDI systems. Moreover, all companies use electronic B/Ls, the terms of which are governed by contractual agreements between the parties.

Three companies (A, B and D) expressed strong views about the role of EC in the container shipping industry. They agreed that EC definitively has an important role to play and, to this end, they are committed to developing and implementing EC industry standards. Nonetheless, they remain careful not to use EC in ways that might commoditize container shipping, but instead to use it to underscore the role of this sector of the industry as a partner in the transportation chain.

## **6.2 USES OF EC OVER TIME**

*Hypothesis 1* predicted significant changes in the uses of EC over time, as follows:

*H<sub>1</sub>: At the beginning of the period under study, deep-sea container shipping companies primarily used EC for intra-organizational purposes; however, by the end of the period, EC with customers emerged as the most important use of EC.*

Table 6-2 summarizes findings regarding the uses of EC ten years ago by deep-sea container shipping companies, as well as by the feeder company. From this table it is evident that companies had similar experiences. That is, the main use of EC at the beginning of the period under study was intra-organizational in nature. Moreover, all companies agreed that at the time the key emphasis of EC interaction was operational, that is, to transmit cargo documents and coordinate carriage procedures.

Only in company C was B2B EC reported to have been as important as intra-organizational EC at the beginning of the period under study. For the rest of the

companies (A, B and D), B2B with other business partners was an emerging use of EC at the time.

**Table 6-2: Summary of Uses of EC at the Beginning of the Period under Study**

Uses of EC ten years ago		Deep-sea companies			Feeder company
		A	B	C	D
Main	Intra-organizational EC	√	√	√	√
	B2B with key customers			√	
Emerging	B2B with key business partners		√		√
	B2B with a number of customs authorities	√			

By the end of the period under study, the emphasis for the use of EC had changed. Over the course of the last ten years, all companies intensified their use of EC and progressively modified the emphasis of EC from an internal operational focus to an electronic interface with customers. In so doing, a common pattern is observed, which explains the integrated approach adopted by companies A, D and B:

*Companies have built on their previous intra-organizational experience and the operational focus of EC to interface with business partners outside of the organizations.*

**Table 6-3: Summary of Current Uses of EC**

Current uses of EC		Deep-sea companies			Feeder company
		A	B	C	D
Main	Integrated / holistic use of EC	√	√		√
	Intra-organizational EC		√	√	
	B2B with key customers			√	
Emerging	B2B with other business partners	√	√		

As seen in Table 6-3, managers in companies A and D feel that since the true value of EC is to integrate cargo related information to deliver cargo solutions to customers, fragmenting EC uses by categories (i.e., EC with suppliers, customers, government agencies or intra-organizational EC) is no longer an adequate way to analyze EC uses. This view is shared by company B's managers who claim that as the full

benefits of EC usage are derived from the cross-over of EC applications, the division between intra-organizational EC and the use of EC with customers, suppliers and government agencies is increasingly irrelevant. However, company B is not at this stage yet. For them, intra-organizational EC still provides the most pragmatic benefits and will continue to do so until customer interaction increases substantially.

To sum up, the experiences of companies A, B, and D indicate that the direction of change in the use of EC over time coincides with *hypothesis 1*. Company C's experience is not contrary to *hypothesis 1*, but shows that the company built on the strong relationship between intra-organizational EC and EC with key customers years ago.

### **6.3 MOTIVATIONS FOR THE USE OF EC OVER TIME**

*Hypothesis 2* suggests that the motivations for the use of EC over time have changed from an internal focus on achieving efficiencies to a more external, competitive and customer-oriented focus.

*H<sub>2</sub>: The main motivation for the adoption and use of EC by deep-sea container shipping companies changed over the period under study. The initial focus was on the achievement of cost and operational efficiencies; however the main motivation later became customer-oriented.*

A snapshot of the dominant motivations for the use of EC ten years ago (see Table 6-4) shows that all companies perceived internal operational and cost efficiencies as the key motivations. However, companies A and B also experienced clear customer-oriented motivations at the time.

**Table 6-4: Summary of EC Motivations at the Beginning of the Period under Study**

EC Motivations 10 years ago		Deep-sea companies			Feeder company
		A	B	C	D
Main	Operational & cost efficiencies	√	√	√	√
	Customer-oriented motivations	√*	√**		
Emerging	Competitive imitation	√			

\* Meet customers' demands

\*\* Offer value-added services

By the end of the period under study, customer-oriented motivations, and internal operational and cost efficiencies were both seen as the fundamental motivations for the use of EC (see Table 6-5). The need to satisfy government requirements is perceived as a powerful emerging motivation.

**Table 6-5: Summary of Current EC Motivations**

Current EC Motivations		Deep-sea companies			Feeder company
		A	B	C	D
Main	Operational & cost efficiencies	√	√	√	
	Customer-oriented motivations	√*	√**		√***
	Competitive imitation	√			
Emerging	Demands by gov. agencies	√	√	√	
	Customer-oriented motivations			√*	
	Competitive imitation			√	

Customer-oriented motivations:

\* Meet customers' demands.

\*\* Offer value-added services.

\*\*\* Increase electronic interface with customers building on the ability to achieve operational and cost efficiencies.

While achieving efficiencies remains a constant and powerful motivation over time, in the last ten years the desire to attract, maintain and better service customers has increased substantially to become as important a motivator as achieving efficiencies. Efficiencies in turn, are now being sought beyond the boundaries of the companies, to encompass the electronic exchange of information with government agencies.

To sum up this section, case study evidence lends support to *Hypothesis 2*, that is, while cost efficiencies remain a powerful motivation over time, customer-oriented drivers are significantly more relevant currently than ten years ago. This increased relevance is

built on companies' ability to use the EC experiences and efficiencies gained in the last years to attract, maintain and better service customers now. One further observation should be noted: the feeder company's behaviour bears similarities with both the medium-sized and large companies.

#### **6.4 BARRIERS FOR THE USE OF EC OVER TIME**

*Hypothesis 3* suggests that barriers for the use of EC have changed from technical and financial issues at the beginning of the period under study to the inadequacy of facilitating measures to foster the commercial use of EC with customers at the present time.

*H<sub>3</sub>: The most relevant barriers for the adoption and use of EC by deep-sea container shipping companies changed over the period under study. They shifted from infrastructure and investment costs at the beginning of the period under study, to the inadequacy of EC-enabling government policies and legal aspects at the end of the period under study.*

As seen in Table 6-6, companies experienced a combination of internal and external barriers ten years ago. All companies experienced external technical barriers associated with the lack of EC-related standards and infrastructure to implement and use EC systems internally and with selected business partners. This has a bearing on internal barriers experienced by two companies (B and C), which included high investment costs of EC initiatives (in general), as well as insufficient in-house know-how (A and B). In addition, the largest company reported that a particular problem ten years ago was the reluctance of practitioners to change paper-based business and coordination procedures.

**Table 6-6: Summary of EC Barriers at the Beginning of the Period under Study**

EC barriers 10 years ago		Deep-sea companies			Feeder company
		A	B	C	D
Main	Lack of EC standards and infrastructure**	√	√	√	√
	Insufficient in-house technical and managerial EC expertise*	√	√		
	High EC-related investment costs*		√	√	
	Resistance to change paper-based practices**	√			

\* Internal barrier

\*\* External barrier

The first part of *hypothesis 3* seems to reflect companies' actual experiences ten years ago, that is, that the main EC barriers were due to the novelty of EC practice. By the end of the period under study, *hypothesis 3* predicted that barriers would be related to the increased use of EC in commercially-driven activities. However, findings in Table 6-7 show no support for this assumption.

**Table 6-7: Summary of Current EC Barriers**

Current EC barriers		Deep-sea companies			Feeder company
		A	B	C	D
Main	Cost-benefit considerations*	√	√	√	
	Digital divide**	√	√		
	Resistance to change paper-based practice	√***			√***
	Lack of critical mass**				√
	EC-system interoperability with partners***			√	
Emerging	EC-system back-end integration*			√	

\* Internal barrier

\*\* External barrier

\*\*\* Both internal and external

Currently, companies continue to experience highly inter-related financial, technological and behavioural barriers, as they did ten years ago. Basically, companies are struggling to justify the benefits of further investment in EC practice. In addition, companies face EC technological imbalances in their trade areas and resistance to abandon paper-based operational, administrative and commercial practices in favour of their electronic equivalents. In other words, case evidence lends support to the first part of

postulates in *hypothesis 3* related to EC barriers ten years ago, but does not support the second prediction related to current EC barriers.

*Hypothesis 3* optimistically assumed that the use of EC by container shipping companies would have progressed further in a ten-year period than reality has shown. Indeed, case study evidence suggests that the current use of EC for electronic commercial or negotiation activities is very low. Container shipping companies at best presently use non-negotiable electronic B/Ls, the terms of which are contractually agreed upon between the parties. Thus, EC legal or policy factors are not currently felt to be major obstacles by either deep-sea lines or feeder organizations.

## **6.5 STRATEGIC RELEVANCE OF EC OVER TIME**

*Hypothesis 4* predicts that the strategic relevance of EC would increase by the end of the period under study.

*H<sub>4</sub>: At the beginning of the period under study, firms viewed EC as having limited strategic relevance in the definition of business goals; however, this relevance progressively changed to become an important consideration by the end of the period under study.*

Since *hypothesis 4* and the *central hypothesis* are interconnected, both should be addressed together, the *central hypothesis* being:

*H<sub>C</sub>: As the main motivations for the use of EC by deep-sea container shipping companies became more customer-oriented, the perceived role of EC shifted from being a tactical tool in the implementation of business strategy to being a strategic driver in its formulation.*

The combined reading of these hypotheses predicts that there has been a change in the strategic intent for the use of EC in the last ten years, and that this change is due to the evolution of EC motivations over time. Thus, there are at least two parts to this issue,



namely: *has there been a change in the perceived strategic relevance of EC over time?*  
and if so, *why did the change take place?*

Table 6-8 summarizes the perception of the main strategic relevance of EC ten years ago among case studied companies: EC as an operational, tactical tool to achieve commercial goals. Case studies also show an embryonic use of EC with customers (companies A, B and C), which has become more intense and sophisticated over the years.

**Table 6-8: Summary of the Strategic Relevance of EC Ten Years Ago**

Strategic relevance of EC 10 years ago	Deep-sea companies			Feeder company
	A	B	C	D
EC perceived as a tactical tool in strategy implementation	√	√	√	√

In terms of the current strategic relevance of EC, Table 6-9 indicates that by the end of the period under study, all companies continued to perceive EC mainly as a tactical tool in strategy implementation. This table also shows three fundamental differences in EC's strategic relevance today compared to ten years ago: (1) by the end of the period under study, all companies perceived EC as a business necessity, thus (2) companies pursued EC more intensively to the point that EC systems became the backbone linking internal and external operations. Moreover, (3) the more intensive role of EC company-wide has had clear strategic effects on the commercial performance of the majority of companies, namely:

- (a) To company A, the extensive use of web-based applications to target and service customers at large has both modified the channels to deliver services and created new products in certain markets;

(b) To companies B and D, EC helps provide very competitive services to compete against much larger operators. This has come to mean commercial survival in the marketplace; and

(c) To company D, EC facilitates the provision of other transportation products, such as door-to-door services, but most importantly EC has become critical to maintaining the company's ability to compete in the marketplace.

As with many other management decisions, the use of EC is context-based. Company C has lagged behind the rest of the companies in pursuing an exhaustive initiative to increase the intensity and quality of EC usage. Reasons are varied, however, it is clear that having a relatively small and selected customer-base does not build up the momentum necessary for speeding up this kind of undertaking.

**Table 6-9: Summary of Current Strategic Relevance of EC**

Current strategic relevance of EC		Deep-sea companies			Feeder company
		A	B	C	D
Main	EC is perceived as a tactical tool in strategy implementation	√	√	√	√
Emerging	The product and market scope shows changes resulting from the use of EC	√			
Other important aspects	EC is pursued with substantially more intensity by the company	√	√	√	√
	The use of EC has become a business necessity to the company	√	√	√	√
	EC is critical for the commercial survival of the company		√		√
	EC facilitates the offering of other transportation products				√

Evidence provided by participating companies suggests that while EC has not yet become a strategic driver in the identification of commercial goals, it is no longer used simply as a tactical tool in strategy implementation, as it was ten years ago. Indeed, there is evidence to suggest that its relevance has increased and that there is a shift towards

companies recognizing that EC is becoming a strategic driver in the definition of business goals.

## 6.6 MAIN FINDINGS

A summary of the case study findings reviewed so far (see Table 6-10) confirms the assumptions embedded in *hypotheses 1, 2 and 4*, but only marginally supports those in *hypothesis 3*. In other words, while changes to EC uses and motivations over time reflect the assumptions made in Chapter 3, hypothesis 3 was only accurate in so far as it predicted the prevalent situation at the beginning of the period under study. The case studies do not support the notion that the main current barriers to EC are legal and policy-related.

**Table 6-10: Summary of Main Findings of Cases 1, 2, 3, and 4.**

	10 Years Ago	Currently
<b>EC Uses</b> ( <i>Hypothesis 1</i> )	<ul style="list-style-type: none"> <li>Mainly intra-organizational EC with some companies undertaking limited B2B with a number of external parties.</li> </ul>	<ul style="list-style-type: none"> <li>While 2 companies still consider intra-organizational EC to be the main use of EC, the remaining 2 companies consider the main use of EC to be of an integrated nature.</li> <li>All companies, however, showed substantially more customer-oriented uses than ten years ago.</li> </ul>
<b>EC Motivations</b> ( <i>Hypothesis 2</i> )	<ul style="list-style-type: none"> <li>Main motivation: to improve operational and cost efficiencies.</li> <li>Half of the companies used EC to interface with customers.</li> </ul>	<ul style="list-style-type: none"> <li>Combined main motivation: <ul style="list-style-type: none"> <li>Continue to improve operational and cost efficiencies; and</li> <li>Substantially boost interface with customers.</li> </ul> </li> </ul>
<b>EC Barriers</b> ( <i>Hypothesis 3</i> )	<ul style="list-style-type: none"> <li>Main barriers attributable to the novelty of EC (i.e., lack of standards, high investment costs, inadequate EC infrastructure and know-how).</li> </ul>	<ul style="list-style-type: none"> <li>Main barriers are still of a financial, technical and behavioural nature, as opposed to legal and policy-related.</li> </ul>
<b>Strategic Relevance of EC</b> ( <i>Hypothesis 4</i> )	<ul style="list-style-type: none"> <li>Mainly as a tactical tool.</li> </ul>	<ul style="list-style-type: none"> <li>While EC is perceived to play the role of a tactical tool in strategy implementation, its emerging strategic role in commercial and competitive aspects is obvious. This new role is evident in the case of companies A, B and D, which claim that EC is a center piece of their competitive strategy. In addition, in the case of company A, EC enabled the provision of a new transportation-related product, i.e., the discount carrier service.</li> </ul>

With regard to the *central hypothesis* and the issue of dominant relationships, a pattern from the case studies arises:

*Despite the existence of considerable EC barriers both at the beginning and at the end of the period under study, EC uses and motivations seem to have exerted greater influence on the strategic relevance of EC.*

Examining their dominant relationships over time, the experiences of all companies ten years ago imply that despite pressing technical and managerial barriers, the need to improve internal economies provided the most fertile grounds for the use of EC. Thus, EC was seen as a tactical tool to achieve these goals. By the end of the period under study, customer-oriented motivations became more relevant and although they cannot be credited for changing the role of EC to become a driver in strategy formulation, they seem to have ignited the process. EC barriers, albeit important, seem to be playing a decreasing role over time.

#### **6.6.1 Other Findings**

Looking at the near future, all companies agreed that EC is likely to serve as a basis to achieve further efficiencies. Three companies also foresee that EC will play a more important role in their commercial performance, and will even become the standard for operational and commercial transactions (company A), serve as a tool for coping with the demands of customers and government agencies (company C), as well serve as a bridge to access new markets (company D). Companies were of the opinion that major challenges, on the other hand, will revolve around convincing customers to make more intensive use of EC with shipping companies (companies B and D), as well as demonstrating and convincing decision-makers that further investments in EC will indeed

result in hard savings (company A). These views also suggest that customer-related motivations will continue to be at the heart of potential EC benefits and challenges in the near future.

This said, there is still the issue of whether company size plays a role in the EC equation. To address this question, it is necessary to highlight the following findings:

- (a) Many similarities between the EC-related experiences of the two medium-sized companies (B and D) were found, which suggests that, in the context of this study, company size might be more relevant than the particulars of the transportation service provided;
- (b) It is evident that there are more commonalities in the rationale and intensity with which companies A, B and D pursued EC capability than the small company C. Companies A, B and D are perceived as being innovative and proactive EC practitioners, while company C is adopting a more reactive and conservative approach to EC; and
- (c) There is little doubt that the large company (A) shows the most advanced and aggressive EC development, followed in descending order by the medium-sized companies (B and D) and the small company (C).

These findings suggest that the intensity with which EC is used by participating companies is related to its size. Nonetheless, this relationship might not be rooted in the company's size *per se*, but in the size of its customer base. Not only is company C the smallest participating company, but it is also the one that made the operational decision not to deal with customers at large, but only with a selected sub-group of them.

Finally, a few interesting observations surfaced during the case analysis:

- (a) First, when asked about key relationships with suppliers in the context of strategic management decisions, all companies automatically focused on suppliers of transportation-related services (e.g., feeder services, terminals, cargo equipment), while disregarding all other kinds of suppliers, including firms dedicated to the procurement of ships. This observation does not signify that other suppliers are unimportant, but certainly suggests that in the context of EC and strategic management considerations, suppliers of transportation-related services play a more essential role than other suppliers;
- (b) Second, the idea of an increasing electronic interface with customers is raising eyebrows in all participating companies. Managers of all case studied companies, while acknowledging the importance of automating processes, are also eager to maintain personalized contact with clients at critical points during contract negotiation and customer service processes; and
- (c) Third, there is a genuine sense among participating companies that the more intensive the use of EC company-wide, the higher the level of integration and dependence on EC systems.

## CHAPTER 7

### SURVEY ANALYSIS

In this chapter, survey data will be analyzed to determine whether evidence lends support to the postulates in the study's central and complementary hypotheses. To this end, the chapter will provide general information about the survey population and response rates, and then test the hypotheses and present a discussion of the findings.

This study's *central hypothesis* suggests that the growing relevance of EC over time is related to the increasing customer orientation of its use. There are also four hypotheses dealing with EC uses, motivations, barriers and strategic relevance that are complementary to the main hypothesis.

#### 7.1 ABOUT THE SURVEY POPULATION, DATA AND CONTROL VARIABLES

The population of container shipping companies satisfying the study criteria was calculated to be 297 companies in Section 4.1.5 on page 89. However, in response to the survey questionnaire, 18 companies indicated they were no longer in the container shipping trade, and were therefore unable to complete the survey forms as requested. The study's initial population of container shipping companies was adjusted to reflect this finding, thus the new 'revised population' is shown in Table 7-1.

**Table 7-1: Revised Population of Container Shipping Companies**

	Initial Population	No Longer in Container Shipping	Revised Population
All Companies	297	18	279
Large Companies	20	-	20
Medium-sized Cos.	58	1	57
Small Companies	219	17	202

The remaining number of communications received either contained the completed survey questionnaire or provided reasons for companies' non-participation in the study. In the latter category of responses, most companies argued that time constraints prevented them from completing the survey form. Table 7-2 indicates that an average of approximately 15% of the total number of companies communicated with the researcher for the purpose of this study.

**Table 7-2: Summary of Communications Received**

Revised Population of Companies		Communications Received			
		Completed Surveys	Unable to Participate in the Study	Communications Received	
				Total	Percentage of Rv'd Population
All Companies	279	31	11	42	15 %
Large Companies	20	6	3	9	45 %
Medium-sized Cos.	57	10	2	12	21 %
Small Companies	202	15	6	15	7.4%

However, since the survey response rate represents only the survey forms actually completed and received by the researcher (31) rather than communications received, the response rate for this survey analysis corresponds to 11.1% of the revised population of companies, as indicated in Table 7-3.

**Table 7-3: Survey Response Rate**

		Revised Number of Companies	Completed Surveys	Response Rate
All Companies	All Sizes	279	31	11.1%
Companies by Size	Large Companies	20	6	30.0%
	Medium-sized Companies	57	10	17.5%
	Small Companies	202	15	7.4%

Issues intrinsically linked to survey studies are the elements of randomness and representativeness of the overall population. In this context, it should be remembered (as discussed in Section 4.3.1 on page 102) that the researcher opted for a census (i.e., survey information was sent to all companies), as opposed to random sampling of companies. It was felt that this course of action would increase the probabilities of responses, given the



tendency of this industry not to participate in this type of study. In this approach, randomness is commensurate with each company's decision to complete and return the survey form. Therefore, 11.1% of 279 companies is thought to be representative of the revised population of companies and will serve as the basis for this exploratory analysis.

Having said this, some limitations associated with a survey response of 31 are acknowledged, related to the range of statistical tests suitable for application. Statistical inferences by size categories (i.e., stratified analysis) cannot be made, nor can relationship strength (i.e., factor analysis) be calculated for certain.

The survey questionnaire (see Appendix 4-2) was composed of 41 numbered questions designed to obtain data about EC-related matters and their perceived strategic relevance by participating companies. However, since most survey questions inquired about both past and present perceptions, for evaluation purposes the final number of questions rose to 63, the overall completion rate of which was calculated to be 97.69% as shown in Table 7-4. This completion rate does not include questions 30 (other motivations) and 39 (other barriers) due to the negligible number of responses to them.

**Table 7-4: Survey Question Completion Rate**

<b>Question #</b>	<b>Missing Data</b>	<b>% of Responses</b>
13 questions (6b; 7b; 8; 21b; 22b; 23b; 27b; 31a; 32a; 35a; 37a; 38a; 40)	13 (1 per question)	96.77
16 questions (24b; 25b; 26b; 27b; 28b; 29b; 31b; 32b; 33b; 34b; 35b; 36b; 37b; 38b; 41a)	32 (2 per question)	93.54
34 questions (all the remaining questions)	---	100.00
<b>Average Question Completion Rate</b>		<b>97.69 %</b>

For analytical purposes, this survey considers two groups of variables. The first group includes EC themes likely to exert direct influence on the strategic relevance of EC over time (i.e., EC uses, motivations, barriers and strategic relevance), and as such they will be fully addressed in Sections 7.2 through 7.6 of this chapter.

The second group contains key descriptive variables crafted to provide a general profile of the survey population. These include company size, competitive strategy, influence of EC in the industry and formal strategic planning process.

### 7.1.1 Company Size

Question 2 confirmed the size categories of participating companies based on the parameters defined earlier in this thesis. Question 2 has two components, one dealing with present capacity (question 2a) and the other with capacity ten years ago (question 2b).

Participating companies experienced little change in terms of their size over time, with the majority of them consistently falling in the small size category. While there was no change in the number of large companies, two small companies became medium-sized ones over time. For this analysis, when a company changed size during the period under study, its current size took precedence, as it is believed that data representing current strategic and competitive conditions tend to be more accurate than data portraying prevalent conditions ten years ago.

**Table 7-5: Company Size Over Time**

	Q2b Size 10 years ago		Q2a Current Size	
	Frequency	Percent %	Frequency	Percent %
Large	6	19.4	6	19.4
Medium	8	25.8	10	32.3
Small	17	54.8	15	48.4
Total	31	100.0	31	100.0

### 7.1.2 Competitive Strategy

Question 3 sought to find out about companies' choice of competitive strategy at the present time (question 3a) and ten years ago (question 3b). Survey results suggest that the two most common competitive strategies at the two time periods under observation were niche and combination strategies. Ten years ago, the majority of companies implemented either niche (35.5%), or combination (22.6%) strategies. By the end of the period under study, niche and combination strategies were still their top approaches; however, while the number of companies implementing niche strategies remained fairly similar over time, the popularity of combination strategies rose from 22.6% ten years ago to 35.5% currently.

**Table 7-6: Competitive Strategy Over Time**

	Q3b Competitive Strategy 10 years ago		Q3a Current Competitive Strategy	
	Frequency	Percentage %	Frequency	Percentage %
Combination	7	22.6	11	35.5
Niche	11	35.5	10	32.3
Competing on Service	4	12.9	7	22.6
Cost Leadership	5	16.1	2	6.4
No Strategy	4	12.9	1	3.2
Total	31	100.0	31	100.0

Two interesting points to highlight are that, over time, fewer companies competed solely on price (cost leadership), and more companies embraced service differentiation strategies. In addition, the number of companies with no strategy at the beginning of the period under study decreased over time.

When compared by size categories, it is evident that the choice of competitive strategy has shifted over time. While ten years ago no significant preferences were shown by large and medium companies (see Table 7-7), currently the majority of large

companies compete on service, while half of the medium-sized companies embrace niche strategies (see Table 7-8). Over time, small companies have maintained a preference for niche and combination strategies.

**Table 7-7: Cross-Tabulation between Company Size 10 Years Ago & Competitive Strategy 10 Years Ago**

Size 10 years ago	Strategy 10 years ago					Total
	Cost Leadership	Niche	Competing on Service	Combination	None	
Large	2	1	2	1	0	6
Medium	1	2	1	2	2	8
Small	2	8	1	4	2	17
Total	5	11	4	7	4	31

**Table 7-8: Cross-Tabulation between Current Company Size & Current Competitive Strategy**

Current size	Current Competitive Strategy					Total
	Cost Leadership	Niche	Competing on Service	Combination	None	
Large	1	0	5	0	0	6
Medium	0	5	1	3	1	10
Small	1	5	1	8	0	15
Total	2	10	7	11	1	31

### 7.1.3 Perceived Competitive Influence of EC in the Industry

Questions 41a and 41b asked participants how they perceived EC currently and ten years ago, specifically if EC is perceived as a source of ‘competitive advantage,’ a ‘competitive necessity,’ or ‘none’ of the above.

Interestingly, while ten years ago the majority of companies argued that EC was either unimportant (58.1%) or was perceived as a ‘competitive advantage’ (25.7%), by the end of the period under study, the perception had changed. Now 54.8% of the

participants perceive EC as a source of ‘competitive advantage’ while 38.7% think it has become a ‘competitive necessity’. The key observation is that EC is perceived as much more of a ‘competitive advantage’ and ‘competitive necessity’ than it was ten years ago.

**Table 7-9: Perceived Competitive Influence of EC in the Industry Over Time**

	10 years ago		Currently	
	Frequency	Percent %	Frequency	Percent %
Competitive Necessity	3	9.7	12	38.7
Competitive Advantage	8	25.7	17	54.8
None	18	58.1	--	0
Missing	2	6.5	2	6.5
Total	31	100.0	31	100.0

**Table 7-10: Cross-Tabulation – Company Size & EC Perception 10 Years Ago**

Company Size 10 years ago	10 years ago EC was regarded as:			Total
	Competitive Advantage	Competitive Necessity	None or Unimportant	
Large	1	1	4	6
Medium	3	1	4	8
Small	4	1	10	15
Total	8	3	18	29

**Table 7-11: Cross-Tabulation - Current Company Size & EC Perception**

Company Size 10 years ago	EC is regarded as:		Total
	Competitive Advantage	Competitive Necessity	
Large	3	3	6
Medium	7	2	9
Small	7	7	14
Total	17	12	29

Ten years ago the majority of participating companies considered EC to be strategically unimportant (see Table 7-10), but by the end of the period under study this perception had reversed (see Table 7-11). Large participating companies<sup>112</sup> are equally

<sup>112</sup> In Chapter 3 it was argued that large container shipping companies have taken the lead in this industry in a variety of aspects, including competitive and technological issues.

split in their perceptions about the current strategic influence of EC in the industry, with half believing that EC has become a competitive necessity, and the other half that it provides a source of competitive advantage.

#### 7.1.4 Formal Process for Strategic Planning

As an indicator of the degree of commitment of participating companies to review strategic issues in general and upgrade their plans accordingly, in question 40, companies were asked whether they currently practiced strategic planning and, if so, how often this type of planning is undertaken.

**Table 7-12: Formal Strategic Planning Process**

	Frequency	Percentage (%)
Yes	22	71.0
No	3	9.7
Don't Know	5	16.1
Missing	1	3.2
Total	31	100.0

As shown in Table 7-12 the majority (71%) of companies indicated that they have a formal process for strategic planning. Analyzing the issue by company size, it is apparent that proportionally speaking, large companies did more strategic planning than medium-sized and small companies.<sup>113</sup> The frequency with which strategic planning was undertaken varied, with annual reviews ranking as the most common.<sup>114</sup>

To sum up, 11.1% of the revised population of companies completed the survey questionnaire, representing 30%, 17.5% and 7.4% of the large, medium-sized and small groups of companies, respectively. The survey data also suggest that companies have

<sup>113</sup> When examined by company size, 88.3% of large companies, as well as 77.8% of medium-sized and 66.7% of small companies appear to have formal planning procedures in place. A total of 22 out of 31 companies responded to this part of the survey question.

<sup>114</sup> Other revision periods were quarterly and ongoing reviews, as well as every 2 to 5 years.

engaged in internal debates regarding key strategic management decisions in general (i.e., competitive strategy and strategic planning processes), as well as the effects of EC–related issues on their business, in particular (i.e., competitive influence of EC in the industry ).

The following sections will examine whether, on the basis of survey findings, *hypotheses 1, 2, 3, 4* and the *central hypothesis* hold up according to the procedure explained earlier in the methodology chapter (see Section 4.3.5 on page 106).

## 7.2 HYPOTHESIS 1 – EC USES OVER TIME

Participants were asked to indicate their level of agreement with statements regarding companies' principle uses of EC over time. Each question dealt with different key types of EC uses as follows:

**Table 7-13: Main Uses of EC Over time**

<i>Question*</i>	<i>Use of EC</i>
4a / 4b	To coordinate operations or communicate with other company branches and/or our fleet.
5a / 5b	To service and/or interact with our customers
6a / 6b	To communicate, interact and/or obtain services from our suppliers
7a / 7b	To communicate, interact or provide information to government agencies.

\* The 'a' and 'b' series address current EC uses and uses of EC ten years ago, respectively.

Hypothesis 1 predicts that the main use of EC has changed over time to become more customer-oriented.

*H<sub>1</sub>: At the beginning of the period under study, deep-sea container shipping companies primarily used EC for intra-organizational purposes; however, by the end of the period, EC with customers emerged as the most important use of EC.*

This hypothesis implies that there were identifiable main uses of EC and that these uses changed during the period under study. This interpretation in turn, gives rise to the following null hypotheses to be tested:

$H_1P_0$ : *At the beginning of the period under study, the main use of EC was not intra-organizational EC.*

$H_1C_0$ : *Currently, the main use of EC is not EC with customers.*

The next sections will follow the testing procedure outlined in Section 4.3.5 on page 106.

### 7.2.1 EC Uses with the Highest Mean Values Over Time

Table 7-14 shows that the highest mean among all uses of EC ten years ago is 2.84 and corresponds to Q4b–*intra-organizational EC*. It is followed by Q6b–*EC with suppliers*, Q5b–*EC with customers* and Q7b–*EC with government agencies*. In terms of current EC uses, the highest mean (4.55) in this group suggests that the most common use of EC currently is Q5a–*EC with customers*, followed by Q6a–*EC with suppliers* and Q7a–*EC with government agencies*, while the lowest mean implies that Q4a–*intra-organizational EC* is perceived as less important than the previous three.

**Table 7-14: Descriptive Statistics - Uses of EC Over Time**

		N Valid- Missing	Mean	Std. Error of Mean	Std. Deviation	Variance
<b>10 YEARS AGO</b>	Q4b- Intra-org. EC	31 – 0	<b>2.84</b>	.197	1.098	1.206
	Q5b- EC with customers	31 – 0	<b>2.45</b>	.201	1.121	1.256
	Q6b- EC with suppliers	30 – 1	<b>2.47</b>	.213	1.167	1.361
	Q7b- EC with gov. agencies	30 – 1	<b>2.40</b>	.195	1.070	1.145
<b>CURRENT</b>	Q4a- Intra-org. EC	31 - 0	<b>3.90</b>	.149	.831	.690
	Q5a- EC with customers	31 - 0	<b>4.55</b>	.121	.675	.456
	Q6a- EC with suppliers	31 - 0	<b>3.94</b>	.179	.998	.996
	Q7a- EC with gov. agencies	31 - 0	<b>3.94</b>	.196	1.093	1.196



It is evident therefore, that Q4b–*intra-organizational EC* and Q5a–*EC with customers* are the past and current uses of EC with the highest mean values, respectively. Statistical indicators from surveys with a relatively low sample size (‘n’ value) must be carefully interpreted to ensure that findings are put into context. To this end, attention needs to be paid to the pattern of responses in Table 7-15, which will help with the interpretation of the mean values of EC uses over time.

**Table 7-15: Distribution of Responses - Uses of EC Over Time**

		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Missing	Total
<b>10 Y. A G O  C U R R E N T</b>	Q4b - Intra-org. EC	2 6.5%	8 25.8%	6 19.3%	13 41.9%	2 6.5%	-	31 100%
	Q5b - EC with customers	2 6.5%	4 12.9%	5 16.1%	15 48.4%	5 16.1%	-	31 100%
	Q6b - EC with suppliers	2 6.5%	4 12.9%	6 19.3%	12 38.7%	6 19.4%	1 3.2%	31 100%
	Q7b - EC with Gov. agencies	1 3.2%	5 16.1%	4 12.9%	15 48.5%	5 16.1%	1 3.2%	31 100%
	Q4a - Intra-org. EC	6 19.3%	19 61.3%	3 9.7%	3 9.7%	-	-	31 100%
	Q5a - EC with customers	19 61.3%	11 35.5%	-	1 3.2%	-	-	31 100%
	Q6a - EC with suppliers	8 25.8%	18 58.1%	1 3.2%	3 9.7%	1 3.2%	-	31 100%
	Q7a - EC with Gov. agencies	10 32.3%	15 48.4%	1 3.2%	4 12.9%	1 3.2%	-	31 100%

Table 7-15 indicates that while the majority of respondents disagreed or strongly disagreed with the importance of various EC uses ten years ago, by the end of the period under study, most agreed or strongly agreed that these uses are important, which in turn suggests that EC has become more essential over time for participating companies. In addition, Table 7-15 suggests that ten years ago, *intra-organizational EC* and *EC with suppliers* were the most common uses of EC, while *EC with customers* and *EC with government agencies* only gained importance as time passed.

### 7.2.2 Test for Statistical Differentiation

Significance coefficients in Table 7-16 show that despite Q4b–*intra-organizational EC* having the highest mean value, it is not statistically different from two of the remaining three EC uses ten years ago and cannot be regarded as the perceived main use of EC at the time. Therefore, the null hypothesis  $H_1P_0$  cannot be rejected. On the other hand, significance factors in the same table do confirm that Q5a–*EC with customers* is statistically different from all other current uses of EC and can be interpreted as the current main use of EC. The null hypothesis  $H_1C_0$  is therefore rejected. The fact that  $H_1P_0$  could not be rejected renders *hypothesis 1* invalid.

**Table 7-16: Paired-sample T-tests of EC Uses Over Time**

Uses of EC with the highest mean	Other uses of EC over time	Sig.
10 Years Ago Q4b - Intra-org. EC (Mean:2.84)	Q5b - EC with customers (Mean: 2.45)	.110
	Q6b - EC with suppliers (Mean: 2.47)	.170
	Q7b - EC with gov. agencies (Mean: 2.40)	.085*
Currently Q5a - EC w/ customers (Mean:4.55)	Q4a - Intra-org. EC (Mean:3.90)	.001**
	Q6a - EC with suppliers (Mean:3.94)	.001**
	Q7a - EC with gov. agencies (Mean:3.94)	.001**

\* Significant at the .10 level.

\*\* Significant at the .05 level.

The results above highlight a situation in which one EC use has the highest mean, but is not significantly different from the other uses within its group. This lack of statistical difference between Q4b, Q5b and Q6b, however, does not necessarily imply redundancy of these EC uses ten years ago. Indeed, the Cronbach's Alpha coefficient for data consistency suggests that while Q4b- *intra-organizational EC* was likely recognized as an EC use on its own, Q5b- *EC with customers* and Q6b- *EC with suppliers* were likely perceived as homogeneous EC uses ten years ago.

### 7.2.3 Relevance of the Uses of EC over Time & Main Findings

A fundamental question in this study revolves around whether EC has indeed gained acceptance in the last ten years, as suggested by the pattern of answers. Since mean values for questions 4, 5, 6 and 7 suggest that EC uses became more relevant over time, statistical proof will be sought in various dimensions, by comparing:

- (a) The mean value of each EC use over time (pairs 1, through 4, Table 7-17); and
- (b) The mean value of the EC use with the highest mean value over time (pair 5, Table 7-17).

**Table 7-17: Paired-sample T-tests – Uses of EC over Time**

		Mean value 10 years ago	Current Mean value	95% Confidence Interval of the Difference		Sig. (2-tailed)
				Lower	Upper	
Pair 1	Q4 – Intra-org. EC	2.84	3.90	.61	1.52	.000**
Pair 2	Q5 – EC w/ customers	2.45	4.55	1.67	2.52	.000**
Pair 3	Q6 – EC w/ suppliers	2.47	3.94	1.02	1.91	.000**
Pair 4	Q7 – EC w/ gov. agencies	2.40	3.94	1.07	2.00	.000**
Pair 5	Q5a – EC w/ customers		4.55	1.23	2.19	.000**
	Q4b – Intra-org. EC	2.84				

\* Significant at the .10 level.

\*\* Significant at the .05 level.

The coefficients from the paired-sample t-tests in Table 7-17 confirm that the mean values of all dimensions are significantly different, and provide evidence that the relevance of various EC uses has increased in the last ten years.

To recap this section, the premises in hypothesis 1 are not fully supported by survey data. While  $H_1P_0$  was not rejected,  $H_1C_0$  was. In other words, despite *EC with customers* being the main use of EC by the end of the period under study, *intra-*

*organizational EC* could not be statistically singled out as the main EC use ten years ago.<sup>115</sup> However, survey analysis made the following observations possible:

1. *Although there are no statistical differences among EC uses ten years ago, of all EC uses, intra-organizational EC seems to have been 'the practice' at the time.*

Statistical tests in Table 7-16 set *intra-organizational EC* apart from *EC with government agencies* ten years ago. Moreover, Cronbach's Alpha coefficients suggest that while *intra-organizational EC* was likely considered a separate use of EC ten years ago, little differentiation existed between *EC with customers* and *EC with suppliers*. Although not definitive, the above evidence suggests that *intra-organizational EC* stood out as an EC use at the beginning of the period under study. Moreover, the pattern of responses in Table 7-15 suggests that EC practice revolved primarily around *intra-organizational EC* at the time.

2. *All uses of EC have gained increasing relevance during the period under study.*

Indeed, the pattern of responses in Table 7-15 and paired-sample t-tests in Table 7-17 confirm that all EC uses are more relevant now than they were ten years ago. Table 7-17 indicates that *EC with customers* presented the greatest increase in relevance over time, followed, in descending order, by *EC with government agencies*, *EC with suppliers* and *intra-organizational EC*. These findings do not signify that *intra-organizational EC* is less important now than it was before, but instead suggest that having developed *intra-organizational EC* to an acceptable level, EC expectations and efforts by companies are now centered around other uses, particularly *EC with customers* and *EC with government agencies*.

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<sup>115</sup> Non statistically-different means do not imply redundancy of two or more variables, but instead the lack of statistical evidence to tell them apart.

3. *EC with customers is the current most relevant use of EC by companies.*

The use of EC, in general, has become a more significant factor for participating companies, with *EC with customers* clearly becoming the most relevant use.

The evidence above leaves no doubt that EC has gained momentum among container shipping companies over the last ten years. In Section 7.6 this study will further explore what influence, if any, EC uses have exerted on the strategic relevance of EC over time and how these uses correlate with other variables.

### **7.3 HYPOTHESIS 2 – MOTIVATIONS FOR THE USE OF EC OVER TIME**

There were ten questions in the survey questionnaire (questions 21 through 30) addressing the issue of competitive motivations for the uses of EC over time. Participants were asked to express their level of agreement with statements as to the importance of each identified motivation. In addition, question 30 provided participants with an opportunity to add any other motivations that they felt were relevant that were not considered in questions 21 to 29. No responses to question 30 were received.

The following table summarizes both the competitive motivations presented to participants, as well as their general classification.

**Table 7-18: General Classification of Competitive Motivations over Time**

Question	EC Motivation	Overall Classification		
		Internal	External	
		Improve efficiencies	Customer-oriented	Other external factors
21a / 21b	To follow our competitors' moves			X
22a / 22b	To penetrate new and/or better service existing markets		X	
23a / 23b	To change the scope of our transportation-related services		X	
24a / 24b	To offer more value-added services to customers		X	
25a / 25b	To respond to customer or market demands		X	
26a / 26b	To improve operational and cost-efficiency	X		
27a / 27b	To improve the marketing of our transportation-related services		X	
28a / 28b	To respond to suppliers' demands			X
29a / 29b	To respond to government demands			X

*Hypothesis 2* forecasted that motivations changed over time from a predominantly internal cost-efficiency focus to more of a customer orientation.

*H<sub>2</sub>: The main motivation for the adoption and use of EC by deep-sea container shipping companies changed over the period under study. The initial focus was on the achievement of cost and operational efficiencies; however the main motivation later became customer-oriented.*

The following null hypotheses are derived from *hypothesis 2*:

*H<sub>2</sub>P<sub>0</sub>: At the beginning of the period under study, the initial focus for the use of EC was not to achieve cost and operational efficiencies.*

*H<sub>2</sub>C<sub>0</sub>: Currently, the main motivation for the use of EC is not customer-oriented.*

### 7.3.1 EC Motivations with the Highest Mean Values Over Time

The majority of respondents agreed that the relevance of EC motivations increased over time. At the beginning of the period under study, Q26b—*improve operational and cost-efficiency* was the motivation with the highest mean among all past

motivations (see Table 7-19). This was followed by Q24b–*offer more value-added services to customers* and Q25b–*respond to customer and market demands* in second and third places, respectively.

**Table 7-19: Descriptive Statistics - EC Motivations Over Time**

		N Valid-Missing	Mean	Std. Error of Mean	Std. Deviation	Variance
10 Y E A R S  A G O	Q21b - Competitive imitation	30 – 1	2.53	.213	1.167	1.361
	Q22b - Penetrate new/ better service existing markets	30 – 1	2.70	.193	1.055	1.114
	Q23b - Change the scope of our services	30 – 1	2.73	.209	1.143	1.306
	Q24b - Offer more value-added services	29 – 2	<b>3.07</b>	.216	1.163	1.352
	Q25b - Respond to customer/market demands	29 – 2	<b>3.03</b>	.225	1.210	1.463
	Q26b- Improve operational and cost-efficiency	29 – 2	<b>3.34</b>	.245	1.317	1.734
	Q27b- Improve marketing of our services	29 – 2	2.97	.225	1.210	1.463
	Q28b - Respond to suppliers' demands	29 – 2	2.31	.173	.930	.865
	Q29b - Respond to government demands	29 – 2	2.66	.200	1.078	1.163
C U R R E N T L Y	Q21a - Competitive imitation	31 - 0	3.29	.251	1.395	1.946
	Q22a - Penetrate new/ better service existing markets	31 - 0	3.84	.203	1.128	1.273
	Q23a - Change the scope of our services	31 - 0	3.65	.205	1.142	1.303
	Q24a - Offer more value-added services	31 - 0	<b>4.42</b>	.111	.620	.385
	Q25a - Respond to customer/market demands	31 - 0	<b>4.45</b>	.091	.506	.256
	Q26a - Improve operational and cost-efficiency	31 - 0	<b>4.35</b>	.151	.839	.703
	Q27a- Improve marketing of our services	30 - 1	4.17	.118	.648	.420
	Q28a - Respond to suppliers' demands	31 - 0	3.23	.226	1.257	1.581
	Q29a - Respond to government demands	31 - 0	3.58	.216	1.205	1.452

As shown in Table 7-19, the top three current motivations are Q25a–*respond to customer/market demands* closely followed by Q24a–*offer more value-added services to customers* and Q26a–*improve operational and cost-efficiency* in second and third place, respectively. Therefore, it can be concluded that Q26b–*improve operational and cost-*

*efficiency* and *Q25a-respond to customer/market demands* are the motivations with the highest mean values over time. These values will be tested for statistical differentiation in the next section. However, before doing so, the pattern of responses (see Table 7-20) outlines an interesting trend worth highlighting at this point.

**Table 7-20: Distribution of Responses - EC Motivations Over Time**

<b>10 YEARS AGO</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Un-decided</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Missing</b>	<b>Total</b>
Q21b- Competitive imitation	1 3.2%	8 25.8%	2 6.5%	14 45.2%	5 16.1%	1 3.2%	31 100%
Q22b- Penetrate new / better service existing markets	1 3.2%	8 25.8%	4 12.9%	15 48.4%	2 6.5%	1 3.2%	31 100%
Q23b- Change the scope of our services	1 3.2%	10 32.3%	2 6.5%	14 45.2%	3 9.7%	1 3.2%	31 100%
Q24b- Offer more value-added services	3 9.7%	10 32.3%	3 9.7%	12 38.7%	1 3.2%	2 6.5%	31 100%
Q25b-Respond to customer /market demands	3 9.7%	10 32.3%	3 9.7%	11 35.5%	2 6.5%	2 6.5%	31 100%
Q26b- Improve operational and cost-efficiency	7 22.6%	8 25.8%	4 12.9%	8 25.8%	2 6.5%	2 6.5%	31 100%
Q27b- Improve marketing of our services	3 9.7%	9 29.0%	3 9.7%	12 38.7%	2 6.5%	2 6.5%	31 100%
Q28b- Respond to suppliers' demands	-	5 16.1%	3 9.7%	17 54.8%	4 12.9%	2 6.5%	31 100%
Q29b- Respond to government demands	1 3.2%	8 25.8%	2 6.5%	16 51.6%	2 6.5%	2 6.5%	31 100%
<b>CURRENTLY</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Un-decided</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Missing</b>	<b>Total</b>
Q21a- Competitive imitation	7 22.6%	11 35.5 %	-	10 32.3 %	3 9.7 %	-	31 100%
Q22a- Penetrate new/ better service existing markets	9 29.0 %	15 48.4 %	1 3.2 %	5 16.1 %	1 3.2 %	-	31 100%
Q23a- Change the scope of our services	6 19.4 %	17 54.8 %	-	7 22.6 %	1 3.2 %	-	31 100%
Q24a- Offer more value-added services	15 48.4%	14 45.2 %	2 6.5 %	-	-	-	31 100%
Q25a-Respond to customers / market demands	14 45.2 %	17 54.8 %	-	-	-	-	31 100%
Q26a- Improve operational and cost-efficiency	16 51.6%	12 38.7%	1 3.2%	2 6.5%	-	-	31 100%
Q27a- Improve marketing of our services	8 25.8%	20 64.5%	1 3.2%	1 3.2%	-	1 3.2%	31 100%
Q28a- Respond to suppliers' demands	3 9.7%	16 51.6%	-	9 29.0%	3 9.7%	-	31 100%
Q29a- Respond to government demands	7 22.6%	14 45.2%	1 3.2%	8 25.8%	1 3.2%	-	31 100%

Table 7-20 suggests that the relevance of EC motivations has increased over time.

In addition, respondents consistently rated a combination of the need to achieve internal



operational efficiencies with customer-oriented motivations over time as the most relevant motivations for the use of EC. On the other hand, supplier demands were consistently rated as the least relevant EC motivation over time.

### 7.3.2 Tests for Statistical Differentiation

To obtain an indication of whether the mean values of the main motivations for EC use are different from other motivations in their respective time periods, paired-sample t-tests for statistical significance were applied. Significance coefficients in Table 7-21 are not able to isolate either Q26b-*improve operational and cost-efficiency* or Q25a-*respond to customer/market demands* as the most significant motivations over time.

**Table 7-21: Paired-sample T-tests of EC Motivators Over Time**

EC motivation with the highest mean over time	Other EC motivations over time	Sig.
10 Years Ago Q26b - Improve operational and cost-efficiency (Mean: 3.34)	Q21b- Competitive imitation (Mean: 2.53)	.005**
	Q22b- Penetrate new/ better service existing markets (Mean: 2.70)	.005**
	Q23b- Change the scope of our services (Mean: 2.73)	.014**
	Q24b- Offer more value-added services (Mean: 3.07)	.223
	Q25b- Respond to customer / market demands (Mean: 3.03)	.142
	Q27b- Improve marketing of our services (Mean: 2.97)	.102
	Q28b- Respond to suppliers' demands (Mean: 2.31)	.000**
	Q29b- Respond to government demands (Mean: 2.66)	.007**
Currently Q25a - Respond to customer / market demands (Mean: 4.45)	Q21a- Competitive imitation (Mean: 3.29)	.000**
	Q22a- Penetrate new/ better service existing markets (Mean: 3.84)	.004**
	Q23a- Change the scope of our services (Mean: 3.65)	.000**
	Q24a- Offer more value-added services (Mean: 4.42)	.712
	Q26a- Improve operational and cost-efficiency (Mean: 4.35)	.522
	Q27a- Improve marketing of our services (Mean: 4.17)	.030**
	Q28a- Respond to suppliers' demands (Mean: 3.23)	.000**
	Q29a- Respond to government demands (Mean: 3.58)	.000**

\* Significant at the .10 level.

\*\* Significant at the .05 level.

As a result, both null hypotheses  $H_2P_0$  and  $H_2C_0$  cannot be rejected and *hypothesis 2* is found to be invalid. Despite the lack of statistical differentiation, the past and current

EC motivations with the highest mean values over time are of interest in this exploratory study, as they may impact, individually or collectively, the strategic relevance of EC over time.

Interestingly, the Cronbach's Alpha suggests that there was great homogeneity between Q26b- *improve operational and cost-efficiency* and a group of customer-oriented motivations ten years ago (i.e., Q24b- *offer more value-added services*, Q25b- *respond to customer / market demands* and Q27b- *improve marketing of our services*), and presently between Q25a- *respond to customer / market demands* and Q24a- *offer more value-added services*. In other words, while EC customer-oriented motivations tended to blend in with internal and operational ones ten years ago, by the end of the period under study, customer-oriented motivations stood apart from operational matters. Q25a- *respond to customer / market demands* and Q24a- *offer more value-added services*, however, are increasingly perceived as homogeneous motivations.

### **7.3.3 Relevance of EC Motivations Over Time & Main Findings**

EC motivations were tested using paired sample t-test comparisons at the 10% significance level. This assessment of mean differences was undertaken to respond to one fundamental question, namely *has there been any significant change in how each motivation is perceived over time?* The mean comparisons (see Table 7-22) were made in two main dimensions, as follows:

- (a) The mean value of each EC motivation over time (pairs 1 to 9); and
- (b) The mean value of the EC use with the highest mean over time (pair 10).

A simple visual assessment of all means reveals that values ten years ago are notably lower than current values, suggesting that they are substantially different, as

confirmed by significance coefficients in the far right column of Table 7-22. Moreover, larger current means also reveal that all motivations are currently perceived as more relevant than ten years ago as confirmed by the upper and lower values of the confidence interval in Table 7-22. Interestingly, the greatest shift relates to four customer-oriented motivations, that is, in descending order: Q25– *respond to customer/market demands*, Q24– *offer more value-added services*, Q27– *improve marketing of our services* and Q22– *penetrate new markets or better service existing ones*. On the other hand, the smallest increase was shown by Q21– *competitive imitation*.

**Table 7-22: Paired Sample T-tests – Motivations for the Use of EC Over Time**

		Mean value 10 years ago	Current Mean value	95% Confidence Interval of the Difference		Sig. (2-tailed)
				Lower	Upper	
Pair 1	Q21 - Competitive imitation	2.53	3.29	.34	1.12	.001**
Pair 2	Q22 - Penetrate new/ better service existing markets	2.70	3.84	.77	1.50	.000**
Pair 3	Q23 - Change the scope of our services	2.73	3.65	.45	1.35	.000**
Pair 4	Q24 - Offer more value-added services	3.07	4.42	.96	1.73	.000**
Pair 5	Q25 – Respond to customer/market demands	3.03	4.45	1.04	1.79	.000**
Pair 6	Q26- Improve operational and cost-efficiency	3.34	4.35	.62	1.45	.000**
Pair 7	Q27- Improve marketing of our services	2.97	4.17	.83	1.67	.000**
Pair 8	Q28 - Respond to suppliers' demands	2.31	3.23	.47	1.25	.000**
Pair 9	Q29 - Respond to government demands	2.66	3.58	.50	1.50	.000**
Pair 10	Q25a– Respond to customer/market demands		4.45	.66	1.55	.000**
	Q26b- Improve operational and cost-efficiency	3.34				

\* Significant at the .10 level.

\*\* Significant at the .05 level.

To sum up the section on EC motivations over time, the tests for *hypothesis 2* found that statistical tests failed to isolate either Q25a– *respond to customer/market demands* or Q26b–*improve operational and cost-efficiency* from other EC motivations and

on this basis, *hypothesis 2* was rejected. Nonetheless, the following observations are possible:

1. *Operational efficiencies and customer-oriented motivations have been among the most common motivations over time.*

Indeed, the pattern of responses in Table 7-20 shows that respondents have consistently rated the need to improve internal operational efficiencies and customer-oriented motivations over time as key motivations for the use of EC. Supplier demands, on the other hand, were shown to be the least important motivating factor over time.

2. *Over time, customer-oriented motivations became easier to differentiate from motivations to improve internal efficiencies.*

Interestingly, Cronbach's Alpha suggested that ten years ago there was great homogeneity between Q26b- *improve operational and cost-efficiency* and a group of customer-oriented motivations (i.e., Q24b- *offer more value-added services*, Q25b- *respond to customer/market demands* and Q27b- *improve marketing of our services*). By the end of the period under examination, homogeneity was only apparent between Q25a- *respond to customer/market demands* and Q24a- *offer more value-added services*.

3. *The intensity with which competitive motivations are pursued has increased over time.*

As shown in Table 7-22, there has been a substantial increase in the relevance of customer-oriented EC motivations as a means to improve business relationships with customers. While the greatest increase relates to four customer-oriented motivations (i.e., Q25- *respond to customer/market demands*, Q24- *offer more value-added services*, Q27- *improve marketing of our services* and Q22- *penetrate new markets or better service existing ones*), the smallest increase was for Q21- *competitive imitation*.

Although no clear motivation could be singled out as the most important in the two time periods examined, results derived from testing *hypothesis 2* clearly indicate that the relevance of EC motivations has substantially increased over time. In Section 7.6, this study will continue to explore the effects, if any, of various EC motivations on the strategic relevance of EC over time and will further examine whether the achievement of internal efficiencies is in effect linked to customer-oriented EC motivations over time, and if so, why.

#### 7.4 HYPOTHESIS 3 – BARRIERS FOR THE USE OF EC OVER TIME

Based on the literature review, eight specific questions (Q31 to Q38) were presented to participants, each one outlining a major potential constraint limiting the use of EC over time (see Table 7-23).

**Table 7-23: Nature of Barriers Over Time**

Question	EC Barrier	Primary nature of barriers			
		Technical	Financial	Legal & policy-related	Behavioural
31a / 31b	Inappropriate infrastructure and communication systems	X			
32a / 32b	Inappropriate in-house expertise	X			
33a / 33b	Deficient security standards	X			
34a / 34b	High investment costs		X		
35a / 35b	Lack of critical mass	X	X	X	X
36a / 36b	Inadequate legal regime			X	
37a / 37b	Inadequate EC government policies			X	
38a / 38b	Reluctance to change paper-based practices	X	X	X	X

Question 39 provided respondents with the chance to include any other barriers that they felt were significant. The lack of meaningful responses to question Q39 prompted its exclusion from this analysis.

*Hypothesis 3* anticipates that EC barriers have shifted from technical and financial to legal and policy framework-related factors.

*H<sub>3</sub>: The most relevant barriers for the adoption and use of EC by deep-sea container shipping companies changed over the period under study. They shifted from infrastructure and investment costs at the beginning of the period under study, to the inadequacy of EC-enabling government policies and legal aspects at the end of the period under study.*

The following null hypotheses for testing are derived from *hypothesis 3*:

*H<sub>3</sub>P<sub>0</sub>: At the beginning of the period under study, the most relevant barrier for the use of EC was not related to infrastructure or investment costs.*

*H<sub>3</sub>C<sub>0</sub>: Currently, the most relevant barrier for the use of EC is not the inadequacy of EC-enabling government policies and legal aspects.*

#### **7.4.1 EC Barriers with the Highest Mean Values Over Time**

As shown in Table 7-24, the means of all EC constraints ten years ago were above the value 3 with the highest mean reaching 4.10 for Q35b-*lack of critical mass*. The second and third highest means were for Q38b-*reluctance to change* with 4.07, and Q31b-*inappropriate EC infrastructure*, with 3.93, respectively. On the other hand, means for current EC barriers are lower than ten years ago. The top four highest means were for, in descending order, Q38a-*reluctance to change paper-based practices*, Q37a-*inappropriate EC-related government policies*, Q34a-*high investment costs* and Q33a-*deficient security standards*.

**Table 7-24: Descriptive Statistics - EC Constraints Over Time**

		N	Mean	Std. Error	Std.	Variance
		Valid-Missing		of Mean	Deviation	
10 Y E A R S  A G O	Q31b – Inappropriate Infrastructure	29 - 2	<b>3.93</b>	.198	1.067	1.138
	Q32b - Inappropriate in-house expertise	29 - 2	3.52	.214	1.153	1.330
	Q33b - Deficient security standards	29 - 2	3.62	.219	1.178	1.387
	Q34b - High investment costs	29 - 2	3.59	.219	1.181	1.394
	Q35b - Lack of critical mass	29 - 2	<b>4.10</b>	.152	.817	.667
	Q36b - Inadequate legal regime	29 - 2	3.41	.214	1.150	1.323
	Q37b - Inadequate EC government policies	29 - 2	3.45	.214	1.152	1.328
	Q38b - Reluctance to change paper-based practices	29 - 2	<b>4.07</b>	.185	.998	.995
C U R R E N T L Y	Q31a - Inappropriate infrastructure	30 - 1	2.73	.209	1.143	1.306
	Q32a - Inappropriate in-house expertise	30 - 1	2.63	.232	1.273	1.620
	Q33a - Deficient security standards	31 - 0	<b>2.84</b>	.232	1.293	1.673
	Q34a - High investment costs	31 - 0	<b>2.84</b>	.228	1.267	1.606
	Q35a - Lack of critical mass	30 - 1	2.63	.237	1.299	1.689
	Q36a - Inadequate legal regime	31 - 0	2.74	.197	1.094	1.198
	Q37a - Inadequate EC government policies	30 - 1	<b>2.93</b>	.191	1.048	1.099
	Q38a - Reluctance to change paper-based practices	30 - 1	<b>3.17</b>	.215	1.177	1.385

These results point to Q35b-*lack of critical mass* and Q38a- *reluctance to change* as the past and current EC constraints with the highest mean values respectively. The pattern of responses in Table 7-25 adds clarity to these findings. They suggest that the means are not swayed by a couple of outliers, and also highlight the fact that, contrary to EC uses and motivations, EC barriers were more strongly felt ten years ago than they are currently.

Table 7-25: Distribution of Responses - EC Constraints Over Time

<b>10 YEARS AGO</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Un-decided</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Missing</b>	<b>Total</b>
Q31b - Inappropriate infrastructure	10 32.3%	12 38.7%	2 6.5%	5 16.1%	-	2 6.5%	31 100%
Q32b - Inappropriate in-house expertise	4 12.9%	16 51.6%	2 6.5%	5 16.1%	2 6.5%	2 6.5%	31 100%
Q33b - Deficient security standards	7 22.6%	12 38.7%	3 9.7%	6 19.4%	1 3.2%	2 6.5%	31 100%
Q34b - High investment costs	5 16.1%	16 51.6%	1 3.2%	5 16.1%	2 6.5%	2 6.5%	31 100%
Q35b - Lack of critical mass	9 29.0%	16 51.6%	2 6.5%	2 6.5%	-	2 6.5%	31 100%
Q36b - Inadequate legal regime	4 12.9%	14 45.2%	2 6.5%	8 25.8%	1 3.2%	2 6.5%	31 100%
Q37b - Inadequate EC government policies	5 16.1%	12 38.7%	4 12.9%	7 22.6%	1 3.2%	2 6.5%	31 100%
Q38b - Reluctance to change paper-based practices	11 35.5%	13 41.9%	1 3.2%	4 12.9%	-	2 6.5%	31 100%
<b>CURRENTLY</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Un-decided</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Missing</b>	<b>Total</b>
Q31a - Inappropriate infrastructure	2 6.5%	8 25.8%	2 6.5%	16 51.6%	2 6.5%	1 3.2%	31 100%
Q32a - Inappropriate in-house expertise	2 6.5%	9 29.0%	-	14 45.2%	5 16.1%	1 3.2%	31 100%
Q33a - Deficient security standards	3 9.7%	10 32.3%	1 3.2%	13 41.9%	4 12.9%	-	31 100%
Q34a - High investment costs	3 9.7%	10 32.3%	-	15 48.4%	3 9.7%	-	31 100%
Q35a - Lack of critical mass	3 9.7%	7 22.6%	1 3.2%	14 45.2%	5 16.1%	1 3.2%	31 100%
Q36a - Inadequate legal regime	-	12 38.7%	2 6.5%	14 45.2%	3 9.7%	-	31 100%
Q37a - Inadequate EC government policies	1 3.2%	11 35.5%	4 12.9%	13 41.9%	1 3.2%	1 3.2%	31 100%
Q38a - Reluctance to change paper-based practices	3 9.7%	13 41.9%	1 3.2%	12 38.7%	1 3.2%	1 3.2%	31 100%

#### 7.4.2 Tests for Statistical Differentiation

Paired-sample t-tests at the 10% significance level were applied to verify whether the constraints with the highest means differed from others in their respective time frames. The results indicated that although different from most, Q35b-*lack of critical mass* cannot be statistically differentiated from the other past barriers. Similarly, significance coefficients failed to statistically differentiate between Q38a-*reluctance to change* and all of the remaining current constraints.



**Table 7-26: Paired-sample T-tests of EC Barriers Over Time**

EC barrier with the highest mean over time	Other EC barriers over time	Sig.
<i>10 Years Ago</i> Q35b - Lack of critical mass (Mean: 4.10)	Q31b- Inappropriate infrastructure (Mean: 3.93)	.421
	Q32b- Inappropriate in-house expertise (Mean: 3.52)	.001**
	Q33b- Deficient security standards (Mean: 3.62)	.020**
	Q34b- High investment costs (Mean: 3.59)	.009**
	Q36b- Inadequate legal regime (Mean: 3.41)	.001**
	Q37b- Inadequate EC government policies (Mean: 3.45)	.001**
	Q38b- Reluctance to change paper-based practices (Mean: 4.07)	.846
<i>Currently</i> Q38a - Reluctance to change paper-based practices (Mean: 3.17)	Q31a- Inappropriate infrastructure (Mean: 2.73)	.130
	Q32a- Inappropriate in-house expertise (Mean: 2.63)	.065*
	Q33a- Deficient security standards (Mean: 2.84)	.177
	Q34a- High investment costs (Mean: 2.84)	.141
	Q35a- Lack of critical mass (Mean: 2.63)	.043**
	Q36a- Inadequate legal regime (Mean: 2.74)	.020**
	Q37a- Inadequate EC government policies (Mean: 2.93)	.316

\* Significant at the .10 level.

\*\* Significant at the .05 level.

These results trigger the non-rejection of both null hypotheses  $H_3P_0$  and  $H_3C_0$  and renders *hypothesis 3* invalid.

Interestingly, Cronbach's Alpha coefficients suggest that while at the beginning of the period under study Q35b- *lack of critical mass*, Q31b- *inappropriate infrastructure* and Q38b- *reluctance to change paper-based practices* were likely seen as homogeneous barriers, by the end of the period under study it was Q38a- *reluctance to change paper-based practices* which was likely homogeneous with Q34a- *high investment costs* and Q37a- *inadequate EC government policies*. These findings lead to the interpretation that ten years ago, the perceived lack of critical mass was associated with infrastructural and technical problems, as well as with the reluctance to change paper-based practices. Similarly, the current reluctance to change traditional paper-based practices also seems to be influenced by financial constraints and by the inadequacy of EC-related government policies.

### 7.4.3 Relevance of EC Barriers Over Time & Main Findings

To examine changes in perceptions over time, paired-sample t-tests were performed in the same dimensions as previously in Sections 7.2.3 and 7.3.3 on pages 229 and 236, respectively, including:

- (a) The mean value of each EC barrier over time (pairs 1 to 8 in Table 7-27); and
- (b) The mean value of the EC barrier with the highest mean over time (pair 9 in Table 7-27).

**Table 7-27: Paired Sample T-tests – EC Barriers Over Time**

		Mean value 10 years ago	Current Mean value	95% Confidence Interval of the Difference		Sig. (2-tailed)
				Lower	Upper	
Pair 1	Q31 - Inappropriate infrastructure	3.93	2.73	-1.79	-.70	.000**
Pair 2	Q32 - Inappropriate in-house expertise	3.52	2.63	-1.38	-.48	.000**
Pair 3	Q33 - Deficient security standards	3.62	2.84	-1.37	-.36	.002**
Pair 4	Q34 - High investment costs	3.59	2.84	-1.34	-.32	.002**
Pair 5	Q35 - Lack of critical mass	4.10	2.63	-2.00	-1.03	.000**
Pair 6	Q36 – Inadequate legal regime	3.41	2.74	-1.20	-.32	.001**
Pair 7	Q37 – Inadequate EC government policies	3.45	2.93	-.97	-.14	.011**
Pair 8	Q38 – Reluctance to change paper-based practices	4.07	3.17	-1.51	-.36	.003**
Pair 9	Q35b - Lack of critical mass	4.10		-1.46	-.47	.000**
	Q38a - Reluctance to change paper-based practices		3.17			

\* Significant at the .10 level.

\*\* Significant at the .05 level.

T-test results of all dimensions in Table 7-27 confirm the following findings: (a) there has been a change in perceived barriers over time; (b) unlike EC uses and motivations, the direction of the perceived change is towards diminishing EC barriers over time; and (c) the EC barriers whose importance have diminished the most are Q35-

*lack of critical mass*, followed by Q31- *inappropriate infrastructure* and Q38- *reluctance to change paper-based practices*.

To sum up, survey data do not lend support to the main postulates of *hypothesis 3* because there was no statistical differentiation between the barriers with the highest means and other barriers in their time period, as demonstrated in Section 7.4.2. However, the testing process revealed the following findings:

1. *It is apparent that some of the key EC barriers over time continue to be related to the operational use of EC, as opposed to its commercial potential.*

Cronbach's Alpha suggests that ten years ago *lack of critical mass* and *reluctance to abandon paper-based practices* were likely perceived as homogeneous barriers. More importantly, these coefficients also suggest that a key reason behind the lack of critical mass and the reluctance to change paper-based practices was inadequate EC-related infrastructure. Similarly, currently, Cronbach's Alpha suggests that a key reason for the perceived *reluctance to abandon paper-based practices* is financial. Interestingly, *inadequate EC-related government policies* are beginning to be seen as an additional reason for the reluctance to change.

2. *The intensity with which factors are seen as barriers to EC by container shipping companies has diminished over time.*

This is demonstrated in Table 7-27, which shows that the EC barriers whose importance diminished the most were Q35- *lack of critical mass*, followed by Q31- *inappropriate infrastructure* and Q38- *reluctance to change paper-based practices*.

Despite the fact that survey data did not support the identification of the main EC barriers over time, the testing of *hypothesis 3* provided other insights such as the decreasing importance of EC barriers over time and a clear indication as to which specific

barriers have diminished the most. It is important in this exploratory study to examine how, if at all, decreasing barriers over time affect the strategic relevance of EC and what can be learned from this.

## 7.5 HYPOTHESIS 4—STRATEGIC RELEVANCE OF THE USE OF EC

There are three sets of questions crafted to examine the strategic relevance of EC over time, namely current relevance (questions 8, 9, 12 and 13), relevance ten years ago (questions 10, 17 and 18) and changes in perception over time (questions 11, 19 and 20).

*Hypothesis 4* foresees that the strategic relevance of EC has changed over time as follows:

*H<sub>4</sub>: At the beginning of the period under study, firms viewed EC as having limited strategic relevance in the definition of business goals; however, this relevance progressively changed to become an important consideration by the end of the period under study.*

For the purposes of survey analysis, the following null hypotheses derive from *hypothesis 4*:

*H<sub>4</sub>P<sub>0</sub>: At the beginning of the period under study, EC did not play a relevant role in the achievement of commercial goals.*

*H<sub>4</sub>C<sub>0</sub>: Currently, EC does not play a relevant role in the identification of commercial goals.*

*H<sub>4</sub>E<sub>0</sub>: The perceived strategic relevance of EC has not changed in the last ten years.*

The rationale to assess whether EC plays the role of a strategic driver or a tactical tool is very simple and is based on a widely recognized strategic management principle: *the identification of commercial goals is intrinsic to the strategy formulation process*. On this basis, the strategic relevance of EC was defined as *the intrinsic tactical or strategic significance, purposely or inadvertently attached to the company's EC decisions or actions*. So, the more relevant EC becomes for the identification of commercial goals, the

closer it comes to the role of a driver in strategy formulation. Thus, if EC is perceived to be playing a key role in the identification of such goals, or if there is a formal strategy to this end, EC could be regarded as a strategic driver in strategy formulation. If however, EC is used primarily to help achieve commercial goals, then its role should be construed as a tactical tool in strategy implementation.

The testing of *hypothesis 4* should clarify three main aspects, namely the strategic relevance of EC at the beginning of the period under study (Section 7.5.1), the current strategic relevance of EC (Section 7.5.2) and the perceived change over time (Section 7.5.3).

#### **7.5.1 Strategic Relevance of EC 10 Years Ago**

Questions 10, 17 and 18 contained statements crafted to measure whether the significance of EC ten years ago primarily revolved around achieving commercial goals, or identifying them. Significant agreement with these statements (see Q10, Q17 and Q18 below) would indicate that EC is perceived to have played a primary role in strategy implementation ten years ago.

*Q10: Ten years, EC did not play any relevant role in the identification of commercial goals in this company;*

*Q17: Ten years ago, EC was only seen as a type of technology that helped achieve operational goals;*

*Q18: Ten years ago, EC was not a key consideration in relation to our product and market scope.*

There was substantial agreement with the statements in the afore-mentioned questions. Q17- *Ten years ago, EC was only seen as a type of technology that helped achieve operational goals* attained the highest mean value, while Q10-*Ten years ago, EC did not play any relevant role in the identification of commercial goals in this company*

and Q18-Ten years ago, EC was not a key consideration in relation to our product and market scope, the second and third highest means, respectively (see Table 7-28).

**Table 7-28: Descriptive Statistics - EC Strategic Relevance 10 Years Ago**

	N Valid - Missing	Mean	Std. Error of Mean	Std. Deviation	Variance
<b>Q10</b>	31 – 0	<b>3.71</b>	.228	1.270	1.613
<b>Q17</b>	31 – 0	<b>3.84</b>	.140	.779	.606
<b>Q18</b>	31 – 0	<b>3.65</b>	.177	.985	.970

Q10- EC did not play any relevant role in the identification of commercial goals in this company

Q17- EC was only seen as a type of technology that helped achieve operational goals

Q18- EC was not a key consideration in relation to our product and market scope

Unlike with EC uses, motivations and barriers, here the relevance of the relative order of the mean values is overshadowed by the group trend. In other words, the fundamental question here is not which of these questions ranks first, but whether the majority of respondents saw EC as playing a key role in the achievement of commercial goals ten years ago. A Chi-Square test will be used to examine whether a substantial number of participants agreed that EC played a key role in strategy implementation as opposed to strategy formulation ten years ago. This will be done by rejecting the null assumption that responses to Q10, Q17, and Q18 are equally distributed in the three groups i.e., participants who agreed, disagreed or were undecided about the contents of each question. To proceed with this test, the re-grouping of survey answers is necessary. This is done by recoding values 1 and 2 as ‘in disagreement’, 4 and 5 as ‘in agreement’ and 3 as ‘undecided’.

As shown in Table 7-29, the residual factors for each question do not support the assumption that answers are equally distributed. More specifically, residual factors show that for Q10, Q17 and Q18 the frequency of the ‘in agreement’ group is higher than in all

other groups. Moreover, the significance coefficients in Table 7-30 confirm that it is highly unlikely that the results in Table 7-29 are due to chance.

**Table 7-29: Chi-Square NPar Frequency Test - Strategic Relevance of EC 10 Years Ago**

		In Disagreement	Undecided	In Agreement	Total
<b>Q10</b>	Observed N	7	-	24	31
	Expected N	15.5	-	15.5	
	Residual	-8.5	-	8.5	
<b>Q17</b>	Observed N	2	3	26	31
	Expected N	10.3	10.3	10.3	
	Residual	-8.3	-7.3	15.7	
<b>Q18</b>	Observed N	6	1	24	31
	Expected N	10.3	10.3	10.3	
	Residual	-4.3	-9.3	13.7	

Q10- EC did not play any relevant role in the identification of commercial goals in this company

Q17- EC was only seen as a type of technology that helped achieve operational goals

Q18- EC was not a key consideration in relation to our product and market scope

**Table 7-30: Chi-Square Statistics - Strategic Relevance of EC 10 Years Ago**

	Chi-Square Stats	df	Asymp. Sig.
<b>Q10</b>	9.323	1	.002**
<b>Q17</b>	35.677	2	.000**
<b>Q18</b>	28.323	2	.000**

\*\* Significant at the .05 level.

Q10- EC did not play any relevant role in the identification of commercial goals in this company

Q17- EC was only seen as a type of technology that helped achieve operational goals

Q18- EC was not a key consideration in relation to our product and market scope

Consequently, there is evidence pointing to the general perception among survey respondents that EC played a key role in the achievement, as opposed to the identification, of commercial goals ten years ago. With this the null hypothesis  $H_4P_0$  is rejected.

### 7.5.2 Current Strategic Relevance of EC

Participants were presented with four statements and were asked to express their level of agreement or disagreement with them.

- Q8: EC is very relevant for the identification of commercial goals in this company;*
- Q9: Not using EC today will drive us out of business in the near future;*
- Q12: EC is making us rethink the scope and range of services this company provides;*
- Q13: This company has established, or is in the process of establishing, a formal EC business strategy.*

These questions seek to measure the perceived role of EC in strategy formulation, that is, in the identification of commercial goals. The high rate of agreement with questions 8, 9, 12 and 13 boosted mean values significantly over 3, the mid point of the SES scale used to rate attributes. These mean values (see Table 7-31) can be arranged in descending order as follows: Q9-*Not using EC today will drive us out of business in the near future*, with the highest mean, Q8-*EC is very relevant for the identification of commercial goals in this company* and Q13-*This company has established, or is in the process of establishing, a formal EC business strategy*, with the second highest means, and lastly, Q12-*EC is making us rethink the scope and range of services this company provides*, with the lowest relative mean value.

**Table 7-31: Descriptive Statistics – Current EC Strategic Relevance**

	N Valid - Missing	Mean	Std. Error of Mean	Std. Deviation	Variance
<b>Q8</b>	30 – 1	<b>3.87</b>	.202	1.106	1.223
<b>Q9</b>	31 – 0	<b>3.97</b>	.194	1.080	1.166
<b>Q12</b>	31 – 0	<b>3.71</b>	.175	.973	.946
<b>Q13</b>	31 – 0	<b>3.87</b>	.201	1.118	1.249

Q8 - EC is very relevant for the identification of commercial goals

Q9 - Not using EC today will drive us out of business in the near future

Q12 - EC is making us rethink the scope and range of services this company provides

Q13 - This company has established, or is in the process of establishing, a formal EC business strategy



Chi-Square tests were applied to examine the assumption that answers to Q8, Q9, Q12 and Q13 were equally distributed among the three groups, i.e., participants who agreed, disagreed or were undecided about the content of each question.

The results of the Chi-Square tests in Tables 7-32, indicate that the frequency of responses to Q8, Q9, Q12 and Q13 is unequal, with the 'in agreement' group consistently receiving more responses than the other two groups. Table 7-33 shows that the results in Table 7-32 are not likely due to chance.

**Table 7-32: Chi-Square NPar Frequency Test - Current Strategic Relevance of EC**

		In Disagreement	Undecided	In Agreement	Total
<b>Q8</b>	Observed N	6	2	22	30
	Expected N	10.0	10.0	10.0	
	Residual	-4.0	-8.0	12.0	
<b>Q9</b>	Observed N	6	-	25	31
	Expected N	15.5	-	15.5	
	Residual	-9.5	-	9.5	
<b>Q12</b>	Observed N	5	5	21	31
	Expected N	10.3	10.3	10.3	
	Residual	-5.3	-5.3	10.7	
<b>Q13</b>	Observed N	6	3	22	31
	Expected N	10.3	10.3	10.3	
	Residual	-4.3	-7.3	11.7	

Q8 - EC is very relevant for the identification of commercial goals

Q9 - Not using EC today will drive us out of business in the near future

Q12 - EC is making us rethink the scope and range of services this company provides

Q13 - This company has established, or is in the process of establishing, a formal EC business strategy

**Table 7-33: Chi-Square Statistics - Current Strategic Relevance of EC**

	Chi-Square Stats	df	Asymp. Sig.
<b>Q8</b>	22.400	2	.000**
<b>Q9</b>	11.645	1	.001**
<b>Q12</b>	16.516	2	.000**
<b>Q13</b>	20.194	2	.000**

\*\* Significant at the .05 level.

Q8 - EC is very relevant for the identification of commercial goals

Q9 - Not using EC today will drive us out of business in the near future

Q12 - EC is making us rethink the scope and range of services this company provides

Q13 - This company has established, or is in the process of establishing, a formal EC business strategy

Thus, it is argued that the general perception of survey respondents is that EC is currently playing an important role in strategy formulation. Consequently, the null hypothesis  $H_4C_0$  is rejected.

### 7.5.3 Change in the Strategic Relevance of EC over Time

So far findings in Sections 7.5.1 and 7.5.2 confirm that EC played different strategic roles over time. However, is there a perception of change over time? Three separate questions were included in the survey questionnaire in order to answer this question. Q11, Q19 and Q20 were designed to examine whether there is consistency among the results obtained in the previous two sections. These questions read as follows:

*Q11: The strategic value of EC to this company has increased compared to 10 years ago;*

*Q19: In this company, the strategic relevance of EC with customers has increased compared to 10 years ago;*

*Q20: In this company, the strategic relevance of EC is not similar to 10 years ago (reversed<sup>116</sup>).*

The general agreement with questions 11, 19 and 20 suggests that the perceived direction of change is towards an increased relevance of EC over time. This high level of consensus translated into high means with relatively small differences in their values (see Table 7-34). The highest mean was for Q11-*The strategic value of EC to this company has increased compared to 10 years ago*, followed by Q19-*In this company, the strategic relevance of EC with customers has increased compared to 10 years ago* and Q20-*In this company, the strategic relevance of EC is not similar to 10 years ago*.

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<sup>116</sup> The survey questionnaire asked participants if they agreed with the view that the strategic relevance of EC was similar to 10 years ago. For analytical purposes, however, both Q20 and answers to it have been reversed to answer the opposite query.

**Table 7-34: Descriptive Statistics - Change in the Strategic Relevance of EC Over Time**

	N Valid-Missing	Mean	Std. Error of Mean	Std. Deviation	Variance
<b>Q11</b>	31 – 0	<b>4.68</b>	.097	.541	.292
<b>Q19</b>	31 – 0	<b>4.52</b>	.102	.570	.325
<b>Q20</b>	31 – 0	<b>4.00</b>	.180	1.000	1.000

Q11 - The strategic value of EC to this company has increased compared to 10 years ago

Q19 - In this company, the strategic relevance of EC with customers has increased compared to 10 years ago

Q20- In this company, the strategic relevance of EC is not similar to 10 years ago

The results of the Chi-Square test in Table 7-35 and the significance coefficients in Table 7-36, demonstrated that the 'in agreement' group was substantially larger than the other two and that this is unlikely to have happened by chance.

**Table 7-35: Chi-Square NPar Frequency Test--Change in the Strategic Relevance of EC Over Time**

		In Disagreement	Undecided	In Agreement	Total
<b>Q11</b>	Observed N	-	1	30	31
	Expected N	-	15.5	15.5	
	Residual	-	-14.5	<b>14.5</b>	
<b>Q19</b>	Observed N	-	1	30	31
	Expected N	-	15.5	15.5	
	Residual	-	-14.5	<b>14.5</b>	
<b>Q20</b>	Observed N	3	3	25	31
	Expected N	10.3	10.3	10.3	
	Residual	-7.3	-7.3	<b>14.7</b>	

Q11 - The strategic value of EC to this company has increased compared to 10 years ago

Q19 - In this company, the strategic relevance of EC with customers has increased compared to 10 years ago

Q20- In this company, the strategic relevance of EC is not similar to 10 years ago

**Table 7-36: Chi-Square Statistics - Change in the Strategic Relevance of EC Over Time**

	Chi-Square Stats	df	Asymp. Sig.
<b>Q11</b>	27.129	1	<b>.000**</b>
<b>Q19</b>	27.129	1	<b>.000**</b>
<b>Q20</b>	31.226	2	<b>.000**</b>

\*\* Significant at the .05 level.

Q11 - The strategic value of EC to this company has increased compared to 10 years ago

Q19 - In this company, the strategic relevance of EC with customers has increased compared to 10 years ago

Q20- In this company, the strategic relevance of EC is not similar to 10 years ago

The results of the Chi-Square test lend support to the rejection of the null hypothesis  $H_4E_0$ . It is concluded therefore that the survey *hypothesis 4* holds up. In other words, survey data suggest that at the beginning of the period under study EC was primarily perceived to play the role of a tactical tool in strategy implementation. This role changed over time, however, and by the end of the period under study, EC increased its importance in the commercial goal-setting process, thus becoming a strategic driver.

Section 7.6 will interpret some of the main findings so far in order to address this study's *central hypothesis*.

## 7.6 THE CENTRAL HYPOTHESIS

After testing *hypotheses 1* to *4*, this part of the analysis will concentrate on examining whether survey data support the *central hypothesis* of the study:

*H<sub>C</sub>: As the main motivations for the use of EC by deep-sea container shipping companies became more customer-oriented, the perceived role of EC shifted from being a tactical tool in the implementation of business strategy to being a strategic driver in its formulation.*

The above hypothesis integrates various assumptions that then become conditions to test its validity, namely:

- (a) That there has been a change over time in both the motivations for the use of EC and the strategic relevance of EC;
- (b) That the direction of these changes is consistent with the postulates of the *central hypothesis*; and
- (c) That there is a relationship between changing EC motivations and the changing strategic relevance of EC.

These conditions give rise to the following criteria to be tested:

1. *Hypotheses 2 and 4* are upheld; and
2. Regression analysis shows a relationship between customer-oriented motivations over time and the role of EC as a driver in strategy formulation.

So far it is known that the first criterion has not been fulfilled, since *hypothesis 2* was not upheld. Thus, the fact that no main motivations over time can be statistically singled out, technically means that the *central hypothesis* should be rejected.

However, as previously argued in Section 7.3.3 on page 236, findings from the testing of *hypothesis 2* encouraged the researcher to examine the impacts of EC motivations on strategic management over time. As the very essence of the *central hypothesis* is to test whether customer-oriented motivations account for the increasing strategic role of EC, the latter becomes the chief focus of the remaining part of this survey analysis.

Consequently, the balance of this chapter will examine whether customer-oriented motivations explain the increasing strategic relevance of EC over time. To this end, a backward method for the selection of variables in linear regression analysis<sup>117</sup> will be used to test two EC models for the interaction of dependent and independent variables. These models are described as follows:

*Initial EC Model:* This is based on the assumption that independent variables depicted as the main or most common EC uses, motivations and barriers account for changes to the strategic relevance of EC; and

*Revised EC model:* This does not assume that changes to the strategic relevance of EC are best explained by the main or most common EC perceptions. Instead,

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<sup>117</sup> As stated in the methodology chapter, linear regression estimates the coefficients that best predict the behaviour of a dependent variable in a model.

the model searches for relationships between correlated dependent and independent EC-related variables that significantly affect the *Revised EC Model* (Stage 1) and then measures the effect that other competitive factors such as the choice of competitive strategy, strategic planning arrangements and the perceived competitive influence of EC in the industry have on the Revised EC Model (Stage 2). To improve the accuracy of interpretation, multi-collinearity issues between independent variables will be addressed by eliminating redundant testing when collinearity factors (i.e., VIF: variance inflation factors) are higher than 2, as suggested by the electronic guide in the SPSS program. In addition, regression results will be assessed for soundness using a model residual diagnostic.

#### 7.6.1 Testing the Initial EC Model

The rationale behind this model is quite straightforward. The formulation of the study hypotheses was based on the assumption that a dependence relationship was likely to exist with independent variables depicted as the main or most common perceptions. Thus, the fundamental question in this section is whether EC strategic changes can be best explained by the theme variables with the highest mean values over time, as summarized in Table 7-37.

**Table 7-37: Summary of Independent Variables with the Highest Means**

	<b>EC Use</b>	<b>EC Motivation</b>	<b>EC Barrier</b>
<b>10 Years Ago</b>	<b>Q4b</b> (Intra-org. EC)	<b>Q26b</b> (Improve operational and cost-efficiency)	<b>Q35b</b> (Lack of critical mass)
<b>Currently</b>	<b>Q5a</b> (EC with customers)	<b>Q25a</b> (Customer / market demands )	<b>Q38a</b> (Reluctance to change)

The initial EC model for the interaction of variables is expressed in the following

terms:

$$ECSR = ECUse_i + ECMot_i + ECBarr_i$$

Where,

$ECSR$  = Strategic relevance of EC over time. It is assessed through two sets of questions, which examine the role of EC as a tactical tool (Q10, Q17 and Q18) and its role as strategic driver (Q8, Q9, Q12 and Q13);<sup>118</sup>

$ECUse_i$  = Main or most common EC uses over time, (series 'a' and 'b' of questions 4 through 7);

$ECMot_i$  = Most common EC motivations over time (series 'a' and 'b' of questions 21 through 29); and

$ECBarr_i$  = Most common EC barriers over time (series 'a' and 'b' of questions 31 through 38).

Results of the regression analysis are summarized in Table 7-38.

**Table 7-38: Regression Analysis – Initial EC Model**

Dependent Variables		Independent Variables		
$ECSR$		$ECUse_i$ Q <sup>c</sup>	$ECMot_i$ Q <sup>c</sup>	$ECBarr_i$ Q <sup>c</sup>
		Regression Indicators	Regression Indicators	Regression Indicators
Y E A R S  A G O	<b>Q10</b> EC unimportant to ID commercial goals) (Prediction rate =28.7%)	N.S.	<b>Q26b</b> Sig <sup>d</sup> = .003 Regr <sup>e</sup> = -.535 VIF <sup>f</sup> = 1.000	N.S.
	<b>Q18</b> EC wasn't key for product & market scope (Prediction rate =14.4%)	N.S.	<b>Q26b</b> Sig <sup>d</sup> = .042 Regr <sup>e</sup> = -.380 VIF <sup>f</sup> = 1.000	N.S.
C U R R E N T L Y	<b>Q12</b> EC triggers service scope review (Prediction rate =27.2%)	N.S.	<b>Q25a</b> Sig <sup>d</sup> = .003 Regr <sup>e</sup> = .521 VIF <sup>f</sup> = 1.000	N.S.
	<b>Q13</b> Company has a formal EC strategy (Prediction rate =38.3%)	<b>Q5a</b> Sig <sup>d</sup> = .000 Regr <sup>e</sup> = .619 VIF <sup>f</sup> = 1.000	N.S.	N.S.

<sup>c</sup> Q5a = EC with customers

Q26b = Improve operational & cost-efficiency.

Q25a = Respond to customer/market demands

<sup>d</sup> Significance level.

<sup>e</sup> Significant regression coefficient.

<sup>f</sup> Collinearity factor.

<sup>118</sup> Since no single variable qualifies EC either as a tactical tool or strategic driver, in Section 7.5, two sets of variables served as indicators of the perceived strategic value of EC as a tool (Q10, Q17 and Q18) and as a driver (Q8, Q9, Q12 and Q13).

To summarize, testing of the *Initial EC Model* uncovered the following insights:

1. EC barriers play no role in the initial EC model; and
2. EC uses only influence relationships currently, suggesting that *EC with customers* has more influence on the strategic relevance of EC today than it did ten years ago; and
3. EC motivations exert influence on both periods of time, but their nature changes over time: efficiency-related motivations predominated ten years ago and customer-oriented motivations predominate currently.

### **7.6.2 Testing the Revised EC Model**

As the initial model was conceptualized at the outset of the study, this section will explore whether survey data can provide elements to improve the accuracy and predictability of the *Initial EC Model*. This will be done in two stages:

*Stage 1* will modify the initial EC model to include all EC uses, motivations and barriers measured in the survey questionnaire, in addition to variables measuring the EC-related expectations of business partners; and

*Stage 2* will add to the *Revised EC Model* variables in *Stage 1* by measuring other factors such as companies' competitive strategy, arrangements for strategic planning, as well as the perceived influence of EC in the industry.

#### **7.6.2.1 Stage 1**

This model will test all variables in the *ECUse*, *ECMot* and *ECBarr* categories. In addition to these, another key set of variables measured in the survey questionnaire is *EC expectations from business partners*. By including this new set of variables in the *Revised*



*EC Model*, the researcher seeks to measure to what extent EC-related expectations and the requirements of business partners play a role in the strategic relevance of EC. The inclusion of this set of variables is of great relevance to this study since it has long been argued that since container shipping is an integral part of the movement of containerized semi- and fully-processed goods, container shipping companies are influenced, directly or indirectly, by the growing EC use and expectations of business partners. As a result, the *Revised EC Model*, Stage 1, is represented as follows:

$$ECSR = ECUse + ECMot + ECBarr + ECExpt$$

Where,

ECSR = Current strategic relevance of EC (Q8, Q9, Q12 and Q13)  
Strategic relevance of EC 10 years ago (Q10, Q17 and Q18)

ECUse = Current EC uses (Q4a to Q7a)  
EC uses 10 years ago (Q4b to Q7b);

ECMot = Current EC motivations (Q21a to Q29a)  
EC motivations 10 years ago (Q21b to Q29b);

ECBarr = Current EC barriers (Q31a to Q38a)  
EC barriers 10 years ago (Q31b to Q38b);

ECExpt= **Current EC expectations (Q14, Q15 and Q16)**

All variables in the *Revised EC Model, Stage 1*, will first be subjected to correlation tests. Only variables with significant correlation coefficients will then be put to regression analysis.

Regression coefficients between ECSR (dependent variables) and all independent variables were calculated as seen in Table 7-39. However, for clarity purposes, only significant correlation coefficients are shown.

**Table 7-39: Significant Correlation Coefficients – Revised EC Model Stage 1**

Dependent Variables		Independent Variables			
<i>ECSR</i>		<i>ECUse</i> Q <sup>c</sup> (Corr. <sup>d</sup> )	<i>ECMot</i> Q <sup>c</sup> (Corr. <sup>d</sup> )	<i>ECBarr</i> Q <sup>c</sup> (Corr. <sup>d</sup> )	<i>ECExpt</i> Q <sup>c</sup> (Corr. <sup>d</sup> )
<b>10 Y E A R S  A G O</b>	<b>Q10</b> EC was unimportant to ID commercial goals	<b>Q6b</b> (-.385**)	<b>Q26b</b> (-.535**) <b>Q24b</b> (-.477**) <b>Q29b</b> (-.432**)	<b>Q34b</b> (.490**)	Not measured
	<b>Q17</b> EC was seen as operational technology	N.S.	N.S.	<b>Q31b</b> (.402**) <b>Q34b</b> (.411**)	Not measured
	<b>Q18</b> EC was not key for product & market scope	<b>Q5b</b> (-.484**)	<b>Q21b</b> (-.418**) <b>Q24b</b> (-.431**) <b>Q25b</b> (-.425**) <b>Q26b</b> (-.380**)	N.S.	Not measured
<b>C U R R E N T L Y</b>	<b>Q8</b> EC is relevant to ID commercial goals	<b>Q4a</b> (.428**)	N.S.	<b>Q35a</b> (-.395**)	N.S.
	<b>Q9</b> Co will be out of business without EC	<b>Q4a</b> (.368**)	<b>Q22a</b> (.379**) <b>Q26a</b> (.381**)	N.S.	N.S.
	<b>Q12</b> EC triggers service scope review	<b>Q5a</b> (.403**)	<b>Q22a</b> (.624**) <b>Q25a</b> (.479**) <b>Q28a</b> (.355**)	N.S.	<b>Q14</b> (.422**) <b>Q15</b> (.437**)
	<b>Q13</b> Company has a formal EC strategy	<b>Q5a</b> (.627**)	<b>Q23a</b> (.538**) <b>Q24a</b> (.369**)	N.S.	N.S.

<sup>c</sup> Q4a = Intra-org EC

Q5a / 5b = EC with customers

Q6b = EC with suppliers

Q14 = Government agencies encourage EC with them

Q15 = Suppliers expect more EC with them

Q21b = Follow competitors' move

Q22a = Market service/penetration

Q23a = Change scope of services

<sup>d</sup> Significant correlation coefficients at 5% significance level

\*\* Correlation is significant at the 0.05 level (2-tailed).

Q24a / b = Offer value-added services

Q25a / b = Respond to customer/market demands

Q26a / b = Improve operational & cost-efficiency

Q28a = Respond to supplier demands

Q29b = Respond to government agencies' demands

Q31b = Inappropriate EC infrastructure

Q34b = Too high investment costs

Q35a = Lack of critical mass

Separate regression tests at the 10% significance level were applied to each row in Table 7-39, that is, between each dependent variable and its correlated independent variables. Only the independent variables in Table 7-40 were determined to play an important role in predicting the behaviour of the dependent variables. For these calculations, VIF indicate no problems of multi-collinearity and residual diagnostics confirm the reliability of the regression results. Histograms were normal; the plot of regression-standardized residuals showed a fairly straight diagonal line and scatterplots showed no pattern of equal spread.

**Table 7-40: Regression Analysis - Revised EC Model Stage 1**

Dependent Variables		Independent Variables			
<i>EC</i> <i>SR</i>		<i>ECUse</i> <sup>c</sup> (Regr <sup>d</sup> / VIF <sup>e</sup> )	<i>ECMot</i> <sup>f</sup> (Regr <sup>d</sup> / VIF <sup>e</sup> )	<i>ECBarr</i> <sup>f</sup> (Regr <sup>d</sup> / VIF <sup>e</sup> )	<i>ECExpt</i> <sup>f</sup> (Regr <sup>d</sup> / VIF <sup>e</sup> )
<b>10 YEARS AGO</b>	<b>Q10</b> EC was unimportant to ID commercial goals (Prediction rate = 44.7%)	N.S.	<b>Q26b</b> (-.462 / 1.034)	<b>Q34b</b> (.407 / 1.034)	Not measured
	<b>Q17</b> EC was seen as operational technology (Prediction rate = 27.4%)	N.S.	N.S.	<b>Q31b</b> (.332 / 1.043) <b>Q34b</b> (.343 / 1.043)	Not measured
	<b>Q18</b> EC was not key for product & market scope (Prediction rate = 25.3%)	<b>Q5b</b> (-.503 / 1.000)	N.S.	N.S.	Not measured
<b>CURRENTLY</b>	<b>Q8</b> EC is relevant to ID commercial goals (Prediction rate = 30.1%)	<b>Q4a</b> (.384 / 1.017)	N.S.	<b>Q35a</b> (-.346 / 1.017)	N.S.
	<b>Q9</b> Co will be out of business without EC (Prediction rate = 23.5%)	<b>Q4a</b> (.305 / 1.039)	<b>Q26a</b> (.322 / 1.039)	N.S.	N.S.
	<b>Q12</b> EC triggers service scope review (Prediction rate = 55.4%)	N.S.	<b>Q22a</b> (.613 / 1.001)	N.S.	<b>Q14</b> (.406 / 1.001)
	<b>Q13</b> Company has a formal EC strategy (Prediction rate = 50.9%)	<b>Q5a</b> (.501 / 1.137)	<b>Q23a</b> (.364 / 1.137)	N.S.	N.S.

<sup>c</sup> Q4a = Intra-org EC

Q5a / 5b = EC with customers

Q14 = Government agencies encourage intensive EC interface

Q22a = Market service/penetration

Q23a = Change scope of services

<sup>d</sup> Significant regression coefficient.

<sup>e</sup> Collinearity factor.

Q26a / b = Improve operational & cost-efficiency

Q31b = Inappropriate EC infrastructure

Q34b = Too high investment costs

Q35a = Lack of critical mass

The question of course is what can be learned from the results of this regression analysis?

First, regression coefficients show a reverse co-variation of *ECUse*, *ECMot* and *ECBarr* with dependent variables over time.

Second, it is evident that the EC expectations of business partners have a somewhat limited effect on the strategic relevance of EC. Variables measuring these expectations, however, do not take into account the indirect effect of the expectations

implicitly embedded in various EC motivations, especially customer-oriented motivations.

Third, no clear-cut pattern of inter-theme dependence is revealed in Table 7-40 at first sight; however, it is apparent that while ten years ago, a larger number of *ECBarr* influenced dependent variables, at the end of the period under study, the number of *ECUse* and *ECMot* affecting dependent variables increased compared to the remaining independent variable categories. Thus, it is observed that:

*Every EC theme included in the revised EC model appears to influence the strategic relevance of EC over time. It is also apparent, however, that with time the number of ECMot and ECUse exerting influence on ECSR increased in comparison to the remaining EC themes.*

Fourth, Table 7-40 reveals findings supporting the main postulate behind the *central hypothesis* of this study, i.e., as motivations became more customer-oriented, the role of EC in strategy formulation increased. This is shown by the following:

- (a) The predictability rates increase by the end of the period under study, which in turn occurs when customer-oriented motivations are part of the equation; and
- (b) The increasing role of EC in the identification of commercial goals over time is coupled with increasing customer-related motivations, as well as an increasing use of EC internally (intra-organizational EC) and with customers.

Fifth, to add precision to these observations, closer attention will be paid to specific relationships over time. Ten years ago there was a negative co-variation between the independent variables *ECMot* and *ECUse* and the dependent variable *ECSR*, which resulted in the following conclusions:

- (c) Ten years, EC did not play any relevant role in the identification of commercial goals in this company – Q10 (44.7% prediction rate). The role of EC as a tactical tool is associated with the negative co-variation between investment costs (as a barrier) and the desire to improve cost-efficiencies (as a motivation).<sup>119</sup> At the beginning of the period under study, the higher the investment costs, the higher the perception of EC as a tactical tool.
- (d) Ten years ago, EC was only seen as a type of technology that helped achieve operational goals - Q17 (27.4% prediction rate). High financial and technical barriers were linked to strong perceptions of EC as an operational tool.<sup>120</sup>
- (e) Ten years ago, EC was not a key consideration in relation to our product and market scope - Q18 (25.3% prediction rate). The impact of EC on companies' product and market scope is positively related to the use of EC with customers.<sup>121</sup>

Therefore, it is argued that:

*Ten years ago, EC was more relevant as a tactical tool than as a strategic driver. The perception of EC as a tactical tool had a positive co-variation with key barriers (i.e., high financial and technical limitations), and a negative co-variation with the desire to improve cost efficiencies and with the importance of EC use with customers.*

In contrast to ten years ago, by the end of the period under study, the positive co-variation is between the independent variables *ECUse* and *ECMot*, the dependent variable *ECSR* . As a result:

<sup>119</sup> Ten years ago, about 77% of survey respondents did not feel that EC played a key role in determining commercial goals, 67% felt that EC investment costs were too high, and 48% that improving efficiencies was the main motivation for the use of EC.

<sup>120</sup> Ten years ago, 83.9% of respondents agreed that EC was seen as an operational tool and 71% and 67.7% were of the opinion that infrastructure and investment costs were considerable EC barriers, respectively.

<sup>121</sup> Ten years ago, about 77% of survey respondents thought that EC did not affect the company's product and market scope and 19% thought that 'EC with customers' was the more relevant use of EC.

- (f) EC is very relevant for the identification of commercial goals in this company – Q8 (30.1% prediction rate). As the critical mass of EC users increases, so does the use of intra-organizational EC, but most importantly for our purposes, the relevance of EC in the identification of commercial goals. Therefore, it appears that currently the role of EC in the identification of commercial goals is linked to the increasing intra-organizational use of EC while also facilitated by a growing critical mass of external users.<sup>122</sup>
- (g) Not using EC today will drive us out of business in the near future – Q9 (23.5% prediction rate). The notion of a company going out of business is positively related to the increased use of intra-organizational EC and the desire to improve cost-efficiencies.<sup>123</sup>
- (h) EC is making us rethink the scope and range of services this company provides – Q12 (55.4% prediction rate). EC has triggered a re-evaluation of the scope of services offered. This is related to the motivation to better service existing markets or penetrate new ones, and the perceived expectation that government agencies would like to interface more intensively with shipping companies.<sup>124</sup>
- (i) The company has established, or is in the process of establishing, a formal EC business strategy Q-13 (50.9% prediction rate). The incorporation of a formal EC

<sup>122</sup> Currently, while 71% of respondents concurred with the idea that EC is very relevant for the identification of commercial goals and 80% said that intra-organizational EC is the most relevant use of EC, 32% indicated that lack of critical mass is a relevant barrier for the use of EC.

<sup>123</sup> Currently, 80.7% of participants agree that not using EC will drive the company out of business. In addition, 80.7% are of the opinion that intra-organizational EC is fundamental to the company and 90.3% believe that improving cost-efficiencies is a key motivation for the continuing use of EC by the company.

<sup>124</sup> Currently, 67% of respondents agreed that EC is making the company re-think the scope of its services, 77% that the main motivation for the use of EC is to penetrate new or better service existing markets, and 67% that government agencies expect more EC interaction with them.

strategy is positively influenced by an increase in the use of EC with customers and the motivation to re-assess the scope of services.<sup>125</sup>

To summarize, the above relationships suggest that:

*Currently, there is a recurrent positive co-variation between the perception of EC as a strategic driver and both customer-related motivations and increased EC use internally and with customers.*

#### **7.6.2.2 Stage 2**

This last section will look at the extent to which other competitive factors<sup>126</sup> influence the strategic relevance of EC. The following observations were made at the beginning of this chapter. First, over time, fewer companies competed solely on cost. An increasing number of companies have moved to implement either combination or niche strategies. Meanwhile, large companies currently prefer to compete on service. Second, on average, 71% of companies indicated that they engaged in strategic planning with a certain frequency; and third, the majority of participating companies are of the opinion that nowadays EC is affecting the industry more intensively than ten years ago. According to respondents, EC had very little influence on competitive issues ten years ago.<sup>127</sup> Currently however, 54.8% of respondents believe that EC is an optional source of competitive advantage, while 38.7% argue that EC is not an alternative anymore, but a competitive necessity.

The question put forward for testing is whether the choice of competitive strategy (Q3a and b), strategic planning arrangements (Q40) or views on the competitive influence

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<sup>125</sup> Currently, 71% of respondents were of the opinion that their companies have taken concrete steps towards a formal EC strategy, 97% that the main use of EC is with customers and 74% that the main motivation for the use of EC is to change the scope of services.

<sup>126</sup> i.e., companies' competitive strategy, arrangements for strategic planning and perceived influence of EC in the industry.

<sup>127</sup> While 58.1% of respondents said that EC had no competitive influence, 25.8% argued that it was a source of competitive advantage.

of EC in the industry (Q41a and b) have any effect on the *Revised EC Model*. To this end, Q3a, Q3b, Q40, Q41a and Q41b were added to the *Revised EC Model* used in *Stage 1* to examine the interaction of variables under a new set of independent variables: competitive factors (*Compfacts*). Regression tests were undertaken once more and the results (see Table 7-41) provide further findings for reflection:

**Table 7-41: Regression Analysis - Revised EC Model Stage 2**

Dependent Variables		Independent Variables				
<i>ECSR</i>		<i>ECUse<sup>c</sup></i> (Regr <sup>d</sup> / VIF <sup>e</sup> )	<i>ECMot<sup>f</sup></i> (Regr <sup>d</sup> / VIF <sup>e</sup> )	<i>ECBarr<sup>f</sup></i> (Regr <sup>d</sup> / VIF <sup>e</sup> )	<i>ECExpt<sup>f</sup></i> (Regr <sup>d</sup> / VIF <sup>e</sup> )	<i>Compfacts<sup>c</sup></i> (Regr <sup>d</sup> / VIF <sup>e</sup> )
<b>C U R R E N T L Y</b>	<b>Q12</b> EC triggers service scope review (Pred. rate= 69.4%)	N.S.	<b>Q22a</b> (.613 / 1.053)	N.S.	<b>Q14</b> (.406 / 1.171)	<b>Q3a</b> (.278 / 1.186) <b>Q41a</b> (.318 / 1.038)
	<b>Q13</b> Company has a formal EC strategy (Pred. rate= 68.3%)	<b>Q5a</b> (.501 / 1.137)	<b>Q23a</b> (.364 / 1.275)	N.S.	N.S.	<b>Q40a</b> (.343 / 1.154) <b>Q41a</b> (.321 / 1.033)

<sup>c</sup> Q3a = Competitive strategy

Q5a = EC with customers

Q14 = Government agencies encourage intensive EC interface

Q22a = Market service/penetration

<sup>d</sup> Significant regression coefficient.

<sup>f</sup> Collinearity factor.

Q23a = Change scope of services

Q40a = Formal strategic planning process

Q41a = EC comp. influence in the industry

The effects of *Compfacts* on the revised EC model differ over time. While these effects were not significant ten years ago, they are increasingly relevant currently.

The inclusion of variables describing competitive factors has an important effect on the role of EC in strategy formulation, as it boosts the prediction rates of Q12 and Q13 from 55.4% to 69.4% and from 50.9% to 68.3%, respectively. This in turn suggests that certain competitive factors may facilitate the current role of EC in strategy formulation, more specifically, when:

- (a) *Service* is a key element of the company's competitive strategy (i.e., competing on service and combination strategies);



- (b) EC is not regarded as an option, but as a *competitive necessity*; and
- (c) *Strategic planning* is an established practice in the company.

Given the relevance of these new findings, the *Revised EC Model* in *Stage 1* should be amended to include a set of variables describing other company's competitive factors (i.e., *Compfacts*) and should now read:

$$ECSR = ECUse + ECMot + ECBarr + ECExpt + \textit{Compfacts}$$

Where,

$$ECSR = \text{Current EC strategic relevance (Q8, Q9, Q12 and Q13)}$$

$$ECUse = \text{EC strategic relevance 10 y. ago (Q10, Q17 and Q18)}$$

$$ECUse = \text{Current EC uses (Q4a to Q7a)}$$

$$ECMot = \text{EC uses 10 years ago (Q4b to Q7b);}$$

$$ECMot = \text{Current EC motivations (Q21a to Q29a)}$$

$$ECBarr = \text{EC motivations 10 years ago (Q21b to Q29b);}$$

$$ECBarr = \text{Current EC barriers (Q31a to Q38a)}$$

$$ECExpt = \text{EC barriers 10 years ago (Q31b to Q38b);}$$

$$ECExpt = \text{Current EC expectations (Q14, Q15 and Q16)}$$

$$\textit{Compfacts} = \text{Current competitive factors (Q3a, Q40 and Q41a)}$$

### 7.6.3 Summary of Findings

Tests of the *central hypothesis* yielded the following insightful observations:

1. The *Revised EC Model* described key relationships that help explain the strategic relevance of EC over time better than the *Initial EC Model*. In other words, when EC-related themes and other competitive factors are considered (*Revised EC Model*), explanations about the changing strategic relevance of EC tend to be more comprehensive than when attention is paid only to the effects of variables depicted as the main or most common perceptions over time (*Initial EC Model*);
2. As time passed, EC motivations and EC uses tended to play a more important role in the increasing relevance of EC than the remaining EC themes;
3. It was found that as motivations for the use of EC (*ECMot*) became more customer-oriented, EC became increasingly relevant for strategy formulation.

Nonetheless, it was also found that EC motivations (*ECMot*) alone did not account for the changes; uses of EC (*ECUse*) also played an important role;

4. EC barriers and expectations (*ECBarr* and *ECExpt*) played a lesser role in explaining perceived changes to the strategic relevance of EC over time;
5. Survey data suggest that other competitive factors (i.e., competitive emphasis, strategic planning and the perceived effect of EC in the industry) may facilitate the increasing role of EC in strategy formulation; and
6. Despite the *central hypothesis* being technically rejected as written, there is significant evidence to support its rationale and direction. That is, customer-oriented motivations to play an increasing strategic role of EC over time.

## 7.7 CONCLUDING REMARKS

In Sections 7.2 through 7.6 of this chapter a number of findings were presented.

For simplicity and clarity, they are summarized in the following table:

**Table 7-42: Summary of Findings from Hypotheses Testing**

EC Theme	Main Findings
EC Uses (Hyp. 1)	<ul style="list-style-type: none"> <li>• <i>Hypothesis 1</i> was rejected;</li> <li>• <i>Intra-organizational EC</i> was perceived to be the most feasible use of EC 10 years ago;</li> <li>• <i>EC with customers</i> is the main current use of EC; and</li> <li>• The intensity in the use of EC has increased in the last 10 years, with EC with customers experiencing the greatest increase.</li> </ul>
EC Motivations (Hyp. 2)	<ul style="list-style-type: none"> <li>• <i>Hypothesis 2</i> was rejected;</li> <li>• <i>Improve operational and cost-efficiencies</i> and <i>customer-oriented</i> motivations have been among the most common motivations over time. With time, however, <i>customer-oriented</i> motivations have become easier to differentiate from motivations to <i>improve operational and cost-efficiencies</i>;</li> <li>• It is apparent that companies are currently using EC as a valued-added tool to respond to customer and market demands; and</li> <li>• The intensity with which EC motivations are felt to have increased in the last 10 years; with customer-oriented motivations experiencing the greatest increase.</li> </ul>
EC Barriers (Hyp. 3)	<ul style="list-style-type: none"> <li>• <i>Hypothesis 3</i> was rejected;</li> <li>• It is apparent that some of the key EC barriers over time continue to be related to the operational use of EC, as opposed to its commercial potential;</li> <li>• <i>Lack of critical mass</i> and <i>resistance to change paper-based practices</i> were perceived to be homogeneous barriers. <i>Infrastructure-related barriers</i> were perceived as a key constraint ten years ago;</li> <li>• <i>Resistance to change paper-based practices</i> is perceived as the most common current barrier, apparently due to financial constraints and the inadequacy of EC-related government policies; and</li> <li>• EC barriers have lowered in the last 10 years, with lack of critical mass and problems with infrastructure diminishing the most.</li> </ul>
Strategic Relevance of EC (Hyp. 4)	<ul style="list-style-type: none"> <li>• <i>Hypothesis 4</i> was upheld;</li> <li>• Ten years ago, EC was perceived as playing the role of a <i>tactical tool</i> in strategy implementation;</li> <li>• The relevance of EC in the identification of commercial goals has increased in the last 10 years; and</li> <li>• Nowadays, EC is perceived as playing the role of a <i>driver</i> in strategy formulation.</li> </ul>
Key interaction between EC variables (Central Hyp.)	<ul style="list-style-type: none"> <li>• The <i>central hypothesis</i> was rejected;</li> <li>• The main or most commonly felt EC motivations on their own do not account for changes to the strategic relevance of EC;</li> <li>• <i>EC uses</i> and <i>EC motivations</i> exerted increasing degrees of influence on the strategic relevance of EC over time;</li> <li>• Evidence suggests that customer-oriented motivations continue to play a role in the increasing relevance of EC for the identification of commercial goals; and</li> <li>• Other competitive factors (i.e., competitive emphasis, strategic planning and perceived effect of EC in the industry) may also facilitate the role of EC as a driver in strategy formulation.</li> </ul>

Does the rejection of the majority of hypotheses mean that the main assumptions derived from the literature review are erroneous? On the contrary, survey results lend

significant support to the main trends envisaged in the majority of hypotheses put forward for testing and exploration, and provide grounds to further refine them. More specifically:

1. Although *hypotheses 1* and *2* were rejected, survey data suggest that the intensity of EC uses and motivations and the direction of their changes over time embedded in these hypotheses are correct;
2. *Hypothesis 3* was rejected and there is still a lot to learn about why. Survey data confirm that EC barriers are lowering over time; however, the barriers proposed in *hypothesis 3* could not be demonstrated as significant. Instead, results only suggest that financial constraints have continued to be important barriers over time and that the use of EC by deep-sea container shipping companies is not yet at the stage at which commercial legal frameworks seriously deter its use; and
3. The postulates embraced in *hypothesis 4* were fully upheld. That is, the main perception is that during the period under study the strategic relevance of EC has increased. It is further suggested that EC has changed its role over time from a tactical tool in strategy implementation to another driver in the strategy formulation process of companies.

The key question still remains whether survey data provide further grounds to assess whether the postulates in the *central hypothesis* have any merit. In this context, the revised EC model ( $ECSR = ECUse + ECMot + ECBarr + ECExpt + Compfacts$ ) depicts relationships between independent and dependent variables that shed some light as to why and how the strategic relevance of EC changed over time. Interestingly, at the beginning of Section 7.6 of this chapter, it was suggested that the *central hypothesis* could not be upheld because *hypothesis 2* had been previously rejected. However, regression analysis points to a far more relevant reason for the conceptual rejection of the *central hypothesis*:

the *central hypothesis* assumes that the main EC motivations over time account for changes to the strategic relevance of EC. Regression analysis instead suggests that companies' customer-oriented motivations, as well as the ability to leverage the internal and external use of EC have been critical in this process. Thus a '*revised central hypothesis*' reflecting survey findings would read:

*As the [~~main~~] motivations for the use of EC by deep-sea container shipping companies became more customer-oriented and companies were able to leverage the use of EC both intra-organizationally and with customers, the perceived role of EC shifted from being a tactical tool in the implementation of business strategy to being a strategic driver in its formulation.*

## CHAPTER 8

### DISCUSSION OF FINDINGS & CONCLUSIONS

The fundamental question put forward for analysis at the onset of this dissertation was: *has the strategic intent for the use of EC by container shipping companies changed over time?* If so, *how and why?* Thus far, the issue has been examined and discussed separately using two methods (i.e., case studies and surveys). This chapter will now comment on the complementarity, or lack thereof, of findings. However, before doing so, a clarification as to the scope of the interpretations is needed.

As discussed in Section 4.1.7 on page 91, findings from case studies and surveys call for two conceptually different interpretations; while case study findings are generalizable to theory, survey results allow statistical inference to the larger population of companies. However, since the representativeness of the sample of shipping companies is somewhat questionable due to the 11.1% response rate, the survey data was analyzed from an exploratory perspective to build explanations about the strategic relevance of EC over time.

#### 8.1 USES OF EC OVER TIME

The review of pertinent literature in Section 3.2.1 on page 67 suggested that the main focus for the use of EC by deep-sea container shipping companies shifted over time as follows:

*H<sub>1</sub>: At the beginning of the period under study, deep-sea container shipping companies primarily used EC for intra-organizational purposes; however, by the end of the period, EC with customers emerged as the most important use of EC.*

Both case study and survey analysis addressed *hypothesis 1* and concluded that there is evidence to suggest that a shift in the main use of EC over time has taken place.

Case studies indicated that at the beginning of the period under study all companies used intra-organizational EC extensively, and that a majority of them had begun using EC with business partners. Over time, the use of EC increased and all companies reinforced their intra-organizational capabilities to the point where IT provided the backbone for internal communications. By the end of the period under study, three out of four companies agreed that while the use of EC by container shipping companies was increasingly oriented towards satisfying customer needs, the main use of EC was to integrate internal and external efforts to deliver services to customers. While this practice was being actively implemented by two of the companies studied, the third company felt that customers were not ready to take full advantage of EC, and therefore focused on intra-organizational EC.

Survey analysis confirms some findings from case studies. First, although statistical tests were unable to provide conclusive evidence that intra-organizational EC was the main focus of EC at the beginning of the period under study, the pattern of survey responses suggests that *intra-organizational EC* was the most common use of EC at the time and further suggests that other EC uses were emerging. Cronbach's Alpha supports this interpretation, as it suggests that no clear distinction was evident between EC with customers and EC with suppliers. Second, there was an increase in the use of EC over time, which was found to be relevant. Third, unlike ten years ago, statistical tests confirmed that by the end of the period under study, the main focus for the use of EC was with customers.

It is apparent that the change in the use of EC suggested in *hypothesis 1* reflects the experiences of deep-sea container shipping companies over time. While EC was most commonly used for intra-organizational and operational aspects at the beginning of the period under study, in today's more EC-savvy industry, companies are placing their efforts in strengthening their internal EC capability to interface externally with those business partners willing and able to do so. Interestingly, case study analysis provided excellent grounds to argue that although substantial efforts have currently gone into promoting EC with customers, a front-end interface with customers requires a great deal of integration and coordination. This integration tends to initially incorporate the entire company and then include key partners in the transportation chain (i.e., suppliers of transportation-related services and government agencies), insofar as their inputs contribute to making the end service to customers more robust and competitive. Thus, case studies suggest that *EC with customers*, though important to understanding companies' behaviour, is not the only factor to consider when attempting to examine companies' EC experiences comprehensively.

## **8.2 MOTIVATIONS FOR THE USE OF EC OVER TIME**

If a shift in the use of EC over time occurred, a similar change ought to be expected with motivations for the use of EC. In Section 3.2.2 on page 73 these expectations were worded as follows:

*H<sub>2</sub>: The main motivation for the adoption and use of EC by deep-sea container shipping companies changed over the period under study. The initial focus was on the achievement of cost and operational efficiencies; however the main motivation later became customer-oriented.*



These arguments were put forward for consideration when examining case study and survey data. Case studies highlighted *operational and cost-efficiencies* and *customer-oriented motivations* as two key types of motivations during the entire period under study. Clearly, ten years ago the emphasis was on the former, while the current emphasis is on the latter. Case studies suggest that over time companies built upon their initial EC-related capabilities (mainly to streamline operations, achieve efficiencies and integrate operational information), to conceptualize, offer and ultimately deliver EC-based alternatives to customers. Thus, the current emphasis on customer-oriented EC motivations should not be construed as incompatible with a continuing desire to improve efficiencies.

Case studies also revealed that *competitive imitation* has been a constant motivation, albeit secondary, throughout the period under study, and that due to new security standards demanding the speedy sharing of container-related information with government agencies, *EC as a means of complying with government demands* is becoming a strong emerging motivation.

Survey analysis indicated that the intensity with which each motivation is pursued has increased over time, and that to these companies all EC motivations are more relevant now than they were 10 years ago. Tests failed to identify the main motivations over time, but suggested that the most common past and current motivations were *to improve operational and cost-efficiencies* and *to respond to customer/market demands*, respectively. This said, the pattern of survey responses and Cronbach's Alpha suggest that over time customer-oriented motivations are becoming more easily differentiated from motivations related to improving cost efficiencies, and that companies are responding to customer and market demands by using EC to add value to their transportation services.

This summary of findings suggests that the postulates in *hypothesis 2* are valid and that the ability to *improve efficiencies* goes hand in hand with the desire to attract new customers, maintain or better service existing customers.

### **8.3 BARRIERS FOR THE USE OF EC OVER TIME**

As barriers are common to almost any commercial or operational undertaking, in the case of EC, barriers were foreseen to change over time as follows:

*H<sub>3</sub>: The most relevant barriers for the adoption and use of EC by deep-sea container shipping companies changed over the period under study. They shifted from infrastructure and investment costs at the beginning of the period under study, to the inadequacy of EC-enabling government policies and legal aspects at the end of the period under study.*

The literature review in Section 3.2.3 on page 76 led to the prediction that in a period of ten years the barriers for the use of EC by deep-sea container shipping companies would have shifted from constraints associated with companies' operational focus to constraints related to the more commercial use of EC. Results of case studies and surveys fail to fully lend support to claims in *hypothesis 3*.

Case study analysis revealed that significant infrastructure- and cost-related barriers were present at the beginning of the period under study. These barriers were seen as related to the novelty of EC; lack of uniform standards, infrastructure, in-house know-how, and high initial costs are expected barriers with most new technology. Case studies also showed that, contrary to the statements in *hypothesis 3*, the nature of barriers has changed very little over time. Technological- and cost-related constraints continued to be at the top of the companies' lists of barriers at the end of the period under study. These barriers have evolved over time, however. Initially, local infrastructural difficulties

predominated, while the current barriers relate to the technological imbalance restricting the wider deployment of EC among geographical regions, known as the digital divide. Furthermore, ten years ago, investments needed to develop basic internal EC capability were important barriers, while now the cost of reaping the potential advantages of that internal EC capability externally with business partners, has become a top constraint. Thus, no substantial change was experienced over time. Case studies suggest that the rather low use of EC for commercial transactions in container shipping has contributed to the unchanged nature of EC barriers over time; companies are currently being very careful in their use of negotiable electronic B/Ls, mostly because the standard practice is not to do so.

Survey results revealed a slightly different picture than case study results. First, they suggest that the *lack of a critical mass of EC users* and *reluctance to change paper-based practices*, respectively, are the most common perceived past and current barriers. However, statistical tests were unable to conclusively differentiate these barriers from other barriers in their respective time periods. The pattern of responses and Cronbach's Alpha suggest that while the key reasons for the *lack of critical mass* ten years ago were infrastructure-related, financial constraints and inadequate EC-related government policies are the main reasons for the current *reluctance to abandon paper-based practices*. Survey data demonstrated a decreasing intensity of all barriers over time, thus suggesting that barriers are currently less of an issue than they were 10 years ago.

The combined interpretation of the results of case studies and surveys supports only the first part of *hypothesis 3*, as these results suggest that the nature of the principle EC barriers ten years ago (i.e., technological and financial) persisted over time. Moreover, data from both methods of analysis lead to the speculation that if EC were

used more intensively for commercial transactions, the inconveniences posed by immature EC-related legal regimes would become more relevant. However, further research would be required to determine this.

#### **8.4 STRATEGIC RELEVANCE OF EC OVER TIME**

The perception of changing strategic relevance of EC over time is at the heart of this research. The literature review suggested an increasing role for EC in the definition of business goals over time, which was captured in *hypothesis 4*, as follows:

*H<sub>4</sub>: At the beginning of the period under study, firms viewed EC as having limited strategic relevance in the definition of business goals; however, this relevance progressively changed to become an important consideration by the end of the period under study.*

Both case study and survey analysis found evidence supporting the postulates in *hypothesis 4*. Case studies showed that at the beginning of the period under study, EC was primarily perceived by companies as a tactical tool in the execution of strategy and remained so until the end of the period of study. However, in-depth study of these companies also revealed that EC is progressively adopting the role of a strategic driver in strategy formulation, as evidenced by the fact that: (a) all companies use EC more intensively over time and recognize EC as a business necessity, (b) half of the companies believe that without EC they would probably not survive the competition; and (c) EC has enabled the large company to offer new products. On this basis, although it cannot be categorically claimed that EC has become a strategic driver today, a clear trend to this effect is evident.

Survey analysis tested *hypothesis 4* and arrived at the conclusion that the strategic relevance of EC has increased during the period under study and its role has shifted from being a tactical tool in the execution of strategy to being a strategic driver in the definition of business goals. Substantial evidence of a noticeable difference between the role of EC 10 years ago compared to today was found. According to the majority of companies, it was probably between 1997 and 2001 that the use of EC stopped being perceived as a competitive advantage and became a competitive necessity.

This said, the finding of a change in the strategic use of EC over time *per se* is of limited value without examining *how* and *why* this occurred.

## **8.5 KEY RELATIONSHIPS OVER TIME & CONCLUSIONS**

Thus far, each of the supporting hypotheses (i.e., 1 through 4) has been addressed independently from each other. In the case of the *central hypothesis*, this is neither desirable nor possible, as this hypothesis interlaces the elements examined in *hypotheses 2* and *4*. The argument in the *central hypothesis* is based on the premise that the main EC motivations account for changes in the strategic relevance of EC over time, as follows:

*H<sub>C</sub>: As the main motivations for the use of EC by deep-sea container shipping companies became more customer-oriented, the perceived role of EC shifted from being a tactical tool in the implementation of business strategy to being a strategic driver in its formulation.*

The link suggested in the *central hypothesis* was tested using case study and survey analysis and produced complementary results, which partially supported the central argument, as it was found that, albeit critical, *EC motivations* were not the only

key factor explaining the dynamics of the strategic relevance of EC over time. More importantly, however, this combined analysis led to insights into what, how and why these dynamics occurred.

The strength of case study analysis is not to determine cause-effect relationships, but to explain the 'how' and 'why' associated with such relationships. Thus, although case studies did not conclusively determine the strength of the links between *motivations* and *strategic relevance*, they suggested that some EC uses and motivations are more likely to influence the strategic role of EC than EC barriers.

The dominant views of participating companies about why EC has increased its relevance over time suggest that barriers, albeit significant, were overshadowed by companies' desire to adopt and develop EC. At the beginning of the period under study, the competitive environment in which companies operated encouraged them to utilize the electronic transmission of data as a tactical means to streamline their operations, thus highlighting the role of EC as a *tactical tool* to improve efficiencies. By the end of the period under study, however, as the benefits of EC had spread widely in the industry and as shipping companies had improved their internal management of cargo and customer data, companies were intensifying their use of EC externally to gain or maintain a competitive edge. Case study data confirm that companies not only continue to use EC as a critical tactical element to optimize internal, cargo and customer service efficiencies, but also use EC as a driver to innovate and create new services.

These arguments suggest both:

- (a) A shift from the tactical to the strategic use of EC over time; and

- (b) That the *central hypothesis* provides a good partial, but incomplete account of the key elements influencing the relevance of EC over time. It is apparent that a more complete explanation must include a combination of EC uses and motivations.

Survey analysis also explored and tested whether the main or most common EC-related perceptions would yield the most complete prediction of changes to the strategic relevance of EC over time.

The *initial EC model* (which incorporates only the most common perceptions over time) confirms some key findings from case studies; over time, EC motivations influence the strategic relevance of EC to a greater extent than EC barriers.

The *revised EC model*, by exploring and testing the effects of an expanded group of variables on the strategic relevance of EC, provided a more complete picture of the dynamics of strategic changes than the *initial EC model*. The *revised EC model* confirmed that:

- (a) As *EC motivations* became more customer-oriented, EC became increasingly relevant for strategy formulation;
- (b) *EC motivations* alone did not account for the changes; *EC uses* also played an important role; and
- (c) EC plays a more intensive role in strategy formulation when *service* is a key component of the competitive strategy; when EC is perceived as being a *competitive necessity*; and when *strategic planning* procedures are well established.

In a nutshell, the combined interpretation of the results of the two analytical tools used in this study lead to the following conclusions about this study's research question:

1. *Has the strategic intent for the use of EC by deep-sea container shipping companies changed over time?* It has indeed. Not long ago, EC was seen as an optional tactical tool for the delivery of business strategy; however, evidence indicates that currently container shipping companies see EC as a business necessity and, progressively, as a strategic driver in the definition of their business goals.
2. *How?* The dynamics of change during the period under study are embedded in the following hypotheses for future testing. First, it was determined that not all EC-related factors influence the strategic role of EC equally:

*Despite the existence of considerable EC barriers both at the beginning and at the end of the period under study, EC uses and motivations seem to have exerted greater influence on the strategic relevance of EC than EC barriers.*

Second, it is apparent that the role of EC becomes more strategic than tactical when companies succeed in bridging their internal EC capabilities with their customers.

*As the motivations for the use of EC by deep-sea container shipping companies became more customer-oriented and companies were able to 'leverage' the use of EC both intra-organizationally and with customers, the perceived role of EC shifted from being a tactical tool in the implementation of business strategy to being a strategic driver in its formulation.*

3. *Why?* Container shipping companies were successful in using EC to address operational inefficiencies and maximize cost-effectiveness. In the process, however, companies also realized that EC provided other competitive benefits, including:
  - a. the provision of new channels to interface with customers;



- b. a basis to differentiate services from competitors and to try to shift the focus away from rates; and
- c. a platform to launch new services and products.

Finally, there is the question of whether company size is a factor in the implementation of EC. It is suggested that it is, for at least the following reasons:

- (a) Financial resources have been a substantial barrier in EC implementation during the period under study. It is apparent that it is easier for larger organizations to find and allocate financial resources for EC initiatives.
- (b) One of the most attractive benefits of EC systems is the reduction of transaction costs, which in turn becomes more pronounced as the number of customers grows larger. Thus, the size of the customer base is an important factor.
- (c) Case studies suggest that large container shipping companies are setting the EC-related technological standards, as well as taking the lead in showing how innovative EC can be used to compete in the marketplace.

## **8.6 ACADEMIC CONTRIBUTIONS & FURTHER RESEARCH**

From an academic standpoint, this study has played an important role in bridging theory to practice in the fields of electronic commerce and strategic management; i.e., in linking the theoretical and anecdotal body of knowledge about the effects of EC practice on strategic management to the practical experience of deep-sea container shipping companies. The major contribution of this study comes as a result of having explored various companies' EC-related experiences and explained how and why the strategic relevance of EC has changed over time.

In addition, this research lends support to findings by other researchers, namely:

- (a) The claims by Porter (2001) that EC is not a substitute for strategic management concepts, but a complement to it.
- (b) The notion put forward by Amit & Zott (2001) that as EC practice intensifies in an industry, the key value of EC is no longer company-based, but network-based. The case studies indicate that one of the key motivations of container shipping companies to expand their EC capability and connect with other business partners (e.g., suppliers of transportation-related services, government agencies and customers) is to take advantage of the benefits that multiple parties bring to the network.
- (c) The findings of Jenssen and Randoy (2002), who concluded that shipping companies with an explicit mandate to innovate are more apt to do so. In the context of innovation through the use of EC, this research supported this view as regression analysis showed that companies with well established strategic planning procedures are more likely to take advantage of EC for the formulation of strategy.
- (d) The arguments of Chow (2001) that the shipping industry has seen few successful online freight initiatives, as these would tend to harm carriers. It was clear from the case studies that container shipping companies have been very selective in the type of EC they implement and have avoided any EC use that would portray transportation services as a commodity. For instance, some examples of potentially damaging EC initiatives include electronic freight exchange, auction or negotiation, where the deciding factor is undoubtedly the freight rate, thus relegating quality of service to a distant second place.

- (e) There is a substantial body of research citing EC-related legal and policy barriers as major factors slowing the rate of implementation of EC in commercial shipping (see Section 3.1.3 on page 62). However, this research found no evidence to indicate that such constraints were perceived as critical by companies during the period under study. This research found that these barriers tend to be significant when companies actively engage in online negotiations. This was not the case in this study, as companies used, at best, non-negotiable electronic B/Ls.

Finally, this exploratory research served to identify the impact of key EC uses, motivations and barriers on deep-sea container shipping companies' perception of the strategic relevance of EC over time. As a result, two hypotheses outlining these dynamics are proposed for future testing (see Section 8.5). It would be interesting to examine how both the *revised central hypothesis* and the *revised EC model* predict the behaviour of EC-related variables in a larger study of container shipping, as well as in other sectors of international shipping. Further research could also provide information about how accurately these conclusions describe the experience of companies of various sizes operating in various sectors of the shipping industry, especially what aspects promote the more commercial use of EC and how government policies facilitate or hinder this. Undoubtedly, further research of this magnitude will require strong links between academic researchers and stakeholders in the field.

## **8.7 PRACTICAL IMPLICATIONS & THE ROAD AHEAD**

From the point of view of shipping practice, this research is of interest to commercial and governmental organizations as it sheds lights on the EC-related experiences and expectations of a number of deep-sea container shipping companies.

First, the outcome of this research suggests that EC has become a competitive necessity in container shipping; thus smart investment in internal EC capabilities to optimize efficiencies and to interface with other business partners, is a 'must'. Secondly, it is clear that to achieve wider and more intensive use of EC in international container shipping, stakeholders must address common constraints, including barriers associated with the digital divide between geographical areas and resistance to substitute paper-based processes for their electronic equivalents. Inevitably, some of this burden will fall on the shoulders of governmental institutions, as they can effectively facilitate the wider use of EC in the industry by promoting, standardizing and monitoring the use of electronic cargo and ship-related information for port and customs authorities, as well as by passing legislation that addresses the functional equivalence between paper-based and electronic shipping processes.

Looking ahead, participating companies perceived that future opportunities and challenges revolved around EC becoming the standard for operational and commercial transactions in container shipping. They believe that EC is likely to further enhance the ability of shipping companies and their customers to achieve hard savings, gain greater efficiencies, facilitate access to new geographical markets, and more importantly, provide a platform for the continuous innovation of transportation services. They argue, however, that these EC-related expectations will only fully materialize once the transition between paper-based and electronic practices in shipping is complete; the current impasse in this regard will be more easily overcome if government agencies were to harmonize requirements for electronic cargo and ship-related information.

Moreover, while the focus with regard to future opportunities and challenges tends to be business-oriented, it is critical to understand the current and future implications of EC in a myriad of areas, including the oftentimes overlooked effects on the human resources of organizations. The fact that one of the most evident current benefits of EC is the reduction of transaction and administrative costs, will inevitably result in a reassessment of current organizational structures by shipping companies both ashore and onboard. Although both are relevant, from this study it was clear that EC facilitates the decentralization of shore-based administrative and managerial duties and further facilitates their relocation to lower cost regions around the world. This in turn highlights potential, and in many cases, largely unforeseen social effects resulting from EC-related matters such as the 'digital divide' among the world's regions, the advantages and disadvantages of which remain to be studied. The profile of the human element in container shipping, the composition and operation of organizations, as well as the social effects of global factors such as the digital divide are at the heart of future developments in this field.

Finally, during this research it was evident that EC is becoming an integral part of container shipping and is having far-reaching implications, including a wide range of highly interconnected operational, technical, social, business, legal and managerial issues. In order to better understand the behaviour of practitioners towards EC, an interdisciplinary perspective to research is a very desirable approach, as researchers studying this matter will be exposed to a diverse range of factors that promote, facilitate or hamper the process of adaptation towards a more EC-friendly container shipping industry. Interdisciplinary analysis provides the flexibility and rigor needed to recognize, examine and

understand practitioners' utilitarian responses to the EC phenomenon trickling down the transportation chain.

## APPENDIX 4-1

### CASE STUDY - INTERVIEW QUESTIONNAIRE

for

General Managers  
Sales, Marketing and Customer Service Managers  
Operations Managers  
Information Technology Managers  
Industry Experts

The following are the initial questions asked to interviewees. In most cases, however, the flow of the interview allowed for additional questions for clarification or exploratory purposes.

#### I. USES OF EC

##### Questions for all Interviewees

1. Are there any benefits obtained / disadvantages posed by the use of EC in this company?
2. How would you rank the importance of the uses of EC in this company applying a scale of '1' (for the most important) to '4' (for the least important)
  - \_\_\_ Intra-organizational use of EC
  - \_\_\_ Use of EC with Customers
  - \_\_\_ Use of EC with Suppliers
  - \_\_\_ Use of EC with Government Agencies
  - ☐ Undecided
  - ☐ None of the above types of EC applications is used in my company today.
- a. Has the most important use changed compared to ten years ago?
- b. If yes, how and why?

##### Specific questions for Sales, Marketing and Customer Service Managers

3. Do you use EC to interact with customers in this company?
  - a. If yes, with who?
  - b. What percentage, if any, of your interactions with customers are undertaken through EC applications?

<input type="checkbox"/> 25% or less	<input type="checkbox"/> Between 26% and 50%
<input type="checkbox"/> Between 51% and 75%	<input type="checkbox"/> More than 76% <input type="checkbox"/> None
  - c. If yes, what are the main uses?
  - d. Have these main uses changed compared to ten years ago?
  - e. If so, how and why?

Specific questions for Operations Managers

4. Do you use EC for fleet / cargo management-related activities in this company?
5. Do you use EC in any other intra-organizational manner / with suppliers / with government agencies?
  - a. What percentage, if any, of your overall intra-organizational dealings are undertaken through EC applications?

<input type="checkbox"/> 25% or less	<input type="checkbox"/> Between 26% and 50%
<input type="checkbox"/> Between 51% and 75%	<input type="checkbox"/> More than 76% <input type="checkbox"/> None
  - b. If yes, what are the main uses?
  - c. Have these main uses changed compared to ten years ago?
  - d. If so, how and why?

Specific questions for Information Technology Managers

6. What are the communication networks used by this company?
  - a. What are they used for?
  - b. Have the communication networks changed compared to ten years ago?

Specific questions for Industry Experts

7. What do you see as the main uses, if any, of EC in container shipping?
  - a. Are there any benefits / disadvantages posed by these types of uses of EC?
  - b. Have these uses changed compared to ten years ago?
  - c. Why?

## II. MOTIVATIONS FOR THE USE OF EC

Questions for all Interviewees

8. What, if any, are the main motivations for the use of EC in this company today?
  - a. Have motivations changed compared to ten years ago?
  - b. If so, how and why?

Specific questions for Industry Experts

9. What, if any, are the main motivations for the use of EC in container shipping today?
  - a. Have motivations changed compared to ten years ago?
  - b. If so, how and why?

## III. BARRIERS FOR THE USE OF EC

Questions for all Interviewees

10. What, if any, are the main barriers for the use of EC in this company today?
  - a. Have barriers changed compared to ten years ago?
  - b. If so, how and why?



Specific questions for Industry Experts

11. What, if any, are the main barriers for the use of EC in container shipping today?
  - a. Have these barriers changed compared to ten years ago?
  - b. Why?

#### IV. STRATEGIC RELEVANCE OF EC

Questions for all Interviewees

12. Are there any benefits obtained / disadvantages posed by the use of EC to interact intra-organizationally / with suppliers / with customers / with government agencies in this company?
13. How relevant is EC for the identification and/or achievement of your company's commercial goals today?
  - ☐ Insignificant    ☐ Helps but is not relevant    ☐ Relevant
  - ☐ Decisive    ☐ Undecided
  - a. Please explain why.
  - b. Has this level of relevance changed compared to ten years ago?
    - b.1. If so, when was the turning point? Year \_\_\_\_\_
    - b.2. If so, how and why?
14. Looking at the short term, do you see any major opportunities and/or challenges for EC in this company?
15. Is there anyone else in this company I should talk to and/or anywhere to obtain other information about this topic?

Specific questions for General Managers

16. How, if at all, does EC fit in your company's competitive strategy?
  - a. How is this different, if at all, from the role of EC ten years ago?
  - b. If different, when did it change? Year \_\_\_\_\_
  - c. Why?

Specific questions for Industry Experts

17. Please indicate the level of agreement or disagreement with the following statement:  
"To ocean container carriers, the use of EC is critical for the identification and achievement of commercial goals and objectives."
  - ☐ Strongly Agree    ☐ Agree    ☐ Disagree
  - ☐ Strongly Disagree    ☐ Undecided
  - a. Why?

## APPENDIX 4-2

### SURVEY QUESTIONNAIRE

#### General Information

1. How many ships engaged in the transportation of containerized cargo does your company currently operate worldwide?<sup>128</sup>
  - (a) Number of vessels:
2. What is / was your company's TEU capacity worldwide?
  - (b) At present:
  - (c) Ten years ago:

**NB:** In question 3, participants were asked to provide an answer for two points in time: '*At present*' and '*Ten years ago*'.

3. What is / was your company's overall competitive strategy for its container shipping operations?
  - a. Cost-leadership.
  - b. Niche (route, geographic or equipment-based).
  - c. Competing on service.
  - d. Combination of the above.
  - e. None of the above.

**NB:** Participants were asked to indicate their level of agreement or disagreement (i.e., '*Strongly Agree*', '*Agree*', '*Disagree*', '*Strongly Disagree*', '*Undecided*') with the statements in questions 4 through 39 for two points in time: '*At present*' and '*Ten years ago*'.

#### Uses of EC

In this company the most important use of EC is / was:

4. To coordinate operations or communicate with other company's branches and/or our fleet.
5. To service and /or interact with our customers.
6. To communicate, interact and/or obtain services from our suppliers.
7. To communicate, interact or provide information to government agencies (e.g., flag, port, customs, immigration or health authorities)

#### EC and Business Strategy

8. EC is very relevant for the identification of commercial goals in this company.
9. Not using EC today will drive us out of business in the near future.
10. Ten years ago, EC did not play any relevant role in the identification of commercial goals in this company.
11. The strategic value of EC to this company has increased compared to ten years ago.

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<sup>128</sup> Participants were asked not to include ships currently chartered out.

12. EC is making us re-think the scope and range of services this company provides.
13. This company has established, or is in the process of establishing, a formal EC business strategy.
14. In this industry, government agencies are encouraging a more intensive use of EC applications with them.
15. Suppliers expect us to use EC applications with them more extensively.
16. Customers expect us to use EC applications with them more extensively.
17. Ten years ago, EC was only seen as a sort of technology that helped achieve operational goals.
18. Ten years ago, EC was not a key consideration in relation to our product and market scope.
19. In this company, the strategic relevance of EC with customers has increased compared to ten years ago.
20. In this company, the strategic relevance of EC is fairly similar compared to ten years ago.

#### **Motivations for the Use of EC**

A motivation for the use of EC in this company is / was:

21. To follow our competitor's move.
22. To penetrate new and/or better service existing markets.
23. To change the scope of our transportation-related services.
24. To offer more value-added services to customers.
25. To respond to customer or market demands.
26. To improve operational and cost efficiencies.
27. To improve the marketing of our transportation-related services.
28. To respond to suppliers' demands.
29. To respond to government demands.
30. Any other? Please specify.

#### **Barriers for the Use of EC**

A constraint for the use of EC in this company is / was:

31. Inappropriate EC-related infrastructure and communication networks.
32. Inappropriate in-house expertise to implement, manage or maintain EC-related infrastructure.
33. Deficient security standards for electronic transactions.
34. Too high EC-related investment costs.
35. Not enough parties (partners/customers/suppliers) to interact electronically with.
36. Inadequate EC-related legal regime (e.g., liability and jurisdictional issues for electronic transmissions and contracting).

37. Inadequate government policies to facilitate the use of EC in this industry.
38. Reluctance of practitioners to abandon traditional paper-based practices.
39. Any other? Please specify.
40. Does this company have a formal process for strategic planning?
- a. I don't know.
  - b. No.
  - c. Yes
- If yes, how often is strategic planning undertaken in this company?

<p><u>NB:</u> In question 41, participants were asked to provide an answer for two points in time: '<i>At present</i>' and '<i>Ten years ago</i>'.</p>
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41. Would you regard EC as:
- a. A source of competitive advantage (since when?)
  - b. A competitive necessity (since when?)
  - c. None of the above.
- Why?

## BIBLIOGRAPHY

### REFERENCES FOR CHAPTER 1

- Anonymous (1993a), "Global Gain," *Lloyd's Shipping Economist*, April, 28-31.
- Anonymous (1993b), "Into the Big League," *Lloyd's Shipping Economist*, March, 27-29.
- Anonymous (1993c), "Raising the Profile," *Lloyd's Shipping Economist*, June, 22-26.
- Anonymous (1993d), "The Restructuring Continues," *Lloyd's Shipping Economist*, December, 24-26.
- Anonymous (1994), "OOCL: 'Core' Provides Sound Base," *Lloyd's Shipping Economist*, October, 19-22.
- Anonymous (1999a), "Exposing the Credit Crunch Myth," *Lloyd's Shipping Economist*, January, 19-21.
- Anonymous (2001), "E-Documents Take Pain out of Paying," *Lloyd's List*, 26 June.
- Bossley, Liz (1999), "Electronic Documentation is Set to Cut Oil Trading Costs," *Petroleum Economist*, October, 66, 10, 30-31.
- Boyes, Jane R.C. (1979), "Happy Ever After," *Containerisation International Yearbook 1979*, London: National Magazine Co. Ltd., 7-13.
- Boyes, Jane R.C. (1980), "In the Melting Pot," *Containerisation International Yearbook 1980*, London: National Magazine Co. Ltd., 7-10.
- Boyes, Jane R.C. (1981), "The Final Frontier," *Containerisation International Yearbook 1981*, London: National Magazine Co. Ltd., 7-10.
- Boyes, Jane R.C. (1984), "A Watershed Year," *Containerisation International Yearbook 1984*, London: National Magazine Co. Ltd., 7-8.
- Boyes, Jane R.C. (1985), "The Year of the Entrepreneur, and Beyond," *Containerisation International Yearbook 1985*, London: National Magazine Co. Ltd., 5-6.
- Boyes, Jane R.C. (1986a), "A Time of Structural Change," *Containerisation International Yearbook 1986*, London: National Magazine Co. Ltd., 5-6.
- Boyes, Jane R.C. (1986b), "US Act Upstages the Slow Progress of International Regulatory Reform," *Containerisation International Yearbook 1986*, London: National Magazine Co. Ltd., 16-17.

- Boyes, Jane R.C. (1988), "Distribution Revolution Takes Hold," *Containerisation International Yearbook 1988*, London: National Magazine Co. Ltd., 5-6.
- Boyes, Jane R.C. (1989), "A Period of Transition," *Containerisation International Yearbook 1989*, London: National Magazine Co. Ltd., 7-8.
- Boyes, Jane R.C. (1990), "The Challenge for the '90s," *Containerisation International Yearbook 1990*, London: National Magazine Co. Ltd., 5-6.
- Boyes, Jane R.C. (1992), "Cautious Grounds for Optimism," *Containerisation International Yearbook 1992*, London: Emap Response Publishing Ltd., 5.
- Boyes, Jane R.C. (1993), "Uncertain Times," *Containerisation International Yearbook 1993*, London: Emap Response Publishing Ltd., 5.
- Boyes, Jane R.C. (1994), "The Industry's Challenge," *Containerisation International Yearbook 1994*, London: Emap Response Publishing Ltd., 5.
- Boyes, Jane R.C. (2000), "Ups and Downs in Liner Shipping," *Containerisation International Yearbook 2000*, London: Emap Response Publishing Ltd., 5.
- Bradley, Keith (1999), "Reducing Soft Dollar Costs: Changes in Supply Chain Management," *Euromoney*, March, 4.
- Brooks, Mary R. (1993), "International Competitiveness – Assessing and Exploring Competitive Advantage by Ocean Container Carriers," *Logistics and Transportation Review*, September, 29, 3, 275-293.
- Brooks, Mary R. (2000), *Sea Change in Liner Shipping: Regulation and Managerial Decision-Making in a Global Industry*, Amsterdam: Elsevier Science.
- Chandler, George III (1998), "Maritime Electronic Commerce for the Twenty-First Century", *Tulane Maritime Law Journal*, 22, 2, 463-511.
- Chircop, Aldo (2000), "Teaching Integrated Coastal Management: Lessons from the Learning Arena," *Ocean & Coastal Management*, 43, 343-359.
- Evangelista, Pietro and Marielle Stumm (2000), "Information Technology Issues in Maritime Transport: How to Better Integrate Liner Shipping in the Supply Chain," (Paper presented at the IAME Maritime Industry into Millennium Conference, Naples, 13-15 September, 2000.)
- Farthing, Bruce (1993), *International Shipping*, London: Lloyd's of London Press Ltd.
- Frankel, Ernest G. (1991), "The Economics of Technological Change in Shipping," *Maritime Policy and Management*, 18, 1, 43-53.

- Gilmore, Grant and Charles L. Back (1975), *The Law of Admiralty*, Mineola, N.Y.: The Foundation Press.
- Gold, Edgar (1986), *Maritime Transport: The Evolution of International Marine Policy and Shipping Law*, Lexington: Lexington Books.
- Gold, Edgar (1996), *Canadian Maritime Law*, Halifax: Dalhousie University.
- Harris, Ira and Timothy Ruefli (2000), "The Strategy / Structure Debate: An Examination of the Performance Implications," *Journal of Management Studies*, June, 37, 4, 587-603.
- Heaver, T., H. Meersman, F. Moglia and E. Van de Voorde (2000), "Do Mergers and Alliances Influence European Shipping and Port Competition," *Maritime Policy and Management*, 27, 4, 363-373.
- Jessop, David (2000), "Welcome to a Paperless World," *The Banker*, May.
- Kalakota, Ravi and Andrew B. Whinston (1996), *Frontiers of Electronic Commerce*, Reading, MA: Addison-Wesley Publishing Company Inc.
- Kindred, Hugh M. and Mary R. Brooks (1997), *Multimodal Transport Rules*, The Hague: Kluwer Law International.
- Klein, Julie T. (1990), *Interdisciplinarity: History, Theory and Practice*, Detroit: Wayne State University Press.
- Lancioni, Richard A., Michael F. Smith and Terence A. Oliva (2000), "The Role of the Internet in Supply Chain Management," *Industrial Marketing Management*, 29, 45-56.
- Marlin, Steven (1999), "Globally Connected: Banks Eye Key Role in Electronic Trade" *Bank Systems & Technology*, 36, 4, 30-36.
- McConville, James (1999), *Economics of Maritime Transport: Theory and Practice*. London: Witherby & Co Ltd.
- Nissani, Moti (1997), "Ten Cheers for Interdisciplinarity: The Case for Interdisciplinary Knowledge and Research," *The Social Science Journal*, 34, 2, 201-216.
- Peters, Hans JK. (2001), "Developments in Global Seatrade and Container Shipping Markets: Their Effects on the Port Industry and Private Sector Involvement," *International Journal of Maritime Economics*, 3, 3-26.
- Phillips, Francis (1991), "Much Change and Rationalisation," *Containerisation International Yearbook 1991*, London: Emap Response Publishing Ltd., 5.
- Raghuran, G. Asopa (1998), *Shipping Management: Cases and Concepts*, New Delhi: Macmillan India Ltd.

Rinman, Thorsten and Rigmor Brodefors (1983), *The Commercial History of Shipping*, Gothenburg: Rinman & Linden AB.

Rumelt, Richard P. (1974), *Strategy, Structure, and Economic Performance*, Boston: Harvard University.

Sawabini, Stuart (2001), "EDI and the Internet," *The Journal of Business Strategy*, January/February, 22, 1, 41-43.

Stember, Marilyn (1991), "Advancing the Social Sciences Through the Interdisciplinary Enterprise," *The Social Science Journal*, 28, 1, 1-14.

Stopford, Martin (2002a), "E-Commerce Implications, Opportunities and Threats for the Shipping Business," *International Journal of Transport Management*, 1, 55-67.

Stopford, Martin (2002b) "Is the Drive for Ever Bigger Containerships Irresistible?" (Paper presented at the Lloyd's List Shipping Forecasting Conference, London, 26 April 2002), available online: <[www.clarksons.net](http://www.clarksons.net)> (accessed on 23 April, 2002).

Talley, Wayne K. (2000), "Ocean Container Shipping: Impacts of a Technological Improvement," *Journal of Economic Issues*, December, XXXIV, 4, 933- 948.

The Internet Society (2001), available online:  
<[info.isoc.org/guest/zakon/Internet/History/HIT.html](http://info.isoc.org/guest/zakon/Internet/History/HIT.html)> (accessed on 29 May, 2001).

Turban Efraim, Jae Lee, David King and H. Michael Chung (2000), *Electronic Commerce: A Managerial Perspective*, Upper Saddle River, New Jersey: Prentice-Hall.

UNCTAD (1974), *Convention on a Code of Conduct for Liner Conferences*, Geneva: United Nations.

UNCTAD (1998b), *Review of Maritime Transport 1998*, Geneva: United Nations.

UNCTAD (2000), *Review of Maritime Transport 2000*, Geneva: United Nations.

UNCTAD (2003), *Review of Maritime Transport 2003*, Geneva: United Nations.

Wilson, John (1988), *Carriage of Goods by Sea*, London: Pitman Publishing.

## REFERENCES FOR CHAPTER 2

Amit, Raphael and Christoph Zott (2001), "Value Creation in E-Business," *Strategic Management Journal*, 22, 493-520.

Ansoff, H. Igor (1965), *Corporate Strategy*, New York: McGraw-Hill Book Company.



- Barney, Jay B. (1991), "Firm Resources and Sustained Competitive Advantage," *Journal of Management*, 17, 1, 99-120.
- Barney, Jay B. (1997), *Gaining and Sustaining Competitive Advantage*, Reading: Addison-Wesley Publishing Company.
- Bowman, Edward H. and Constance E. Helfat (2001), "Does Corporate Strategy Matter?" *Strategic Management Journal*, 22, 1-23.
- Buffam, William J. (2000), *E-Business and IS Solutions*, Boston: Addison-Wesley.
- Carroll, Glenn R., (1988), *Ecological Models of Organizations*, Cambridge, MA: Ballinger Publishing Company.
- Chandler, Alfred D. (1962), *Strategy and Structure*, Cambridge MA: The MIT Press.
- Chandler, George III (1998), "Maritime Electronic Commerce for the Twenty-First Century", *Tulane Maritime Law Journal*, 22, 2, 463-511.
- Child, John (1972), "Organizational Structure, Environment and Performance: The Role of Strategic Choice," *Sociology*, 6, 1-22.
- Coase, Ronald H. (1937), "The Nature of the Firm," *Economica*, 4, 386-405.
- Conner, Kathleen R. (1991), "A Historical Comparison of Resource-based Theory and Five Schools of Thought within Industrial Organization Economics: Do We Have a New Theory of the Firm?" *Journal of Management*, 17, 1, 121-154.
- Daft, Richard (1998), "The External Environment," in *Organization Theory and Design*, Cincinnati: South-Western College Publishing, 80-107.
- DiMaggio, Paul (1988), "Interest and Agency in Institutional Theory," in L.G. Zucker (Ed) *Industrial Patterns and Organization*, Cambridge, MA.: Ballinger, 3-22.
- Eisenhardt, Kathleen M. (1989a), "Agency Theory: An Assessment and Review," *Academy of Management Review*, 14, 1, 57-74.
- Eisenhardt, Kathleen M. and Jeffrey A. Martin (2000), "Dynamic Capabilities: What are They?" *Strategic Management Journal*, 21, 1105-1121.
- Ghemawat, Pankaj (1991), *Commitment: The Dynamic of Strategy*, New York: The Free Press.
- Ghoshal, Sumantra and Peter Moran (1996), "Bad for Practice: A Critique of the Transaction Cost Theory," *Academy of Management Review*, 21, 1, 13-42.

- Hannan, Michael T. and John Freeman (1977), "The Population Ecology of Organizations," *American Journal of Sociology*, 82, 5, 929-964.
- Heracleous, Loizos and Michael Barrett (2001), "Organizational Change as Discourse: Communicative Actions and Deep Structures in the Context of Information Technology Implementation," *Academy of Management Journal*, 44, 4, 755-778.
- Jensen, Michael C. (1986), "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers," *American Economic Review Papers and Proceedings*, May, 76, 2, 323-329.
- Kalakota, Ravi and Andrew B. Whinston (1996), *Frontiers of Electronic Commerce*, Reading, MA: Addison-Wesley Publishing Company Inc.
- Kalakota, Ravi and Andrew B. Whinston (1997), *Readings in Electronic Commerce*, Reading, MA: Addison-Wesley, Inc.
- Kalakota, Ravi and Marcia Robinson (2000), *E-Business 2.0: Roadmap for Success*, Boston: Addison-Wesley.
- Kreps, David M., Paul Milgrom, John Roberts and Robert Wilson (1982), "Rational Cooperation in the Finitely Repeated Prisoners' Dilemma," *Journal of Economic Theory*, 27, 245-252.
- Krishna, Vern (1999), *The International Income Taxation of Electronic Commerce*, Vancouver: Certified General Accountants Association of Canada.
- Learned, Edmund P., C. Roland Christensen, Kenneth R. Andrews and William D. Guth (1965), *Business Policy: Text and Cases*, Homewood: Richard D. Irwin, Inc.
- May, Paul (2000), *The Business of ECommerce: From Corporate Strategy to Technology*, Cambridge: Cambridge University Press.
- May, Paul (2001), *Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business*, Cambridge: Cambridge University Press.
- Miles, Raymond E. and Charles C. Snow (1978), *Organizational Strategy, Structure, and Process*, New York: McGraw-Hill Book Company.
- Mintzberg, Henry (1987a), "Crafting Strategy," *Harvard Business Review*, July-August, 65, 4, 66-75.
- Mintzberg, Henry (1987b), "The Strategy Concept I: Five Ps for Strategy," *California Management Review*, Fall, 30, 1, 11-24.
- Mintzberg, Henry (1989), *Mintzberg on Management: Inside Our Strange World of Organizations*, New York: The Free Press.

Mintzberg, Henry, Bruce Ahlstrand and Joseph Lampel (1998), *Strategy Safari*, New York: The Free Press.

OECD (1997), *Electronic Commerce: Opportunities and Challenges for Governments*, France: OECD.

Ojala, Lauri (1994), "A Transaction Cost Analysis of Finnish, Swedish and Norwegian Shipping," *Maritime Policy and Management*, 21, 4, 273-294.

Pfeffer, Jeffrey (1982), *Organizations and Organization Theory*, Boston: Pitman Books Limited.

Porter, Michael E. (1980), *Competitive Strategy*, New York: The Free Press.

Porter, Michael E. (1985), *Competitive Advantage*, New York: The Free Press.

Rayport, Jeffrey F. and Bernard J. Jaworski (2001), *E-Commerce*, Boston: McGraw-Hill / Irving MarketspaceU.

Rindfleisch, Aric and Jan B. Heide (1997), "Transaction Cost Analysis: Past, Present, and Future Applications," *Journal of Marketing*, October, 61, 30-54.

Rugman, Alan M. and Alain Verbeke (2000), "Six Cases of Corporate Strategic Responses to Environmental Regulation," *European Management Journal*, August, 18, 4, 377-385.

Rumelt, Richard P. (1974), *Strategy, Structure, and Economic Performance*, Boston: Harvard University.

Rumelt, Richard P., Dan E. Schendel and David J. Teece (1994), "Fundamental Issues in Strategy" in *Fundamental Issues in Strategy: A Research Agenda*, Boston: Harvard Business School Press.

Sampller, Jeffrey L. and James E. Short (1998), "Strategy in Dynamic Information-Intensive Environments," *Journal of Management Studies*, July, 35, 4, 429-436.

Sokol, Phyllis (1995), *From EDI to Electronic Commerce: A Business Initiative*, New York: McGraw-Hill, Inc.

Tallon, Paul P (2000), "A Process-Oriented Assessment of the Alignment of Information Systems and Business Strategy: Implications for IT Business Value," (Ph.D. diss., University of California, Irvine).

Timmers, Paul (1999), *Electronic Commerce: Strategies and Models for Business-to-Business Trading*, New York: John Wiley & Sons, Ltd.

Turban Efraim, Jae Lee, David King and H. Michael Chung (2000), *Electronic Commerce: A Managerial Perspective*, Upper Saddle River, New Jersey: Prentice-Hall.

Vanroye, Karel and A. G. Blonk (1998), "The Creation of an Information Highway for Intermodal Transport," *Maritime Policy and Management*, July / September.

Westland, J. Christopher and Theodore H.K. Clark (1999), *Global Electronic Commerce: Theory and Case Studies*, Cambridge, MA: The MIT Press.

Williamson, Oliver E. (1975), *Markets and Hierarchies: Analysis and Antitrust Implications*, New York: The Free Press.

### REFERENCES FOR CHAPTER 3

Amit, Raphael and Christoph Zott (2001), "Value Creation in E-Business," *Strategic Management Journal*, 22, 493-520.

Anonymous (1988), "Spreading the EDI Message," *Cargo Systems*, September, 15, 9, 45-49.

Anonymous (1999b), "Time to Embrace IT," *Lloyd's Shipping Economist*, January, 30-31.

Anonymous (2000a), "Containers: E-Commerce Set to Benefit Niche Carriers," *Lloyd's List*, 13 April.

Anonymous (2000b), "Geared up for Challenges Ahead," *Lloyd's Shipping Economist*, December, 27-28.

Ashford, Andy and Robin McDowall (1995), "The Bolero Beat," *Containerisation International*, August, 63-64.

Beddow, Matthew (1999), "E-Commerce Made Easy," *Containerisation International*, June, 58.

Beddow, Matthew (2001), "Carriers Face up to IT Challenge," *Containerisation International*, February, 58-59.

Bonney, Joseph (1991), "Electronic Tower of Babel," *American Shipper*, May, 22-23.

Bonney, Joseph (1992), "Automation: First Imports, Now Exports," *American Shipper*, February, 20-22.

Bonney, Joseph (1995a), "Goodbye to the Manila Folder," *American Shipper*, January, 41.

- Bonney, Joseph (1995b), "Ocean," *American Shipper*, January, 40-41.
- Booker, Mark (1991), "EDI: Trading Paper for Problems?" *Containerisation International*, February, 39-41.
- Boyes, Jane R.C. (1984), "A Watershed Year," *Containerisation International Yearbook 1984*, London: National Magazine Co. Ltd., 7-8.
- Boyes, Jane R.C. (1985), "The Year of the Entrepreneur, and Beyond," *Containerisation International Yearbook 1985*, London: National Magazine Co. Ltd., 5-6.
- Boyes, Jane R.C. (1988), "Distribution Revolution Takes Hold," *Containerisation International Yearbook 1988*, London: National Magazine Co. Ltd., 5-6.
- Boyes, Jane R.C. (1989), "A Period of Transition," *Containerisation International Yearbook 1989*, London: National Magazine Co. Ltd., 7-8.
- Boyes, Jane R.C. (1990), "The Challenge for the '90s," *Containerisation International Yearbook 1990*, London: National Magazine Co. Ltd., 5-6.
- Boyes, Jane R.C. (1994), "The Industry's Challenge," *Containerisation International Yearbook 1994*, London: Emap Response Publishing Ltd., 5.
- Boyes, Jane R.C. (2001), "E-Commerce Heralds Sea Change for Liner Shipping," *Containerisation International Yearbook 2001*, London: Emap Business Communications Ltd., 5.
- Brooks, Mary R. (1993), "International Competitiveness – Assessing and Exploring Competitive Advantage by Ocean Container Carriers," *Logistics and Transportation Review*, September, 29, 3, 275-293.
- Buttom, Peter (1988), "EDI at the Ready," *Cargo Systems*, April, 15, 4, 95.
- Canna, Elizabeth (1990), "Central Booking: Is it the Solution?" *American Shipper*, May, 32, 5, 12-16.
- Chandler, George III (1998), "Maritime Electronic Commerce for the Twenty-First Century", *Tulane Maritime Law Journal*, 22, 2, 463-511.
- Chow, Garland (2001), "E-Business Impact on Canadian Transportation," Research Paper Prepared for the Canada Transportation Act Review Panel, July, available online: < [http://collection.nlc-bnc.ca/100/200/301/reviewcta-examenltc/e\\_business\\_impact-e/chow.pdf](http://collection.nlc-bnc.ca/100/200/301/reviewcta-examenltc/e_business_impact-e/chow.pdf) > (accessed on 31 May, 2004).
- Crichton, John (1993), "Kicking the Hard-copy Habit," *Containerisation International*, June, 36-40.

- Damas, Philip (1999), "Internet Delivers Problem-Free B/Ls," *American Shipper*, June, 70-71.
- Eller, David (1997), "Carriers Expand Logistics Choices," *Containerisation International*, April, 59-61.
- European Commission, Directorate General of Transport (1998), *Cost 330: Teleinformatics Links Between Ports and their Partners*, Brussels: Directorate of General Transport.
- Evangelista, Pietro and Marielle Stumm (2000), "Information Technology Issues in Maritime Transport: How to Better Integrate Liner Shipping in the Supply Chain," (Paper presented at the IAME Maritime Industry into Millennium Conference, Naples, 13-15 September, 2000.)
- Feeny, David (2001), "Making Business Sense of the E-opportunity," *Sloan Management Review*, Winter, 42, 2, 41-51.
- Flemming, Brian, Jean Patenaude, Glen M. Findlay, Robert K. Rae and William G. Waters II (2001), *Vision and Balance: Report of the Canada Transportation Act Review Panel*, Ministry of Public Works and Government Services Canada, June.
- Ford, Warwick and Michael S. Baum (1997), *Secure Electronic Commerce: Building the Infrastructure for Digital Signatures and Encryption*, New Jersey: Prentice Hall PTR.
- Forward, Keith (2001), *Recent Developments in Web-based Maritime Service: A Digital Ship / Drewry Report*, London: Digital Ship Ltd.
- Fossey, John (1995), "Electronic," *Containerisation International*, July, 74-75.
- Frankel, Ernst G. (1982), "Ship Management Systems Developments," *Maritime Policy and Management*, 9, 2, 135-143.
- Frankel, Ernst G. (1989), "Strategic Planning Applied to Shipping and Ports," *Maritime Policy and Management*, 16, 2, 123-132.
- Frankel, Ernst G. (1991), "The Economics of Technological Change in Shipping," *Maritime Policy and Management*, 18, 1, 43-53.
- Garfinkel, Simson and Gene Spafford (1997), *Web Security and Commerce*, Cambridge: O'Reilly and Associates Inc.
- Gliniecki, Judith and Ceda Ogada (1992), "The Legal Acceptance of Electronic Documents, Writings, Signatures, and Notices in International Transportation Conventions: A Challenge in the Age of Global Electronic Commerce," *Northwestern Journal of International Law & Business*, 13, 117-158.

- Gronfors, Kurt (1991), *Towards Sea Waybills and Electronic Documents*, Gothenburg: Scandinavian University Books.
- Jeffery, Karl (1999), *Electronic Commerce and Container Shipping: A Containershipping.com Report*, London: IIR Publications Ltd.
- Jenssen, Jan I. and Trond Randoy (2002), "Factors that Promote Innovation in Shipping Companies," *Maritime Policy and Management*, 29, 2, 119-133.
- Kindred, Hugh (1992), "Trading Internationally by Electronic Bills of Lading," *Banking & Finance Law Review*, Toronto: Thomson Canada Limited, 7, 265-282.
- Knee, Richard (1993), "Standard EDI Packages," *American Shipper*, September, 64-65.
- Knee, Richard (1995), "Electronic Schedule," *American Shipper*, January, 37-38.
- Kozolchyk, Boris (1992), "Evolution and Present State of the Ocean Bill of Lading from a Banking Law Perspective," *Journal of Maritime Law and Commerce*, April, 23, 2, 161-245.
- Lee, Tae-Woo, Nam-Kyu Park, John F. Joint and Woong Gyu Kim (2000), "A New Efficient EDI System for Container Cargo Logistics," *Maritime Policy and Management*, 27, 2, 133-144.
- Marlin, Steven (1999), "Globally Connected: Banks Eye Key Role in Electronic Trade" *Bank Systems & Technology*, 36, 4, 30-36.
- Menon, Chris (1996), "Surfing the Seven Seas," *Containerisation International*, June, 60-61.
- Mottley, Robert (1997), "Sign it," *American Shipper*, October, 34-38.
- Nilson, Ake (1996), "Finding a Legally Acceptable Solution," *Lloyd's Shipping Economist*, September, 10-12.
- North, Mark (1988), "Online for EDI," *Cargo Systems*, January, 15, 1, 61.
- Patraiko, David (1998), "IT Strategies," *Seaways*, September, 5.
- Pejovic, Caslav (1999), "Main Legal Issues in the Implementation of EDI to Bills of Lading", *European Transport Law: Journal of Law and Economics*, 34, 2, 163-186.
- Peters, Hans JK. (2001), "Developments in Global Seatrade and Container Shipping Markets: Their Effects on the Port Industry and Private Sector Involvement," *International Journal of Maritime Economics*, 3, 3-26.

- Porter, Michael E. (2001), "Strategy and the Internet," *Harvard Business Review*, March, 79, 3, 63-78.
- Prince, Theodore (2000), "E-Commerce: Ignore it at your Peril," *Containerisation International*, January, 67-68.
- Rich, C.A. (1978a), "Corporate Planning in Shipping: Relating Theory to Practice (Part 1)," *Maritime Policy and Management*, 5, 31-38.
- Rich, C.A. (1978b), "Corporate Planning in Shipping: Relating Theory to Practice - Part 2," *Maritime Policy and Management*, 5, 39-50.
- Ronen, David (1980), "The Role of Information in Ocean - Shipping Management," *Maritime Policy and Management*, 7, 2, 133-137.
- Sampler, Jeffrey (1998), "Redefining Industry Structure for the Information Age," *Strategic Management Journal*, 19, 343-355.
- Slack, Brian, Claude Comtois and Gunnar Sletmo (1996), "Shipping Lines as Agents of Change in the Port Industry," *Maritime Policy and Management*, 23, 3, 289-300.
- Slack, Brian, Claude Comtois and Robert McCalla (2002), "Strategic Alliances in the Container Shipping Industry: A Global Perspective," *Maritime Policy and Management*, 29, 1, 65-76.
- Stopford, Martin (2002a), "E-Commerce Implications, Opportunities and Threats for the Shipping Business," *International Journal of Transport Management*, 1, 55-67.
- Stopford, Martin (2002b) "Is the Drive for Ever Bigger Containerships Irresistible?" (Paper presented at the Lloyd's List Shipping Forecasting Conference, London, 26 April 2002), available online: <[www.clarksons.net](http://www.clarksons.net)> (accessed on 23 April, 2002).
- Talley, Wayne K. (2000), "Ocean Container Shipping: Impacts of a Technological Improvement," *Journal of Economic Issues*, December, XXXIV, 4, 933- 948.
- Timmers, Paul (1999), *Electronic Commerce: Strategies and Models for Business-to-Business Trading*, New York: John Wiley & Sons, Ltd.
- Turban Efraim, Jae Lee, David King and H. Michael Chung (2000), *Electronic Commerce: A Managerial Perspective*, Upper Saddle River, New Jersey: Prentice-Hall.
- UNCITRAL (1996), *Model Law on Electronic Commerce*, Geneva: United Nations.
- UNCTAD (1998a), *Electronic Commerce: Legal Considerations*, document UNCTAD/SDTE/BFB/1, dated 15 May 1998, Geneva: United Nations.



UNCTAD (2001), *Electronic Commerce and International Transportation Services*, document TD/COM.3/EM.12/2, dated 31 July, 2001, Geneva: United Nations.

Van Bergen, Philip (1994), "Electronic Data Interchange," *Seaways*, February, 3-5.

Vanroye, Karel and A. G. Blonk (1998), "The Creation of an Information Highway for Intermodal Transport," *Maritime Policy and Management*, July / September.

Venkatraman, N. (1994), "IT-enabled Business Transformation: From Automation to Business Scope Re-definition," *Sloan Management Review*, Winter, 35, 2, 73-88.

Verspeek, H.J.J. (1991), "EDI: A Management Challenge," *Containerisation International*, September, 69-75.

Von Stempel, Alex (1990), "Crossed Lines," *Cargo Systems*, August, 17, 8, 107-109.

Wilson, John (1988), *Carriage of Goods by Sea*, London: Pitman Publishing.

Yiannopoulos, A.N., (1995), *Ocean Bills of Lading: Traditional Forms, Substitutes, and EDI Systems*, The Hague: Kluwer Law International.

#### **REFERENCES FOR CHAPTER 4**

Aczel, Amir D. (1999), *Complete Business Statistics*, Toronto: Irwin McGraw-Hill.

Anderson, Dan (1995), "Logistics Alliances and Structural Change", (Ph.D. diss., No. 470, Linkoping University, Sweden).

Cook, Thomas D. and Donald T. Campbell (1979), *Quasi Experimentation: Design and Analysis Issues for Field Settings*, Boston: Houghton Mifflin.

Creswell, John W. (1994), *Research Design: Qualitative & Quantitative Approaches*, London: Sage Publications.

De Vaus, D.A. (1996), *Surveys in Social Research*, London: UCL Press Limited.

Eisenhardt, Kathleen M. (1989b), "Building Theories from Case Study Research," *Academy of Management Review*, 14, 4, 532-550.

Fowler, Floyd (1993), *Survey Research Methods*, Newbury Park, C.A.: Sage Publications.

Gioia, Dennis A. and Evelyn Pitre (1990), "Multiparadigm Perspective on Theory Building," *Academy of Management Review*, 15, 4, 548-602.

Glaser, Barney G. and Anselm L. Strauss (1967), *The Discovery of Grounded Theory*, Chicago: Aldine Pub. Co.

- Jick, Todd D. (1979), "Mixing Qualitative and Quantitative Methods: Triangulation in Action," *Administrative Science Quarterly*, December, 24, 602-611.
- Lohr, Sharon (1999), *Sampling: Design and Analysis*, Pacific Grove: Duxbury Press.
- McBurney, Donald H., (1998), *Research Methods*, Toronto: Brooks/Cole Publishing Company.
- McCracken, Grant (1989), *The Long Interview*, London: Sage Publications.
- Menard, Scott (1991), *Longitudinal Research*, London: Sage Publications.
- Oppenheim, A.N. (1992), *Questionnaire Design, Interviewing and Attitude Measurement*, London: Pinter Publishers.
- Silverman, David (2000), *Doing Qualitative Research: A Practical Handbook*, London: Sage Publications.
- Sutcliffe, Kathleen and George P. Huber (1998), "Firm and Industry as Determinants of Executive Perceptions of the Environment," *Strategic Management Journal*, 19, 793-807.
- Turban Efraim, Jae Lee, David King and H. Michael Chung (2000), *Electronic Commerce: A Managerial Perspective*, Upper Saddle River, New Jersey: Prentice-Hall.
- Yin, Robert K. (1984), *Case Study Research: Design and Methods*, London: Sage Publications.
- Yin, Robert K. (1994), *Case Study Research: Design and Methods*, Second Edition, London: Sage Publications.

## REFERENCES FOR CHAPTER 8

- Amit, Raphael and Christoph Zott (2001), "Value Creation in E-Business," *Strategic Management Journal*, 22, 493-520.
- Chow, Garland (2001), "E-Business Impact on Canadian Transportation," Research Paper Prepared for the Canada Transportation Act Review Panel, July, available online: < [http://collection.nlc-bnc.ca/100/200/301/reviewcta-examenltc/e\\_business\\_impact-e/chow.pdf](http://collection.nlc-bnc.ca/100/200/301/reviewcta-examenltc/e_business_impact-e/chow.pdf) > (accessed on 31 May, 2004).
- Jenssen, Jan I. and Trond Randoy (2002), "Factors that Promote Innovation in Shipping Companies," *Maritime Policy and Management*, 29, 2, 119-133.
- Porter, Michael E. (2001), "Strategy and the Internet," *Harvard Business Review*, March, 79, 3, 63-78.