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Firm size and performance: A study on the use of electronic commerce by container transport operators in Hong Kong

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ABSTRACT

In this study, we examine the relationship between firm size and the use of electronic commerce (EC) by container transport operators in Hong Kong and their performance implications. Using data collected from a sample of container shipping operators in Hong Kong, we identified internal and external drivers that affect the use of EC by container transport operators. Our findings indicate that large firms tend to adopt EC at a higher level of sophistication. This study also investigates the relationship between the use of EC and firm performance. Our results show that sales growth is positively related to the use of EC and firm size. To understand how firm size affects firm performance, we use a structural equation model (SEM) to examine their structural relationships. Our findings indicate that firm size positively influences sales growth. On the other hand, sales growth affects the profitability of a firm. Although customer satisfaction does not have a direct impact on profitability, our SEM suggests that customer satisfaction is a significant variable that affects the sales growth of firms.

1. Introduction

The types of electronic commerce (EC) used by the container shipping operators can be categorised into intra firm and inter firm systems (Lai, Ngai, & Cheng, 2005). Intra firm systems are used to facilitate collaboration among different functions within a firm. These information technology applications are used to capture, store, and transmit information for greater efficiency and visibility in handling physical container transport. Information on container movement has to be handled transparently, not only within a firm, but also to all related parties within the container transport chain (Lun & Browne, 2009), including customer firms, vendors and customs authorities. One example is the use of Tradelink to complete the customs declaration in Hong Kong. To improve operational efficiency and reduce transaction cost, many traders use Tradelink as a platform to complete their customs declaration. Another example of inter-firm EC is shipping lines work with other actors such as logistic service providers in the container transport chain to develop INTTRA which is a free and single-source Internet portal through which shippers can access services offered by a community of liner shipping companies (source: www.inttra.com). Services offered by INTTRA include checking the sailing schedule, booking shipping space, and tracing container status. The use of EC suggests that operators in container transport chains are making use of EC to develop their networks and connect with shippers and their suppliers to improve productivity and the service provided (Bailey & Francis, 2008).

Recognising the importance of maintaining a high level of visibility for the business operations in container transport networks, many firms have developed inter firm EC in the form of electronic data interchange (EDI) to facilitate the flow of information enabling different parties to track and trace the status, location, and delivery time of their containers. Container transport operators also use EC as a tool for online booking and sending booking confirmation to shippers. Inter firm systems are employed to assist communication among different parties within container transport chains. Within a container transport chain, the amount of data generated by a container move can include many physical documents such as shipping order, terminal interchange receipt, bill of lading, cargo manifest, container load plan, and invoice (Bichou, Lai, Lun, & Cheng, 2007). It also covers many data elements including information on the bill of lading number, shipper, consignee, notify party, place of receipt, port of loading, port of discharge, place of delivery, vessel name, voyage number, pre-carriage, on-carriage, shipping mark, container number, cargo description, cargo weight, cargo volume, place of payment, cargo on-board date, and so on (Lun, Lai, & Cheng, 2009).

Effective information exchange among the firms in the container transport chain are essential to ensure that containers

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are dispatched from shippers to consignees in a timely manner as well as to meet the regulatory requirements. Increasingly, many container transport operators have recognised the importance of using EC for container transport operations to attain a competitive edge through reduced costs, increased productivity, and improved customer services (Lai, Cheng, & Yeung, 2004). To use EC, the effect of firm size is an important area to explore. In the container transport industry, large carriers are influential in business and industrial practices. Modern containerships are expensive, and their purchase involves financial risk because of the lead time between ordering and deploying a new vessel. Withdrawing capacity during a period of low demand is also costly. Additions to shipping capacity must be tailored to infrastructure constraints such as the width and depth of ports and the loading and unloading capacities at container terminals (Fusillo, 2004). The container shipping business has entered into a phase where liner shipping companies have shifted towards scale operation in ship size (Cullinane & Khanna, 2000). With an increase in ship size, carriers need to have a large cargo volume to fill their ships (Lun Y.H.V., 2009). Moreover, the scope of services in terms of the geographical size of the network increase costs unless the volume to the enlarged network attracts sufficient traffic (Midoro & Pitto, 2000).

Concentration of container carriers contributes to the economies of scale and generates revenue. It is also an excellent tool for ocean carriers to expand by enlarging their fleets and allocating more ships to serve wider markets (Slack, Comtois, & McCalla, 2002). This concentration in recent years is a result of increased carrying capacity by the largest liner operators. Between January 2000 and 2006, the capacity of liner trade rose from 5,150,000 to 9,135,000 TEU, i.e., a 77.4% increase, according to the data from BRS-Alphaliner. In 2006, the market share of the top five liner operators, namely Maersk, MSC, CMA CGM, Evergreen, and Hapag–Lloyd, grew to 42.1% of the world total container carrying capacity (source: http://www.brs-paris.com). Due to the scale of operations and abundant resources, large carriers provide services for major routes and employ smaller carriers as their feeder services partners.

Firm size plays an important role in most empirical researches on strategic management ranging from internal organisation to strategic alliance among sets of firms (Wang, Liu, & Yong, 2007). Size effects are so strong that researchers are working on a large variety of research topics including performance, knowledge management and many others (Macher & Boerner, 2006). Firm size can be a source of competitive advantage as bigger firms are presumed to be relatively more efficient than smaller ones (Hawawinin, Subramanian, and Verdin, 2003). Despite this widespread recognition of its importance, little research has been conducted that focuses on firm size and the use of EC on firm performance in container transport operators. To gain a better understanding of the effect of firm size and use of EC on firm performance in the container transport industry, we develop hypotheses and test them empirically to investigate this issue.

In this study, the use of EC by container shipping operators are categorised into four groups, namely simple usage, e-collaboration, e-booking and e-payment. We examine the effect of firm size and the use of EC on firm performance by container transport operators in the context of Hong Kong as this city has been involved in the container port business for more than three decades. Hong Kong is a major hub in the global container transport chain and is served by 80 international shipping lines with more than 400 container liner services per week to over 500 destinations worldwide. From 1992 to 2004, Hong Kong was the world's busiest port (Port of Hong Kong, 2004). Due to the scale and history of container transport operations in Hong Kong, a study on the use of EC and firm size on firm performance in this city would advance knowledge for the industry. The objectives of this paper are as follows:

- To identify the factors that influence container transport operators to use EC.
- To investigate the relationship between firm size and the use EC.
- To examine if firm performance is dependent on the use of EC.
- To develop and empirically test a theoretical model on firm size and firm performance.

2. Conceptualisation and development of hypotheses

Managers often perceive growth as a desirable goal for their organisation (Hall, 1967; and Brush, Bromiley, & Hendrickx, 2000). Growth may lead to economies of scale (Chandler, 1990) and increased firm size has been associated with prestige, the ability to withstand environmental shocks and other managerial benefits. From the strategic management literature, resource-picking and capability-building are proposed as two mechanisms to explain how firms create competitive advantages (Makadok, 2001). Under the resource-picking mechanism, managers gather information and conduct analyses to make better use of the resource market in picking resources. Under the capability-building mechanism, managers design and construct organisational systems to enhance the productivity of the resources the firm acquires. From this resourced-based view, container transport operators of different sizes vary in their capabilities in picking resources and building capabilities. To examine the issues of firm size and its relationship with drivers to use EC, as well as its performance outcome, we develop a series of hypotheses to test the research questions.

2.1. Firm size and internal drivers to use EC

Many container transport operators use EC but others are still resisting to use it for their operations. What are the drivers for firms to use EC? Management advocacy is one of the key determinants to use EC (Srinivasan, Lilien, & Rangaswamy, 2002). Top management's role is important because new technology entails the destruction of existing assets for which management's approval will be required. With the support from top management, the quality of transport and logistics service can be assured by a network of global partners who offer different types of services with suitable strategic alliances, making available the required facilities such as the application of EC (Gunasekaran & Ngai, 2004). To use EC, container transport operators may need to have adequate resources to support the high investment in hardware and software technology that would be required (Lai et al., 2005). Other key drivers for firms to use EC include reduction in cost and improvement in productivity (Chiu, 1995; and Rao, Metts, Carlo, & Mora, 2003). Hence, there are a number of drivers for firms to use EC (Ngai, Lai, & Cheng, 2008). Nevertheless, literature on the relationship between firm size and its impact on internal drivers to use EC is very limited. Whether firm size is related to internal drivers to use EC is an issue to investigate. To evaluate the relationship between firm size and internal drivers to use EC, we present the following hypothesis:

Hypothesis 1. Internal drivers to use EC are stronger on large container transport operators.

2.2. Firm size and external drivers to use EC

In addition to internal drivers, there are external drivers for container transport operators to use EC. Firms that focus on customers may use EC as a tool in customer relationship management. They use the Internet to boost their corporate image and build brand recognition in the cyber market