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A collaborative learning lesson from using effective information technology combinations

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ABSTRACT

The purpose of this study is to measure the impact of the effectiveness of the use of IT system combinations on logistics firms' performances. This study used market basket analysis to identify the information technology packages used by logistics firms. A total of 181 major international logistics service providers are used as the samples of this study. The research findings provide strong empirical evidence that leading logistics firms running the most frequently used combinations of IT systems clearly outperformed those forgoing these combinations and their use of information technology is rated much better than others. This study is the first to use market basket analysis to examine the impact of the IT combinations logistics companies are using on firm performance. It identifies the information technology packages most frequently used by major international logistics firms, and then analyzes the impact these combinations have on the organizational performances of the companies. Also, the effects of collaborative learning can be gained if effective information technology combinations can be implemented.

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1. Introduction

As the role of IT in today's organizations continues to increase in importance, organizations implementing new IT stand to benefit greatly from investigations into these critical success factors (Mitchell, Gagné, Beaudry, & Dyer, 2012). Moreover, Yoon (2009) indicate that an individual's computing capability has an effect on his performance of given tasks in a business environment that is heavily dependent on computing. In recent years, to improve competitiveness and cut down cost, companies have been relocating their manufacturing bases to other countries to take advantages of international labor division. Due to the characteristic change of industries, product life cycle and delivery time to market have become shorter and shorter. As manufacturing and marketing have been increasingly globalized, delivering raw materials and finished products promptly to the requested destinations across the globe are the tasks for international logistics providers.

As logistics plays an important role in the global economic development, it is essential to improve the competitiveness of the logistics providers. Coupling with rapid advancement of Information Technology and globalization, like many other

industries, logistics also relies on Information Technology (IT) to increase its competitiveness. O'Brien (1996) suggests that Information System may serve three purposes in different organizations: 1. Supporting company's operation; 2. Helping with decision making; and 3. Serving for providing competitiveness advantages.

There are different information systems which are tailored for logistic operations. At the same time, various studies have also focused on discussing one individual system, studying issues like the performance of the system, the motivation of using such a system, its fields of application, the limitation of the usage and possibilities for further improvement. While more and more information systems have been used in logistic operations, multiple systems are employed in different areas of logistics. It is interesting to find out the benefits and effects of information systems by looking at several systems as a whole, as well as the selection and combination of systems.

A number of studies have been done that investigated the use of specific IT tools in the logistics industry. Lai, Ngai, and Cheng (2005) studied the use of IT systems at 1500 logistics firms in Hong Kong and listed the percentage of logistics providers and customers that used each individual IT tool specified in the survey. Its conclusion gave those in the industry a better understanding of how IT tools were being used and suggested where improvements in applying information technology needed to be made. In Singapore, a survey of third party logistics firms was conducted to examine IT

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investment in the logistics industry. Among its results, it showed the percentage of companies using information technology to carry out specific functions, with more than 40% of the companies surveyed using information technology in the areas of accounting, warehouse management and inventory control (Piplani, Pokharel, & Tan, 2004). Besides, the e-learning concept can be treated as a technological advancement with advantages and disadvantages. The ability of information and communication technologies to realize its various components formulates a wide range of applied informatics (Lytras, Pouloudi, & Poulymenakou, 2002). Furthermore, Wu and Huang (2013) find that the web-based learning environment might possibly motivate students to join logistics related industries in the future.

Unlike previous research, this study analyzes the use of combinations of IT systems by logistics companies rather than focusing on individual IT tools or functions. It identifies the most common IT system packages used in the industry and evaluates the impact these systems had on the operational performance of logistics providers. The study ultimately hopes to answer the following three questions:

1. Does the use of the most frequently used IT system packages influence the operational performance of logistics companies?
2. Do the logistics firms employing the most frequently used IT system packages rate their own information systems higher than those that are not using these packages?
3. Is the use of these IT packages by logistics firms correlated to how long they have been in business?

2. Related work

Firstly, this paper defines logistics, third party logistics, and international logistics and describe their activities and the IT systems they use. Secondly, the paper define performance in and of itself and as it applies to the logistics industry and introduce how performance is measured and its key indicators. Finally, the paper discusses the importance and influence of information technology and how it relates to performance.

2.1. Logistics

Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flows and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements. Frazelle (2002) defined logistics as the flow of materials, information, and funds between suppliers and consumers.

Third party logistics describes companies authorizing professional logistics companies to handle all or part of their logistics operations. Because the logistics companies act as third parties in providing services related to the actual transaction, they are called

“third party logistics providers. Coyle, Bardi, and Langley (1996) see “third party logistics providers” as an external supplier that performs all or part of a company’s logistics functions. The difference between “international logistics” and “logistics” described above is that international logistics involves the flow of goods between two or more countries, in other words where the point of origin and point of consumption are in different countries. Frazelle (2002) defines “global logistics” as the movement of goods, information or funds between different countries, with suppliers of suppliers linking customers of customers across borders.

2.2. Logistics firms' activities and the information technology

Sink, Langley, and Gibson (1996) note that logistics firms provide a broad range of services, including warehousing, transportation, inventory management, order processing and value-added services. Frazelle (2002) divide logistics services into five general categories: customer response, inventory planning and management, supply, transport, and warehousing. These five are mutually connected and constitute a full range of logistics functions. Based on the five categories of logistics functions noted above, Table 1 summarizes existing research to more clearly summarize the information technology systems used by logistics firms.

2.3. E-learning

Lytras and Pouloudi (2006) propose an integrated e-learning knowledge management framework to involve in the AIS SIG on Semantic Web and Information Systems, then provides a new context for the integration of emerging technologies to knowledge management practices. Their major contribution is the framework for knowledge management support from a learning perspective, which can guide strategies of effective knowledge and learning management. This framework also initiates an interesting discussion of technological issues that can enhance current knowledge management practices. Furthermore, Lytras, Naeve, and Pouloudi (2005a), Lytras, Naeve, and Pouloudi (2005b) advance a framework for Strategic Adoption of Semantic Web in Business and Market, and conclude that no semantic web application can be successful without alignment to the key strategic objectives of companies. And furthermore nobody can realize the benefits of Semantic Web evolution without a direct analysis of business performance factors that can be enhanced/supported by semantic web and ontological engineering.

To gain more insight into China's logistics industry, it is necessary to develop a closer understanding of the industry's key elements – company structure, finances, service, operations, management, information technology, and customer relations. Dai et al. (2003) surveyed 33 prominent logistics firms operating in China – 25 domestic and eight foreign companies – and reached the above conclusion after obtaining first-hand data from the companies.

Table 1
Information technology systems used by logistics firms.

Logistics activities	Usage of information technology
Transportation	Electronic data interchange, distribution requirement planning, geographic information system, information and communication technology, transportation management system, decision support system
Warehousing	Electronic data interchange, inventory planning and control system, material handling system, warehouse management system, radio frequency identification, RF tags
Inventory planning and management	Inventory package software, inventory management system, production and inventory control module, inventory system
Order processing	Order processing module, forecasting module, electronic data interchange
Information system and others	International logistics information system, RFID, customer response system, logistics planning system, enterprise resource planning system, internet customer access

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