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Service Supply Chain: How Does It Effects to the Logistics Service Effectiveness?

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1. Introduction

In 2009, Malaysia's International Trade and Industry Minister Tan Sri Muhyiddin Yassin quoted services sector in Malaysia is expected to have a significant impact on the growth of Malaysia's economy and targeted to contribute 70% of the gross domestic product (GDP) by 2020 and the services sector currently contributing about 55% to Malaysia's GDP (17th March 2009, BERNAMA). Importance of services industry seem to be acknowledged well by, Ellram et al. (2004) through the article entitled "Understanding and Managing the Services Supply Chain" and this author have popularized the term service supply chain. Sengupta et al., (2006) have taken a next step by differentiating between service supply chain and manufacturing supply chain. They argued that human labor forms a significant component of the value delivery process in service supply chain and while physical handling of a product leads to standardized and centralized procedures and controls in manufacturing supply chains.

With regards to the performance of service sector in Malaysia, the transport sub-sector registering the highest growth of 4.5%, followed by trade, finance and utilities sub-sectors. Services sector achieved total factor productivity utilization of capital and labor. The sector is expected to grow by 2.8% in 2009 supported by broad-based expansion in all services sub-sectors (Productivity Report, 2008). From this data, it shows clearly that the transport sector which comes under logistics industry plan plays an important role in the development of services industry in Malaysia. The present trend of logistics industry in Malaysia is about outsourcing and this has increase the growth of third party logistics (3PL). This is supported by Sohail and Sohal (2006) in their study, in which they found that 67.7% companies in Malaysia use the contract logistics services, with a primary focus on domestic operations. The significance growth logistics industry is officially recognized and underlined under the third industrial master plan (IMP3). According to Ali, Jaafar and Mohamad (2008), Malaysian government has set targets to achieve a growth of 8.6% and the GDP contribution is estimated to be 12.1% by the year 2020 under the Third Industrial Master Plan. The government has decided to increase the total marine cargo by three fold, air cargo by more than two fold and railway freight by more than fourfold by 2020. It is estimated that currently, there are about 22,000 companies in the logistics industry in Malaysia undertaking various areas of activities. Therefore, this study is interested to study about service supply chain management in the context of Malaysian logistics industry.

2. Literature review

A. Service Supply Chain

Baltacioglu et al. (2007) defines service supply chain (SSC) as a network of suppliers, service providers, consumers and other supporting units that performs the function of transaction of resources required to produce service followed by transformation of these resources into supporting and core services and finally delivery these services to customers. Lin et al. (2009) provided the similar explanation with Baltacioglu et al. (2007) but focuses on services as well as servitised products. Lin et al. (2009); Zhang et al. (2009) explains the key members in service supply chain are, service provider, service integrator and customers. The ultimate and most important member would be service provider. They serve as the core unit of service supply chain and service provider plays similar role as the focal company in a traditional manufacturing supply chain. The second key member in service supply chain would be service integrators and they play the role of coordinator in between service and for customers. When a customer places an order, service integrator will react to the customer request by breakdown the service request to service providers in the service chain and deliver back the required services to customer.

B. Service Supply Chain Practices

The service model that was proposed by Ellram et al. (2004) identifies the key practices that need a careful management to ensure a effective service supply chain. Service supply chain scholars have defined service supply chain based on the nature of the service they examine, which means the key definition of service supply chain will be similar to all service sectors, but nature of the definition varies accordingly based on the service sector they have chosen to study. Ellram et al. (2004), studied about professional services and it is a transfer of the service by utilizing the supplier's service assets and staff. However, Ellram et al. (2004) modified the definition to suit professional services by defining service supply chain as the management of information, process, capacity, service performance and funds from the earliest supplier to the ultimate customer.

Baltacioglu et al. (2007) studied about healthcare services and defined service supply chain as the delivery of core services to customer and the core service will be delivered with support of supporting service industry. In healthcare the core service is treatment of illness to the patient and supporting services would be surgical facilities, doctor's examination and laboratory tests. This study will focus on how service supply chain practices will lead to logistics service effectiveness. The following section will discuss about service supply chain practices undertaken in the study. The service supply chain practices proposed by Ellram et al. (2004) and Lin et al. (2009) will be the independent measures for this research. These independent variables will be tested at logistics industry focusing on logistic service providers. But in the context of SSC, they are the key members who are known as service providers and service integrators. The practices such as information flow, knowledge management, capacity and skills management and cash flow management are considered as strategically resources to the logistics service provider (Wong & Karia, 2009). These independent variables will be tested at logistics industry focusing on logistic service providers. But in the context of SSC, they are the key members who are known as service providers and service integrators.

C. Logistics Service Effectiveness

There are various definitions for logistics effectiveness but for this study, the definition from Mentzer & Konrad (1991) is adapted and defines as the extent to which the logistics

functions goals are accomplished to achieve high performance. Logistics services are a series of management activities provided by logistics service provider in order to fulfill customer's requirement whereas logistics service effectiveness is referring to the logistics process that can create value added benefits for customer and customer satisfaction. According to Panayides (2007), logistics service effectiveness is defined as of extend of service delivery the logistics service provider can provide to the customer. With reference to past literature, the term logistics service effectiveness can be referred as logistics service delivery or logistics performance and literature related to these two topics can be used to explain about logistics service effectiveness (Bienstock, Mentzer, & Bird 1997; Panayides, 2007).

D. Hypothesis Development

Olavarrieta and Ellinger (1997) discussed that resources are related to "having" while capabilities are related to "doing", making them more invisible. Therefore capabilities and resources should be treated as independent (Grant, 1991; Amit & Schoemaker, 1993; Yang et al., 2009). Therefore, information flow is process of linking all the members in a supply chain through information. It involves the process of collecting and transmitting and processing data to create information to support all the other management processes (Johnson & Mena, 2008). Information resources help to integrate the downstream and upstream of logistics service provider (Wong & Karia, 2009). Capacity can be referred as firm existing resources to support the customer demand. Armistead and Clark (1994) explained that capacity management from the service perspective as their ability to balance demand request from customers and how capable the firms service delivery system in order to fulfill this customer demand. Cash flow management is activities such as invoicing customer, payment for supplier and transfer of funds in the supply chain. Therefore, a second hypothesis is proposed:

- H1: Service supply chain practices have positive effect on logistics service effectiveness.
- H1a: Information Flow has positive effect on Logistics Service Effectiveness.
- H1b: Knowledge Management has positive effect on Logistics Service Effectiveness.
- H1c: Capacity and Skill Management has positive effect on Logistics Service Effectiveness.
- H1d: Cash Flow Management has positive effect on Logistics Service Effectiveness.

3. Methodology

A. Unit of Analysis

The units being analyzed for this study are the firms. The term firm here refers to companies as well as individual units or sites within companies. Specifically they are the logistics service providers in Penang region which comprises transport service providers, and logistics service providers. The transport service providers include transport operators of air, sea, road, and rail; multimodal operators; and terminal operators. The logistics service providers consist of facilitation services (such as freight forwarders, customs brokers, ship brokers, shipping agents, consolidators, and non-vessel operating common carriers), distribution services (warehousing and transportation, inventory management, and domestic and regional distribution and courier companies), and integrated logistics services (third party logistics providers and lead logistics providers / fourth party logistics providers (Penang Economic Monthly Report, Seri 2007).

The population frame for this study is obtained from the Malaysian Logistics Directory 2009/2010. The list of all population was prepared so that samples can be selected randomly

from the identified population. From the Malaysian Logistics directory, there are 250 logistics service providers in Penang Region. However, given the small sampling frame of the study and the likelihood of low response from mail survey (Sekaran, 2003), all the 250 logistics service providers were selected as sample for this study from the Penang region including mainland. Since the population is used as the sample in the study, therefore, the sampling technique employed in this study is census. Questionnaire was distributed to each and every respondent, by mail, by hand and by online respond via goggle group. In deciding the appropriate sample size for this study, Roscoe's (1975) rule of thumb suggests that the minimum sample should be at least 10 times the number of variables (120 in this study). However, given the small sampling frame of the study and the likelihood of low response from mail survey (Sekaran, 2003), the entire 250 logistics service provider firm was included in the study.

B. Development of the Survey Instrument

The questionnaire were developed from the question and issues highlighted in previous literature which was referred as the base for this study. The questionnaire divided into 5 sections as described above with difference type of choices provided to respondent to provide their information. Five point likert-type scale ranging from 1- 5 which refer as "strongly disagree" for 1, "disagree" for 2, "neutral" for 3, 'agree' for 4 and 'strongly agree' for 5 is used on issues such as implementation of service supply chain practices and the effectiveness of logistic service to customers. Five point likert-type scale ranging from 1-5 which refer as "very low extent" for 1, 'low extent' for 2, 'moderate' for 3, 'high extent' for 4 and 'very high extent' for 5 (Lai, 2004) is used to measure the extent to which the logistics service provider perceived their companies are capable of performing each of the logistics service items and the assessment on logistics service effectiveness of the researched firm.

C. Survey Items

Information flow is defined by Zhou and Benton (2007), as the fundamental for integration in the strategic alliance and describes information flow by three characteristics: level of information sharing, information quality and IT supply chain applications. The dimensions undertaken for the study for information flow are information sharing and level of information quality. These measurement items are adapted from Shang and Marlow (2005), Sengupta et al., (2006), and Li et al., (2006). Knowledge management is a set of processes transferring data and information into valuable knowledge (Yang et al, 2009). Hung and Chou, (2005), knowledge management framework generally consists of knowledge management processes and knowledge management enablers. For the purpose of this study, dimension for knowledge management was taken based on knowledge management enablers and the measurements were adapted from (Yang et al, 2009). Panayides (2007), logistics service effectiveness is defined as of extend of service delivery the logistics service provider can provide to the customer. The dimension was captured based on operational performance of the logistics service providers.

4. Data analysis

A. Descriptive Analysis

The overall response rate for the study is 38% from 110 out of 293 questionnaire distributed. However, among 110 questionnaires collected, only 106 sets could be proceed to the data

analyses because remaining 4 sets of questionnaire were incomplete. The high response rate obtained from this study is mainly due to the fact that the study applied different methods for the data collection such as by hand and through postage. It is believed that this response rate is considered very good given the low response expected from mail survey and generally low response rate for this type of correlational study in Malaysia.

The respondent firm is mainly focus on Logistics Service Company (27.4%), Container Shipping Company (16.0%), Freight Forwarders (13.2%) and the remaining firms are namely from Forwarding Company, Warehousing, Transportation, Container Shipping Agency, 3rd Party Logistics and others. In this study, we have included railway service, courier service and postal service under the Other category. Whereas, for the number of employee in the firm, the data shows, firms with less than 20 employees (41.5%), 21 to 50 employees (15.1%), 51 to 100 employees (16.0%), 101 to 500 employees (13.2%) and 14.2% for firm which has more than 500 employees. Majority of the firm surveyed in this study have been involved in this industry for more than 15 years (51.9%), while those firms involved for less than 5 years is 11.3%. Those firms established for 5 to 10 years (21.7%) and 15.1% of the firms are between 11 to 15 years involvement in the industry.

B. Hypotheses Testing

To test the hypotheses generated a multiple regression analysis was used. The results are presented in Table 1. The R² was 0.454 indicating that 45.4 percent of the variation of logistic service effectiveness can be explained by the four service supply chain variables and the F-value of 21.031 was significant at the 0.001 level. Thus, information flow ($\beta = .371$; $p<0.001$), knowledge management ($\beta = .195$; $p<0.05$), and cash flow management ($\beta = .417$; $p<0.001$) were positive and significantly related to logistic service effectiveness. Nevertheless, capacity and skill management ($\beta = -.018$; $p>0.05$), was found have no relationship with logistic service effectiveness. Table 1 shows that cash flow management was counted have greater beta and dominance factor in predicted logistic service effectiveness. Figure 1 visualizes the relationships.

Description	Standardized Coefficients (β)
Information Flow	.371***
Knowledge Management	.195*
Capacity and Skill Management	-.018
Cash Flow Management	.417***
R ²	.454
Adjusted R ²	.433
F	21.031***

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$

Table 1. Predictors of Logistics Service Effectiveness

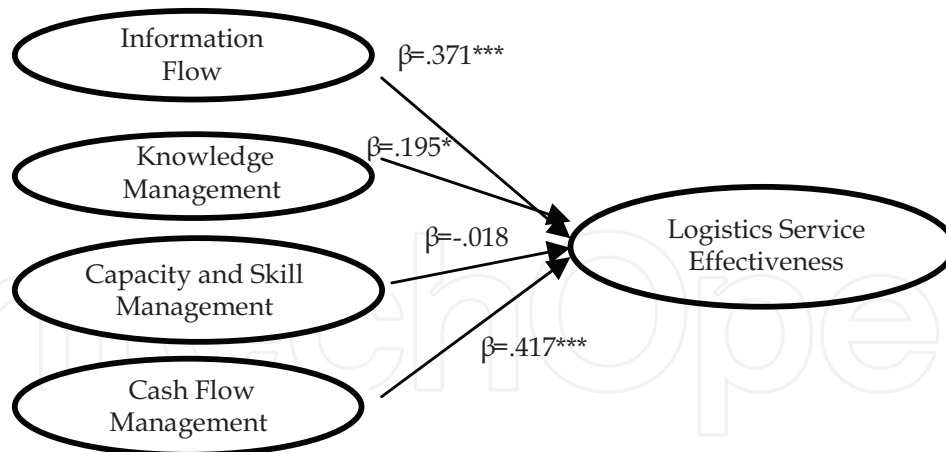


Fig. 1. Predictors of Logistic Service Effectiveness

4. Discussions

A. Service Supply Chain Practices and Logistics Service Effectiveness

Service supply chain practices have a partially significant effect on logistics service effectiveness. As expected, there is a positive relationship between service supply chain practices and logistics service effectiveness. This result is in line with Baltacioglu et al. (2007) commented that effective supply chain management is critical for service companies in order to gain competitive advantage. Baltacioglu et al. (2007) commented that service industry are becoming more complex to manage and a proper service supply chain practices are indeed a tool to cope with challenges in the service industry. Ellram et al. (2004) suggested that understanding and practicing proper service supply chain will improve the outcomes and positively impact the performance of service companies. The evidence provided by this research further strengthens the positive link between service supply chain and logistics service effectiveness. The result of the study indicates that logistics service providers in Penang region do have service supply chain practices in order to delivery effective logistics services to their customer.

The results for the study also shows that information flow, knowledge management and cash flow management are positively significant with logistics service effectiveness. The study shows the dimensions for independent variables which are that information flow, knowledge management and cash flow management are positively significant with logistics service effectiveness. But capacity and skill management has a no positive significant relationship with logistics service effectiveness. The results from the study shows that logistics service provider in Penang region have information flow as a part of their supply chain practices in order to achieve logistics service effectiveness. This results is supported with Ellram et al. (2004) comments, as this scholar point out that the service sector has less flexibility to deal with uncertain demand thus, information flows in the supply chain – including information-sharing and feedback are very important in services for managing this uncertainty. Baltacioglu et al. (2007) consider information flow and technology management as essential for the successful coordination of all key functions in the service supply chain. In an empirical study, Sengupta et al. (2006) find support at the company level for a positive relationship between information-sharing and operational performance in service supply chains.

According to Lee et al (2004) and Yang et al. (2009), organizations often have a competitive advantage or able to exhibit superior performance compared to those organizations that do not implement knowledge management. The results from the study shows that logistics service provider in Penang region have knowledge management as a part of their supply chain practices in order to achieve logistics service effectiveness. Yang et al. (2009) studied about knowledge management and the relation with firm performance in the context of liner shipping. The study showed that organizational structure and knowledge management culture were positively related to organizational performance. The results for this study is similar with Yang et al. (2009) thus further strengthen the empirical result of positive relationship between knowledge management and firms operational performance. The knowledge management practices in this study imply that top management of the logistics service providers firms are very supportive in knowledge management practice in their firms. The logistics service firms provide various programs to encourage employees to create and share knowledge.

There is a no significant relationship between capacity and skill management with logistics service effectiveness. It shows that logistics service provider do not belief proper practice of capacity and skill management can lead to logistics service effectiveness. However the negative relationship supports the justification by Ellram et al.(2004) that capacity and skill management are difficult to measure in the service context hence, organization have a high possibility to misrepresent the quality level of staff providing the service to customer. Capacity and skill management is closely connected to the demands management of the organization and availability of the resources to meet the demand (Baltacioglu et al., 2007). Rao et al. (2009) stated that capacity is important criteria for obtaining and continuing new service request and skill management helps to assign the right people with the right skill level to fulfill the logistics customer request. Hence, the result implies that capacity and skill management is less important in ensuring logistics service effectiveness among the logistics service providers.

The findings shows that logistics service provider in Penang region have a proper practice of cash flow management and according to Ellram et al., (2004), cash flow management usually have lack of proper control for services firms and commented that in service firms the transaction that occurs is only a two-way match which involves the invoice and summarizing the services delivered to customer on the purchase document. Therefore, if the service is not delivered based on the quality defined by customer it is difficult to be tracked and controlled. As of this study, logistics service providers are well aware of the cash flow management and have a proper tracking over the service provided to their customer. Lin et al., (2009) highlighted that cash flow management practice helps to ensure the transfer of fund between the service provider and customer takes places without any issue.

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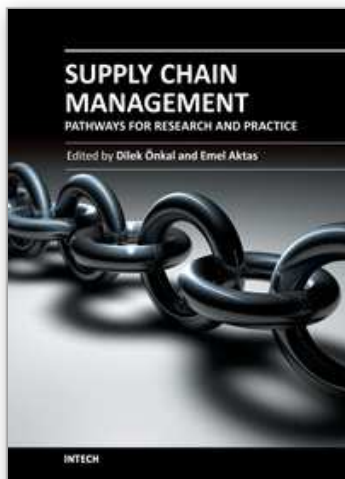
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Challenges faced by supply chains appear to be growing exponentially under the demands of increasingly complex business environments confronting the decision makers. The world we live in now operates under interconnected economies that put extra pressure on supply chains to fulfil ever-demanding customer preferences. Relative attractiveness of manufacturing as well as consumption locations changes very rapidly, which in consequence alters the economies of large scale production. Coupled with the recent economic swings, supply chains in every country are obliged to survive with substantially squeezed margins. In this book, we tried to compile a selection of papers focusing on a wide range of problems in the supply chain domain. Each chapter offers important insights into understanding these problems as well as approaches to attaining effective solutions.

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