

Service supply chain (SSC): proposed SSC practices measurement items for empirical testing

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Abstract: The importance of services industry seems to be acknowledged well. Nevertheless, compared to manufacturing, the service sector has received less attention and considered as relatively immature and many supply chain management researchers are now switching their attention to understand issues about services in supply chain instead of manufacturing. Since it is a new research topic, academically scholars have not established any measurement items in this area. As an effort to contribute in the area of service supply, this paper explains about the service supply model currently used in supply chain management and proposes measurement items for service supply chain practices which can be used by scholars for empirical testing.

Keywords: Service Supply Chain, Information Flow, Knowledge Management, Cash Flow Management, Capacity and Skill Management

1. Introduction

The competition among business is no longer within the same geographical area but rather global and organization are currently moving forward to compete in terms of supply chain. Business corporations are continuously taking efforts to strive hard to compete in the global markets to deliver effective and efficient products and services. As the prominence of the service sector increases it is vital to understand the concept of service supply chain which popularized by Ellram et al. (2004) through the article entitled "Understanding and Managing the Services Supply Chain".

The general definition of service supply chain refers to supply of services to any organization, manufacturing, service or public sector (Voss, 2009). Yu and Hua (2009) summarized in their research that service supply chain reflects on

three aspects. Firstly the structures of service supply chain which is a complex network that combines direct or indirect service providers around the service integrator. Secondly, the business process of service supply chain consist of capability, demand, supply, customer relationship, service delivery and capital management and thirdly to understand the components of 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. The purpose of this article is to establish measurement items for the service supply chain practices and proposed to use the measurement to measure the performance of logistics service providers. As logistics service supply chain is one type of service supply chain besides, healthcare service supply chain and tourism service supply chain.

2. Literature for Service Supply Chain Practices

2.1 Information Flow

Zhou and Benton (2007) defined information flow as the fundamental for integration in the strategic alliance. They further described information flow by three characteristics: level of information sharing, information quality and IT supply chain applications. The first characteristics of information flow which is information sharing refers to the knowledge sharing which takes place among the members of the chain to serve the downstream of the supply chain effectively and efficiently (Vanpoucke et al., 2009). This information sharing refers to information on customer request, service planning, capacity allocation and other type of planning process. The level of critical and proprietary information, which are shared with supply chain partners are also known as information sharing (Monczka et al., 1998). The literature for information sharing suggested that firms should disseminate information, which reaches the internal and external partners (Mason-Jones et al., 1997). Some well-known scholar in logistics area such as Bowersox et al. (1999); Cooper and Gardner, (1993); Lambert et al. (1996); Second characteristic of information flow is level of information quality. Information quality refers to the accuracy, timeliness, adequacy and credibility of the information exchanges (Li et al., 2006). Hence the third characteristic of information flow is information

technology applications. Kearns and Lederer (2003) mentioned that information technology (IT) plays a critical role in supply chain management activities and allows a large amount of information sharing in between firms. Romano (2003) explains that information technology improves the processing capabilities in firms by creating paperless. Several examples of IT application from logistics industry would be electronic data interchange (EDI), logistics information systems (LIS), radio frequency identification RFID. According to Vanpoucke et al. (2009); Forza & Salvador (2000) information needs to be shared at different levels and classified information flow and horizontal information flow and vertical information flow. Vertical information flow refers to the communications which take places at upstream and downstream of the supply chain, followed by horizontal information flows which refer to the communications which do not pass through the command chain inside the company but pass through the hierarchy lines.

Information flow is a critical service supply chain practice, which enables all the processes in terms of identifying demand, sharing information, establishing expectations through a service level agreement or statement of work, and clearly defining the scope of the work, the skills required from service providers and feedback on the performance (Ellram et al., 2004). 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). An organization can speed up their information flow by ensuring the data which are readily available is shared it with other members within the supply chain. When the speed of information flow increases, it will improve the efficiency and effectiveness of the supply chain and help the organizations to respond to customer changing needs at a faster pace. Therefore, in the long run scenario, a proper information sharing creates competitive advantage for an organization compared to their competitors (Li et al., 2006).

2.2 Knowledge Management

Knowledge resources the firm owns compared with their competitors (Choi & Lee, 2003; Spender, 1996). Knowledge management is a set of processes which transfers the data and information into valuable knowledge (Yang et al., 2009). Hall and Andriani (2003) refer knowledge as intuition, organizational culture, skills, reputation, and codified theory that probably would influence human thought and behavior.

Plessis (2007) explains knowledge management consists of organizational elements such as technology, human resources practices, organizational structure, and culture. Pan and Scarbrough (1998) on other hand have proposed that knowledge management have three major layers based on a socio-technical view and they are known as infrastructure, structure, and culture. In addition to all these descriptions, Knapp (1998) suggested knowledge management comprises of at least six elements, which are known as contents, learning, technology, assessment, personal responsibility, and culture.

Besides that, several knowledge management authors such as Arthur Andersen and The American Productivity & Quality Center (1996), Knapp (1998), Van Buren (1999), Hung and Chou (2005) have recommended that knowledge management framework generally consist of knowledge management processes and knowledge management enablers. Organizations knowledge efficiency can be achieved through proper knowledge management enablers whereby knowledge management processes focuses on the basic knowledge for of firms operations. The similarity can be seen in the works of six different authors like Chauvel and Despres (2002), Lee and Choi (2003), Yeh et al. (2006) and Yang et al. (2009) who have all defined knowledge management as enablers structural or functional conditions which initiate knowledge management mechanism or factors for facilitating knowledge creation, sharing, application, and protection within the organization.

2.3 Capacity and Skill Management

In service sector, capacity and skill management is essential but is difficult to manage. Capacity in services supply chain referred as a replacement for inventory as service industries do not kept inventory to meet their customer demands.(Ellram et al., 2004).Capacity and skills management in service industries also refers to the organizations, processes, assets and staffs. 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. The same authors mentioned that capacity management in service operations is a challenging task for service managers due to the nature of services as it involves customers during the service delivery system and restricts the service managers from having controls over the process of matching supply with demand across the whole service delivery system. Service managers face difficulties concerning capacity management also due the perish ability characteristics of services, as service cannot be inventoried (Ng et al., 1999).

Capacity is considered as firm existing resources to support the customer demand. Wong and Noorliza (2009) studied about strategic logistics resources acquired by logistics service providers to achieve competitive advantage. In their logistics, resources were divided into physical resources, technology resources human resources, and managerial competences. Physical resources in logistics are known as vessels, cargo, hubs, transportation vehicles, warehouses and logistics service centers. These resources are valuable and difficult to imitate by other competitors due to high capital investments (Wong & Noorliza 2009). Technology resources in logistics are referred as information technology such EDI, online cargo tracking, shipment notice for receiving/sending and letter of credit receiving/sending (Lai et al., 2005; Brah & Lim 2006; Wong et al., 2009)

Human resources are critical logistics resources because logistics services are labor oriented business (Wong & Karia, 2009). Myers et al. (2004) and; Murphy and Poist (2007), suggested human capital logistics industry should have skills set in terms of social skills, decision skills, problem solving skills and time management skills. These authors are mentioned that skills for logisticians cannot be limited to certain or focusing certain areas of logistics such as transports, warehouse, freight forwarding but should also cover management skills and knowledge about supply chain. Managerial of competent resources refers to the management skill to incorporate all the resources to achieve competitive advantage (Wong & Noorliza, 2009).

2.4 Cash Flow Management

Cash flow is a necessary process control which is need in the service supply chain management. Cash flow represents the flow of funds between the service provider and buyers (Ellram et al., 2004). The service provider determines the timing and the amount need to be paid by the buyers (Ellram et al., 2004). Cash flow management in also termed as financial flow management by Johnson and Mena (2008) and summarized it as a process that consists of activities such invoicing customer, payment for supplier and transfer of funds in between and other financial activities to monitor the flow of funds across the supply chain. Nevertheless, they have changed the term proposed by Ellram et al. (2004) from cash flow management to financial flow management to avoid the confusion between the cash flow management from finance context and cash flow management under service supply chain (Johnson & Mena, 2008).

3. Measurements for Service Supply Chain Practices

3.1 Items for Information Management

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 as shown in “Table 1.1”. These measurement items are adapted from Shang and Marlow (2005), Sengupta et al. (2006), and Li et al. (2006).

Table 1.1: Items for Information Flow.

No	Items: As a logistics service provider, our	Source
IF1	information on capacity levels are shared with our logistic supply chain partners	Adapted Sengupta et al., (2006)
IF2	forecasts of customer demand are shared with our logistic supply chain partners	
IF3	information on price promotions are shared with our logistic supply chain partners	
IF4	share information electronically with our logistic supply chain partners	
IF5	logistic partners will be informed in advance of changes in the firm	Adapted Li et al., (2006)
IF6	communication with logistic partners are appropriate, reliable and timely	
IF7	operational information are share effectively between departments	Adopted Shang & Marlow, (2005)
IF8	firm has adequate ability to share both standardized and customized information externally with logistic partners.	

3.2 Items for Knowledge Management

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).

Table 1.2: Items for Knowledge Management.

No.	Items: As a logistics service provider, our	Source
KM1	senior manager clearly supports the implementation of knowledge management	Adopted Yang et al., (2009)
KM2	employees are encouraged to explore and experiment new operation methods	
KM3	employees understand the importance of knowledge to corporate success	
KM4	company provides various formal training programs for performance of duties	
KM5	company's structure facilitates the creation and sharing of new knowledge	
KM6	company designs processes to facilitate knowledge exchange across functional boundaries	
KM7	company has a standardized reward system for proposing innovative programs	

3.3 Items for Capacity and Skill

Management:

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 customer demand. The dimensions for capacity and skill management are physical, human, and facilities resources which are known as logistics resources (Wong & Karia, 2009).

Table 1.3: Items for Capacity and Skill Management.

No.	Items: As a logistics service provider, our	Source
CSM1	firm has sufficient physical resources	Adapted Wong & Karia (2009)
CSM2	firm has skilled human resources from logistic industry to handle customer's requirement	
CSM3	firm has wide range of logistic facilities in term of capacity and type to suit varied requirement	Adopted Srikanhta Dath et al. (2010)
CSM4	firm has certified logistic staffs to provide effective and efficient logistic service to our customers	
CSM5	firm has employees who are a part of our customer cross-functional team for formulating and implementing logistic/supply chain objectives and plan	

3.4 Items for Cash Flow Management

Cash flow is a necessary process control which is need in the service supply chain management. Cash flow represents the flow of funds between the service

provider and buyers (Ellram et al., 2004). The dimension for cash flow was adapted from Brewer and Speh (2000), Bhagwat et al. (2007) and Lai et al. (2004).

Table 1. 4: Items for Cash Flow Management.

No.	Items: As a logistics service provider, our	Source
CF1	firm has total cash flow time monitoring to improve the rate of return on investment	Adapted Brewer and Speh (2000)
CF2	firm has information technology to monitor the control of cash flow	Adapted Bhagwat et al. (2007)
CF3	firm has cash to cash cycle practice to improve cash flow	Adapted Lai et al. (2004)

4. Conclusions

The objective of the paper was to establish measurement for the items under service supply chain model proposed by Ellram et al. (2004) and Lin et al. (2009). Since the study will focus on how service supply chain practices measurement can be used by logistics service providers to measure the service effectiveness of logistics supply chain. However, the paper only tailors the measurement for 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) and the items are proposed to be tested at logistics industry.

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