

## Supply chain management in the service sector: an applied framework

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### Keywords

Supply Chain Management, Service Supply Chain, Performance Measurement, Supply Chain integration, Logistics Industry.

### Abstract:

*The importance of the services' business sector increased dramatically as a main driving force of GDP particularly in developed countries which highlights the potential impact of an effectively managed service supply chain (SSC). There is a significant lack of understanding of the concept of SSC and the implementation of its practices; in addition to the lack of studies that focused on how to model, manage and assess the performance of SSC. This paper aims at developing an adequate framework to manage and assess the performance of SSC. A critical review was conducted to define and map the key supply chain processes in the service sector, then a corresponding set of appropriate performance measures was identified and quantified to analyse and assess SSC performance. To demonstrate the applicability of the developed framework, sampling of multiple cases from logistics industry in Egypt was conducted. It has been found -unlike the manufacturing sector- services cannot be standardized as they vary and lack common features. In addition, the review indicated that the analysis of services quality is unlikely to be quantifiable which makes the assessment of SSC performance rather difficult. The implementation of the developed framework can be a quantifiable practical tool for managing SSC performance. The proposed framework would help service-based companies in managing the effectiveness and the efficiency of SSC and to trace areas that need improvement through evaluating, monitoring and controlling SSC processes' performance.*

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### 1. Introduction

The new business environment and the structures of today's economies mainly depend on the service sector. The service industry has increased quickly due to the economic globalization process, making its contribution to economic growth is increasingly obvious (Liu et al., 2017). The importance of the services' business sector increased dramatically as a main driving force of GDP particularly in developed countries. The GDP share of the services sector in developed countries presents nearly two-thirds of total GDP, while in emerging economies, service businesses contribute to at least half of GDP which highlights the potential impact of an effectively managed service supply chain (SSC) (Baltacioglu et al., 2007).

Although the rapidly growth of service sector and the significant importance of managing this sector, SSC management is still immature in literature. Compared to manufacturing sector, there is a significant lack of understanding of the concept of SSC and the implementation of its practices in addition to the lack of studies that focused on how to model, manage, establish measurement items and assess the performance of SSC (Zailani and Kumar, 2011). The changing of SSCs' structure from a linear to network form makes the evaluation of the functioning of the entire supply chain more complicated, which requires tracking a growing amount of information to select the proper performance indicators (Leończuk, 2016).

Unlike the manufacturing sector, services cannot be standardized as they vary and lack common features (Ellram et al., 2004). The lack of a standard unified SCC management framework is considered one of the main challenges that impact the effectiveness and efficiency of SSC management

practices (Zhang and Chen, 2015). Moreover, the intangible nature of service makes it difficult to apply a number of logistics activities to service supply chains and requires high level of integration and close relation with both suppliers and customers in order to gain the synergy advantage of cooperation in the chain (Baltacioglu et al., 2007).

Therefore, the aim of this research is to develop an integrated comprehensive framework of service supply chain management. The developed framework aims at establishing a standardized unified performance measurement metrics addressing the unique nature of SCC to manage and assess the performance of integrated SSC.

## 2. Literature Review

Baltacioglu et al. (2007) defined the service supply chain as “the network of suppliers, service providers, consumers and other supporting units that performs the functions of transaction of resources required to produce services; transformation of these resources into supporting and core services; and the delivery of these services to customers”. Deriving from this definition, service supply chain management should mainly focus on the management of information, processes, capacity, service performances and funds across the SC from the earliest supplier to the ultimate customer (Ellram et al., 2004).

In this essence, the successful SCC management requires an integrated supply chain management approach. SCC management strategy should concern with the integration with other partners in the SC and enhance the SCC relationships developed with upstream suppliers and downstream users of the service. The strategic design choices of SCC management should ensure maintaining services networks, knowledge transfer and communication channels with suppliers and customers (Roth and Menor, 2003).

In this research, the key SCC processes are mapped following Ellram et al. (2004) and Johnson and Mena (2008). Ellram et al. (2004) identified 8 key process of SCC, namely: information flow, capacity and skills management, demand management, customer relationship management (CRM), supplier relationship management (SRM), service delivery management, and cash flow management. Johnson and Mena (2008) confirmed these eight processes, while added risk management as one of the main process of SCC required in the current business environment which involves higher risk exposure. This section discusses the nine key SCC processes and identifies their corresponding performance measures, up on which the developed framework for managing SCC will be proposed at the end of this section.

### 2.1. Information Flow Management

Johnson and Mena (2008) identified information flow as the process of linking all the members in a SC through information through collecting, transmitting and processing data to create information required to support all the other management processes. Information flow is described as a flow that links the various participants in the chain. It is considered a critical service supply chain practice which supports and enables all other processes in the SC such as demand forecasting, defining the scope of the work, the skills required from service providers and feedback on the performance (Ellram et al., 2004). Since information flow is considered as the fundamental for integration in the strategic alliance (Zhou and Benton, 2007), providing the right amount of relevant information to the right person at the right time has become essential for increasing collaboration among SC members and enabling the effective supply chain management (Mukaddes et al., 2010).

Vanpoucke et al. (2009) identified three different information flow strategies to enhance SC integration and studied these strategies with respect to contextual factors and the impact on performance: Silent, Communicative and IT intensive alliances. The study revealed that Silent alliances have the poorest overall performance while substantial similarities are found between Communicative and IT intensive alliances which found to be performing better. The results highlighted the importance of information sharing among partners to serve downstream customers effectively and efficiently. It became evident

that Information flow management stood out as a key process linking other processes in a way allowing greater responsiveness in all these processes. Moreover, information flow can enhance CRM and SRM, by allowing the most efficient and effective flow of information between SC partners (Johnson and Mena, 2008).

Zhou and Benton (2007) introduced three characteristics to assess the level efficiency and effectiveness of information flow, namely: level of Information sharing, Information quality and IT supply chain applications. These characteristics evaluate the information flow from three perspectives: volume, the content and the medium of the shared information. The first characteristic of information flow which is the level of information sharing refers to the level of critical and proprietary information shared with supply chain partners (Monczka et al., 1998). Information sharing can occur at several levels starting from the level of “no information sharing” where the only data that can be shared is the actual orders from sent by customer to his supplier, till the level of “ full information sharing” where complete information is available to support decision making environment within the SC (Sahin and Robinson, 2002). In addition, information needs to be shared at different levels of the process details. The level of information sharing should not be limited to the operational level, sharing and matching objectives at the strategic level is required to achieve a higher level of integration among SC partners (Vanpoucke et al., 2009).

The second characteristic of information flow- which is the information quality- was defined by Li et al. (2006) as “*the accuracy, timeliness, adequacy and credibility of the information exchanges*”. Sharing accurate and reliable information with SC partners can create competitive advantage for an organization compared to its competitors. In addition, speeding up the information flow can improve the efficiency and effectiveness of the supply chain management through offering recent and frequently exchanged information which allow the immediate responses to customer changing needs (Zailani and Kumar, 2011). Vanpoucke et al. (2009) described high quality information as being appropriate and having the precise and complete content that meets the needs of the different partners.

Information technology (IT) improves the capabilities of information sharing as it allows the processing and transmission of large amount of information within the company and among the SC partners by creating paperless communication paths (Kearns and Lederer , 2003; Romano, 2003). The new information technology applications can offer great opportunities for linking the planning, control and processing functions of the SC (Mukaddes et al., 2010).

## 2.2. Customer Relationship Management (CRM)

In order for a company to be successful, a satisfied customer is a definite necessity. Thanks to globalization, customers are scattered across the globe and companies face the challenge of ensuring that they are well served and retained. As Gunasekaran et al. (2004) stated “without a contented customer, the supply chain strategy cannot be deemed effective”. Therefore, SC metrics that focus on strengthening the relationship between companies and customers must be clearly identified. Payne and Frow (2005) defined customer relationship management (CRM) as ‘a strategic approach that is concerned with creating improved shareholder value through the development of appropriate relationships with key customers and customer segments’. Srivastava et al. (1999) and Wisner et al. (2005) showed that linking CRM with SC processes improved firm performance and increased shareholder value.

Measuring CRM performance, as claimed by many researchers, is a challenging mission (Kim et al., 2003). This is primarily due to the fact that CRM processes are intertwined with other functions within companies (Kim et al., 2003; Sin et al., 2005; Mishra and Mishra, 2009). The most comprehensive CRM performance measures was presented by Kim et al. (2003) who proposed a CRM specific balanced scorecard that focuses on four elements: *Customer Knowledge* that measures the quality of customer knowledge and data analysis, *Customer Interaction* that measures the operational excellence of internal processes and multi-channel management, *Customer value* which measures the financial benefits gained from customers, and finally *Customer satisfaction* which measures the level of

satisfaction achieved by products and services. Sin et al. (2005) also developed a reliable and valid scale to measure the following four dimensions of CRM: key customer focus, CRM organization, knowledge management and technology-based CRM.

### **2.3. Supplier Relationship Management (SRM)**

Suppliers play a very important role in modern supply chains and they have a direct impact on the success or failure of supply chain networks. Since the majority of supply chains depend on outsourcing, it became crucial to build strong relationships with suppliers. Boon-itt and Pongpanarat (2011) defined SRM as “a process where customers and suppliers develop and maintain a close and long-term relationship as partners”. They also explained that SRM is composed of five key elements: coordination, cooperation, commitment, information sharing and feedback (Boon-itt and Pongpanarat, 2011). These key elements which reflect the collaboration in planning, forecasting and replenishment activities have a positive impact on strengthening supply chain relations in addition to facilitating the information flow across the supply chain (Cassivi, 2006).

In this relationship, suppliers would be closely monitored and their performance would be evaluated against some metrics which include: supplier delivery performance, lead-time against industry norm, supplier pricing against market, efficiency of purchase order cycle time, efficiency of cash flow method, and supply booking procedures (Gunasekaran et al., 2004). But in terms of measuring the SRM process, some other measures would be used such as: developing long term relationships, focusing on key suppliers to improve SC quality and sharing common resources (Boon-itt and Pongpanarat, 2011). A framework was also developed by Giannakis (2007) to measure the performance of supplier relationships. In his framework, Giannakis (2007) used four structural variables: trust, power, involvement and commitment, which in return are decomposed into measurable second level variables to assess and identify the performance of relationships.

### **2.4. Demand Management**

Croxton et al., (2002) defined demand management as “the balancing of customers’ requirements with supply chain capabilities to reduce variability and uncertainty and increase flexibility”. Compared to manufacturing sector, managing demand for SSC involves additional difficulties. The intangible nature of service makes it impossible to inventory services to buffer against demand uncertainty resulting in a higher level of demand uncertainty in SSC (Johnson and Mena, 2008). Thus, demand management in SCC requires full understanding of current workloads and capacity available in addition to clear identification of potential to absorb additional work through hiring and overtime (Ellram et al., 2004).

The demand forecast accuracy depends on the ability to define the demand factors which vary from service to another along with the observation of market changes and how they might impact the demand factors. Moreover, the reliability of the information used for demand forecast would improve forecast accuracy. The higher the quality of the information collected about the demand factors and the market changes, the higher the ability to predict the demand with high level of accuracy (Ramanathan, 2011).

Collaborative forecasting is another essential issue that can improve the level of demand forecast accuracy in SCC. Sharing the forecasting information with other partners in the SC can help in creating a more accurate demand forecast and formulating flexible response to changes in customer demand (Li et al., 2006).

### **2.5. Service Delivery Management**

Ellram et al. (2004) defined service delivery management as “making promises to the customer, enabling service providers (internal or external) to meet those promises and meeting the promises”. Service delivery management process includes three main activities, namely: define a customer order, create a network to deliver the order and enable the network to deliver the order (Johnson and Mena, 2008). However, empowering a service delivery system requires the supportive structure (facilities,



equipment, etc.) and infrastructure (job design, skills, etc.) along with the process for delivering a service (Goldstein et al., 2002).

The process design plays a key role in service delivery systems. The good service design can contribute to the overall competitiveness of the service company through the delivery of high quality service while maintaining process efficiency (Frei and Harker, 1996). Service design should focus on enabling the implementation of service delivery process in an appropriate manner that ensures the delivery of right service's outcome (Mohr and Bitner, 1995)

Lambert and Cooper (2000) defined customer service management and order fulfillment as two main supply chain management processes. The fulfillment of customer order process effectively requires sharing the updated information about the customer order status with key supply chain partners. Moreover, customer service management process should be enhanced by an interactive communication channel with the customer in order to provide him with the necessary real-time information on promised delivery dates and service availability.

## 2.6. Cash Flow Management

Johnson and Mena (2008) defined cash flow management as *"The activities required to facilitate the flow of funds across the supply chain, including invoicing customers, paying suppliers and internal transfers"*. A company's cash flow is tightly integrated with its SC which requires a collaborative approach across the SC to reduce the total procure to payment cycle time, and consequently improve overall financial stability of the SC. Having a common vision among the supply chain (SC) partners to ensure predictable and reliable cash flows across the SC is considered the most critical challenge confronting SC cash flows management (More and Basu, 2012).

Cash to cash cycle practice is considered the key performance indicator of supply chain cash flows management. The cash to cash cycle indicates the value of net cash flows generated across the SC, starting from the inbound material and service activities with suppliers, then manufacturing operations, and finally to the outbound sales activities with customers (Chen, 2011). The cash to cash cycle time estimates the average time required to turn money invested into raw materials into money collected from customers through calculating the number of days that payables are not paid (days of credit), the number of days that inventory remains inactive (days sales in inventory) and the number of days that receivables are collected (average collection period) (Stewart, 1995).

In addition, information technology applications can play a significant role in improving the cash flows management through automating the payment process and monitoring the cash flow control system (Bhagwat and Sharma, 2007).

## 2.7. Capacity and Skills Management

As services are essentially intangible, capacity management within the service sector refers to the organization, the processes, the assets and the staff required to meet the customers' demands (Ellram et al., 2004). In other words, capacity refers to the firm's resources to satisfy the customer's needs (Zailani and Kumar, 2011). As for skills management which primarily focuses on the firm's staff, Bitner (1995) stated that service providers can differentiate themselves from the competition through the acquisition and retention of qualified staff. As a matter of fact, skilled labor is of utmost importance to the service sector because it is labor intensive (Murphy and Poist, 2006; Wong and Karia, 2009; Thai et al., 2011). However, capacity and skills management is difficult to manage, nevertheless measured (Zailani and Kumar, 2011). Therefore different authors have tried to define valid and reliable measures to measure capacity and skills performance in the service sector (Ellram et al., 2004; Baltacioglu et al., 2007; Cho et al., 2012). Measures included customer waiting and service time, sufficiency of physical resources to meet the service demand and flexibility in meeting customers' demand (Ellram et al., 2004; Wong and Karia, 2009).

Thakkar et al. (2009) have also proposed an integrated supply chain performance measurement framework for small and medium scale Enterprises (SMEs) using a set of qualitative and quantitative

measures which could be equally used for production or service based firms. Thakkar et al. (2009) provided in their framework the measures for “Innovation and learning” which could be used in measuring the processes within ‘capacity and skills management’. The measures for “Innovation and learning” included: flexible workforce, service innovation, process innovation, information sharing across the SC, training to managers and workers, vendor development initiatives and design modification based on customer requirements.

### 2.8. Knowledge Management

Knowledge management (KM) is concerned with the creation, storage, dissemination, and application of organizational knowledge (Shaw et al., 2003). It could be also defined as a set of processes that transfers data and information into valuable knowledge (Yang et al., 2009). The organizational elements which formulate knowledge management are technology, human resources practices, organizational structure and culture (Plessis, 2007). According to Nissen (1999) the fundamental capabilities of knowledge based systems can be divided into five areas: knowledge capture, knowledge organization, knowledge formalization, knowledge distribution, and problem solving application. He further explained that each capability requires a specific technique or technology.

Knowledge management is a key component towards achieving supply chain success, as organizations must possess and share knowledge about different aspects of the process (Shaw et al., 2003; Zailani and Kumar, 2011). As stated by Danskin et al. (2005), knowledge management can increase communication and eliminate unnecessary or duplicated steps in the manufacturing process which result in lowering costs. They also added that the supply chain partners would benefit from ‘rapid learning by jumping onto another’s learning curve with particular processes or procedures...’ (Danskin et al., 2005). This would consequently result in higher quality and better customer perceptions of the brand offering.

### 2.9. Risk Management

Supply chain risk management SCRM as defined by Jüttner (2005) is “the identification of potential sources of risk and implementation of appropriate strategies through a coordinated approach among supply chain members, to reduce supply chain vulnerability.” Supply chain risk has also been defined as any risk to the information, material, and product flow from original suppliers to the delivery of the final product (Christopher, 2003). According to Hillman and Keltz (2007) and Ponomarov and Holcomb (2009), a number of major trends contributed to the increased importance of SCRM, namely: outsourcing, lean and agile operations, volatility and variability of demand, higher customer expectations, natural disasters and increased terrorist threats. The process of risk management has been recently recognized as a necessary process in the supply chain especially in the service sector as services are complex and have long life cycles, which according to Johnson and Mena (2008), are two ‘factors that contribute to a higher risk exposure’.

There is no doubt that risk adjusted SCs can translate into improved financial performance and competitive advantage (Hauser, 2003; Mitroff and Alpasan, 2003; Elzarka, 2013). Organizations which integrate the SCRM process into its operations can benefit from identifying risks before events occur and create a crisis, achieving better planning, prioritization and allocation of resources and improved financial performance as a result of uninterrupted operations (Waters, 2007).

Typically, the SCRM process involves three core elements: risks identification, risks analysis and design of appropriate responses (Waters, 2007). Manuj et al. (2007) also suggested a five step model for SCRM which includes: risk identification, risk assessment and evaluation, selection of appropriate risk management strategies, strategy implementation, and mitigation of risks.

## 3. Methodology

The above review identified and discussed the key processes involved in the SSC and their corresponding key performance indicators. Based on this review, the following conceptual framework was developed to list the key performance indicators for each of the main nine SSC's processes.

Performance measure	Adapted from
<b>Information Flow Management</b>	
1- level of Information sharing	
<ul style="list-style-type: none"> <li>level of details (from no information sharing to full information sharing)</li> </ul>	(Sahin and Robinson, 2002)
<ul style="list-style-type: none"> <li>Managerial level of information sharing: (from the operational level to the strategic level)</li> </ul>	(Vanpoucke et al., 2009)
2- Information quality	
<ul style="list-style-type: none"> <li>Accuracy</li> </ul>	(Li et al., 2006; Zailani and Kumar, 2011)
<ul style="list-style-type: none"> <li>timeliness (speed, frequency, recency)</li> </ul>	(Li et al., 2006; Zailani and Kumar, 2011)
<ul style="list-style-type: none"> <li>adequacy (complete, precise, appropriate)</li> </ul>	(Li et al., 2006; Vanpoucke et al., 2009)
<ul style="list-style-type: none"> <li>credibility</li> </ul>	(Li et al., 2006; Zailani and Kumar, 2011)
3- IT supply chain applications	
<ul style="list-style-type: none"> <li>share information electronically with our logistic supply chain partners</li> </ul>	(Kearns and Lederer , 2003; Romano, 2003)
<ul style="list-style-type: none"> <li>using IT SC application</li> </ul>	(Mukaddes et al., 2010)
<b>Customer Relationship Management (CRM)</b>	
1- Ability to develop long-term relationships with customers.	(Boon-itt and Pongpanarat, 2011)
2- Ability to classify & prioritize key customers.	(Boon-itt and Pongpanarat, 2011)
3- Ability to customize customers' orders	(Thakkar et al., 2009)
4- Establishing and monitoring customer-centric performance standards	(Sin et al., 2005)
5- Employee performance is measured and rewarded based on meeting customer needs	(Sin et al., 2005)
<b>Supplier Relationship Management (SRM)</b>	
1- The ability to develop long-term relationships with suppliers	(Boon-itt and Pongpanarat, 2011)
2- The ability to maintain close relationship with a limited pool of suppliers	(Boon-itt and Pongpanarat, 2011)
3- The ability to evaluate supplier performance	(Boon-itt and Pongpanarat, 2011)
4- The ability to focus on key supplier to improve the service chain quality	(Boon-itt and Pongpanarat, 2011)
5- The ability to develop a partnership program with suppliers for the benefit of the whole service supply chain	(Boon-itt and Pongpanarat, 2011)
6- The ability to share common resources with suppliers	(Boon-itt and Pongpanarat, 2011)
<b>Demand management</b>	
1- Full understanding of the current workloads and capacity available	(Ellram et al., 2004)
2- Potential to absorb additional work through hiring and overtime	(Ellram et al., 2004)
3- Level of demand forecast accuracy	(Ramanathan, 2011)
4- Forecasts of customer demand are shared	(Li et al., 2006)

with supply chain partners	
<b>Service delivery management</b>	
1- Having a clear and appropriate design of service delivery processes	(Mohr and Bitner, 1995; Frei and Harker, 1996).
2- sharing the updated information about the customer order status with key supply chain partners	(Lambert and cooper, 2000)
3- using an interactive communication channel with the customer	(Lambert and cooper, 2000)
<b>Cash Flow Management</b>	
1- Sharing information and vision with the SC partners to predict cash flows	(More and Basu, 2012)
2- Applying cash to cash cycle practices	(Chen, 2011)
3- Using information technology applications to automate the payment process and to monitor the control of cash flow	(Bhagwat and Sharma, 2007).
<b>Capacity and skills management</b>	
1- Sufficiency of physical resources to meet the service demand	(Wong and Karia, 2009)
2- Competency of employees to respond to customer's requirement	(Wong & Karia, 2009; Srikanhta Dath et al., 2010)
3- Existence of cross functional teams to formulate supply chain objectives	(Srikanhta Dath et al., 2010)
4- Flexible workforce who can operate in any function within the company	(Thakkar et al., 2009)
5- Regular training for managers and workers	(Thakkar et al., 2009)
<b>Knowledge Management</b>	
1- Top management supports the implementation of knowledge management	(Yang et al., 2009)
2- Employees understand the importance of knowledge to corporate success	(Yang et al., 2009)
3- Company's structure facilitates the creation and sharing of new knowledge	(Yang et al., 2009)
4- Company has a standardized reward system for proposing innovative programs	(Yang et al., 2009)
<b>Risk Management</b>	
1- The ability to identify risks within the company's supply chain	(Waters, 2007; Manuj et al., 2007; Elzarka, 2013)
2- The ability to define the potential impact of the risks, and the severity of consequences.	(Waters, 2007; Manuj et al., 2007; Elzarka, 2013)
3- Designing appropriate responses to risks	(Waters, 2007; Manuj et al., 2007; Elzarka, 2013)
4- Coordination among supply chain members to reduce supply chain vulnerability	(Norman and Lindroth, 2004; Jüttner, 2005)

**Table 1: Key performance indicators for Service Supply Chain's processes**

Sampling of multiple cases was conducted to demonstrate the applicability of the developed framework. The sample comprised three companies from the Egyptian logistics industry selected as multiple-case studies to test the validity and the applicability of the proposed framework. Using multiple-case studies research approach provides more opportunities for in-depth observation to test the proposed framework in a real life context. The selected case studies presented different sectors in



the logistics industry i.e. a freight forwarder company, a logistics service provider and a shipping line. Having a diversified sample allows the findings to be contrasted and improves the validity and the reliability of the proposed framework.

Interviews were conducted with top managers to investigate the extent to which the conceptual framework's performance measures are applied and to discuss the barriers that limit the implementation of such measures. Case studies findings and analysis are discussed in the following section.

#### **4. Case Summaries**

##### **4.1. Information Flow Management**

In the proposed framework, information flow management consists mainly of three main measures: level of information sharing, information quality and IT supply chain applications. The interviews revealed that the most applied measure is the 'level of information sharing' where the interviewees indicated that it is applied in a rather moderate way and that it requires further development. As for the measure of 'information quality', it was found that it was not applied by the interviewed companies mainly because it was not regarded as an issue of prime importance. However, they indicated that the impact of not applying such measure resulted in spending time and effort to verify information which was inaccurate. The measure of 'IT supply chain applications', was found to be applied in only one of the three companies because of the top management's enforcement that was reasoned by the high investment made to apply the IT supply chain applications in the first place. Thus it was the motive to implement the measures of 'IT supply chain applications'. As for the other companies that did not implement this measure, they stated that one of the reasons responsible for this is the lack of the supply chain partners' IT orientation which in return did not encourage them to apply such measure. The impact of the absence of this measure is shown in wasted time and redundancies.

##### **4.2. Customer Relationship Management**

The three interviewed respondents agreed that CRM as a concept is not yet popular within the field of logistics services in Egypt but it is starting to get the attention of managers. This is the reason why not all the stated measures are used in evaluating the CRM process. They also stated that they all applied the first three measures which are: 'the ability to develop long term relationships with customers', 'the ability to classify and prioritize key customers' and 'the ability to customize customers' orders'. They stated that these measures were important because as service oriented firms, it helped the companies in regularly evaluating their performance, sustaining their key customers and ensuring their satisfaction. However, the two remaining measures which are 'establishing and monitoring customer centric performance standards' and 'employee performance is measured and rewarded based on meeting customer needs' were not implemented. One of the interviewees stated that his company's new management is considering CRM as a top priority and that the CRM process is being designed to be adequately measured in the future and it will include these previously mentioned measures.

##### **4.3. Supplier Relationship Management**

The SRM process was the first process in the proposed framework that was not being measured by any of the interviewees. The reasons for this apparent negligence were that the process was not regarded as a priority, the lack of integration with suppliers, and the fact that suppliers were not regarded as partners. However, one of the interviewees explained that the absence of the process and its measures resulted in some negative consequences such as the lack of loyal suppliers and difficulty in getting better prices. But, as the case with CRM, it was claimed by one of the interviewees that SRM is also getting more attention from companies who realized that their relationship with their suppliers have a significant impact on the success of their supply chains especially in the unstable business environment that Egypt and the whole middle east region is witnessing.

##### **4.4. Demand Management**

In the process of demand management, the three interviewees stated that they implement the first three measures: 'full understanding of the current workloads and capacity available', 'potential to absorb addition work through hiring and overtime', and 'level of demand forecast accuracy'. They further explained that these measures are being closely followed by the top management to ensure that companies are capable of executing and satisfying the available demand. The last measure which was not implemented by any of the three companies was 'forecasts of customer demand are shared with supply chain partners' mainly for confidentiality issues. This claim proves the fact that was stated in the previous section, which showed that these companies do not have strong relationships with their suppliers who are considered one of their supply chain partners. The interviewees stated that in their views, this measure would be hard to implement in Egypt and they cannot foresee whether it could be applied in the future or not.

#### **4.5. Service Delivery Management**

All the measures stated in the service delivery management process in the proposed framework were applied by the three companies. They stated that the measures presented reflect the core of their business because it is important for their companies to evaluate the clarity and relevance of the service delivery process and to evaluate the extent of sharing the updated information about the customer order status. They claimed that these measures have a direct impact on the customers' satisfaction they want to achieve.

#### **4.6. Cash Flow Management**

In the cash flow management process, the three interviewees use the measures of 'applying cash to cash cycle practices' and 'using IT application to automate the payment process and to monitor the control of cash flow'. They explained that evaluating the processes and flow of cash and payment is of prime importance to their businesses' financial well-being. As for the last measure 'sharing information and vision with the SC partners to predict cash flows', it was not implemented for confidentiality issues.

#### **4.7. Capacity and Skills Management**

The measures in the capacity and skills management process were all nearly implemented, except for the measure of 'regular training for managers and workers' which was not implemented by one company. The interviewee stated that regular training costs the company a large sum of money, especially that the logistics sector, namely the freight forwarders suffer from high employee turnover. As for the other measures which evaluate the 'sufficiency of resources to meet the customers' needs', 'the competency of employees', 'the cross functional teams', and the 'flexible workforce', the interviewees explained that it is important for their companies to closely monitor the measures presented in this process because once more it reflects the core of their business and it directly impacts customers' satisfaction.

#### **4.8. Knowledge Management**

The knowledge management process was the second process that was not being measured by any of the interviewees. The interviewees indicated that their companies did not acknowledge this process as a viable process to be integrated within their supply chains. They even claimed that according to their experiences, they did not witness the existence of such process in any company in Egypt, not just in the logistics sector. However, they stated that in case of application, it would allow companies to have a competitive advantage in the market they serve as creativity is valued in the logistics service sector.

#### **4.9. Risk Management**

The process of risk management, as claimed by the interviewees, gained a lot of attention after the political unrest that Egypt and the Middle East have been witnessing since the start of 2011. Prior to that date, risk management was not considered an important process in the service sector as most of the companies tended to be reactive to risks instead of being proactive. They claimed that prior to 2011, the service sector did not really experience a major crisis that negatively impacted the business. But

after the high risks and turbulent events that were due to the escalated unrest in the region, many companies were forced to consider risk management as an essential process in their service supply chain. The interviewed companies regularly evaluate their performance on how they identify risks and their impacts, the extent of designing appropriate responses and how they coordinate with their key partners to maintain their supply chain resilience.

## 5. Conclusion

Although the service sector has become increasingly important as the main driving force of the structures of today's economies, the literature review revealed the absence of an integrated comprehensive framework of service supply chain management. This paper proposed a performance measurement framework identifying the key processes involved in the SSC and their corresponding key performance indicators. The framework was then used for evaluating the performance of SSC in selected cases studies from the Egyptian logistics sector in order to test the applicability of the proposed framework and identify patterns across the cases.

The findings revealed the applicability of the proposed framework to all the cases. The implementation of the proposed framework has been found to be a quantifiable practical tool for managing SSC performance. In the analysis of the cases, it became evident that this framework can help service-based companies in managing the effectiveness and the efficiency of SSC and tracing areas that need improvement through evaluating, monitoring and controlling SSC processes' performance across the SC. However, the research has limitations in terms of generalizability of the framework to all SSCs. Future research can consider further empirical testing of the proposed framework by addressing larger and more diverse cases.

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