ΔΙΑΤΜΗΜΑΤΙΚΟ ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ
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της

ΑΝΑΓΝΩΣΤΟΥ ΜΑΡΙΑΣ

Υποβλήθηκε ως απαιτούμενο για την απόκτηση του μεταπτυχιακού διπλώματος ειδίκευσης στη Διοίκηση Επιχειρήσεων

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Abstract

Recent studies on operations management tend to show an increasing interest in services, due to their high importance in developed economies. Supply chain management (SCM) is considered to be of vital importance for the efficient function of organizations, because it adds value in the supply system. Moreover, it helps organizations gain and maintain competitive advantage among their competitors. Limited studies though, focused on SCM of service organizations. Therefore, a literature review was conducted to collect the findings concerning Service Supply Chain Management (SSCM).

This thesis aims to present the need of creating a SSCM framework and the reason that is differentiated from traditional SCM. Also, it aims to examine customers' role in the SSCM-due to their importance in the chain- and how greater customer satisfaction can be succeeded.

The added value of the thesis is that, it tries to collect all findings from previous studies concerning SSCM in one, and pinpoint possible gaps. All of them, leading to a theoretical common framework of SSCM.

The basic findings from the study were that, despite the fact that efforts have been made to create a common-theoretical-framework for services; there is no extended research on its application.

Περιεχόμενα

Introduction

Within the past decades, there is a turn in managerial studies to focus on service companies. This happens, due to the fact that services represent the highest rate of the GNP of every developed nation and the majority of employees are occupied in service related professions (Sampson S.E., 2000, Giannakis M., 2011, Cho D.W. et al, 2012, Apte A. et al, 2011). Till then, studies were mainly focused in the manufacturing sector and in developing efficient manufacturing strategies (Cho D.W. et al, 2012, Giannakis M., 2011).

After having examined thoroughly operations management in manufacturing companies, managers realized that they should pay attention to the service sector as well. It has been proven that services demand a different way of management than manufacturing companies, due to their peculiarities and the turn of economies to servitization (Giannakis M., 2011, Ellram L.M. et al, 2007).

Much attention has been given to SCM (Supply Chain Management), because it contributes in adding value in the total system and in gaining competitive advantage (Lin Y. et al, 2010, Vandaele D., Gemmel P., 2007). However, findings and frameworks related to Supply Chain concerned mainly the manufacturing sector (Ellram L.M. et al, 2007). The increasing importance of services and the inability to implement traditional SCM models in them, led to the imperative need of a SCM model applicable to services. This model was named Service Supply Chain Management (SSCM).

Despite long studies on traditional SCM, there is still no extensive research on SSCM (Samuel C. et al, 2010, Kathawala Y., Abdou K., 2003, Apte A. et al, 2011).

The aim of the present thesis is to examine and present the studies focused on SSCM. Specifically, at first it aims to explain why services need different management from manufacturing companies and mainly the reasons leading to create a SSCM framework.

Afterwards, the SSCM's features for this framework are pointed. Based on them, models of traditional SCM, which can be applied in services are presented, along with SSCM models.

To measure the effectiveness of each framework for services, their performance measures are presented. Thus it can be evaluated, whether they are suitable for services or not.

Also, studies focused in implementing SSCM are presented in order to evaluate their efficiency.

Next, based on the SSCM frameworks a discussion is made on their contribution in customers' satisfaction. The customers' role in the SSCM is discussed at first, and next how customer satisfaction can be obtained, using examples of dissatisfaction expressed by the customers in SSCM failures.

Finally, conclusions of the study are noted.

Analytically, the thesis is structured as follows:

Chapter 1 presents the methodology followed to carry out the study.

Chapter 2 summarizes the literature findings on the topic and services and their peculiarities are examined. After that, traditional SCM and its major theories are mentioned to help in better understanding the SSCM differences. Later, the SSCM's features and frameworks are presented. Finally, the connection with the customers' satisfaction is made.

Chapter 3 mentions remarks on the findings and points gaps for further study as well.

Chapter 1.

Methodology

The methodology followed in this thesis is based on the existent literature relative to this topic. After reading carefully the theory and principles of services and SCM, a research concerning the SSCM was conducted.

The research is mainly conducted through the following databases: Business Source Complete, EconLit and Scopus. It is based on papers published in scientific magazines.

The study began at first, by searching for entries with the key-words: “Service Supply Chain Management” and “Service Supply Chain Management and customers”. Findings from this first attempt were relatively few.

Based on the papers found, the references from the papers were used for further findings. Particularly, specific titles in the references related with *services, SCM, SSCM* and *customer contribution/satisfaction.*

The research on each topic stopped when there were no further available findings relative to the topic.

Chapter 2.

Literature review

The literature review begins with defining what services are (**1**) and what their differences from goods are (**2**). Next, the most important points of SCM are written down (**3**) and after that the SSCM concept is thoroughly explained (**4**), including the reason for studying it separately from SCM (**5**). Later, the special features of SSCM along with its framework and the difficulties of its implementation are examined (**6, 7, 8, 9**). Also, successful implementations of the framework are mentioned (**10**). In the end, benefits gained from the firms that implemented it (**11**) and SSCM's contribution in adding value for the end customer are cited (**12**).

1. The nature of services

Despite the importance of services in developed economies, still there is no universal and consistent definition for them. Several studies have tried to give a definition about services. According to Sampson S.E. (2000) each definition has its own managerial implications.

As defined by Heizer J. and Render B. (2011, p.42) "services are economic activities that typically produce an intangible product such as repair and maintenance, government, food lodging, transportation, insurance, trade, financial, real estate, education, legal, medical, entertainment, and other professional occupations".

As we can see from the definition above many kinds of services are not pure services, but include goods as well (Fitzsimmons J., Fitzsimmons M., 2001, Van Looy B. et al, 2003, Lin Y. et al, 2010, Spring M., Araujo L., 2009, Sampson S.E., 2000). Lately, there is an increased change into this, often called as servitization (Spring M., Araujo L., 2009). Manufacturing firms tend to provide services as well, and services may also sell the goods used for the service (Spring M., Araujo L., 2009). For example, after-sales services at IKEA, or hairstyling products sold by the hairdresser (Fitzsimmons J., Fitzsimmons M., 2001, Spring M., Araujo L., 2009).

Niranjan T.T. and Weaver M. (2011, p.2395-2396) defined services as: "the application of specialized competences (skills and knowledge), through deeds, processes, and performances for the benefit of another entity".

Another definition was mentioned by Fitzsimmons J., Fitzsimmons M. (2001, p.4), who defined services as: "service is an activity or series of activities of more or less intangible nature that normally, but not necessarily, take place in interactions between customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems".

All of these definitions include the term of intangibility, which probably is the main difference from goods, and the fact that services are activities. The first one (Heizer J., Render B., 2011) is more general and gives examples of services. While, the other two (Nirajan T.T., Weaver M., 2011, Fitzsimmons J., Fitzsimmons M., 2001) also include the added value to end customer.

Schmenner R.W. (1986) described how services can be divided in categories-interaction with customers, service customization or labor intensity. He, also, created

a matrix, which portrays the division of services into main categories depending on the previous criteria. In both cases, where it is not just pure service, it is a service package (Fitzsimmons J., Fitzsimmons M., 2001, Roth A.V., Menor L.J., 2003). An important role at services plays the environment in which the service is performed. It is really important because it contributes to the customers' experience. Service packages have some special characteristics according to Fitzsimmons J., Fitzsimmons M. (2001) which are:

- "Supporting facility. The physical resources that must be in place before a service can be offered. E.g. a hospital, an airplane, etc.
- Facilitating goods. The material purchased or consumed by the buyer, or the items provided by the customer. Examples are legal documents, medical supplies.
- Explicit services. The benefits that are readily observable by the senses and that consist of the essential or intrinsic features of the service. For example a smooth-running automobile after a tune up, the response time of a fire department.
- Implicit services. Psychological benefits that the customer may sense only vaguely or the extrinsic features of the service. Examples are the privacy of a loan office, worry-free auto repair."

Roth A.V. and Menor L.J. (2003) added to the above characteristics the *facilitating information*, which is "the information that supports or enhances the execution of explicit services, e.g. medical records".

2. Differences between services and goods

To realize the reasons for adopting different managerial implementations for services, the differences creating these needs should be studied thoroughly. Many researchers like Heizer J., Render B., 2011, Norman R., 2002, Van Looy B. et al, 2003, Fitzsimons J., Fitzsimons M., 2001, Baltacioglu T. et al, 2007, Akkerman H., Vos B., 2003, Koc A.N., 2009, Arlbjorn J.S. et al, 2011, have worked on the topic. The most widely accepted by all of them are mentioned below:

- Services are intangible (Bienstock C.C., 2002, Apte A. et al, 2011). They cannot be seen, touched, smelt, tasted or transferred. Customers cannot store the service, but they are left with the experience or the result of the service. For example the patient, who visits the doctor, receives cure. The majority of services is not pure intangible, but includes tangibles as well (Cook J.S. et al, 2001, Lin Y. et al, 2010, Fitzsimmons J., Fitzsimmons M., 2001, Roth A.V., Menor L.J., 2003). For example when drinking coffee the atmosphere, the decoration of the café and the service play a very important role in contrast on take away.
- There is no ownership and they cannot be resold. Mainly, these differences are connected with the intangibility of the services.
- They are produced and consumed simultaneously (Bienstock C.C., 2002, Apte A. et al, 2011), they are perishable. Thus, they cannot be stored to create inventory and neither can be demonstrated before they are performed (Apte A. et al, 2011).
- They are unique for every customer. The same service cannot be produced for any other.
- Services have high customer interaction. Customers are those who decide what the service would be. This is called customization. Customization of services refers to what point customers can decide the characteristics of the service provided. It is considered as a defining factor of the SSC's flexibility (Sengupta K. et al, 2006). Furthermore, they usually need to be present, when the services are performed. Only a few do not demand their presence, like an automobile's service. They are not just customers; they are inputs/co-

producers in the service's operation (Shahin A., Rostamian N., 2011, Sampson S.E., 2000, Apte A. et al, 2011).

- Service operations are not easy to automate as people cannot perform the same actions/attitudes with the exact same way without any mistake (Shahin A., Rostamian N., 2011, Choi S., Mattila A.A., 2008, Sengupta K. et al, 2006). Thus, heterogeneity is unavoidable and variations in the outcome are very often.
- Their quality cannot be easily measured (Akkermans H., Vos B., 2003).

Those are the most obvious differences between goods and services. However, many of their differences are not very clear. This happens due to the fact that, manufacturing companies offer services as part of their goods and service firms provide goods or use goods during the service process. This is referred as *servitization* (Lin Y. et al, 2010, Spring M., Araujo L., 2009).

There are also companies that are not clear whether they are service or manufacturing firms. They have characteristics of both kinds (Fitzsimmons J., Fitzsimmons M., 2001, Van Looy B. et al, 2003, Lin Y. et al, 2010).

All the above differences of services help to highlight that different management is required for services. In addition, these peculiarities lead us to wonder if existing SCM models can be applied in services.

Specifically, the intangibility, simultaneity, inventory, location and transportation are only a few issues that arise. Customers' interaction and lack of automation in service production also arise the question of, how the quality of the service provided can be measured and how can a firm promote the service provided when each service is customized to each customer?

Finally, all the above can lead to consider them as prerequisites for the SSCM framework.

3. Main features of Supply Chain Management

Companies nowadays are trying to create and maintain a competitive advantage to gain a bigger market share. One way to gain a bigger market share is, to maximize the value provided to the customer (Baltacioglu T. et al, 2007). To accomplish this, they try to reduce their costs, be more innovative or try to offer better quality among their competitors. The SCM contributes to the maximization of the value received by customers, if it is properly managed (Baltacioglu T. et al, 2007, Giannakis M., 2011). Recently, studies have proven that global companies are competing on the supply chain level rather than competing with individual organizations (Sengupta S. et al, 2006, Mentzer J.T. et al, 2001, Vries J., Huijsman R., 2011). The question of what SCM really is still remains,

This chapter aims to explain the term through several definitions given in previous studies (Heizer J., Reinder B., 2011, Simchi – Levi D. et al, 2003, Mentzer J.T. et al, 2003). Next, the most important elements and tools of SCM, on which the frameworks are created, are summarized. In the end of the chapter, the most common SCM systems and trends are mentioned. All of them are mentioned in this chapter in order to compare them with the SSCM, whether they have something in common or not.

Many definitions have been written for the supply chain. Baltacioglu T. et al (2007) pinpoints the variety of the existent definitions about SCM, which vary from being very general to being very specific, e.g. for a particular industry. Some of them are mentioned below.

As Heizer J. and Render B. (2011, p.452) write in their book: “supply chain management is the management of activities that procure materials and services, transform them into intermediate goods and final products, and deliver them through a distribution system. It includes determining transportations vendors, credit and cash transfers, suppliers, distributors, accounts payable and receivable, warehousing and inventory, order fulfillment and sharing customer, forecasting and production information.”

According to Simchi – Levi D. et al (2003) supply chain management is “ a set of approaches used to efficiently integrate suppliers, manufacturers, warehouses, and stores so that merchandise is produced and distributed at the right quantities, to the

right locations, and at the right time in order to minimize systemwide while satisfying service-level requirements".

Other definitions mention supply chain as: "the alignment of firms that brings products or services to market" and "the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate customer" (Mentzer J.T. et al, 2001). Both these definitions consider customers as part of the chain.

From the above definitions we can see some common traits of the SCM that are included in all the above definitions. Suppliers and customers are the most important members of the supply chain. Suppliers provide the goods and services with the aim to add value to the end customer. It can be said that customers enjoy the results from suppliers' activities. To provide this value to the end customer there are some important inputs and tools to the chain: logistics, transportation, location, inventory and information technology. Afterwards, each of them is further explained.

Suppliers as recognized by many studies (Heizer J., Reinder B., 2011, Simchi-Levi D. et al, 2003, Jack M., Shafer S., 2011) are of vital importance for a firms' success. It is believed that suppliers should be partners to the company.

The efficiency of the whole chain leads to a greater customer satisfaction. Each part of the supply chain, and thus suppliers, should manage their operations efficiently. If they do not, they create problems and delays to the other parts and thus dissatisfaction to the customers (Heizer J., Reinder B., 2011, Simchi-Levi D. et al, 2003, Jack M., Shafer S., 2011).

Each firm should have a relatively limited amount of suppliers so that they can manage their relationships easily and they can be in control of the supply chain. Also, because suppliers are considered part of the company, who participate in its strategic decisions, to avoid complications (Heizer J., Reinder B., 2011, Simchi-Levi D. et al, 2003, Jack M., Shafer S., 2011.

Logistics as described by Jack M. and Shafer S. (2011) is the procedure, which plans and controls effectively the flow of goods, services and information from the one point of the chain to another. It includes inventory management, distribution network, storage, warehousing, transportation, information and sometimes production.

Transportation includes the transfer of goods and perhaps services from one place to another fast. To transfer the goods, different means of transport are used, depending

on the needs and the nature of the product. They can be used airplanes, trains, ships, trucks or even a combination of all these (Jack M., Shafer S., 2011).

Location is a very important factor of the supply chain. All the facilities should be close enough to succeed speed in transportation. Another reason, the members of the chain should be close to each other is, when the goods are perishable and need to be processed soon-vegetables for instance-, or if the provisions are difficult to be transported. Consequently, the closest the organizations are to the customer, the greatest customers' satisfaction is (Jack M., Shafer S., 2011).

Inventory management is another key aspect of the supply chain. The inventory has to be on a level that is neither too high nor too low. Firms try to achieve the ideal quantity of inventory, which satisfies the firms' needs, without having excessive inventory or be in lack of it (Jack M., Shafer S., 2011).

Inventory has a cost to the company that cannot be underestimated. Significant capital is invested on it, which could be used to satisfy other needs of the company instead. That is why excessive inventory is undesirable (Simchi-Levi D. et al, 2003, Jack M., Shafer S., 2011).

To create a successful supply chain, information is really important. Information helps to manage more efficiently the inventory and even reduce the bullwhip effect[i], which is a major problem in the supply chain (Simchi-Levi D. et al, 2003, Reid R., Sanders R., 2010, Jack M., Shafer S., 2011, Sengupta K. et al, 2006). It also, contributes to more accurate forecasts, more efficient production plans and pricing information (Segunpta K. et al, 2006).

Supply chain management uses the latest technological evolutions to be faster and more efficient. The internet has contributed at a large scale because it helps on a fast and easy transmission of valuable information on real time. Electronic data interchange (EDI), Radio-Frequency Identification (RFID) tags, Enterprise Resource Planning (ERP) and e-commerce are the most common ways of using the information technology in supply chain management (Jack M., Shafer S., 2011, Sampson S.E., 2000). Below, they are explained thoroughly.

EDI (Electronic Data Interchange) is the ability of an organization's computer to connect with another's computer. Information and useful data related to provisions are transmitted between these two computers (Jack M., Shafer S., 2011, Simon J., Cook J., 2001, Sampson S.E., 2000).

RFID (Radio-Frequency Identification) tags are tags like barcodes, which notify the suppliers when the customers' inventory drops down of a particular level.

ERP (Enterprise Resource Planning) is a software used by organizations, which help integrate, organize and automate their processes through information gathered in a central database (Vries J., Huijsman R., 2011, Jack M., Shafer S. 2011).

E-commerce on the other hand, is the well-known business transactions through the use of internet. Sales are carried out through the companies' websites (Reid R., Sanders R., 2010, Simchi-Levi D. et al, 2003, Jack M., Shafer S. 2011). In addition, apart from sales, it provides valuable information to suppliers for on time replenishments and it contributes to more efficient integration among members of the supply chain (Cook J.S. et al, 2001).

Apart from the above supply chain components, there are several ways and systems to create an efficient supply chain. As regarded by Simchi-Levi D. et al (2003) the integration between the two ends of the supply chain is necessary. Push – pull systems are widely used for this reason.

Push, pull and push-pull systems are traditional supply chain management systems. The push-based strategy is based mainly on forecasts. Production and distribution is based on them and since they are not accurate they create the bullwhip effect. For an efficient supply chain the push-based system is unsuitable as it does not help to increase the total value of the chain. On the contrary, it creates both bigger or inadequate inventories, and high transportations costs. In general, it is not able to react to sudden changes in demand, which is very important for efficient SCM (Lee H.L., 2004).

The pull-based strategy is based on real demand. The members of the supply chain do not hold any inventories until demand is known or the order is set. With this system the inventory level is kept at the minimum quantities possible, the variability in the system decreases-and so does the bullwhip effect-. The real demand is known to every level in the chain. As a result, it can easily adjust to the changes. However, when it comes to real market situations it cannot always be achieved.

The push-pull system is a combination of the two previous systems. At the first stages the chain is push-based, while the latter are pull-based. The point where the push systems stops and the pull system begins is called the push-pull boundary. This system is used lately, in order to eliminate the disadvantages of the two systems. Usually it is used to products where the main "body" is the same and the special

characteristics that differentiate the final goods are added later. For example, an automobile industry produces white cars and paints them before they are sent to customers (Simchi-Levi D. et al, 2003, Heizer J., Render B., 2011).

To manage all the topics that concern SCM different strategies are followed. The most common include: sharing information, level of product and service customization, building long-term relationships and hedging methods (Sengupta K. et al, 2006).

Related to the previous chapter and having explained the basic elements of SCM, and relatively to the thesis, several questions occur. Since services are intangible how transportation, location and inventory can be defined into the SSCM framework, supposing that both SCs have common traits? Are they valid for services? And if yes, do they have the same meaning as in traditional SCM?

Suppliers and information technology seem to be analogous in SSCM at a first sight. Suppliers can probably be considered as the service providers and information technology as the tool with which useful information about customers' preferences and needs can be collected. Findings from exiting studies in the next chapter contribute in answering these questions.

Also, the above systems will also be discussed under the SSCM framework in the following chapters, in order to highlight the differences between the two SCs.

4. Service Supply Chain Management

Concluding from the above, service companies need different management from manufacturing companies. This chapter will try to define SSCM. In addition, it will present the perspectives, under which the SSCM can be studied. This contributes in understanding better the object of this thesis and providing the basic elements, which have to be considered for a SSCM framework.

The definition of SSCM is directly connected with the definition of services according to Sampson S.E. (2000). Below the most well-known are mentioned.

Even though, there is no official definition of SSCM, Ellram L.M. et al (2004, p.17) modified the supply chain definition to create a new one fitting services: "supply chain management is the management of information, processes, capacity, service performance and funds from the earliest supplier to the ultimate customer".

After Ellram L.M. et al (2004), Baltacioglu T. et al (2007, p.112) proposed the following as definition: "Service supply chain management is the management of information, processes, resources and service performances from the earliest supplier to the ultimate customer". The same definition was expressed by Vries J., Huijsman R. (2011).

In the SSCs according to the same study, the service delivered to the end customer is the one that adds value to him, including the supporting and secondary services used for the performance of the core service, which provide additional value and thus greater customer satisfaction is accomplished (Roth A.V., Menor L.J., 2003). For example, Mentzer J. et al (1989) mentioned distribution as a supplementary service in the supply chain.

Later, Lin Y. et al (2010, p.1192) define service SSC as: "a network of suppliers, service providers, customers and other service partners that transfer resources into services or servitised products delivered to and received by the customers" and SSCM as: "the management of information, processes and resources along the service supply chain to delivery services or servitised products to the customers effectively".

These definitions mention that supply chains conduct several tasks. These tasks are carried out by the members of the chain, which usually are different organizations (Kathawala Y., Abdou K., 2003).

All of these definitions (Ellram L.M. et al, 2004, Baltacioglu T. et al, 2007, Vries J., Huijsman R., 2011, Lin Y. et al, 2010) include the same inputs in the SSCM: suppliers, customers, processes, information, service performance. Suppliers, customers and information are common with SCM, thus perhaps they can follow the same management like in traditional SCM. The terms, processes and service performance, which are-according to the definitions-necessary inputs to the SSCM should be further analyzed. The following chapters try to answer this in detail. Also, all of them pinpoint that the main target of the SSCM is the added value to the end customer (Ellram L.M. et al, 2004, Baltacioglu T. et al, 2007, Vries J., Huijsman R., 2011, Lin Y. et al, 2010).

To realize better the concept of SSCM Anderson E.G. and Morrice D.J. (2000), created the *Mortgage Service Game*, which is analogous to the *Beer Game* for the traditional SCs. This game emphasized in finding whether the bullwhip effect has an impact on SSCs.

According to Sampson S. and Spring M. (2012) there are three aspects of the term SSC under which it can be eaxmined: services sourcing, making services and employing services to facilitate the delivery of products to customers.

Services sourcing refer to firms, who regardless of their nature –manufacturing or service firms- purchase services. For example economic and law services, purchased by a hotel or by a computer manufacturer (Oflac B. et al, 2012).

Decisions considering the selection of the service provider are very important. The service offered cannot show its results until it is performed (Shahin A., Rostamian N., 2011). Consequently, quality and cost cannot be measured (Bienstosk C.C., 2002) in order to assess the providers based on them. According to Kathawala Y. and Abdou K. (2003) the quality of the service provided depends on the people, who produce the service. Shahin A. and Rostamian D. (2011) pointed that customers when purchasing services should rely on word-of-mouth and reputation. Furthermore, Vandaele D. and Gemmel P. (2007) proposed the contribution to the end-customer's satisfaction as a criteria of the service providers, especially for choosing the service providers' suppliers.

The making of services is connected with the double role of customers, who are suppliers and customers at the same time (Sampson S.E., 2000, Sampson S., Spring M., 2012). There is difficulty in predicting the demand and thus the capacity planning cannot be accurate. The customers' double role affects the forecasts and the bullwhip

effect. Since the real demand and the supplies are unknown, they cannot be correct. Service supply chain managers should examine a way to be able to calculate approximately the demand, in order to manage the capacity planning (Sampson S., Spring M., 2012).

Last, the employing of services refers to the services performed in the traditional SC like logistics services (Sampson S., Spring M., 2012).

Sampson S. and Spring M. (2012), also take into consideration a fourth aspect, the service customer perspective. This refers to the benefits gained by the end customers, who are also suppliers to the services.

Another view of service supply chains is mentioned at the services purchased in the goods' supply chain. The most common examples are the outsourcing of logistics services, distribution services and even the product design (Oflac B., 2012).

Maull R. et al (2012) examined the SSCs from the customer's perspective. The satisfaction of its needs is the center and the aim of the SSC. By taking this perspective organizations try to find ways to add value for both customers and the organization (Maull R. et al, 2012). In their research they recognize that there are no pure SSCs, but rather Product Service Systems (PSS), which are both products and services purchased for satisfying the customer's needs.

Yihua W. et al (2013) examined the ordering, pricing and allocation in the SSC. Especially in the cases, when demand exceeds the service providers' capacity. They used a game theory with one supplier and two retailers. The supplier has a fixed capacity. Retailers are competitors and the retail prices can either be set by the supplier or by themselves. Their model sets light on usual problems that occur in SSCs.

This thesis studies the perspectives of service firms providing services to the end customers and be provided with services as well. For example, a hospital provides cure to the patients and is provided with services from a microbiological center-by receiving the patients' medical results.

5. Reasons for studying Service Supply Chain Management

The problems that occur in services are more difficult to be dealt than problems that occur in manufacturing, because they are more complex and they do not have a specific structure (Roth A.V., Menor L.J., 2003). Consequently, the same happens in the supply chain management and thus, special management is needed for services.

The most important reason of studying SSCM is the services' special characteristics (Shahin A., Rostamian N., 2011, Apte A. et al, 2011), such as bidirectional optimization, intangibility, perishability and simultaneous management, which make traditional SCM model inefficient for the service sector (Shahin A., Rostamian N., 2011). As a result different supply chain management models should be invented (Baltacioglu T. et al, 2007). However, Ellram L.M. et al, (2004) and Giannakis M. (2011) claimed that existent SCM models can be applied in SSCM as shown in the following chapter.

Therefore, a reason for studying SSCM is whether it really is differentiated from traditional SCM, taking into consideration the differences in Chapter 2. Also, if there are some common traits, how are they defined in the service sector? For example: is inventory correct as a term in services? If yes, is it defined likewise SCM?

According to Giannakis M. (2011), from a managerial point of view the study of SSCM contributes to increased service productivity. From the research point of view, it contributes in examining how the SSCM is in different kinds of firms (Giannakis M., 2011).

Furthermore, another reason to study this field is the benefits gained by the companies, which implement it. Some of them are competitive advantage, dependability, better service quality, greater customer satisfaction, better organized delivery schedule – which means products/services delivered on time- increased revenues and reduced costs (Baltacioglu T. et al, 2007, Giannakis M., 2011).

6. Basic principles of SSCM

This chapter has as its main target to examine the basic principles of SSCM. As in traditional SCM, and concluding from the definitions SSCM has some inputs, which will be discussed in this chapter. Also, it will be discussed whether some of them are analogous to traditional SCM. All of them contribute in creating the SSCM framework.

The service supply chains have a lot in common with supply chains in manufacturing sector (Sengupta K. et al, 2006,). External suppliers, internal operations and external distributors are needed (Reid R., Sanders R., 2010). Suppliers' relationship management is also developed (Baltacioglu T. et al, 2007). This mostly concerns services that can easily be delivered to customers like home health care. The high degree of participation of the human factor during the production of services makes though the function of the SSC more difficult (Ellram L.M. et al, 2004). Also, the intangibility of the services complicates the SCM, as it is more difficult to depict the flow of the services provided (Giannakis M., 2011).

But, according to an empirical survey by Sengupta K. et al (2006) different important factors for the supply chains made it crucial to study separately the SSCs. Indeed, each service sector requires different management –e.g. tourism, healthcare, finance, etc. (Sengupta K. et al, 2006, Maull R. et al, 2012). To be more specific, most important for the supply chain of the manufacturing sector are hedging strategies and long-term relationships, while for the SSCs are information sharing, customization and distribution (Maull R. et al, 2012). Or as Boon-itt S. and Pongpanarat C. (2011) state, traditional SCM focuses on reducing cycle time, inventory and logistics costs, while SSCM on increasing supplier responsiveness and customer service. The first is mainly dealing with flow of materials, whereas the last mainly with flow of resources (Boon-itt S., Pongpanarat C., 2011).

Concluding from the above, several concepts of traditional supply chain can be applied in services supply chain. Some of them are customer and supplier relation management, technology, forecasting, outsourcing, Just-In-Time purchasing and cost management (Simon J., Cook J., 2001).

Creating stable and long-term relationships create many benefits for the firms. Among them are loyal customers (Cook J.S. et al, 2001). Good supplier relation management

creates stability, improves quality and speed, helps in establishing JIT systems (Simon J., Cook J., 2001), improves collaboration in the chain and efficiency in management (Segunpta K. et al, 2006).

Customers though, in SSCs are suppliers as well (Shahin A., Rostamian N., 2011, Sampson 2000, Popescu S., Rusko R., 2012, Sampson S.E., 2000). Consequently, customers and suppliers are the same for SSCM, while for traditional SCM are different entities. For example at the hairdresser's service, the customer is also a supplier, because he provides his hair on which the haircut is done. In this case, the supplier-customer has a dual role. He is up and down of the service's company supply chain. In contrast with the manufacturing companies', who are selected, service companies' suppliers-customers have to be attracted. This dual role of customers was firstly introduced by Sampson S.E. (2000), Sampson S.E. (2012), who recognized three types of bidirectional supply chains, which give emphasis to this dual role of customers.

The single-level bidirectional supply chain, which includes the relationships among the customer and the first-tier supplier,

The two-level bidirectional supply chain, which includes the relationships with the second-tier suppliers as well, such as 3PL companies.[ii]

The supply chain where the customer does not need to be present during the service production, where he receives the outputs of the service e.g. delivery of letters (Sampson S.E., 2012, Sampson S.E., 2000, Shahin A., Rostamian N., 2011).

The single and two-level bidirectional service supply chains are analogous to the direct and extended supply chains as defined by Mentzer J.T. et al (2001). The direct supply chain consists of a supplier, a company and a customer and the extended consists of the second-tier suppliers, the supplier, the company and the end customer (Mentzer J.T. et al, 2001).

Companies have to be very flexible in these cases. Also, the number of the suppliers increases dramatically and is more difficult to manage.

Another important issue is the distribution of services, which is analogous to transportation from traditional SCM. Services cannot be transported as they are not tangible -there are only the mobile services, where service workers go to the customers. This means that the service is provided where the customer is, e.g. home health care or road assistance service. It is very difficult to set a schedule in these cases as the demand is only known just before distribution. For example, it cannot be

predicted how many car accidents will happen, in order to know when to be in specific places. Information is gained last minute (Van Looy B. et al, 2003, Fitzsimons J., Fitzsimons M. J., 2001).

The majority of services are delivered directly to the customer at the time they are produced. However, there are cases where intermediates are necessary. Services like hotel reservations or concerts usually need agents or brokers to deliver and sell their service. Especially, when the services include tangibles as well, retailers may be needed to perform their services. For example automobile manufacturers need retailers to provide repair and maintenance services for their products (Assael H., 1993).

Location is also, especially important to the service sector. Services, since they are intangible, cannot be stored at a place. Also, the majority of services demand the customer's presence, in order to be performed (Saccani N. et al, 2007). This way, they need to be located where the customers can easily obtain them. In services though, where the presence of the customer is not necessary like call centers, location comes second (Jack M., Shafer S., 2011). Location in services is not very different from that of traditional SCM. Both are mentioned to the place where the goods and service will be provided to the customers (Jack M., Shafer S., 2011).

Services cannot be stored, thus there is no inventory. For example theater seats, once the show has been performed the losses from the empty seats cannot be gained. In order to deal with these problems, firms are trying to control capacity or control the demand (Van Looy B. et al, 2003, Fitzsimons J., Fitzsimons M.J., 2001, Baltacioglu T. et al, 2007). A contrasting idea is the one by Niranjan T.T. and Weaver M. (2011), who support the idea that services can indeed be stored. For example theater seats are booked in advance. Below, it will be explained if services can be inventoried.

The definition of inventory is quite complex in services. Inventory can be considered as the inventory of goods used during the service production (Niranjan T.T., Weaver M., 2011). Another definition of it, is the services that can be produced and offered to the customer the time needed, without any delay (Niranjan T.T., Weaver M., 2013). Also, other studies in SSCM consider service inventory as the order backlog (Akkerman H., Vos B., 2003, Anderson E.G., Morrice D.J., 2000). Chopra S. and Lariviere M.A. (2005) consider service inventory as all the procedures and preparations made before the customers' arrival.

Related to the inventory control and distribution, the major problem of the bullwhip effect, sensibly differs in services. Due to the characteristics of the services, the bullwhip effect can only be considered in connection with the delay of the orders or the backlog of orders (Akkerman H., Vos B., 2003, Anderson E.G., Morrice D.J., 2000, Anderson Jr. E.G. et al, 2005). Only services with a lower intangibility face this problem in the supply and inventory management of the goods involved (Giannakis M. (2010).

In the study of Akkerman H. and Vos B. (2003) the term bullwhip effect in services is replaced with the term amplification. The writers state that the first term represents better the manufacturing industry, while the second is more appropriate for services, because it demonstrates better the results. Additionally, they remark that even though there is no obvious inventory, it can occur in back-office services.

It may seem at a first sight that capacity is almost impossible to be defined for services as they are produced the time they are requested by the customers. Capacity in services is analogous to capacity in goods (Niranjan T.T., Weaver M., 2011). It is the biggest amount of services that can be produced at a certain time with certain sources (e.g. workforce) (Niranjan T.T. Weaver M., 2011). However, capacity in SSCs cannot be stored as in traditional SCs (Balasubramanian P., 2007). Anderson E.G et al (2006) and Cherian J. (2007) considered labor as capacity of SSCs. Especially the later, pointed peoples' importance in global SSCs.

To control capacity, companies are trying to meet demand through forecasts. When the capacity is insufficient customers either wait for the service or not. When the capacity is above demand the resources will be under-utilized. Usually, it is preferable to have some under-utilized resources than lost customers. To perform forecasting in services the same methods to traditional SCM can be applied (Niranjan T.T., Weaver M., 2011).

From the above it is concluded that inventory, bullwhip effect and capacity are valid terms for services too. Their definitions though are a little different. Following, it will be discussed how these are taking into account for the SSCM framework.

Technology contributes importantly in transmitting fast, valuable information about demand (Simon J., Cook J., 2001), which is extremely necessary for services –as in goods as well-which are not easy to predict the demand. Whereas, forecasting, helps in estimating approximate demand (Simon J. et al, 2001). Just-in time systems are very important for services due to fact that services have to be produced the time

demanded. Both JIT systems and forecasts help in cost reduction (Simon J., Cook J., 2001). However, as Cook J.S. et al (2001) stated in their study, JIT systems involves a high risk of time lag of procurements. As a result, delays in procurements in services are fatal, since they are essential for the service performance. This, although, does not diminish its importance (Cook J.S., 2001). Sampson S.E. (2000) supports that JIT in SSCM is not an option, but rather a requirement.

Innovations in information technology (IT) are very useful in the service supply chain (Vries J., Huijsman R., 2011) as it helps gain knowledge of the real demand. Companies have the opportunity to know customers' demand and preferences and are even able to understand better the local markets. In addition, when relative information about the demand is available companies are able to schedule better their production, keep the inventory under control and at the lowest possible level (Baltacioglu T. et al, 2007). Furthermore, IT contributes in the efficiency, cost-effectiveness and quality of the service provided (Montoya M.M. et al, 2010).

As all operations in all kinds of firms, service supply chains have sources of value as well. These sources of value are the most important elements of SSCM that add value to end customer, thus attention should be paid on them. The three main of them are bidirectional optimization, management of productive capacity and management of perishability (Fitzsimons J., Fitzsimons M.J., 2001).

Bidirectional optimization is doing the best for both the customer and the firm. The customer in the service sector is a co-producer of the service, a supplier in other words (Sampson S.E., 2000). With bidirectional optimization both demand and supply are optimized simultaneously. Service is more customer-based and it is customized on customers' needs, which sometimes tend to change during the production of the service (Lillrank P. et al, 2011). For example, in healthcare, unpredicted changes in patients' health might lead to change the service provided (Lillrank P. et al, 2011). To obtain optimization, managers have to be aware of the demand. Thus, they use several types of forecasts, which help them.

Productive capacity is the amount of service that service workers can offer in a certain amount of time. However, since the service workers have to be present during the production of the service (Vandaele D., Gemmel P., 2007), the time spent to be transferred from one point/customer to the other is lost capacity. To reduce this lost capacity proper management has to be applied.

The management of perishability is directly connected with the productive capacity. Its main target is to minimize the idle times between services. Moreover, it is connected with the service workers' skills and knowledge. Apart from the lost time, customers' needs have to be satisfied. For this reason, the management of perishability involves training, refining and extending service workers' skills.

In the end, in connection with the previous chapter some strategies of SCM were mentioned. The push, pull, push-pull systems and outsourcing (Simchi-Levi D. et al, 2003, Heizer J., Render B., 2011, Simon J. et al, 1997). From the above, it seems that push systems cannot be applied as service cannot be produced in advanced. The most proper is pull system and for services that include goods the push-pull system as well.

Another strategy of SCM is outsourcing. Outsourcing refers to outsource the company's non-core activities, in order to succeed competitive advantage (Simon J. et al, 1997). As in traditional supply chains there is a tendency the past few years in outsourcing services. This either means both manufacturing and service companies outsource services like finance, marketing, etc., which cannot perform on its own, or service firms outsourcing a part of their services to other firms.

Part of the SSCM comprises outsourcing. Outsourcing in service firms is, when a service company turns to another service company to perform part or the entire service (Shahin A., Rostamian N., 2011). At most, firms assign outsourcing to specialized suppliers (Lillrank P. et al, 2011). With this method, companies can focus on the production of their core service and on their strategy and reduce their costs (Shahin A., Rostamian N., 2011). Furthermore, service companies tend to outsource more the past few years, because greater customer satisfaction is succeeded (Cook J.S., 2001, Razzaque M.A., Sheng C.C., 1998). In addition, outsourcing contributes in gaining competitive advantage, adds value in the product or service provided, helps in entering new markets and provides reliable resources (Razzaque M.A., Sheng C.C., 1998).

Lately, offshore outsourcing of services is also very common. Communication, especially through the internet, is very easy and direct, while labor costs are very low in third countries. Thus, services like call centers can be outsourced easily (Tate W.L., Ellram L.M. (2012).

In their study, Shahin A. Rostamian N. (2011) created a framework for outsourcing strategies in a hospital. The quadrant framework they invented, for deciding whether

or not outsource a service, can also be applied in other single level bidirectional services, as long as the proper changes in the questionnaire are made.

7. Models for implementing SSCM efficiently

In this chapter an effort is made to define the SSCM model. At first, the members of the chain are presented and afterwards previously proposed models are discussed. This contributes in examining, if there is a complete SSCM model or it still remains a gap in the literature.

To coordinate and function an effective SSC, there must be an organized structure, which will control tasks that have to be performed and will control the flow of the services. Till now, no official model for the SSC has been introduced. One perceptive still supports that SSCs should be treated like traditional manufacturing supply chains. Giannakis M. (2011) based on this, in combination with the special characteristics of services, proposed three models of the traditional supply chains that can be applied into SSC,s with some adaptations to fit in services.

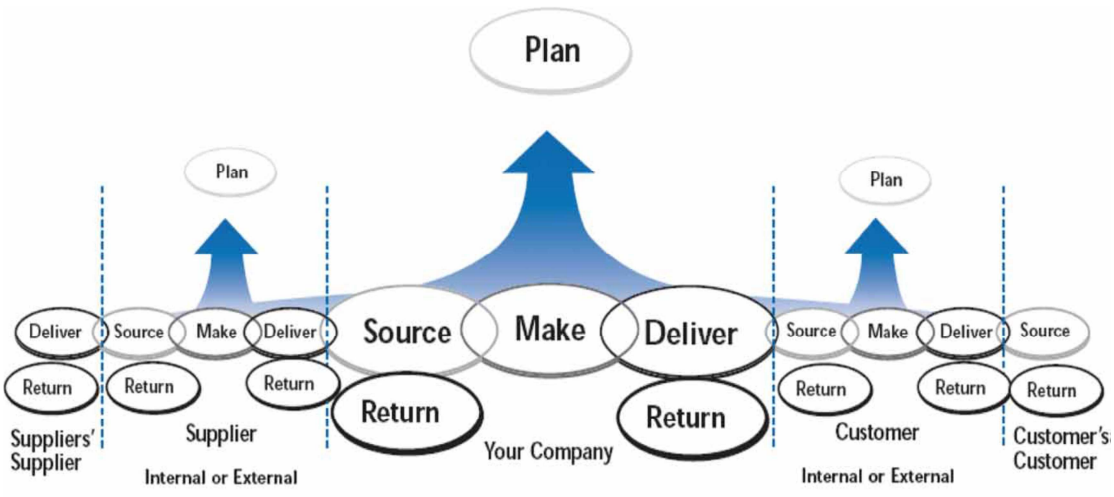
-The supply chain orientations reference (SCOR) model.

The SCOR model is based on five main processes: plan, source, make, deliver and return (Giannakis M., 2011, Baltacioglu T. et al, 2007). According to this model each company is in the center of the supply chain having the suppliers on its one side and the customers on the other (Baltacioglu T. et al, 2007). However, in services the two edges of the chain are customers (Sampson S.E., 2000). There are though the service providers as well, which are organizations providing services to the service suppliers (Lin Y. et al, 2010). Based on certain expected results, the efficiency of the supply chains can be easily measured.

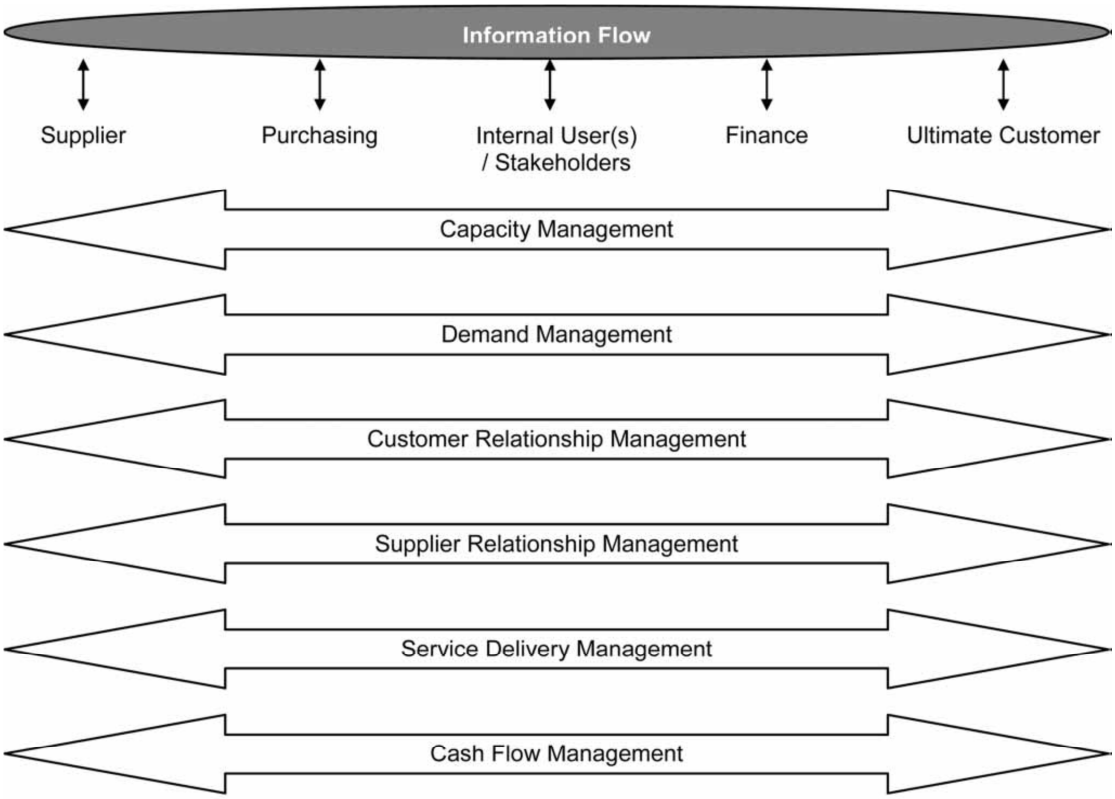
SCOR model was also proposed by Ellram L.M. et al (2004) and Baltacioglu T. et al (2007) with the difference that the last ones, considered it only as a base for a SSCM framework. They argued that it cannot be applied due to services' peculiarities. Instead, they proposed Ellram L.M. et al (2004) model, which is similar to SCOR model, but it is adapted to services.

In services, there are no obvious or measured results. They cannot be made or delivered. The process *make* refers to the transformation of tangible resources in finished goods (Giannakis M., 2011). The service production happens during the *delivery* process. As a result, these two stages perhaps should be merged for the services. In practice, to adopt this model service firms must exactly define who their supplies are, the production of the service should be thoroughly described, the

processes performed and the desirable results. In a second study Giannakis M. (2011) focused particularly on SCOR model, trying to create a framework applicable in services by applying it to a consulting firm and to the train transportation service. However, he states that it is only a tool to help managers to create their own framework adjusted in their service firm's needs. Finally, for the return stage, feedback from customers is very important. Each service firm can define the qualitative and quantitative results that wish to succeed and through the feedback, they can be measured. Below the SCOR model and the framework proposed by Ellram L.M. et al are depicted.



Source: Giannakis M. (2011)



Source: Ellram *et al.* [2004].

- 3S model

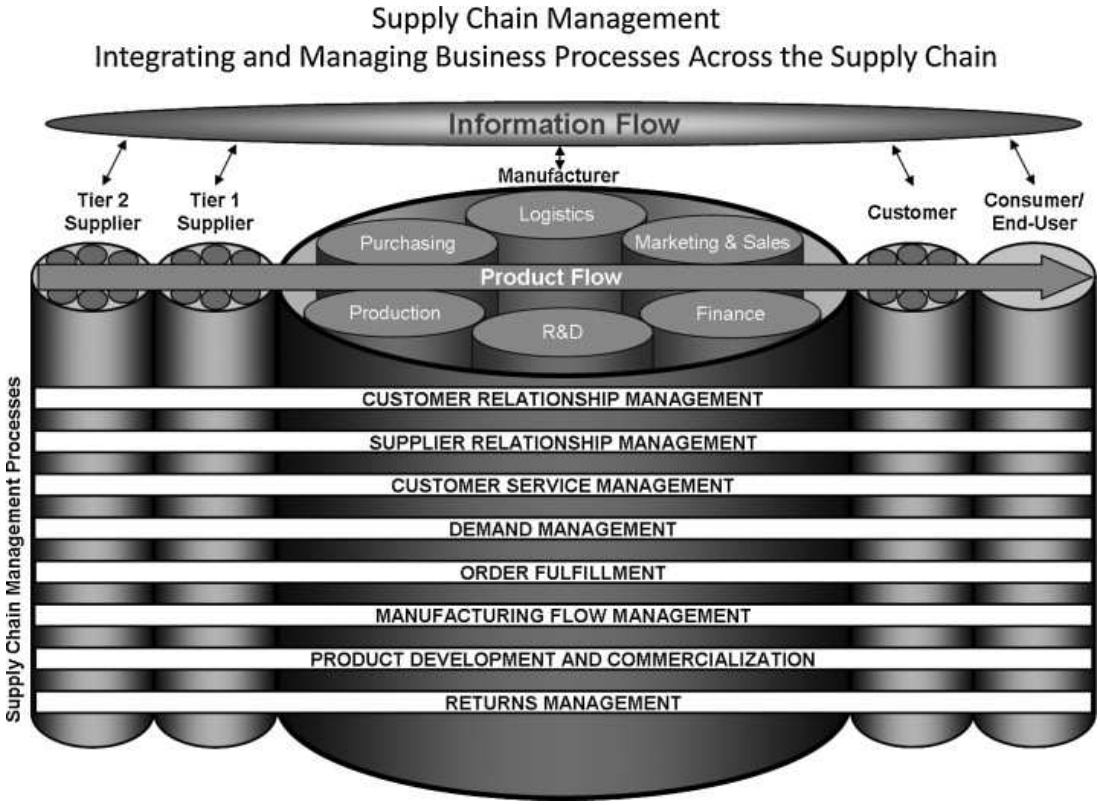
The 3S model is a theoretical model, presenting the supply chain's processes and its major dimensions. These include the processes executed in the supply chains and the decisions that have to be made. Also, the relations among different parts of the supply network that have to be managed properly in order to avoid conflicts. Last, the proper time management. All the processes have to be completed at a particular time, to avoid delays in the next process and to the final customer.

This model can provide some help in organizing a SSC at the beginning. Its theoretical framework and the fact that does not take into account the services' characteristics, make it inadequate for an integrated SSC system (Giannakis M, 2011). It is a more general model, rather descriptive than a tool for organizing the SSC.

- Global supply chain forum model (GSCF)

Similar to the SCOR model is the GSCF. It is based on Porter's value chain concept (Giannakis M., 2011, Ellram L.M. et al, 2004). It invokes three basic elements: business processes, management components, structure of the supply chain (Ellram L.M. et al, 2004). The supply chain begins from the first-tier suppliers to the end users/customers (Ellram L.M. et al, 2004). This has its focus on the added value

gained by the customer. All the processes have as main target to add value. Information management and feedback is critical for its success (Ellram L.M. et al, 2004). Nevertheless, this model as well does not count the services' differences.



Source: Croxton, K.L., et al, 2001

- Hewlett – Packard model

Ellram L.M. et al (2004) also proposed the Hewlett-Packard model, as one that can be applied in services. This model shows that the members of the supply chain are connected with each other and they hold inventories to encounter the unknown demand. At a point, this can be applied, especially for services, which use tangibles. Pure services might face serious difficulties in it.

Many problems arise during the application of a SSC model. Ellram L.M. et al (2004) in the same article explains them thoroughly. To begin with, since services do not have a specifically defined structure and the results are not described in detail, disagreements between the service offered and the expected, are very common. The peculiarities of services make the definition of their specifications and the recognition of the problems arisen difficult.

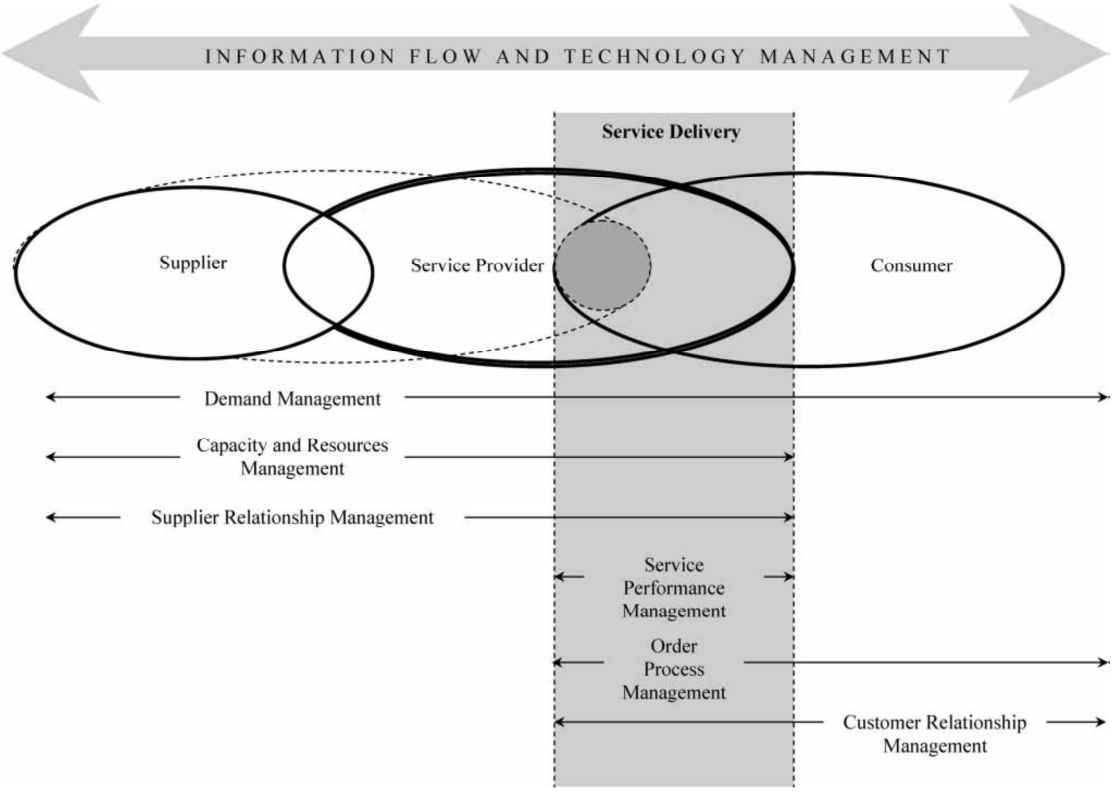
Perhaps, the common characteristics and processes to the manufacturing companies might be managed with the above models. Attention though, should be paid for the services' peculiarities. To create a proper SSC system the attention should be turned on the information and customer relationship management (Giannakis M., 2011). The question that still remains is how a SSC network can be completely managed. A model that will be able to achieve this has to be invented, in order to answer this question.

Another question that occurs and has to be answered is what happens in the cases of firms that are not pure services, but provide both goods and services. Which is the perfect combination of the two supply systems, in order to succeed excellence and meet customers' satisfaction. The intangibility's degree of each firm should be taken into account.

Demirkan H. and Cheng H.K. (2008) studied the SSCM in applications industry, using this model with only first-tier suppliers. The members of the chain were: the ASP (Application Service Provider), who was the service provider. AIP (Application Infrastructure Provider) was the service supplier, who provided at the ASP computer capacity.

Baltacioglu T. et al (2007) proposed another model for SSCs using an example from the healthcare industry named IUE-SSCM. It refers to the SSC in healthcare organizations, but they propose extended research on whether it can be applied to other industries as well. To overcome the problem of the tangibles used in the production of services they considered them as resources.

This model consists of three participants: the supplier, the service provider and the customer. The service provider is in the center of the supply chain, and is the one that performs the core service to the customer. Supplier is considered the company that offers to the service provider or directly to the customer supplementary services to the core. The cost of these services, though aggravate the service provider (Baltacioglu T. et al, 2007).



Source: Baltacioglu T. et al (2007)

Another model of SCM is the Build-to-Order Supply Chain (BOSC). According to Gunasekaran A., Ngai E.W.T. (2005) is a model well-applied at both manufacturing and service industry. BOSC is when companies assemble the goods or perform the service when an order is set. Information technology and good supplier relationship management are essential (Gunasekaran A., Ngai E.W.T., 2005). Combining with previous statements that services are performed the time needed, BOSC sounds ideal for services, as services can only be performed when an order is set (Anderson Jr. E.G. et al, 2005).

Akkerman H. and Vos B. (2003) proposed on the other hand the "establish customer service" process, mainly for pure services. This model resembles to the model proposed by Anderson E.G. and Morrice D.J. (2000). Both models supports that there are four processes: selling, provisioning, installing and billing. Their difference is that in the study of Akkerman H. and Vos B. (2003) these processes are performed by the same company, while in Anderson E.G. and Morrice D.J.'s (2000), they were performed by separate companies.

To understand better how the above traditionally manufacturing SCM models can be applied in the SSC, we use Lin Y. et al (2010) description for the SSC's participants.

In the SSC there are the service provider, the service supplier and the customer. Service provider is equal to the manufacturer in the traditional SCM and the service supplier is the supplier that procures the service provider with services, which are part of the service provided to the customer. Also, there are the goods suppliers, who are the suppliers of tangibles, essential for the service production. It should be noted though, that only first tier suppliers are taken into account. Second-tier suppliers are considered as not adding important value to the chain. Service providers are meanwhile performing as the end customer for the service suppliers.

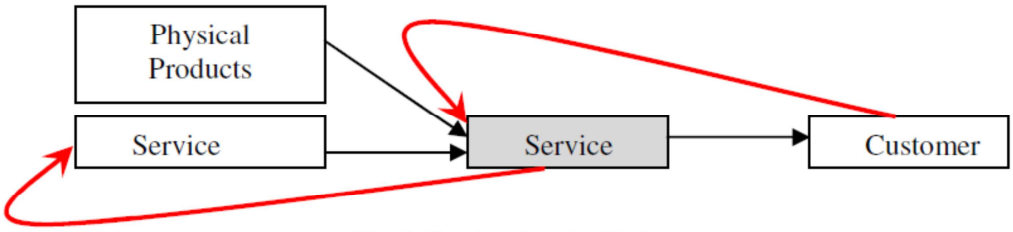


Fig. 1. Service Supply Chain

Source: Lin Y. et al (2010)

Also, to understand how traditional supply chain models can be adopted in services, the common characteristics between the two supply chains should be mentioned. The two fundamental concepts of the SCM according to Niranjan T.T. and Weaver M. (2011) are the inventory and the capacity. To transfer the models and rationales of SCM into the SSCM, these two should be adapted in services.

From the one point of view service capacity is similar to inventory in SCM. However, if this view is accepted, the capacity from the SCM cannot be paralleled to another concept in services. We are lead thus, in considering as service inventory and service capacity as being the same thing (Niranjan T.T., Weaver M., 2011). The problem lies on the fact that in Operations Management capacity and inventory are two separated frameworks that need different management (Niranjan T.T., Weaver M., 2011).

From the other point of view, the above cannot be accepted. According to Niranjan T.T. and Weaver M. (2011) previous studies, like those by Akkerman H. and Vos B. (2003) and Anderson E.G. and Morrice D.J. (2000) the most proper framework for inventory is the order backlog. This thought is enforced with Sampson's S.E. studies

(2000, 2006) about the service bidirectional character. Customers create demand, but they are also suppliers too. Thus, the increased demand creates excessive inventory of supplies, known in services as waiting lines or queues (Sampson S.E., 2006, 2000, Niranjan T.T., Weaver M., 2011).

In their effort to adopt the SCM framework in services, Niranjan T.T. and Weaver M. (2011), define services. They claim that intangibility, perishability and heterogeneity are also goods' characteristics. Additionally, the managerial inputs are common in all firms (Niranjan T.T., Weaver M., 2011).

To sum up, all the models discussed have a theoretical base to be applied in services. However, studies did not provide examples of successful implementation. Further research should be made, in order to prove their efficiency for services.

8. Measurements of SSCM effectiveness

As mentioned in Chapter 4, in SSCM's definitions the service performance is considered very important to measure the effectiveness of SSCM. Several measurements of service performance have been proposed, and they are mentioned below.

Independently which model of SSC is performed, its effectiveness has to be measured, in order to evaluate its contribution to the firm's success. Also, SSC's performance is used to evaluate the firm's results for a certain period of time and to set goals for the future (Won Cho D et al, 2012). In addition, the information provided contributes in the customers' satisfaction (Won Cho D. et al, 2012).

As mentioned before SCM models can be applied in services to measure their performance e.g. the SCOR model (Giannakis M., 2011, Ellram L.M. et al, 2004, Won Cho D. et al, 2012), however they still have not been applied in service companies. Won Cho D. et al (2012) agree with Ellram L.M. et al (2004) and Giannakis M. (2011), who stress the need of a service SSCM model.

The measurements of the SSCM can relate to the quantitative results of the SSC's processes. According to Ellram L.M. et al (2004), the service processes are: information flow, capacity and skills management, demand management, customer relationship management, supplier relationship management, service delivery management and cash flow. Thus, the outputs of all the above should be measured in order to evaluate their performance, and the performance of the SSC as a whole.

Baltacioglu T. et al (2007) also identified seven service processes, which are: information and technology management, capacity and resource management, demand management, customer relationship management, supplier relationship management, service performance management and order process management.

Revising several similar aspects –including the above- Yap L.L. and Tan C.L. (2012) recognized five main dimensions of services generally accepted. These are: information and technology management, customer relationship management, supplier relationship management, demand management and capacity and resource management.

Won Cho D. et al (2012) and Giannakis M. (2011) in their studies, also mention Fitzerald's et al (1991) measures of service performance, as they appear in the below

table. Also, they proposed measures relative to order process management, supplier relationship management, service performance management, capacity and resources management, customer relationship management, demand management, information and technology management and service supply chain finance. All these are very important factors for a successful and efficient service provision.

The outputs in the above processes differ, depending the service sector it concerns (Won Cho D. et al, 2012). To measure the efficiency of the above the Won Cho D. et al (2012) proposed the AHP and the fuzzy-AHP method.

Dimension	**Issue**	**Type of measure**
Financial	Asset turn over	Profitability
	Control of labor	Liquidity
	Profit per serve	Capital structrure
		Market ratios
Competitiveness	Ability to win new customers	Relative market share and position
	Customer royalty	Sales growth
		Measures of the customer base
Quality of service	Relationships between customer and organization	Overall service indicators:
	Setting of clear customer expectations	Reliability
	Measurement of customer satisfaction	Responsiveness
		Aesthetics/appearance
		Cleaningless/tidiness
		Comfort
		Friendliness
		Communication
		Courtesy
		Competence

		Access Availability Security
Flexibility	Building volume, delivery speed and specification flexibility into service design in the long term Use a level of capacity strategies Employment of part-time and floating staff Use of price and promotion strategies to smooth demand	Specification flexibility Volume flexibility Delivery speed flexibility
Resource utilization	Utilization of facilities, equipment and staff	Productivity Efficiency
Innovation	Measurement of the success of the innovation process and the innovation itself	Performance of the innovation process Performance of individual innovations

Source: Six service performance dimmensions, issues and type of measure. Source: Fitzerald et al. (1991).

9. Difficulties in implementing SSCM

Despite the difficulties in creating a SSCM framework, there are also many difficulties in its implementation. Adopting any of the models discussed previously, particular problems arise.

One of the difficulties when studying the SSC by adopting concepts from the goods' SCM is the fact that services do not have a specific framework on which the first can be applied. The basis of this problem begins with the fundamental concept of the SCM the inventory (Niranjan T.T., Weaver M., 2011). Its absence creates problems in organizing the capacity management (Samuel C. et al, 2010).

A complexity in the SSCs is that to produce the service both the supplier and the customer need to interact with each other before, during and after the service's production (Paton R.A., McLaughlin S., 2008). The higher the interaction between them, the better understands the customer's needs. And when the customer's needs are comprehended and satisfied, good customer relationship management is founded.

Peoples' high involvement in the procedure provokes additional problems. In contrast with traditional SCs, where the human factor added value in the chain, the high degree of interaction in SSCs creates more problems. Mistakes are more common as people cannot perform the exact same thing. Besides different customers have different needs (Sengupta K. et al, 2006).

Moreover, since services are intangible, perishable and without the ability to be stocked, logistics and transportation are the first problems that come in mind.

Their intangibility has a major effect on the management of several fields. While in manufacturing companies, the result of each part of the chain can be seen, services in any part of the supply chain cannot be transported, transformed or inventoried. As a consequence, the result of the services cannot be perceived easily (Norman R., 2002, Van Looy B. et al, 2003, Fitzsimons J., Fitzsimons M.J. 2001, Baltacioglu T. et al, 2007, Won Cho D. et al, 2012).

Apart from the technical issues that make difficult the SSCM implementation Cook J.S. et al (2001) mentioned one more in his study. It requires managerial commitment, due to the fact that employees have got used to different practices. The radical change in the attitudes cannot be easily applied.

10. Prerequisites for successful implementation of SSCM

The lack of a SSCM framework applicable to all services, lead many researchers (Lillrank P. et al, 2011, Vries J. and Huijsman R., 2011, Arlbjorn J.S. et al, 2011, Cho D.W. et al, 2012, Zhang X. et al, 2009) in trying to create a framework for service sectors, e.g. healthcare, tourism, etc.

Lillrank P. et al (2011) studied the SSC in healthcare. They tried to create a supply framework applicable in healthcare, by studying two different cases in a hospital. They concluded that a common framework can be applied to some point, but unexpected incidents in patients' health can lead to emergency situations, where the SSC framework I impossible to be applied (Lillrank P. et al, 2011).

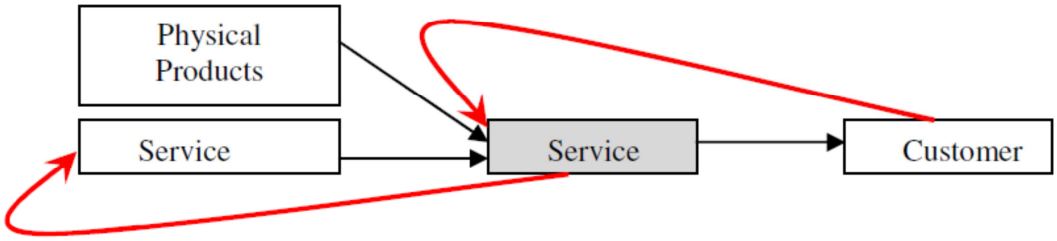
Similar study was conducted by Vries J. and Huijsman R. (2011), who studied SCM in healthcare organizations. They recognized too the complexity of the SC and they conducted a literature review on previous studies. It is notable, that they separate the SCM of materials from the health SSCM (Vries J., Huijsman R., 2011).

Arlbjorn J.S. et al (2011) conducted a research on SSCM in public sector, particularly in Danish municipalities. Their focus was on applying the lean theory into SSCM through the empirical study (Arlbjorn J.S. et al, 2011).

Cho D.W. et al, (2012), in their study to support their view of how to measure performance in the SSCs, created a SSC framework for the hotel industry. Hotel industry presents a high rate of interest in the SSCM's study due to its peculiarities.

Zhang X. et al (2009) studied thoroughly the tourism supply chain, trying to create a new framework for tourism SCM. However, his study was based upon traditional SCM principles. Their description of the tourism industry characteristics though, implied that tourism supply chain comes under SSCM's principles.

Lin Y. et al (2010) represents exactly the type of SSC in the hotel industry. The hotel can be considered as the service in the grey box, in the depicted framework below.



Source: Lin Y. et al, (2010)

This model considers the hotel supply chain as the service provider directly to the customer. However, the model proposed by Yihua W. et al (2013) could be applied as well.

The model proposed by Zhang X. et al (2009) is similar with this, but it does not deal with the tourism supply chain as a SSC, but rather it is focused on the traditional SCM. The point of view in their study is rather different from the previously mentioned. Cho D.W. et al (2012) considered the SSC from hotels perspective, delivering the service to the end customers. Zhang X. et al (2009) on the other hand, studied tourism SCM as a whole. Their confusion in their study is that despite the fact that they recognize that tourism SCM is about service provision, thus they use the traditional SCM principles and theories.

Apart from the hotel SSC mentioned above, Guo X. et al (2013) studied the case of the third party distribution in the hotel SSC. This refers to outsourcing rooms' bookings to promotional websites. These websites promote rooms from various hotels. They are part of their SSC as service providers. They can be considered as providers, who manage their orders and demand.

Apart from hotels, the tourism industry includes other kinds of firms as well. Font X. et al (2008) studied the supply chain from the tour operators' point of view. Tour operators are the intermediaries in the tourism supply chain. They considered hotels, transportation and food companies as suppliers and the tourists as the end customers. Their study focused mostly on the sustainable supply chain rather than SSC. However, it proposes a different aspect of the tourism supply chain which can be studied from the SSC point of view.

All of the studies show, that each one was based on particular findings. None of them provides a complete framework for services. As a result, it is concluded that there is an imperative need to create a SSCM framework for all services.

11. Benefits of successful SSCM implementation

Despite the fact that no official framework of SSCM has been defined, studies mention the benefits of its implementation (Cook J.S. et al, 2001, Baltacioglu T. et al, 2007, Giannakis M., 2011, Kathawala Y., Abdou K., 2003). These benefits stress the need for SSCM implementation, because it will have positive effects on service firms.

Successful implementation of SSCM can be beneficial for services. According to Cook J.S. et al (2001) it helps improve customers' service, by meeting their needs. Also, it contributes in creating a competitive advantage against their competitors (Baltacioglu T. et al, 2007, Cook J.S. et al, 2001).

Furthermore, Baltacioglu T. et al (2007) and Giannakis M. (2011) pointed that SSCM can have some similar benefits to those of traditional SCM's. Such as: dependability, better service quality, greater customer satisfaction, more efficient delivery process, increased revenues and reduced costs.

Kathawala Y. and Abdou K. (2003) apart from the cost reduction, claim that SCM contributes in the flexibility and responsiveness of the chain and in increased capacity, utilization and ROA (Return on Assets).

12. Contribution to customers' satisfaction

As mentioned above the SSCM contributes in gaining a competitive advantage and in a greater customer satisfaction. Especially, SSCM aims in adding value to the end customer and satisfy their needs. In their study Vandaele D. and Gemmel P. (2007) mentioned thoroughly the definitions expressed in previous studies. Apart from the definitions, they, also, indicated the factors that contribute in customer satisfaction e.g. the other members of the SSC. This chapter firstly describes the customer's role in SSC in order to realize how greater customers' satisfaction can be obtained.

Later, despite the research in studies there were no studies that clearly set the contributions of SSCM in the customers' satisfaction. The majority of the studies studied the customers' reactions to SSCM failures, rather than what contributes in customers' satisfaction. Thus, findings from these studies are presented (Oflac B. et al, 2012, Choi S., Mattila A.S. 2008, Levesque T., MacDougal G.H.G., 2000, Kalamasa M. et al, 2008).

12.1. Customer's role in SSCM

Major role in the SSC is held by the customers due to their dual character to be also suppliers at the same time (Sampson S., Spring M., 2012, Lin Y. et al, 2010, Sampson S.E., 2000). Unlike traditional supply chains, in the SSC customers are asked to perform various tasks and actually participate in the service's production (Bitner M.J. et al, 1997). The level of customers' participation in the service production depends on the kind of service provided as well depicted by Bitner M.J. et al (1997). The customers' participation can be considered as equal to the interaction level with the service providers. Indeed, Webb D. (2006) highlights that customers' participation contributes in the level of satisfaction gained.

Customers participate in services' production by providing inputs (Spring M., Araujo L., 2009, Sampson S.E., 2000). Spring M. and Araujo L. (2009) and Sampson S.E. (2000) define three forms of customers' inputs. The inputs, which are related with the services produced on customers' bodies, the inputs, which are the customers' objects on which the service is produced and finally, the inputs, which are the information gathered from customers (Spring M., Araujo L., 2009, Sampson S.E., 2000). Although, Sampson S.E. (2000) claims that information should not be considered as input, because it is gathered after the provision of the service.

In traditional supply chains customers only purchase final goods. Whereas in SSCs, customers are found in the other end of the supply chain as well, performing tasks like suppliers, transporters, product designers, etc.

Bitner M.J. et al (1997) were of the first who studied the customers' role in SSCs distinguishing three major roles: "customer as productive resource, as contributor to quality, satisfaction and value and as competitor to the service organization" (Bitner M.J. et al, 1997). Sampson S. and Spring M. (2012) studied this topic thoroughly. Lin Y. et al (2010) also included that, customers also provide demand information and tangible inputs.

Customers provide to service firms the things on which the service will be performed. Either this is goods like a TV that needs to be repaired or themselves. For example healthcare services are performed on people. In both cases, the service cannot be performed with the absence of the customers' inputs.

At the same time, customers are considered as employees. Customers are called to do things that under other circumstances would be completed by the firm's staff (Maull R. et al, 2012, Bitner M.J. et al, 1997). From the customers' perspective, customers are responsible for the organization of the first-tier suppliers, who are directly connected with them (Maull R. et al, 2012). The most common examples as mentioned in Sampson S. and Spring M.'s (2012) article is the self-service, e.g. fast food restaurants or automated service machines, like ATMs in banks. However, this role probably was enforced simultaneously with the technological advances. If ATMs had not been invented, bank clerks would still serve customers. Bitner M.J. et al (1997) on the other side, cite the advantages and disadvantages of this role.

The fact that services cannot be stored and thus they are produced just-in-time, in connection with the customers being suppliers too increases the customization. Customers participate in the procedure and seek certain results of the service. When customers decide the service's specifications, they become design engineers. Also, they can be considered as product managers, since they are the ones, who decide when the service is performed (Sampson S., Spring M., 2012).

In service firms customers are also the products. This happens, because they are performed on them.

While in traditional supply chains special quality control is necessary, in service firms the quality control is executed by the customers. Customers provide the desirable specifications to be met, and when the service's production is fulfilled, customers provide feedback for the result.

Many times SSCs are inadequate in scheduling and capacity planning leading to "excessive inventory". This is translated as many customers having to wait a long time for the execution of a service either before or during the service's production. Sampson S. and Spring M. (2012) face this problem like the inventory in traditional supply chains. Better and efficient capacity planning has to be attained with the difference that customer need more friendly and comfortable waiting environment.

Finally, customers can be considered as competitors to service firms (Maull R. et al, 2012, Bitner M.J. et al, 1997). Many people believe that they can perform the service by themselves. For example women instead of visiting a make-up artist, prefer to makeup themselves. However, this can happen in only certain cases. Healthcare services are impossible to be performed by people, who do not have the knowledge.

Also, there are services like the hairdresser's where even if they do have the knowledge, they cannot perform it on themselves.

12.2. SSCM in cases of service failures

All kinds of firms, both manufacturing and services, are trying to satisfy their customers' needs. Services especially, who are customer-driven and are mainly provided based on each customer's demand. All operations contribute to this, but those who include customer interaction are highly important. Supply chain consists of many operations.

Delivery is a supply chain operation that interacts directly with customers and Oflac B. et al, (2012) examined the effect of delivery delays on customers' satisfaction. They also, took into consideration the case of 3PL companies, who take on this task, and how does this affect the company's profile.

The new aspect they examined in their research is the delays in delivery as service failures, which have a consequence on customers' perception of the firm. A previous research by Choi S. and Mattila A.S. (2008) was conducted, but it examined service failures in the service factor in general. Before them Levesque T. and MacDougal G.H.G. (2000) conducted a research about service failures in the hospitality sector. The difference was that they focused on the recovery strategies' characteristics. The results of the studies were quite similar.

All of the above studies were related to customers' expectations and the service they were provided (Oflac B. et al, 2012, Choi S., Mattila A.S. 2008, Levesque T., MacDougal G.H.G., 2000). Customers' expectations are formed by word-of mouth, communication with the firm, direct contact with the firm's delivery system and by prior experiences (Webb D., 2006, Oflac B. et al, 2012, Choi S., Mattila A.S., 2008).

Customers tend to maintain their positive opinion for a firm, when a service failure occurs due to prior good experiences. Higher expectations lead to the perception that the failure was incidental and as a result firms do not lose their customers and they keep their brand's strength (Oflac B. et al, 2012, Choi S. and Mattila A.S., 2008).

However, in cases where the service is of high importance for the customers, the repurchase intention decreases independently of the customers' expectations (Oflac B. et al, 2012).

Customers' reaction in failures depends on various factors. Some of them are: if the failure is incidental or permanent, if it could be avoided or not and whether the customer was involved in the failure (Oflac B. et al, 2012, Choi S. and Mattila A.S.,

2008). If it is of their blame, then they are more positive with the service provider (Oflac B. et al, 2012, Bitner M.J. et al, 1997).

In the case of 3PL companies customers with higher expectations of the firm are more likely to blame the 3PL company for the failure. On the contrary, those with lower expectations tend to blame mainly the firm. Higher expectations are also connected with customers accusing themselves for the failure. Those with higher expectations tend to blame the firm than themselves. The knowledge, also, for the existence of a 3PL company increases the rate of customers attributing the logistics company (Oflac B. et al, 2012).

Moreover, depending on the importance of the service provided, when it is very high, customers usually attribute the failure to the firm (Oflac B. et al, 2012).

The best way to deal with failures is, according to the research, to boost customers' perception of the firms. Due to the good reputation, customers are more tolerant to service failures.

Both studies conclude the recovery strategies should be adopted in cases of service failures (Oflac B. et al, 2012, Choi S. and Mattila A.S., 2008). According to Levesque T. and MacDougal G.H.G. (2000) recovery strategies are the exchange for the customers' dissatisfaction and include three basic characteristics: apology, assistance and compensation.

Another study conducted by Kalamasa M. et al (2008) studied the consequences of anger, which is provoked by service failures. Their study included the customers' satisfaction and evaluation of the firm, the repurchase intentions and the word of mouth.

Chapter 3.

Conclusions

Through the literature review we can conclude that SSCM is relatively a topic, which has not been analyzed in depth.

Many studies have focused on the differences between services and goods (Heizer J., Render B., 2011, Norman R., 2002, Van Looy B. et al, 2003, Fitzsimons J., Fitzsimons M., 2001, Baltacioglu T. et al, 2007, Akkerman H., Vos B., 2003, Koc A.N., 2009, Arlbjorn J.S. et al, 2011, Bienstock C.C., 2002, Apte A. et al, 2011, Shahin A., Rostamian N., 2011, Choi S., Mattila A.A., 2008, Sengupta K. et al, 2006, Sampson S.E., 2000) and the need for separate management, however the SSCM has not been examined thoroughly.

The studies by Ellram L.M. et al (2004), Baltacioglu T. et al (2007) and Giannakis M. (2011) were those, which shed light on the topic and on which the following studies were based. However, they proposed frameworks based on the existing models of SCM. Baltacioglu T. et al (2007) and Giannakis M. (2011) tried to implement them in services but the results showed that they could be used only partially in services.

No study focused on creating a SSCM model, which would be implemented in all kinds of services. Even the case studies mentioned in chapter 10 were focused on particular service sectors: healthcare, hospitality and municipalities and they had particular targets.

Additionally, even though the added value for the customer is broadly recognized (Lin Y. et al, 2010, Vandaele D., Gemmel P., 2007, Nirajan T.T., Weaver M., 2011, Fitzsimmons J., Fitzsimmons M.J., 2001, Baltacioglu T. et al, 2007, Ellram L.M. et al, 2004, Vries J., Huijsman R., 2011, Maull R. et al, 2012, Giannakis M., 2011), there are no relative studies that investigate how the efficiently implemented SSCM contributes in greater customer satisfaction.

To conclude, below a table is presented in order to summarize the basic findings on the SSCM framework.

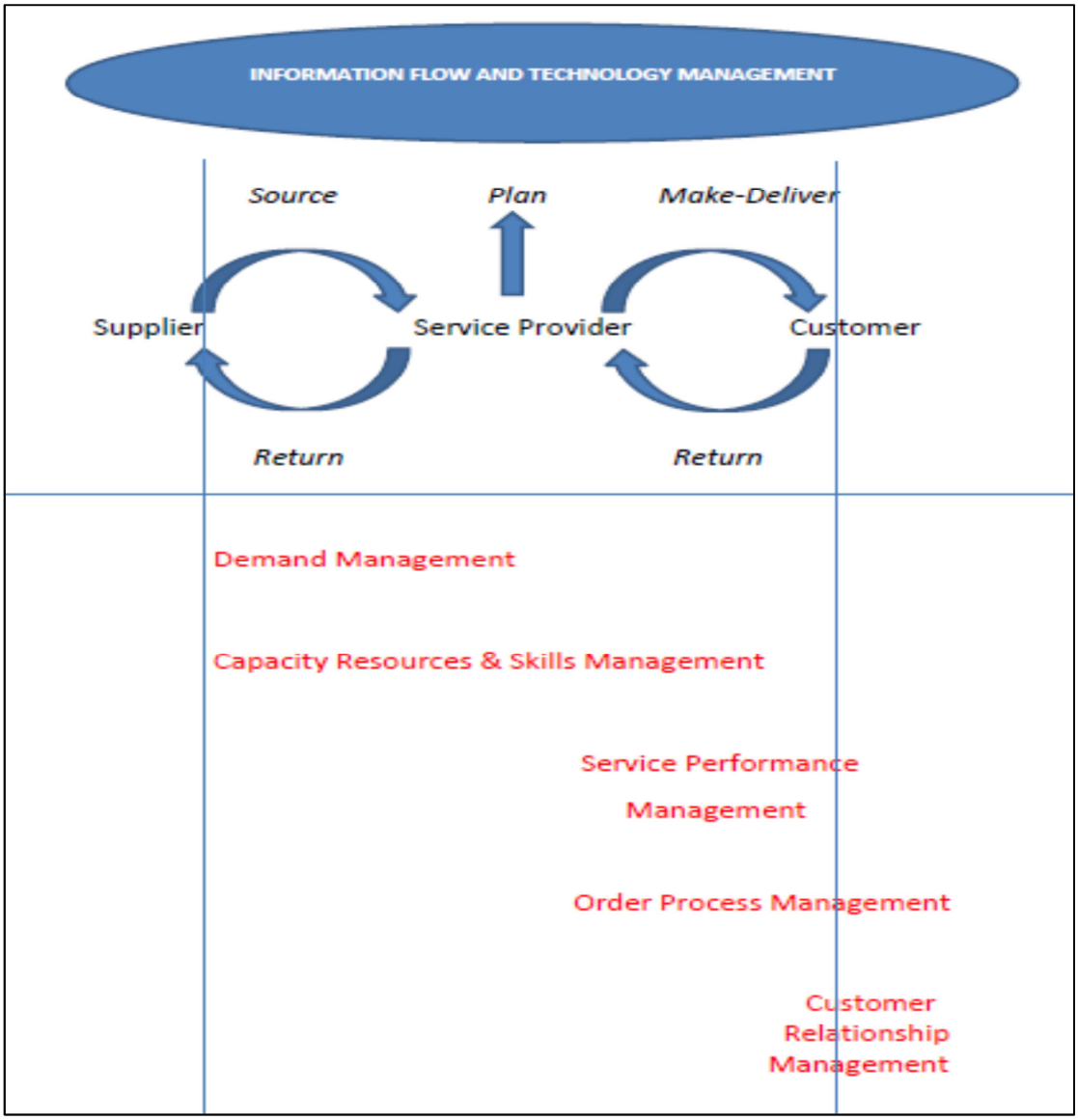
Writer	Findings
Sampson S.E. (2000)	He recognized customers' dual role (customer-supplier)in services
Akkerman H., Vos B. (2003)	"Establish customer service" process
Ellram L.M., Tate W.L. Billington C. (2004)	1)They proposed traditional SCM models that can be applied in services: a) SCOR model b) GSCF model c) Hewlett-Packard model d) They proposed their own model suitable for services 2)They defined service processes, which can be measured, in order to assess the SSCM framework
Gunasekaran A., Ngai E.W.T. (2005)	They proposed BOSC model
Anderson Jr E.G., Morrice D.J., Lundeen G. (2005)	They proposed BOSC model
Baltacioglu T., Ada E., Kaplan Y.C. (2007)	1)They proposed traditional SCM models that can be applied in services: a) SCOR model b) GSCF model 2)They proposed their own SSCM framework (IUE-SSCM) 3)They defined service processes
Vandaele D., Gemmel P. (2007)	They defined the factors contributing in customers' satisfaction

Font X., Tapper R., Schwartz K., Kornilaki M. (2008)	They studied a SSCM Framework in the Hotel Industry
Demirkan H., Cheng H.K. (2008)	They studied SSCM in applications industry
Zhang X., Song H., Huang G.Q. (2009)	SSCM Framework in the Hotel industry
Lin Y., Shi Y., Zhou L. (2010)	1)Literature review of the SSCM studies 2) SSCM Framework in the Hotel Industry
Giannakis M. (2011)	He proposed three models of traditional SCM that can be applied in services: a) SCOR Model b) 3s model c) GSCF model Application of SCOR model in services to proove his theory
Niranjan T.T., Weaver M. (2011)	They created frameworks to define service inventory and service capacity
Lillrank P., Groop J., Vanesmaa J. (2011)	Practical application of a SSCM framework in healthcare
De Vries J., Huijsman R. (2011)	Literature review of SSCM in Healthcare
Arlbjorn J.S., Freytag P.V., De Haas H. (2011)	Study in SSCM in public sector
Cho D.W., Lee Y.H., Hwang M.K. (2012)	They proposed a SSCM Framework in the Hotel industry
Yap L.L., Tan C.L. (2012)	They defined service processes
Guo X., Ling L., Dong Y., Liang L. (2013)	They proposed a SSCM Framework in the Hotel industry, studying the role of the tour agencies

From the above studies a theoretical framework for SSCM can be proposed. This framework is useful for organizations in order to be able to measure their supply chain's efficiency, which has a serious impact on customers' satisfaction, the main aim of organizations.

The present thesis does not propose the measurements, but highlights the need for defining them before applying the framework. More specifically, each organization should first set its targets and what it needs to measure and then apply the framework to measure them.

Below, the framework, combining the previously mentioned studies is presented. It has to be noted here, that the SSCM framework is applied after an order is set. Also, it should also be taken into consideration the traditional SCM for the flow of goods- depending on how many goods are required to produce the service.



From the above framework, it can be seen that information flow and technology management is very important throughout the whole SSC. The SSC consists of three main members: the suppliers, the service providers and the customers. The members of the chain are separated from the others by the vertical lines. Also, the vertical lines include the processes performed by the service provider.

The suppliers are the services' suppliers e.g. the microbiological centers are suppliers to doctors, the goods' suppliers e.g. the vegetable suppliers to restaurants and the customers as well, due to their dual role in services (Sampson S.E., 2000).

The service provider is sourced from the suppliers and then produces-and delivers at the same time-the service to the end customer. Also, he provides feedback to his suppliers for the service he received.

Customers on the other hand, provide the service provider with the object on which the service will be performed; and when the service is produced, they provide feedback whether they are satisfied or not.

During the service production, however, there are many service processes that are essential for the service's production and that need to be measured in order to assess the SSCM framework's efficiency. Such are Customer Relationship Management, Supplier Relationship Management and Demand Management. In the picture they are depicted in red color. In addition, they are located left, right or in the center depending on the member of the chain that performs this process.

All the above, theoretically, if they are applied in a service organization firm, they can assess the organization's supply chain and they can evaluate customers' satisfaction.

The last can be succeeded by measuring the service performance management and the customer relationship management. For example, if the customers' order is fulfilled, if there were any delays in the order fulfillment, if there were any mistakes in the order, etc. According to each firm's needs, a questionnaire should be formed to make the assessment more quantitative.

Consequently, there are some points for future research. A SSCM framework for all services should be created and implemented into a service organization to evaluate its efficiency. Furthermore, quantitative measures for customer satisfaction and a questionnaire that will measure them should be proposed.

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Notes

[i] The bullwhip effect is the increase in variability in the supply chain. As we move upward in the supply chain, the order quantity tends to increase in higher rates (Lee, Padmanabhan, Whang (1997)). This usually happens due to the lack of valid information to the supply chain as a whole. For example if the wholesaler does not know the exact demand of the retailer he has to rely on forecasts, which are not always accurate and he usually orders larger quantities than he really needs. The results of it are excessive inventory, lower customer service levels, ineffective transportation use, misused manufacturing capacity and lost revenues (Reid R., Sanders R. (2010), Simchi-Levi D, Kaminsky P., Simchi-Levi E., (2003), Jack M., Shafer S. (2011)).

[ii] The past few years, there is a tendency to outsource the supply chain to Third Party Logistics companies (3PL). 3PL are companies, who are responsible for all the work of the supply chain such as transportation, inventory management, etc. Companies outsource either because they are incapable of managing it by itself (lack of equipment, buildings, knowledge, etc.) or because in that way, they have access to the best practices and technologies, resulting in gaining a competitive advantage. Also, another reason is that each firm desires to concentrate on what can do best (Simchi-Levi D, Kaminsky P., Simchi-Levi E., (2003).