Model Construction of Supply Chain of Innovative Producer Service—Perspective of Service Outsourcing Based on SOA Theory

Yi-Ping SUN

Department of Business Administration, Hubei University of Economics, Wuhan, 430205, China

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Abstract. With the deepening of economic globalization and the advancement of science and technology, modern service industry has developed rapidly. However, the traditional product supply chain cannot meet the need of its development. A new market environment needs a new theory of service supply chain which accords with the social development, to guide a healthy and orderly development of modern service industry. Considering the correlation between service supply chain and service-oriented architecture theory (SOA), this paper constructs the general model of Producer Service supply chain based on SOA theory by using relevant scientific theories and methods of service. Furthermore, a case analysis is made on the model of Foxconn's human resources' outsourcing chain. This paper broadens the theoretical perspective of supply chain to a certain extent, and provides practical guidance for Producer Service supply chain management based on concrete case analysis.

Introduction

As the global economy enters the Post Crisis Era, the global macro-economy and various industries, driven by emerging technologies, are undergoing tremendous changes, showing new features and trends. Therefore, the traditional theory of supply chain has been unable to meet the need of the development of modern service industry. According to statistics from China's Ministry of Commerce, in 2013, a total number of 24,817 Chinese service outsourcing enterprises, had employed 5.113 million people to undertake international service outsourcing contracts with an amount of 53.41 billion US dollars and an increase of 47.8% year-on-year. With the rapid development of service industry, service industry itself and manufacturing industry gradually blurred the boundary between each other, the traditional supply chain management has broken through the boundary of the manufacturing industry, extending to the downstream service industry. At the same time, manufacturing services have become one of the developmental trends of the manufacturing industry. Service outsourcing is also attracting more and more attention. Meanwhile, with the global changes in demand for buyers, outsourcing services have undergone tremendous migrations, such as from the lower cost to obtaining value-added transfer, from maintenance operations to achieving the transformation of the transfer, etc. It can be seen that service outsourcing has enhanced the core competitiveness of enterprises and optimized the allocation of enterprises to an important means of resources.

Browning and Singelman (1975) first put forward the concept of producer services, that is, producer services, including finance, legislation, insurance, business services, brokers and
other knowledge-intensified type of service industry. They can provide customers with specialized services industry. Globally, producer services are the fastest-growing sectors of the world economy. Global merchandise exports totaled $18.8 trillion in 2013, up by 2.1 percent from 2012; total trade in services exports grew by 5.5 percent to $4.6 trillion. According to IMF, in 2013, including goods and services, world trade volume growth has reached 2.7%, the same as 2012. However, the proportion of service trade in total world trade has been increasing year by year. Producer services in developed countries account for more than half of the total value of services. For China itself, China's producer services sector accounts for a relatively small share of the service sector. Its international competitiveness is weak and development quality is not high. Dealing with these deficiencies in the producer services sector, the Chinese government is actively supporting production service industry. The producer service industry has become the production service supply chain management model to build the strategic focus of China's industrial structure upgrade and a new round of opening up of the focused areas. China's "second Five-Year Plan" proposed in particular to accelerate the development of Producer Services. In 2014, China's "Government Work Report" on the deployment of Producer Services highlights the development of key and weak links to promote industrial restructuring and upgrading, making it an important and long-term competitiveness of China's economic growth.

The first to study the supply chain is Edward G. and Anderson, Jr., who in the paper of Production and Operation Management published in 2000 referred to the service supply chain. It is the service industry supply chain. The feature of the chain is different from the previous supply chain. Anderson (1999) stated in his article that the service-oriented supply chain research is the bank credit authentication service model of the dynamic behavior, aimed to explore the existence of non-stationary demand for a simple service-oriented supply chain dynamic behavior. In his article, Cohen (2001) referred to the after-sales service supply chain model as computer manufacturers and service providers in the North American computer industry. In the past, scholars have generally regarded the literature of Ellram (2004) as the mark of the scholars’ dedication in the service supply chain. The paper studies the service formed in the business process of outsourcing. Supply chain management model is mainly related to software outsourcing business, logistics services and professional outsourcing business services.

According to different views of service supply chain, scholars proposed different service supply chain models. Dirk and Kremper (2004) proposed a service-oriented supply chain model based on the after-sales service of the automotive industry. Poole (2003), based on manufacturing products after-sales service process, put forward the method that the entire service process supports activities in management. Klein (2004) and Metters (2004) apply supply chain management to the service industry, but focusing on differentiated services and manufacturing, adopting an integrated management model for service enterprises to actively and effectively respond to customer needs and protect competitive advantage. There are also scholars (Tate and Ellram, 2012) who have explored the relationship between strategy and organizational structure under highly complex outsourcing environments. Coyle and Angela (2010) studied the effects of social and cultural differences on customer service efficiency and proposed ways to avoid the difficulties of training labor. Lee, Pinker, and Shumsky (2012) used empirical evidence to examine supplier selection and labor cost advantages that influenced customer service outsourcing choices.

However, there are few literatures on the research of the model of the producer service
supply chain from the perspective of service outsourcing, and there are still some shortcomings in the theoretical and empirical research. Based on the reasons above, this paper constructs an innovative model of producer service supply chain based on the "service component" of SOA theory and relevant theories of service science. The innovation of this paper is to broaden the research perspectives, analyze the production service supply chain model from the perspective of service outsourcing, improve the research methods, construct the model of producer service supply chain by introducing service components based on SOA theory and enrich the research content. Through the concrete case analysis of human resources outsourcing model, we draw relevant conclusions about future research prospects.

Definition of Producer Service Supply Chain and Its Characteristics

Definition of Producer Service Supply Chain

According to the relevant definition of product supply chain management, producer service supply chain management refers to the production service-oriented, in the process of production service outsourcing, for service generations and delivery, ranging from the initial service providers to the final customers between the information and service processes, capabilities, performances, capitals and other integrated management models.

Based on the perspective of producer services outsourcing, this paper studies the service supply chain from the perspective of supply chain management, and constructs an effective service supply chain model by effectively managing the production service outsourcing activities. In the production service outsourcing process, different levels of service outsourcing are interrelated to form a service supply chain. In manufacturing enterprises in the production of service outsourcing, it is necessary to consider the supply chain environments according to how the service providers and customers on both sides will benefit from the use of supply chain management of service outsourcing. Through the construction of service supply chain management model, the entire service outsourcing process is effectively controlled. Thus, to build a correct and effective service supply chain for its entire management is of great significance.

Characteristics of Producer Services Supply Chain

As the differences between service outsourcing and product outsourcing, and the features of heterogeneity, indivisibility and perishability of service outsourcing, producer services is different from the traditional service industry. On one hand, producer services are characterized by strong industrial relevance, intensive knowledge-based and high degree specialization. On the other hand, producer services are spatially separated from manufacturing. Based on the above two points, the production service supply chain management must be different from the traditional product supply chain management.

First, the production service supply chain structure is simple. Most of the operating models are for the pull-type Producer Services. Because of their knowledge-intensive and highly specialized characteristics, service providers and customers need to strengthen communications between the service provider and the client. The requirements of the production service supply chain cannot be too long, otherwise it will affect the efficiency and quality of services, related to product supply chain, producer service supply chain structure is relatively simple. With the continuous development of producer services diversification, customer demands for services continue to grow. The production service supply chain
operating model needs to choose more pull-based business models. In the pull-type operation mode, service providers need to adjust according to the needs of customers at any time, and have strong flexibility and pertinence. Of course, for the need for standardization of services, reducing costs can also be used in pull-based combination of business model.

Second is the need to emphasize service needs and service capacity management. On one hand, because the producer services supply chain is invisible in the flow of Producer Services, and demand for services with a diversified demand for Producer Services, but the demand for services itself cannot be measured with specific parameters, production services enterprises must be fully paid attention to service demand management, real-time control of customer service needs, the use of the contract service content, quality, cost and other important requirements fixed down. On the other hand, the producer services enterprises need to provide the management of service capacity in order to replace the buffering role of inventory, fast and efficient response to customer demand for different responses.

**Design of Supply Chain Model of Producer Service based on SOA Theory**

**Service Model Analysis**

In the service environment, the service providers and customers are in close contact. In general, the service provider consists of a service front and a service back-end (see Fig.1). Among them, the service front is the main position of communication. The communication between the service provider and the customer is responsible for collecting relevant information of the service demand, such as the execution time and efficiency of the service. Service back-office service, including the implementation of service environment for the preparation, is allocated to service resources and the provision of efficient services. Through the cooperation of service front and service back-office, the supplier can provide customers with good service and improve customer satisfactions, which can attract more consumers and enlarge their market share on the basis of maintaining the existing customer loyalty.

![Service model](image)

**Production Services in the Supply Chain Service Components**

SOA theory defines service components as reusable and replaceable parts of the business.
Therefore, in the producer service supply chain, the business modules that an enterprise’s outsourcing is the service component. In this paper, the service-oriented architecture is used to establish the enterprise-level SOA theory. The service areas involved in the enterprise are regarded as the corresponding service components. Through the integration of the service components, the service-supply chain is re-screened and sorted out. To meet the needs of customer service processes, the existing service modules will be integrated into customer needs in line with the new services. Specifically, the service components come from the service interface, attributes, base layer, resource layer, service activities, goals and other components. The service interface is used to integrate the service components. The attributes are the description of the service components. The basic layer is the requirement of the service environment standard. The resource layer represents the resources needed by the service. The service activities are referred to as the mechanism of the service operation and the ultimate goal of service components. Each service component has its specific function, according to the different customer service needs, integration of different service components, the formation of specific service processes to meet customer service needed to achieve service goals.

**Producer Service Supply Chain Model Design**

According to the above analysis, combining the service model, service component and service process, the author proposes the model of producer service supply chain (Fig.2).

![Producer service supply chain model](image-url)
In the model of production service supply chain, the service front includes customer demand management, service outsourcing enterprises and service integration platform. The service background includes specific service composed of relevant service components. In the service front, service outsourcing enterprises need to know the corresponding needs of customers. Customer demand management is the beginning of the production service supply chain. Enterprises need to provide the production-related services related to the operation of enterprises. In-depth understandings of the needs of customers are also required to clear the specific needs of the service. The service background, mainly in the service front of the service integration platform by selecting the appropriate service components to meet customer needs, is included in building the appropriate service processes to provide customers with satisfactory service. The service integration platform is the core aspect of the whole service supply chain. It integrates the resources of the service provider, manages the supplier relationship, forecasts, manages the customer demand and adjusts the service provision in real time according to specific needs of the customer. The goal of the service integration platform is to integrate information flow, identify customer needs, realize information sharing, and select the appropriate service components to provide customers with the necessary services through service outsourcing. Through the information flow control, reducing the uncertainty is required in the producer service supply chain.

For the entire production service supply chain, it needs network information technology support. To integrate and coordinate many functions such as demand management, capacity management, relationship management and service delivery management in the supply chain management is also vital. Faced with the diversification and variability of customer demand, producer service providers need to strengthen customer demand management and anticipate and plan customer demand in advance so as to respond to changes in customer demands in a timely manner. Service integrators have to choose competitive service providers according to differentiated strategies among many service providers. Therefore, the competence management of employees becomes more and more important, and the suppliers should improve their technical capabilities and service quality. Relationship management involves customer relationship management and supplier relationship management. Customer relationship management (CRM) is referred to as a comprehensive understanding of customer needs, and the use of all resources to meet customer needs; supplier relationship management, including vendor selection, evaluation to the final supplier to provide production services involved in the entire process of activities. Therefore, supply chain management is very necessary in the supply chain of producer services. On the basis of ensuring the correct and effective supply chain model, strengthening supply chain management can improve the quality and level of service supply and expand the service market.

**Foxconn Technology Group Production Services Supply Chain Model-An Empirical Analysis of Human Resources Outsourcing**

With the continuous development of service outsourcing, human resources management has become one of the fastest growing areas of business outsourcing. At present, the average growth rate of human resources outsourcing market is more than the double average growth rate of China's GDP, showing that China's human resources outsourcing business development prospects are very broad. But as a developing country, the level of development of human resources service industry still has much room for improvement. It is necessary for Chinese enterprises to apply the relevant concepts of supply chain management for human resources outsourcing.
resource outsourcing activities so as to effectively guide HR outsourcing activities. Therefore, it is necessary to study the HR supply chain.

According to the model of production service supply chain, which is constructed on the basis of SOA theory, the model of HRS supply chain constructed in this part is shown in Fig.3, which mainly includes human resources service contracting companies, customers, integrated service providers and related services components. In order to analyze the model of HRS supply chain, this paper takes Foxconn Technology Group (hereinafter referred to as Foxconn) as the case, and analyzes the service outsourcing of HR training outsourcing project in detail.

Figure 3. Human resource outsourcing service supply chain model.

Foxconn poured investment into China in 1988 and soon became the world's largest electronics industry of technology manufacturing service providers. Foxconn is mainly engaged in computer, communications, consumer electronics, such as 3C R & D manufacturing, digital content, automotive components, access, cloud computing services, new energy, new materials development and application of high-tech enterprises. In 2013 the total import and export volume accounted for 5.7% of the total volume. In addition, the company leapt to "Fortune" Global 500 30th. Foxconn in spirits of the "localization, technology and internationalization" kept the policy objectives for the staff to set up five security lines and take various measures to encourage outstanding employees. At the same time, according to the characteristics of industrial workers in the new era, improving the psychological counseling, trouble resolution and staff care system needs to create a harmonious environment of "well-being, stability and development". Foxconn innovative vocational education model actively implement the staff "entry to school" to promote the young talent strategy, such as practicing "change factory campus, plant change classroom"
approach, through cooperation with the famous universities and research institutions. The local government has set up enterprise universities with different training systems, upgrading the transformation of talent structure. The use of technology and cloud group network carrier expands the enterprise to whole plant coverage. Considering the entire staff of "personnel training factory", Foxconn also pays special attention to employee career development. It has established a complete and scientific system of education and training to encourage all employees to learn at work and study after work, through education and training to enhance personal accomplishment, growth of work skills, improve team performance and strive to create opportunities for talent growth and display talented arena.

Foxconn has set up more than 10 staff training bases in Shenzhen, Shanxi and other places in mainland of China, including education in continuing education, network college training, overseas study and vocational and technical management skills. Among them, continuing education is meant that the Foxconn has set up their own business university - Shenzhen Foxconn Advanced Manufacturing Productivity Institute, the company bears staff education costs and hires a partner institution to educate. Network Academy training is the establishment of Foxconn Group covering the United States, Europe, Asia and three continents of the network college, employees can study at any time and any place. To meet the international requirements of the Group's development, Foxconn provides staff with training in foreign language use and training opportunities for foreign employees. Vocational and technical training is acquired in the engineers’ on-site professional courses, and other means of technical training. Management skills training are supposed to be involved in the entire group.

Since 2001, Foxconn has set up its own enterprise university—Shenzhen Foxconn Advanced Manufacturing Productivity Institute—to outsource staff education and training services to colleges and universities training institutions, forming a training institutions as the core training service outsourcing supply chain. Foxconn needs to determine the training needs of their own development needs and then select the appropriate training service outsourcing.
agencies, by the training service outsourcing organization for Foxconn customized training courses, and eventually find the appropriate course service providers. The specific supply chain structure shown in Fig. 4, which Foxconn is the training services of the contractor, college training institutions is the service integration platform, which is the core of integrated service supply chain. The rest of the curriculum service providers as a service component is responsible for Foxconn employees’ related courses for training.

**Conclusion and Future Research Prospects**

With the development of service outsourcing and service economy, producer services have been paid more and more attention. In the context of the continuous development of China’s market economy, this paper analyzes the characteristics of producer services and improves the traditional supply chain model. From the perspective of service outsourcing, we construct the theories of service supply chain management based on SOA and the producer service supply chain model. The model of producer service supply chain constructed in this paper is aimed at improving the whole producer service industry. The future research can construct a supply chain model for a particular industry in the producer service industry. Furthermore, following the model of producer service supply chain which has already been constructed, we are going to make a deep study on the production service supply chain management and fully exert the function of the producer service supply chain. In addition, it also works on the specific characteristics of service outsourcing, such as the non-storage of services, the intangibility of services and the production service supply chain management in the future. All of this is well worthy of study.

**References**


