Research on Configuration and Innovation of Service Supply Chain: A Case Study
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Abstract: Service Supply chain is a new research concern in supply chain management. This research described the configuration and characteristics of service supply chain based on the case study of Shanxi Blower Company. With the comparison between the manufacture supply chain and the service supply chain, the insights provided by this research suggested that service supply chain was reflected on three aspects, that is, network structure, business process and management component. Combining this theory with results of the case study, we figured out the key factors of service integrator as follows: high level of credit and capability, searching for integration opportunity and complex benefit, establishing better social capital, controlling product supply chain and focusing on financing and capital management. Then, here we validated this new model for service supply chain and might supply certain instruction on the operation and management for the service integrators.

Keywords: Service supply chain, Service integrator, Configuration and innovation, Case study

1 Introduction

Customer service is becoming a critical factor in supply chain management. Through supplying all kinds of services that satisfy customers’ demands, the company can not only enhance its competitiveness but also realize good customer satisfaction, customer loyalty and high performance [1]. Therefore, how to make splendid service industry come true is becoming a significant project in practical and theoretical fields of supply chain for a long period. However, in the field of supply chain management, service supply chain proposed in recent years challenges the traditional service of supply chain. The service supply chain suggested by lots of scholars has many differences from service in manufacturing supply chain [2]. First of all, most of the previous studies have explored performance and influence of service in supply chain from a perspective of production and manufacture without considering particular effects of service factors on structure and operation of supply chain management. Furthermore, previous concepts of supply chain services recognize service as a management factor brought up by manufacturing supply chain while neglecting huge effects of rising in value created by human resource, information sharing and capital management during service process. Finally, essential management factors of supply chain services and service supply chain share some similarities but also many different characteristics. These similarities and differences also determine that it is necessary to integrate manufacturing supply chain with service supply chain to form a new operational model that surpasses the traditional supply chain. Hence, using case study method, this paper analyzes configuration and operational model of service supply chain for Chinese equipment manufacturers and expects to drive further development of supply chain management in China based on the exploration for theories of service supply chain.

2 Literature Review

Scholars have many different kinds of understanding about what the configuration and characteristics of service supply chain are. They can be divided into the following categories:

First kind considers service supply chain as procedures and activities of supply chain that are connected with service. According to definition made by Waart and Kemper [3], service supply chain is about the whole processes and activities which refer to planning, moving and repairing in order to support services after sales of products. Some scholars did professional researches on services and after-sale services in global supply chain [4, 5], while domestic scholars pay much attention to logistical
service supply chain.

Second kind recognizes service supply chain as supply chain of service industry or service sector corresponding to supply chain of manufacturing industry or manufacturing sector. Akkermans and Vos [2] found the sources of amplification effects of supply chains in service sector. Ellram [6] compared supply chain management in manufacturing sector and constructed a service supply chain model which adapts to service sector. Recently, Sengupta, Heiser and Cook [7] proposed and tested supply chain model of service sector by using empirical method. There are also many scholars in China who did research on supply chains in service sector such as Yang’s study [8] about port supply chain.

This paper combines both two kinds and intends to understanding that considers service supply chain as integrated supply chain leading by service. After customers call for service to one company integrating services, it will respond to customers’ demands immediately, provide systematic and integrated service to customers, break the requirements when necessary, and outsource part of service activities to other service providers. Then, beginning from customers’ demands for service and breaking demands through cooperating among service providers on different positions, it forms supply-demand relationship and service integrator takes responsibility for integrating all kinds of service factors. This is called Service Supply Chain [9]. Three aspects determine formation of a certain supply chain: supply chain network structure, supply chain business process, supply chain management component (Figure 1) [10].

Firstly, network structure of service supply chain. Considering special characteristics, this paper constructs network structure of service supply chain (Figure 2). It is a complex network from initial suppliers to final customers, which takes service as node, workload as cushion, direct or indirect service provides, company that integrates service, direct or indirect customers as members, and includes not only three dimensions of horizontal structure, vertical structure and horizontal position but also four ways of managed, monitor, not-managed and non-member process links, while service integrator is the leader of building and managing the whole chain.

![Figure 1: Service supply chain framework (SSCF)](image1)

Secondly, business processes of service supply chain. In spite of support from information system and network platform, effective and sustainable operation of the whole service supply chain relies on integration and coordination of main processes such as general demand and customer relationship management, supplier relationship management, service delivery management, capacity management and cash flow management. To realize development and improvement of the whole service supply chain, integrators should hold complex capacity of harmonizing co-opetition relationship among all the nodes as well as coordinating internal capacity with external resources, which makes participators realize their own development based on benefit of the whole supply chain and deliver integrated service efficiently.

At last, management components of service supply chain. Adding more management components or increasing the level of each component can increase the level of integration of the business process.
link such as planning and control, organizational structure, the power and leadership, culture and attitude. For example, organizational structure can refer to the individual firm and the supply chain, of which the use of cross-functional teams would suggest more of a process approach. When these teams cross the organizational boundaries, the supply chain should be integrated.

3 Research Method and Sample Selection

This study used the embedded single-case method, in which researchers firstly select a typical firm in a certain industry and then investigate a few sub analytical units in the firm. After that, they establish and verify their theoretical model. The background of this study is blower industry. In the field of blower and composer, Shaanxi Blower (Group) Co., Ltd. (SHAANGU) is a typical company of quick evolution. Before 2000, SHAANGU was a traditional blower manufacturer in China. Since then, operational performance and competitive position has taken great changes. Until 2005, assets of SHAANGU hit 3.45 billion RMB, which increased by 2.53 billion RMB comparing with that at the end of 2000. Net asset of SHAANGU was 0.93 billion RMB, which was 4.14 times of that at the end of 2000 and surpassed the gross assets of 2000. This quick development is unique in blower industry in China and the reasons behind are complex, which is reasonable to use single-case method to do research in different kinds of aspects.

All the data and resources in this research come from three aspects: first is the field survey and depth interview in SHAANGU, which began from January 15th, 2007 to January 17th, 2007. The interview objects were top-level manager, middle-level manager and basic-level employee. Departments interviewed included procurement and supply department, product and service centre, whole set of equipment centre, product distribution department, contract management centre, technology department. Interview of each took about two hours; second is the archives and data of SHAANGU including annual report, financial report and internal management system; and third is the analytical report of blower industry.

4 Structure and Key Factors of Service Supply Chain of SHAANGU

4.1 Network structure of service supply chain

As is shown in Figure 3, network structure of service supply chain is composed of three parts. Firstly, the members of the supply chain relate to upstream design institution, equipment manufacturer, relative companies and other direct service providers, as well as indirect service providers and downstream direct or indirect customers, while SHAANGU lies in the core position as an integrator. Secondly, the structural dimensions of the network reflect in a complex network structure of multiple levels and nodes, where SHAANGU is in the centre. Thirdly, the process links among nodes are mainly managed type, and only a few are monitor and non-managed types. Design of network structure internal service supply chain (Figure 4) including organization and management of contract management centre and product and service centre make integration of internal and external resources realized.

4.2 Business processes of service supply chain
4.2.1 Management system of general demands and customer relationship

First is the systemic marketing service, which has been promoted since 2001. Concretely, in spite of offering mainframe to customers, SHAANGU also takes charge of whole set of equipment (e.g. systemic design, systemic equipment, systemic installment) and contract with engineering projects (e.g. construct fundamental, workshop and periphery establishments).

The second point is remote management of equipment. Supervisor in product and service centre of SHAANGU said in the interview that:

SHAANGU supplies 24 hours on-line services and real time monitoring machines under operation, sends group of experts to judge the degree of problems, and hands out periodic monitoring report. Therefore, customers can focus on their primary work. At the same time, analysis of experts and forecast online can also bring a lot of information to marketing group about customers’ requirements of maintenance and spare parts.

Third is sustainable maintenance service. In order to optimize resources, SHAANGU outsourced original maintenance work of its equipments to professional firms, which furthest ensures the service level and reduces the cost. Besides, by way of dealing with resources and professionals, SHAANGU organized the human resource to invest into value-added service activities and exerted advantage in profession to supply professional maintenance services to customers effectively.

4.2.2 Service delivery management

Inventory serves as a cushion against market fluctuation. SHAANGU established strategic partnerships with primary suppliers and consigned inventory management to them. In spite of intensifying its own inventory management, one token of SHAANGU service delivery is optimizing inventory of customers’ spare parts. Whole sets of equipment supplied by SHAANGU ask for high reliability, because specialization of them is so high that most are key equipments in customers’ processes. If the equipment goes wrong, it will make the whole system stop and cause big incident. To deal with this problem, SHAANGU offers zero inventory service of customers’ spare parts. For example, when SHAANGU supplied spare parts to Laigang steel structure Co., Ltd. (LAIGANG), store of the equipments used by LAIGANG was not purchased beforehand. Once the machine went wrong, these spare parts would be supplied timely. According to statistics of SHAANGU, services of supplying spare parts between 2002 and 2004 had accumulated orders of 0.124 billion RMB, which increased by 45% each year.

4.2.3 Supplier relationship management

SHAANGU has formed groups of cooperative suppliers all around the country. Before carrying out contracts with any customers, they will firstly survey the suppliers. It is just as supervisor in whole set equipment center of SHAANGU referred in the interview that:

If simply compare quality and price in the stage of invitation and submission for bid, it will destroy the quality of the whole process. Hence, only by combining with the concrete analysis of activities and controlling each link and price in processes can we satisfy customers’ demands and provide engineering service of high quality.

Supplier collaborative institution is critical to develop supplier relationship. SHAANGU established external resources network---supplier strategic collaborative network. It holds meeting every year to communicate with each other including publicizing culture and strategy of SHAANGU, developing some systemic technology, even some professional research seminar, all of which will enter into coordination and communication in supply chain. Besides, each month there is a coordination meeting, the members of which involve quality, supply, technology, financial and other departments in SHAANGU as well as parts of participators in collaborative network. In the two collaborative networks, SHAANGU also invites suppliers to make scores for each functional department and evaluate performance of processes and departments in SHAANGU in order to help SHAANGU discover its problems and deficiencies, which can improve activities and enhance efficiency.

4.2.4 Capacity management

Realization of systemic service is partly determined by matched suppliers and various capacities of external organizations. Hence, SHAANGU suggests considering matched suppliers as workshops of SHAANGU so as to enhance the capability of satisfying the market. During the interview, supervisor of
whole set equipment centre introduced that:

In Sept. 2003, SHAANGU organized 56 corresponding matched suppliers in Xi’an and established “SHAANGU whole set of technology and equipment collaborative network”. Siemens, Emerson, GE and other world famous companies joined in this network.

Operation of this network makes each partner share resources and enhance level of technology, and it helps SHAANGU promote human resources. For example, each year Emerson provides human resources training for 50 persons of SHAANGU at one time in Singapore. Besides, SHAANGU has cooperated with colleges, universities and research institutes by means of development consignment, joint development, and consignment auditing in order to complement research forces of its own.

4.2.5 Cash flow management

When providing service of integration supply chain, SHAANGU also begins to develop management of supply chain financing. Concretely, since 2004 SHAANGU has established strategic cooperation relationships with Industrial and Commercial Bank of China, Shanghai Pudong Bank, China Merchants Bank and other banks. It used the resources of finance institutions to provide finance service and promote credit security. Firstly, SHAANGU set up accounting center, implement unified management of independent accounting units. Furthermore, SHAANGU established contract management centre and financial centre to manage supply chain financing and promote financing warehouse. Supervisor in contract management centre referred in the interview that:

On the basis of combining resources from banks, SHAANGU promotes financing warehouse based on management of moveable. That is to say, SHAANGU takes use of self-finance and bank credit to develop mortgage based on moveable (like equipment) and mortgage of warehouse receipt (like steel and other products). After finishing the project, SHAANGU will obtain corresponding funds and financing fee.

4.3 Management components of service supply chain

It is necessary to confirm the departments and staffs who take charge of implementing processes to realize the goal of supply chain operation and integration service. Since 2000, organization structure of SHAANGU has been transformed with the business strategy and objectives and has formed matrix form guided by strategy (Figure 5). The main characteristics of this structure represent in two aspects. On one hand, the company has formed two levels of cooperate level and business level. On the other hand, in the organization structure realized by business strategy, SHAANGU has tried matrix form across processes led by projects.

![Figure 5: Organization structure across process of SHAANGU](image_url)

4.4 Performance of service supply chain

During the process of transform from manufacturing supply chain to service supply chain, financial performance of SHAANGU has also been enhanced dramatically, which represents the increase of output value, sales avenue, capital (Figure 6) and decrease of financial cost and loans (Figure 7) from 2000 to 2005 year by year.
5 Conclusions and Future Research

This paper suggests that service supply chain is providing integrative service system based on capability management, demand management, supplier relationship management, customer relationship management, service delivery management, and capital and financing management by integrating end customers with service integrator, all kinds of supplier (other equipment and system supplier), other direct and indirect supplier (such as architectural design institute, logistics corporate and so on), distributor (product and service distributor of SHAANGU), finance institution. Through case study, we find that the realization of this objective or model relies on the following factors:

Firstly, service integrator should have high level of reputation and capability. It can not only satisfy customers’ direct and simple requirement for product and equipment, but also provide a higher level of reputation capital depending on capability of the core company. On one side, whether the product and service supplied can deliver key value and response to any requirement of customers. On the other side, taking use of each participator’s knowledge can drive the whole network into a new developing “blue ocean market”. According to sustainable developing relationship of Japanese corporations, Sako proposed that reputation is also a kind of capital and three levels of reputation mechanism (contract reputation, capability reputation, business reputation) regulate development of this relationship [11].

Secondly, service integrator can find opportunities and benefits among distinctive individuals, organizations and factors. The greatest attribute of service supply chain is breaking out boundary of traditional industry and region. As is shown in the survey of SHAANGU, due to institutional reasons of some economic subjects such as architectural design institute, customers have no sense of party A though they are in the contracts. However, because SHAANGU provides project contractor based on solutions customers save a lot of energy, cost and time, which helps customers to realize expansion of value indirectly. Therefore, operation of service supply chain can both realize direct economic benefit brought by integration and make participators enjoy social transaction cost reduction.

Thirdly, service integrator can form good social capital between individuals and organizations through its own behavior and operation. That is on one side building effective horizontal bridge (processed linkage among departments of SHAANGU) and vertical bridge (linkage among management levels of SHAANGU such as the coordination mechanism between contract management centre and all the functional departments) internal the company. On the other side, it is necessary to build effective horizontal bridge (linkage between SHAANGU and relative cooperators such as other equipment manufacturer, supplier, finance institute and architectural design institute) and vertical bridge (trust and coordination between SHAANGU and department of managing domestic resources). Only these links can represent group social capital and make sustainable development of service supply chain.

Fourthly, effective operation of service supply chain is based on integrator’s control of manufacturing supply chain. As is shown in the case study, success of service supply chain of SHAANGU is based on good design and organization of manufacturing supply chain. If SHAANGU loses control of technical management of blower equipment and manufacturing supply chain, the service supply chain will be hard to form. Furthermore, because service supply chain of SHAANGU has been
built on the foundation of manufacturing supply chain, the two kinds of supply chain get good combination and promote mutually representing that service supply chain benefits technology innovation and manufacturing supply chain.

Fifth, financing and capital management is one significant objective of service integrator. During the process of organizing service supply chain, how to deal with the capital and financing problems in network, especially when participators come up against shortage of capital or capital obtained based on real estate is hard to meet requirements of production and operation. Simultaneously, banks and financial institutions are unable to provide capital for the reason of controlling credit risks. At that time, financing and capital management become the critical point in determining the performance of service supply chain. One important factor contributing to success of supply chain in SHAANGU is not only constructing service network and supplying integrated service products, but also providing general service for managing material flow, bill flow, and capital flow as a financing warehouse.

In conclusion, this paper has discovered the configuration and operation of service supply chain through the single case study of SHAANGU, which represents the innovation model and path of breakthroughs of equipment manufacturers during economic change and enterprise evolution in China. However, research of this paper is based on case study lack of large scale of samples to test the results. Besides, the conclusion draw from case study also needs to be verified in other equipment manufacturers and further analysis of each factor. These are all insufficiencies of this paper, which need subsequent research in the future.

References