

Management Practice of Supply Chain Quality Management in Service-oriented Manufacturing Industry

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Abstract. Supply chain quality management (SCQM) in service-oriented manufacturing industries is needed in delivering value to customers in all process of supply chain management based on total quality management (TQM). In the paper, we identify the latest themes through reviewing prior quality management and supply chain management (SCM) literature. In particular, we find manufacturing firms transform from providing products towards providing services, which means they need to go through fundamental changes especially in supply chains. We use a case study of Heilan Home to illustrate the SCQM themes and their ways in industrial practice. Based on our research, the case study, the experience of working with this firm, we propose a SCQM performance evaluation framework, as well as four strategies for other industries to improve customer satisfaction and added value. In this way can promote the transformation and upgrading of the manufacturing industry in the perspective of quality.

1 Introduction

The trend of transformation towards servitization has taken an important role in the development of global economy. Service industry in developed countries accounted for more than 70% of GDP, which is the source of economic growth. At the central economic work conference of China, leaders proposed that the primary task of promoting the structural reform of the supply side is resolving excess capacity actively and steadily in 2016. This means the manufacturing industry of China will transform from excess capacity to better supply. Service upgrade of manufacturing industry is the only way to develop Chinese economy currently. Enterprises pay more attention to the quality focused on providing better products and services for customers rather than quantity only. It will carry out the manufacturing industry better development and transformation by building “customer-centered” innovation collaboration value chain platform. This depends on the supply chain innovation and quality control. More and more scholars and enterprises try to integrate the supply chain management and quality management, expand the scope of application of quality management and endow it with the new connotation. The effective use of quality management can significantly affect the overall performance of the supply chain and the enterprise performance [1]. Previous researches on quality management focus on the internal quality and external service quality, however, the core of supply chain quality management is centered on quality and win-win cooperation instead of cost and competition among enterprises on supply chain [2].

2 Literature review

2.1 Service-oriented manufacturing industry

With the development of economic globalization and informatization, the adjustment of industrial structure has become an important way for our national economy to transform. The boundary between manufacturing and service industry is constantly blurred. The differences between manufacturing and service industry in terms of product characteristics, functional distinction and organizational features have been weakened, then, the trend of integration of manufacturing and service industry is increased, then the development of modern manufacturing services has become the key to ensure the efficiency development of national economy [3]. At first, the manufacturing enterprise is the core of service-oriented manufacturing industry, then, which realize servitization by service industry as a tool. It is a strategic choice for manufacturing enterprises in their development process. Through “smile curve”, firms can choose the high value added process of the left side-R&D and service, right side-marketing and brand, spun off its low value added process-

manufacturing in the middle to improve the competitiveness and efficiency of enterprises. Vandermerwe S [4] gave many real-life examples, the authors assess the main motives driving corporations to servitization, and point out that its cumulative effects are changing the competitive dynamics in which managers will have to operate. The special challenge for top managers is how to blend services into the overall strategies of the company. Zahir Ahamed [5] examined the needs of servitization from customer perspectives, particularly the IT industry of emerging market 'Bangladesh'. The survey results showed that the current suppliers cannot satisfy the customer needs at this moment, because customers are not happy anymore with the IT goods only; they also require solutions, knowledge and reliability as well. Christian Schnürmacher [6] pointed out in contrast to the product development the service development approach is highly dependent on the project manager. There is no service development process defined and most of the employees and project managers are not used to work in processes. Thus it was important to train the fundamentals and benefits of a process based development to the people from the service development first before introducing the new method to ensure a successful implementation of an integrated product and service development process. Yong S K [7] contented that service elements are added and enhanced to make manufacturing companies more innovative and grow revenue. The servitization process could take many different routes reflecting various properties of the manufacturing firm and its business contexts. King Fengguan [8] described the basic purpose of servitization is to promote the combination of existing service and new service, the combination of goods and services and the commercialization of services. Furthermore, White [9] focused on the relationship between service and environment, defined the servitization as the transformation from the goods provider to service provider for the manufacturers.

2.2 Supply chain quality management

Kuei and Madu [10] defined supply chain quality management (SCQM) with three simple equations where each equation represents the letters that make up SCQM. The definition is as follows:

-SC=a production–distribution network;

-Q=meeting market demands correctly, and achieving customer satisfaction rapidly and profitably;

-M=enabling conditions and enhancing trust for supply chain quality.

In SCQM, Pu Guoli [11] discussed the relationship between supply chain members and customers, the important problem of supply chain is providing satisfied products and services for customers through joint effort of all members in supply chain, the concept of process has also been the focus instead of products. In essence, SCQM is not the study of supply chain, but the further understanding of QM from the point of view of supply chain. Kuei and Madu [12] note that the focus of quality-based paradigm has shifted from the traditional company-centered setting to complete supply chain systems. Tan et al. [13] discussed the commitment involved to integrate channel suppliers, manufacturers, and customers in order to achieve both long-term growth. Collaborative relationships are also topics reviewed by Choi and Hartley [14], Forza and Filippini [15] Obtaining customer satisfaction (caused construct) requires greater attention to factors which concern downstream relations with customers such as the involvement in quality improvement programs (causing construct=TQM link with customers) Waterson et al. [16], Most successful practices for quality improvement: TQM, Team-based groups, Manufacturing Cells and Integrated computer-based technologies. Most common practices: SC partnering, TQM, JIT, team-based working and integrated computer-based technology. Mangiameli and Roethlein [17], Multi-directional quality awareness and communication between channel partners (case study) can be a competitive advantage. Fynes and Voss [18] Strong buyer-supplier relationships will improve design quality.

In the past, QM practices pay much attention to inter-enterprise, so SCQM can transform the external problems of supply chain into the internal process, which include the process of expanding supplies at upstream such as negotiation, selection and improvement of suppliers' performance and the process of service at downstream such as customer service and after-sales service etc. Logistics flow, business flow, capital flow, information flow in supply chain, each flow can run correctly and effectively, then firms can obtain excellent performance.

2.3 Characteristics of supply chain quality management under the servitization

Service demand is the precondition of servitization [19], which is a transformation for specific enterprises to meet development needs. Under the trend of service-oriented manufacturing, enterprises integrate customer satisfaction into SCQM, deliver the behavior and perception of customers into the entire supply chain process, that is collaborative creation and acquisition of value through customer participation. Thus, supply chain quality must further improve the value on supply chain by customer participation and experience. "Customer" includes not only the ultimate objects accepting service, but also the member of the inner supply chain one by one.

In this paper, we will focus on SCQM in service-oriented manufacturing industry, which is to improve the overall quality on the supply chain through the attention to customer satisfaction and customer demand. In this model, the supply chain will have a multidimensional trend, deliver products and service. The path of information flow and logistics flow will connect with service demand and priorities of different customer groups. The relationship between the customer and the supplies is a kind of value added relationship, which makes the structure of the supply chain and operation rules have new features.

Logistics management is the core of the traditional supply chain, and the service flow is introduced in the service network organization, which is invisible and lack of material carrier. In fact, it is a kind of ability to transfer.

The traditional manufacturing supply chain raw materials and parts logistics are coupled by product structures and related needs; there is specific products and services existing in service network, which is connected with a new mechanism.

In service network, supply chain is customer demand-oriented; furthermore, customer participation and customer experience is more important, the core enterprises need provide direct and indirect service, service configuration and service platform.

Under the trend of economic globalization and the development of technology information, customer consumption has already shifted from the previous consumption based on the product to the service based experiential consumption. Service oriented manufacturing is the necessary means to enhance the manufacturing industry in China [20]. The transformation of manufacturing service makes the core business of the enterprise changed, which affects the entire supply chain of enterprises. The core enterprises will affect its own production and operation mode to realize the servitization, and have a significant impact on the entire supply chain members [21].

By focusing on the customer, the customer needs to be found, and the demand is delivered to the entire supply chain network. The effect of customer satisfaction on enterprise's operation ability is significantly higher than that of the enterprise's profitability. The impact of input- servitization on the traditional supply chain is mainly reflected in the procurement and production processes. Enterprises shift business focus to R&D and procurement management, that makes the production outsourcing and vendor management inventory (VMI). Manufacturing supply chain structure also changes. Input-servitization for the core enterprises means increasing investment in R&D. Output-servitization means that the enterprises transform products providing to service based on products providing. This change will affect the entire distribution and after-sales service model, downstream of the supply chain will be significantly reduced. Enterprises will face directly to terminal customers as "service-distributor" based products; another situation is that the downstream distributors and retailers will be replaced by service partners.

3 Research framework

The research on SCQM is established on comprehensive systematic and objective basis, according to the different development status of the industry, characteristics and situation of this enterprise-- Heilan Home, this paper mainly includes the following:

- a) research on supply chain quality management practice.
- b) research on the strategy of supply chain quality management based on customer satisfaction.

The main contents of this case as shown in the following Figure1.

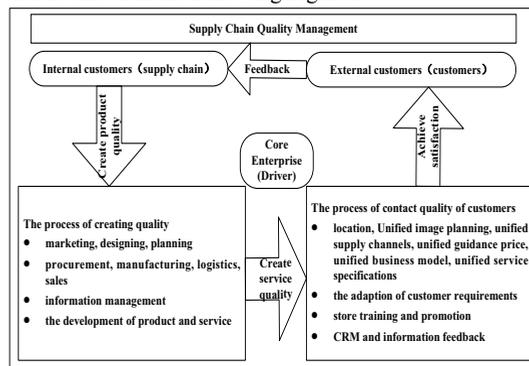


Fig. 1. Main contents.

3.1 The selection of research method

This paper takes a single case study method, and based on archival materials, interviews, field investigation to Heilan Home(Heilan) that is a typical and representative enterprise. It is heuristic for others. So the method of selecting single case study is reasonable. This company attaches to the construction of internal management system, adhering to the "market-oriented, customer satisfaction", articulates the marketing positioning, makes market segmentation, identifies target customer groups, implements marketing research, designs unique men's clothing integrated into the corporate culture with its brand and resources integration capability. Heilan company has established and consolidated win-win relationship with customers. The managers of Heilan are actively involved in product and service quality by promoting and highlighting the importance of customer requirements. This concept is emphasized in staff training, daily meetings, weekly management meetings. Furthermore, Heilan has its unique employees in quality-solving teams and customer site visits to solve those quality issues. In particular, Heilan has its unique ways to avoid and solve quality issues. This processes include (1) product design, (2) suppliers selection,(3) production stage, (4) inspection before storage,(5) patrolling ,

inspection, secret enquiry. Heilan is a ideal case of this research for its quality-oriented culture, and its communication and partnership activities are strategically integrated with their customers. In this interview with their senior executives and department managers we communicate about performance index, management system and process activities, continuous improvement programs, customer demands as well as the quality project quality plan.

3.2 Data sources and data processing

In this paper, the data collection carried out through field research, interviews, which is helpful for understanding the theoretical basis, research process and the background of this case. We collected the information by means of Heilan Group official website, journal articles, interviews and investigation including: (1) group reports, (2) journals and speeches of senior managers ,(3) five-year strategic planning,(4) department development planning,(5) company management process, system files and so on. The members of the project group had in-depth experience-sharing and discussion with senior managers including R&D, brand, quality, marketing department to guarantee the integrity and efficiency of information.

4 A case study of management practice

4.1 Joint operations

Heilan takes the ways of payment after the completion of the sale, the return of unsalable goods and procurement of secondary purchases to get the interests together between the brands and manufacturers. The relationship of Heilan and other suppliers is “returnable joint venture”, which means suppliers are no longer OEM manufacturers. They have to improve dynamic pin ratio and profit margin, understand market trends, cooperate closely with Heilan, produce readily marketable goods. That would help improve dynamic pin ratio and the efficiency of stores. It is the benefit-sharing mechanisms that maintain Heilan with suppliers cooperate closely. Heilan has formulated a series of rules and regulations on the supply chain management to ensure effective operation including the selection and evaluation of supplier, supplier production process tracking and management, supplier sample design selection and modification, product purchasing and quality control, supplier accounting, supplier elimination system, logistics and so on.

Heilan develops the new products jointly with suppliers, and makes full use of suppliers’ design resources. The design center of Heilan adhere to market-oriented, reference the domestic and international fashion design principles, focus on the 20-45 year old Chinese man as customers, pay attention to their clothing habits and taste, analyze and summarize the sales data, plan and design products. Designers complete the product development proposal, fully communicate with the design department of suppliers. Suppliers’ designers conduct the overall proofing. Heilan’s designers select and modify the old proofing, at last, determining the next season product styles. Under the joint development mode, Heilan not only masters the dominate the product design, but also give full play to suppliers’ subjective initiative, and make full use of the suppliers’ design resources.

Heilan signs procurement contracts of returning unsalable goods with suppliers, which is beneficial for company to make full use of the channel resources to control the product quality, sales channels, brand advantage. the stores provide high quality, cost-effective products and services. There is little left in two sale quarter. In order to take advantage of the company’s resources, Heilan’s stores would place more marketable commodity to reduce the occupancy of unsalable goods. At the same time, this contract would help suppliers more responsible to design marketable products and keep the quality. This kind of procurement contracts agree to return unqualified products and still return unsalable goods after a certain period.

Suppliers and Heilan become the organic combination, assume different responsibilities, share the interests, develop with each other. In this purchasing mode, suppliers provide high quality products, safeguard brand reputation and pay more attention commodity management, supply chain management and sales management. Only provide marketable products can suppliers have more interests, otherwise, both would have a loss.

4.2 Union and control

In sales link, Heilan has taken the mode of the ownership and operation-right separated from franchisee. Franchisee need bear the rent, renovation costs, utilities, staff salaries and other expenses of its store, but not participate in the management of the store. Heilan investigates the store location, assesses the future revenue, decides the distribution, manages the store, controls the whole market. There are more than 3000 stores with unified image planning, unified supply channels, unified guidance price, unified business model, unified service specifications. This helps the cooperation and control. Sales settlements take the trust-surrogate mode. The franchisee does not bear the inventory unsalable risk, according to the contract to settle business income.

- **Store expansion**

The location is very important for the stores, and passenger flow is the key elements. The company requires the store must located in the main business district, which is in charge by the market department. Heilan take the screening mode, according to the business development plan to decide the store expansion goal, through the level of “city-

commercial distinct-store”, find the qualified store, at the same time, actively develop the local private owners with strength to become franchisee.

- Operation management

Heilan has established a series of standardized management system about the daily store operation, delivery, settlement, inventory management system, customer communication and service management methods and so on. All stores must be strictly enforced. The staff salary(including bonuses) of all stores is decided by the company, all the expenses are charge by franchisee .

- Sales information management of franchisee

The pos system of store is connected with DRP system of Heilan. All after-sales data is gathered and analyzed by Heilan. In addition to electronic sales list, franchisee need provide written consignment list every month, after checked by Heilan, that would confirm sales revenue according the consignment list.

- “three-inspection”

In order to realize the target of standardized stores, Heilan has set up the inspection department to conduct regular or irregular inspections of all stores to check the implementation of the rules and regulations of service. The company would analyze the issue of feedback of inspection department, request the business manager to process and track, which is helpful to realize customer satisfaction.

4.3 Focus on management

As the model of service-oriented manufacturing industry, Heilan has taken the asset-light strategy, kept R&D and sales, peel off the production and processing. The company is committed to build a community of interests, on the other hand, enhances operational efficiency of stores, which would strengthen the core competitiveness. In the management mechanism, it implements standardized management, that is “management institutionalization, process standardization, supervision tracking, assessment digitization”. In the work process, in addition to R&D center and logistics center, there is development, quality control, deployment, brand management and other departments, around the new business model and the trend of servitization, it gives full play to the advantages of “headquarters economy”, dedicated to provide the whole process for the upstream and downstream of industry chain. At the same time, Heilan has set supplier requirements, with the advantages of scale to reduce procurement costs. Otherwise, the establishment of the store manager system and patrol clerk team, help to enhance the store management level. In Heilan’s SAP project, the implementation system involves all aspects of retail management, product planning, logistics and warehousing, financial management, personnel management, data analysis and other, which support the headquarter ,retail stores and suppliers to share information and coordinate.

Heilan has taken two methods to establish current formats in the process of transformation, finally developed as a new type of retail industry ”service-oriented manufacturing industry” . One is the reconstruction of the business process of supply chain based on TQM, another is the establishment of the most advanced IT technology to support the construction of the logistics system.

Heilan has taken the flat centralized distribution model of “supplier-headquarter-store” differing from the most clothing companies’ mode of “regional warehouse storage and sales agent”. It established the strategic cooperative relationship with the domestic logistic enterprises. Thousands of goods from more than 300 suppliers are transported to headquarters, after sorted, which then distributed to nationwide stores. This could let the company orders quickly and accurately delivered to the stores, furthermore, grasp the distribution of goods resources. Headquarter distribution center allocates reasonably and manages scientifically, not only to ensure efficient distribution but also control the cost of storage, labor and freight. Intensive distribution mode requires enterprises to have a certain storage capacity. Heilan group invested more than 500 million to build intelligent automatic tridimensional storage system, covers 10 million square meters, including 2 tridimensional warehouse, 3 delivery hall, a distribution center. This is the largest and the most technologically advanced automatic garment logistics park with the most advanced SAP information management system. Regardless any one item, from query, positioning, library and logistic, this process just needs 30 seconds to achieve “zero error”, which completed from manpower to brainpower. With SAP, Heilan can grasp all the information of warehousing , distribution, sales and other aspects, realize the whole process tracking, conduct the overall control of the market.

4.4 SQCM performance index

According to the SQCM practice of Heilan, the following (Table 1) is the SCM process performance index. Through setting the reasonable performance indicators, it is helpful to implement the process.

4.5 Lessons and suggestions

Through the analysis of Heilan, taking different methods to analyze different scale enterprises, the level of transformation and reform are not same. From the perspective of servitization , according to the process of its organizational reform, considering the necessity and importance of transformation and if discovers and uses the key factor of the success elements of current business fields as shown in the following Figure2. Firstly, it is the customer

satisfaction, which depends on the sophisticated analysis by the e-commerce, big data platform for customers, understands the customer demand and consumption. Secondly, it is business model innovation. Heilan’s business model is developed from SPA(Speciality retailer of Private label Apparel) ,the characteristics of this model is integrated the research, production, logistics, sales by IT in order to realize the efficiency and the speed of commodity supply plan. Heilan stripped the lowest part of the value chain to gain competitive advantage. Thirdly, service configuration and construction of service industry platform is very important, service is apperceived by customer, how to transfer customer perception into whole supply chain, that relies on the platform. Last but not least, forming the co-creative service means full participation, including all stakeholders, it is also the core of supply chain quality management, through this kind of joint participation and creativity to determine the content and value of service.

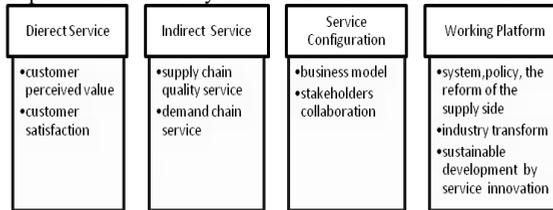


Fig. 2. The points of SCQM practice.

5 Conclusion

The focus of this paper is supply chain quality management in service-oriented manufacturing industry. On one hand, it provides better theoretical and empirical support for service-oriented manufacturing enterprises to achieve total quality management and improve customer satisfaction, on the other hand, lays the path foundation for some enterprises to transform itself from a traditional manufacturing to a service-oriented company. As this paper demonstrates, it is easy to see how future research in SCQM that seeks to integrate quality and process improvement strategies across the entire supply chain will benefit the stakeholders, the concept of TQM should be carried out in the whole process of business management, the trend of servitization has entered into an era of providing more added value into service process.

Table 1. Performance evaluation index.

Key Process	Stakeholders						Requirement	Process Requirement	Indicator
	Shareholders	Customers	Employees	Vendor	Partner	Community			
R&D management	•	•	•	•		•	※ & ©	Meet market demand	Dynamic pin ratio sales Storage attainment rate Product quality
Supplier management	•	•	•	•			※ ★ ◆ ▲	Select the products of meeting brand culture	Prenatal sample confirmation rate Documentary efficiency Delivery quality
Logistics management	•	•	•	•	•		※ ★ ◆ ▲ & ©	Improve goods accurate and targeted	Storage time rate Time delivery rate Delivery accuracy Inventory accuracy Sales completion rate Store turnover

Key Process	Stakeholders						Requirement	Process Requirement	Indicator
	Shareholders	Customers	Employees	Vendor	Partner	Community			
									Delivery success rate
									Store demand satisfaction rate
Store management		•		•	•	•	※◆◎ *	Achieve business objectives with unified store image, model, service standards	Sales completion
									Personnel management
									The third superintendence
									Store development success rate
IT management	•	•	•		•		※★◆ ▲◎	Meet the accuracy , integrity, reliability, timeliness, safety and ease using of information and knowledge management	Technology capability
									Business ability
									Communication and coordination
									Annual comprehensive performance

- ★—provide unique products and services,
- ◆—provide the effective solution with the best value,
- ▲—improve market share and share value,
- &—import advanced technology and tools,
- ◎—enhance corporate citizenship and social responsibility,
- *—provide high quality products .

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