

## Chapter 53

# Research on the Shape of the Dual-Core Supply Chain

Xigang Yuan and Zhigao Liao

**Abstract** The form of retailers and manufacturers as the core companies in supply chain are firstly summarized simply. Then, combined with previous researches, the mechanism of the shape of “dual core” enterprise supply chain is proposed. Meanwhile, the fact is pointed out that this form of supply chain is not suitable for all industries and only when manufacturers and retailers expands to a certain size, can such supply chain model emerge. Finally, factors of the shape of such supply chain mode are explained from the information-sharing, a certain firm size, control of the core enterprise and coordination mechanism.

**Keywords** Retailers · Manufacturers · Dual-core company

### 53.1 Introduction

Economies globalization urges the competition between supply chain to become increasingly fierce and the theory of supply chain management has become one of the hot points in the theories researches. A supply chain which is centered on core enterprise is a value chain formed from suppliers, manufacturers, retailers, distributors to ultimate customers, in which there are flows of information, logistics and capital.

In the supply chain, there is a core enterprise and others are in subordinate positions. The core enterprise determines the running rhythm, undertaking the task of interest's coordination and profit distribution among core enterprise determines the running rhythm, undertaking the task of interest's coordination and profit distribution among node enterprises. Thus, the core enterprise is extremely pivotal in supply chain. If the core enterprise had some problems in management, the operation of the

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whole supply chain would probably break down. Therefore, the research on the core enterprise in supply chain bears important theoretical and practical significance.

Many scholars mainly focus on the researches of retailers-oriented supply chains and manufactures-oriented supply chains. Many researches are mainly concentrated on the shape of the two types of supply chains. For example, Zhou and Zhu [1], through the analysis of the commercial and manufacturing gross relation, holding that industry-commerce relations in china has entered into the commerce-oriented period and many large-scale commercials control and constrain manufacturing use of the ability to control the market. Guo [2] analyses from the aspects of manufactures, retailers and consumptions, that retail trades will dominate in the market gradually replacing manufactures. Wang and Li [3] illustrate from the aspects of the change of market environment, the scale of development, the development of information technology and the rise of commercial capital, that retailers will gradually take the lead in supply chain. Those scholars expound the reasons for the shape of "single core" enterprises supply chain from different perspectives. Some other scholars study the coordination of "single core" enterprises supply chain. Liu [4], through linear transfer payment contract, testifies that choosing appropriate reward and punishment factors and limiting the minimum sales scale in a certain range can coordinate supply chain. Cao and Lai [5] analyze that the coordination of supply chain system composed of one supplier and several Bertrand Competition retailers, and testify that when demand and production cost of suppliers are in turmoil, the integration of supply chain will achieve the coordination of supply chain. Meanwhile, an increasing number of scholars carry out abundant quantitative researches on cooperation mechanism of "single core" enterprises supply chain. Seyed et al [6] derived coordination under credit period for a two-level supply chain and they develop the optimal ordering policies and bounds are provided for credit period to develop an algorithm. As a result, they instructs their model are effective. Tiao and Dan [7] come up with two coordination mechanisms: an all-unit quantity discount and an incremental quantity discount. As a result, they think that this two mechanisms can make the total supply chain profit increasingly. Zhong and Si [8] develop retailer-dominant non-cooperative game models by introducing a sensitivity of retailer's order quantity to manufacturer's wholesale price then they analyze two cooperative scenarios in which the Nash bargaining model is utilized to implement profit sharing between the manufacturer and the retailer. Information sharing is also well worth studying. At present, many scholars have done lots of researches on information sharing of "single core" enterprise supply chain. For example, Borland, Bourland-Powell-Pyke Model, investigate that under the condition of a retailer and a manufacture, EDI (Electronic Data Interchange) can achieve the interchange of customers' information to meet purchasers' needs promptly [9]. D'Amours et al [10] advance the D'Amours-Montreuil-Lefrancois-Soumis model in which analyzing different degrees of customers' demand information sharing among each node of supply chain company and comparing the gross profit, they proved that information sharing has greater value. Lee [11] advanced three information sharing models which are information transformation model, third-party information model and information neutralization model, making a great contribution to the research

of demand information. Edwin and other scholars [12] testified that increasing the information sharing among members can achieve Pareto optimality according to the optimal inventory policy in different circumstances of information sharing. Seung put forward planning demand transferring method (PDTM) and Prediction of demand distribution method, evaluating the effect of supply chain information sharing [13]. Hau pointed out a general demand information model supposing that suppliers don't know retailers' demand information and investigated the influence of optimal smoothing parameters on the gross profit of supply chain [14]. In addition, the price of the node enterprises in supply chain also arouse many scholars' attention. Thus investigating the pricing policy of core enterprises in supply chain seems significant.

### **53.2 The Establishment and Description of the Model**

Now an in-depth study on the two supply chain models is conducted from the form of supply chain model, the pricing strategy of core enterprise in supply chain, the coordination of supply chain, the information sharing of core enterprise and non-core enterprise. However, there are still some deficiency in current studies. On one hand, the researches on "single core" enterprise mostly focus on the "bi-level" supply chain of one core manufacture and one retailer or one core retailer and one manufacture. For example, only a pricing coordination model of "bi-level" supply chain under Game Theory Framework is studied in document and there are excessive assumptions in the research, which distorted the effect of model [14]. Only the coordination of two-stage supply chain system composed of one supplier and several competitive retailers is studied in Document [3]. Therefore, whether Linear Transfer Contract can be applied in the supply chain system composed of one core manufacture and several retailers is worthy of study. Whether the mentioned achievement of the researches on the "single core" company supply chain can be applied in multi-stage supply chain is also worthy of further study. On another hand, the research on "single core" company supply chain is mostly conducted by the application of quantitative method through the establishment of mathematical model. Excessive assumptions and the idealization of some assumptions make it hard to simulate some complex questions and to apply the conclusions in practice. Finally, what should be pointed out is that the retailer or the manufacture is regarded separately as the core enterprise of a supply chain, but the manufacture and the retailer are not taken together as the core enterprise of a supply chain to study on in most of current researches. Thus, it has great practical and theoretical significance to conduct an in-depth study on the backgrounds and reasons of the formation of "dual core" enterprise supply chain mode taking retailers and manufactures together as the core enterprise in supply chain, the allocation of profit among core enterprises, cooperative pricing strategy, the method of information sharing. Based on the deficiency in the researches, "dual core" enterprise supply chain mode is put forward and an in-depth description of the formation mechanism of such new supply chain

model is done in this article. The formation mechanism of “dual core” enterprise supply chain as follows:

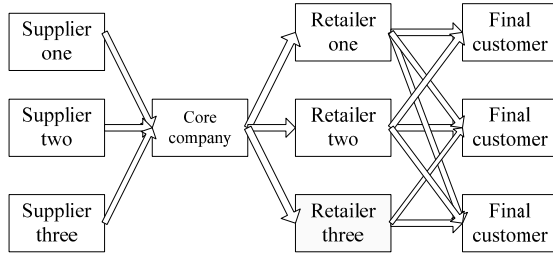


Fig. 53.1 The manufacture of the core company in the supply chain

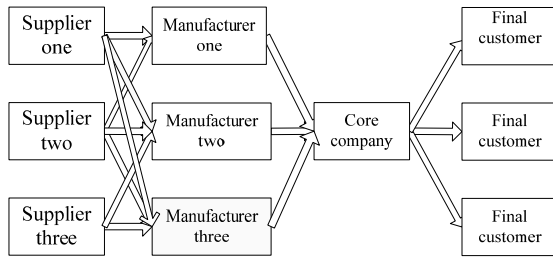


Fig. 53.2 The retailer of the core company in the supply chain

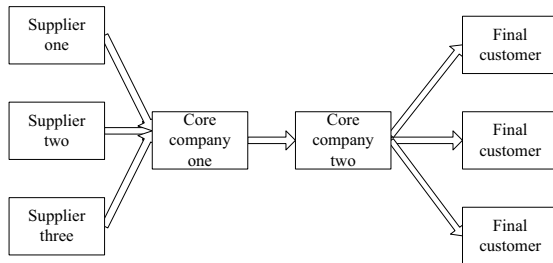


Fig. 53.3 The manufacture and the retailer of the core company in the supply chain

Supply chain has been regarded as a Dynamic Alliance, so an enterprise should be in the chief position. In Fig. 53.1, the manufacture is in the leader position and other node enterprise are in the subordinate. However, under this condition, the phenomenon of the big bullying the small or the strong domineering over the weak may

occur. In the supply chain model of taking the manufacture as the core, the manufacture purchase raw materials from the original supplier in a very low price and then sell them to the retailers in a relatively high price to intensify the control over the original supplier and the subordinate retailer. In general, large manufacturers occupying a relatively large market share, having high credibility and strong competition, the suppliers and the retailers in a subordinate position are not willing to lose such large customers and such large suppliers. To maintain the survival, suppliers and retailers usually choose to maintain the relationship with core manufactures. When the relationship deteriorates, the core position of manufactures will be shaken and other node enterprises will seek new partners.

In Fig. 53.2, the retailer is in the leader position in supply chain and other node enterprises are in the subordinate. To obtain more benefits, the retailers will intensify the control over other node enterprises. Under this condition, the retailers purchase products from the manufacture in a relatively low price and then sell them to the customers in a relatively high price. In general, large core retailers occupying a relatively large market share and having high credibility, manufactures are not willing to lose such stable and large customers. Therefore, to reduce the control from large retailers, manufactures will cooperate with other retailers. When the manufacture separates itself from the supply chain, the core retailer will suffer great losses because of the loss of a stable supply.

Considering the problems in the “single core” enterprise supply chain, the “dual core” enterprise supply chain model shown in Fig. 53.3 is pointed out in this article. In such supply chain model taking manufactures and retailers together as the core enterprise, the large manufacture and retailer establish a marketing alliance, being the leaders in the supply chain and share information and risk. Manufactures have stable customers and retailers have stable supply so that they will not be generally separated from the supply chain.

The organization of such supply chain is formed when the retailers have equivalent strength with the manufactures. Supposing the strength of manufactures is stronger than that of retailers, the retailers will be under the leadership, constituting the supply chain model taking manufactures as the core shown in Fig. 53.1. In such model, manufactures are at the core deciding the running rhythm and direction of the supply chain and other enterprises are in subordinate positions. Besides, supposing the strength of retailers is stronger than that of manufactures, the manufactures will be under the leadership, constituting the supply chain model taking retailers as the core shown in Fig. 53.2. In such model, retailers are at the core deciding the running rhythm of the supply chain and mastering the core resources and other enterprises are in subordinate positions. Only when the two have equivalent strength can the “dual core” enterprise supply chain shown in Fig. 53.3 be composed, which is only suitable for industries of production and marketing alliance.

The most typical example of “dual core” enterprise supply chain in reality is the “Production and Marketing Alliance Supply Mode” of Wal-Mart store and P&D. It is well known that the two large retailers and manufactures, Wal-Mart store and P&D, get both greater development and profit through establishing new the produc-

tion and marketing alliance. Two of them jointly determine the running rhythm and become the core enterprises in the supply chain.

### 53.3 Formation of Conditions

Some conditions for the formation conditions of “dual core” enterprise supply chain are needed to take the manufacture and retailer as the core compare in supply chain. Combined with the relative theories of the Synergetic Theory, the compare conditions are represented as the following aspects.

First of all, information sharing is the basis for the formation of “dual core” company supply chain. A high degree of mutual trust between manufactures and retailers is based on information sharing, including order information, stock information, the final demand information of customers and other information, which is usually related to whether the coordination of supply chain can be improved, whether the quality of products and service can be improved, whether the cost of supply chain can be reduced and whether the competition and information sharing can be strengthened. The information sharing among core enterprises and node enterprises in the whole supply chain can improve the coordination of the supply chain to meet customers’ needs at a faster rate. Only highly shared information can reduce the Bullwhip effect, avoiding the higher cost and lower profit caused by information distortion.

Secondly, certain scale is a necessity of “dual core” enterprise supply chain. Only manufactures and retailers of a certain scale in the aspect of purchase, product, sale, management can attract other enterprises to share profit and bear risk driving the formation and development of the supply chain, such as Wal-Mart store, the largest retailer and P&D, the largest daily necessities manufacturer in the world. In the 514 million dollars value of sales of P&D in 2004, 8% is from Wal-Mart store, and in the 2,560 million dollars of Wal-Mart store, 3.5% is from P&D.(The data is from the research and survey of Bain& Co.)

In addition, the control over strategy, operation and manipulation is necessary. The core enterprise must notice the factors of supply chain to improve the ability of the supply chain to integrate resources. The manufacture and retailer must establish the platform of information sharing to ensure the smoothness of logistics and improve the quality of information transmission. The two core enterprises must have the ability of improving the control over the operation and manipulation to improve the competition of the whole supply chain.

Finally, effective coordination mechanism is significant for “dual core” enterprise supply chain. Coordination mechanism mainly includes interest coordination and operation coordination. The distribution of interests of manufactures and retailers, being the core enterprises, must be explicit and an effective pricing strategy should be established to ensure the effectiveness of coordination of interests. The effective coordination of manufactures and retailers can reduce the stock, cut the cost and improve the level of management and the efficiency of operation to improve the

whole performance of the supply chain. At the same time, the internal activities of manufactures and retailers must achieve a certain degree of coordination to ensure the operational efficiency of the whole supply chain.

### 53.4 Comments

The form of retailers and manufacturers as the core enterprise in supply chain is first summarized simply. Then, combined with previous studies, the mechanism of “dual core” enterprise supply chain is proposed. Meanwhile, the fact is pointed out that this form of supply chain is not suitable for all industries and only when manufacturers and retailers expands to a certain size, can such supply chain model emerge. Finally, factors of the shape of such supply chain model is explained from the information-sharing, a certain firm size, control of the core enterprise and co-ordination mechanisms. Combined with the previous researches, only the definition and factors of formation of “dual core” enterprise supply chain is pointed out in this article. The aspects of whether such new supply chain is suitable for all the manufactures and retailers, what the internal mechanism and the influence on information will be when such supply chain occurs and what theoretical bases are need to be research further.

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### References

1. Zhou Q, Zhu Y (2005) Evolution of the relationship between manufacturing and commerce in China: Analysis of total. *China Industry Economy* 8:578–589
2. Guo J (2008) The reason of China’s retail market buyer power. *Economist* 3:4578–4585
3. Wang F, Li X (2004) Position of retailers in supply chain evolution. *Business Economy* 6:5676–5683
4. Liu C (2007) Research on multi-retailer supply chain contract coordination problems. *Journal of Management Science* 4:1–5
5. Cao E, Lai M (2010) Requirement and costs at the same time disturbing when retailers supply chain coordination. *Theory and Practice of systems engineering* 10:1753–1761
6. Seyed R, Ali A, Taghi R (2009) Coordination mechanism for tow-level supply chain with one manufacturer and one buyer under credit period. *International Journal of Management Science and Engineering Management* 4:39–48
7. Tiao J, Dan Q (2009) Risk sharing and information revelation mechanism of a one-manufacturer and one-retailer supply chain facing an integrated competitor. *European Journal of Operational Research* 196:1076–1085
8. Zhong S, Si J (2008) Impacts of demand uncertainty on retailer’s dominance and manufacturer-retailer supply chain cooperation. *Science Direct* 36:697–714

9. Bourland KE, Powell SG, Pyke DF (1996) Exploiting timely demand information to reduce inventories. *European journal of Operational Research* 92:239–253
10. D'Amours S, Montreuil B, Lefrancois P et al (1999) Networked manufacturing: The impact of information sharing. *International Journal of Production Economics* 58:63–79
11. Lee H, Whang S (2000) Information sharing in a supply chain. *International Journal of Technology Management* 20:373–387
12. Yu Z, Yan H, Cheng T (2001) Benefit of information sharing with supply chain partnerships. *Industrial Management* 101:114–119
13. Seung-Jin R, Takahiro T, Hisashi O (2009) A study on evaluation of demand information-sharing methods in supply chain. *International Journal of Production Economics* 120:162–175
14. Hau L, Lee C (2009) Information sharing and order variability control under a generalized demand model. *Management Science* 10:781–798