

Research on Controlling Supply Chain Logistics Costs Based on Activity-Based Costing

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Abstract ABC is both accurate cost calculation methodology and an effective cost control system. With the increase of indirect expenses of supply chain logistics cost and the variety of logistics services, controlling supply chain logistics costs using ABC (Activity-Based Costing) has been getting more and more important and necessary. This study examines the meaning and composing of supply chain logistics costs, analyzes the basis of controlling supply chain logistics costs using ABC, and proposes a few measures to control supply chain logistics costs using ABC, such as activity elimination, activity selection, activity reduction and activity sharing and so on.

Key words Supply chain; Logistics costs; Control; ABC; Measures

1 Introduction

Japan and the U.S. had more in-depth research on control of enterprises' logistics costs based on supply chain. As early as 1970, Japan's Professor Cesar of Waseda University proposed the first part of enterprise's profit comes from sales increase of sales sector, the second part of enterprise's profit arises from the lower costs of production sector, and the third part of enterprise's profit derives from reduced costs of logistics sector. American scholar Chopra, Sunil and Peter Meindl (2007) thought that the characteristic of supply chain logistics is the equilibrium between the response capacity and profitability. Every strategy to improve response capacity will pay additional cost, thereby to reduce the level of profitability. So there are two types of supply chain competitive advantages: response advantage and cost advantage. Pohlen, Terrance L., and Bernard J. La Londe (1994) analyzed logistics activities need to focus on more accurate cost information, and explored the strengths and weaknesses of application of Activity-Based Costing in logistics activities.

From the global overall trend of supply chain logistics costs control, Japan, the United States, Canada and some developed Western European countries have effectively made the supply chain logistics costs lower level. Especially in Japan, besides the formation of a comprehensive logistics management system and operation processing, the logistics costs have been systematically monitored and controlled.

In China, Logistics started late, research on control of supply chain logistics costs is still in its infancy, and there is not specialized system. Chen Yaoting and Tian Jian (2009) divided the control approaches of supply chain logistics costs into two categories: ECR cost control and the techniques and methods of inventory management of supply chain, in which the techniques and methods of inventory management of supply chain were divided into the VMI-vendor managed inventory and the JMI-jointly managed inventory. Tian Zhaoyun (2006) proposed the strategy to explore the potential value of reverse logistics. Rong Rong, Xing Xiangqin (2004) put forward the optimization model of supply chain management of inventory and transportation based on the modern information technology 3PL which is to reduce supply chain inventory and transportation costs of enterprises through the application of information technology and outsourcing transportation and inventory to 3PL. Wang Ying, Sun Linyan, Chen Hong(2003) proposed the model based on the comprehensive evaluation of DEA / A HP law of two-stage logistics system and established the comprehensive evaluation indices system of logistics system composed of five indices of transportation, warehousing, inventory management, information level, enterprise's potential. Li Huilan explored the necessity of research on enterprises' logistics costs from the perspective of supply chain based on the analysis of the characteristics of logistics costs.

Activities are the basis of supply chain logistics cost control. Supply chain logistics is the aggregate of a series of activities to meet the ultimate customers' needs. The activity aggregation includes transportation activities, warehousing activities, packaging activities, loading and unloading activities, handling/carrying activities, circulation processing activities and distribution circulation processing. Besides, we need to manage logistics and process logistics information. The completion of every activity must consume some resources, and activity's output forms a certain value which transfers to the next activity, until to the final consumers. In order to control supply chain logistics costs, we must

increase the output of each activity, reduce activity cost. Therefore, the control of supply chain logistics cost must go deep into each activity.

Activity-Based costing (ABC) is a costing methodology that is designed to provide managers with cost information for strategic and other decisions that affect potential capacity. It is one kind to activity-based cost accounting system and cost management system. Using ABC, we can eliminate non-value-added activities, improve the efficiency of logistics management and control logistics costs through the analysis and evaluation of logistics activities.

One of the applicable conditions of ABC is that manufacturing costs account for a high proportion of the total cost of product; the other is the strong individuation requirement of production and service. And the prominent characteristic of modern logistics is the variety of logistics services and increasing proportion of indirect expense of total costs. So ABC is a good methodology to control supply chain logistics costs.

The purpose of this study is to explore a few control measures of logistics costs of industry supply chain using ABC, thereby to reduce supply chain logistics costs as well as the total costs of supply chain, to improve supply chain competitiveness.

2 The Meaning and Composing of Supply Chain Logistics Cost

Logistics system of industry supply chain is a complex, including suppliers, manufacturers, distributors, etc. The member enterprises of supply chain link closely by material flow, information flow, capital flow. Figure 1 reflects supply chain structure and supply chain logistics.

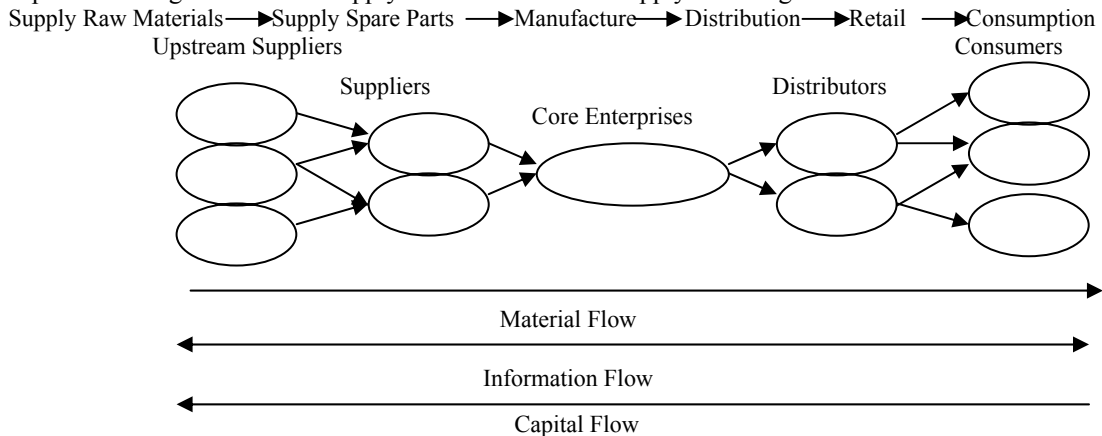


Figure 1 Supply Chain Logistics

Supply chain provides customers with products or services through transportation, warehousing, loading and unloading, carrying, distribution and other logistics activities. The forward activities service subsequent activities among logistics activities of supply chain, which forms activity chain from here to there, from the inside to outside. These activities will incur various costs in relation to logistics. Figure 2 describes clearly supply chain logistics costs.

Supply chain logistics costs refer to the direct and indirect economic consumption or expenditures related to logistics activities in the whole operation process of supply chain.

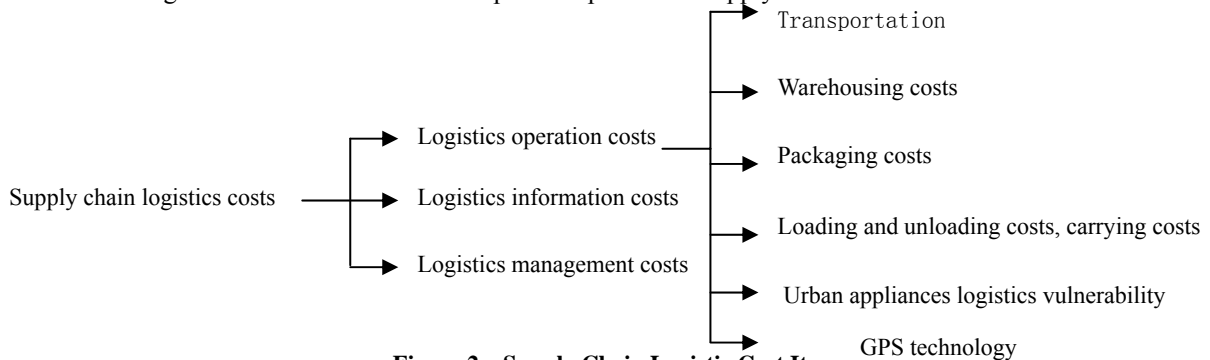


Figure 2 Supply Chain Logistic Cost Items

Supply chain logistics costs include logistics costs of suppliers, manufacturers and distributors and other member enterprises.

As figure 2 shows, supply chain logistics costs are composed of the costs caused by all functional elements of supply chain logistics which provide logistics services, including logistics operation costs, logistics information costs and logistics management costs. There into, logistics operation costs consist of transportation costs, warehousing costs, loading and unloading costs, handling/carrying costs, packaging costs, circulation processing costs and distribution costs.

Transportation costs are an important part of supply chain logistics costs. Transportation costs comprise variable cost, fixed cost, joint cost and public cost. Variable cost is the cost which is changed with the amount and distance of transportation, including power consumption of transportation tools in the transportation. Fixed cost is the cost not changed with the transportation, such as the construction cost of transportation routes. Joint cost refers to the cost which is shared by carriers and purchasers, such as the cost of empty return. Public cost is the expenditure paid to public sector.

Control of supply chain logistics costs should be deep into the activities, as far as possible to eliminate the ineffective or non-value-added activities, while improving the efficiency of effective or value-added activities.

3 The Basis of Controlling Supply Chain Logistics Cost Using ABC

3.1 Dividing supply chain logistics into logistics activities

The basic characteristic of ABC is that it takes activities as the center. ABC assigns costs to activities using resources drivers. So first step is to divide the entire supply chain logistics into different logistics activities, and process cost absorption.

Analysis and determining logistics activities needs to distinguish various stages of logistics services and activities, and to divide supply chain logistics into the basic understandable logistics activities one by one. logistics activities of supply chain can be divided into transportation activities, warehousing activities, packaging activities, loading and unloading activities, handling/carrying activities, circulation processing activities, distribution activities, logistics information processing, etc. during each stage of supply chain.

3.2 Identifying and confirming cost drivers of supply chain logistics

As one of ABC's core concept, the proper confirmation and use of cost drivers is of great significance. Whether confirmation of cost drivers is objective and reasonable or not is the key of effective implementation of ABC.

There are two cost drivers: resources drivers and activity drivers. The resources driver of supply chain logistics cost is the factor to determine the type and quantity of resources consumed by logistics activities, to reflect the causality between amount of logistics activities and the consumption of resources. The activity driver is the factor to determine the type and amount of logistics activities required by costing objective, to reflect the frequency and intensity of logistics activities used by costing objective.

3.3 Partitioning levels of supply chain logistics activities

The traditional cost system uses the simple number cost drivers, while ABC system analyzes costs with multiple activity drivers. Only activity cost levels are revealed, can the drivers of activities of different levels be pointed, and can causality be described more accurately so as to help managers understand the fundamental reasons for the logistics activities to improve activity performance and reduce logistics costs of supply chain.

4 Measures of Controlling Supply Chain Logistics Costs Using ABC

Figure 3 shows accounting framework of activity cost of supply chain logistics. The cost of each logistics activity of supply chain comprises direct expenses and indirect expenses. Direct expenses are recognized and accounted to the cost of a certain logistics operation, and indirect expenses need to be allocated into the cost of a certain logistics operation according to the amount of activities consumed by a certain logistics operation.

ABC is not only a cost calculation method, but also an effective measure of cost control.

Obviously, supply chain logistics costs depend on the amount of logistics activities because the activities need to consume resources. So the application of ABC in supply chain logistics requires to improve the logistics activities continuously so as to reduce logistics costs under the circumstances of supply chain management. There are the following main four measures to control supply chain logistics

costs:

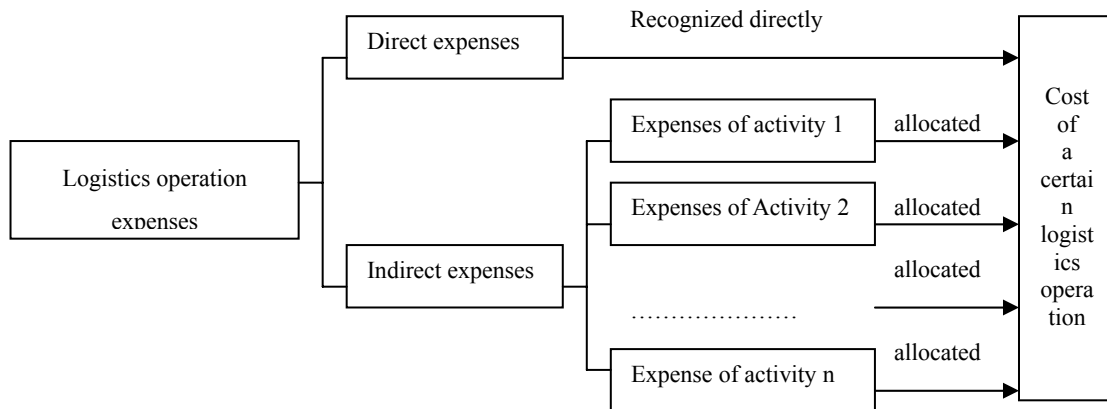


Figure 3 Accounting Framework of Activity Cost of Supply Chain Logistics Operations

4.1 Activity elimination

Activity elimination is to eliminate those inefficient and non-value-added logistics activities. We should firstly identify inefficient and non-value-added logistics activities of supply chain, and then take effective measures to eliminate them. For example, manufacturers often check the raw materials purchased from suppliers to ensure the product to be produced with high quality raw materials. But it is necessary only when suppliers' products quality is not good. If manufacturers select high-quality suppliers, check activities can be eliminated to reduce the total logistics costs.

4.2 Activity selection

It is to select the best activities (chain) from a number of different logistics activities (chain). Different strategies will have different logistics activities, for instance, different product distribution strategy will result in different logistics activities, while activities will inevitably bring costs, so different strategies of product distribution will lead to different costs. Therefore, we should select the logistics activity chains with the lowest cost without lowering the level of services based on comprehensive consideration of various conditions.

4.3 Activity reduction

Activity reduction is to reduce the time and resources spent by logistics operations to improve efficiency of the value-added activities or to eliminate inefficient and non-value-added activities in the short term. Take an example, the preparative times and associated costs can be reduced by improving machine preparative activities by changing the activity mode.

4.4 Activity sharing

The meaning of activity sharing is to improve the efficiency of value-added logistics activities, i.e., to increase input-output ratio of logistics activities by scale economy, which thereby reduces the allocation rate of activity drivers and the logistics costs. For example, when designing new products, supply chain should try its best to use the existing product distribution channels while designing distribution channels, which can reduce logistics activities in relation to new products, thereby to reduce logistics costs of supply chain.

5 Conclusion

Supply chain management not only affects their own performance, but also affects the logistics costs of other member enterprises of the supply chain. The lack of logistics cost control of the upstream suppliers often leads to high costs of themselves and the downstream enterprises and end-users. Meantime, the unilateral control of logistics costs of one node enterprise of supply chain or within enterprises can not control and reduce supply chain logistics costs. ABC is an effective method to control and reduce logistics costs by strengthening the strategic cooperation and collaborative management among member enterprises of supply chain. But Supply chain logistics costs control involves many factors, and accurate and complete cost information is important and necessary.

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