Study on Logistics Cost Control Based on Activity-based Costing

Rui Zhang and Hehua Li

ABSTRACT

With the rapid development of the global economy and the strengthening of enterprises' internal management, the importance of logistics cost management is becoming more and more prominent, and people pay more and more attention on the logistics cost of enterprises, how to reduce logistics cost effectively has been a hot topic. Experts come from all over the globe actively introduce ABC into enterprise logistics cost accounting management and achieve results. On the basis of logistics cost, this paper begins with the analysis of enterprise logistics costs and account cost through the activity-based costing, it is of great economic and practical significance to combine cost management with logistics management.¹

KEYWORDS

Logistics cost; Accounting; Activity-based costing; Cost analysis

INTRODUCTION

Since the twenty-first Century, the competition among the manufacturing enterprises is becoming more and more fierce, and almost no profit in the cost of controllable production field. Therefore, the enterprise leadership will turn to the third source of profit, that is, the management and control of the logistics cost. This paper applies the activity-based costing in the management of enterprise logistics cost accounting, analyzes and studies the calculation of logistics cost operation,

¹Rui Zhang, Hehua Li, Shanghai Second Polytechnic University, Shanghai, China
reflects the logistics consumption situation of the enterprise from the basic operation, finds out the relationship between the total logistics cost and the influencing factors, and calculates the logistics operation cost more accurately, so as to effectively carries out the logistics cost control and provides a useful tool for the logistics cost management.

DEVELOPMENT OF ABC

Now, the logistics cost accounting system is more mature in some countries with rapid logistics development, such as the United States, Japan and other developed countries, which have made significant achievements in the research of logistics costs, and there are many points worthy of learning.

In 1998, La Ronde et al. obtained the use of ABC method in American logistics companies from 1993 to 1998 according to the questionnaire method. After a systematic analysis of the data, it is found that about 18% of American logistics enterprises’ daily cost accounting used ABC method, of which 13% enterprises have used ABC method for more than five years, and the use of ABC has been quite popular in the United States[1]. By the middle of the 20th century, Griful Miquela Carleshad first tried to use ABC in the third-party logistics companies to conduct cost accounting[2].

Wei Wu (2006) analyzed the existing problems in the current manufacturing cost accounting method, the paper has expounded the importance of homework cost method’s implementation, and established the applications of ABC and cost calculation model, put forward the operation cost should be carried out in accordance with the cost drivers, and how to allocate the cost between products and finished products[3]. Fengpin Shen, YuhuaHuang (2008) based on the characteristics of the current logistics cost and the basic principle of ABC, put forward the necessary and effectiveness of the implementation of ABC in China's logistics enterprises. At the same time, they designed a complete set of procedures of ABC[4]. Ruiqing Shao (2011) studied the use of ABC in the third party logistics, and designed the content and format of the accounting documents, accounting subjects, records and so on in the implementation of the activity-based costing, and demonstrated the process of accounting statements. In addition, the detailed implementation steps of Activity-Based Costing in the third party logistics enterprises are analyzed in the actual case, and the conditions for ABC implementation are put forward[5].

The significance of studying the logistics cost is shown as: (1) The reduction of logistics cost can enhance the profit space of the enterprise and increase the profit of the enterprise. (2) Reducing the logistics cost can enhance the advantage of the price, improve the competitiveness of enterprises in the market, increase the sales of products, and bring more benefits to the enterprises. (3) The reduction of social logistics costs will improve the efficiency of social logistics and enhance
the international competitive advantage. (4) Logistics costs have a great impact on
the price of products. The lower average cost of logistics can reduce the price,
which is conducive to maintaining the stability of prices and maintaining the
purchasing power of the people.

This paper uses ABC method to price the product, and compares ABC with
traditional costing method to find out how to reduce the operating cost effectively.
In terms of logistics service, the logistics cost accounting and management
method of ABC is used to analyze and study the logistics and its cost.

ANALYSIS OF LOGISTICS COST

Logistics cost refers to the cost required by the physical and intangible
material resources from the suppliers to the needs. The logistics costs are mainly
divided into transportation costs, storage costs, circulation and processing cost,
loading and unloading and handling costs, distribution costs, packaging costs and
handling costs[6]. involving:

1. Labor costs, including related staff salaries, bonuses and various subsidies.
2. Material loss in logistics activities, such as repair fee, fuel cost,
depreciation of machine and equipment, etc.
3. Reasonable loss of goods during loading and unloading.
4. Management expenses in logistics activities, such as travel expenses and
office expenses.

Logistics activities mainly include seven links: transportation, storage, loading
and unloading, handling, distribution, packaging, processing and after-sales
information services. Logistics services provide intangible products, which
greatly increase the difficulty of logistics cost management and control.

ANALYSIS OF ABC

The Theory of ABC Method

The activity-based costing is referred to the ABC method, which includes the
following five elements: resource, operation, cost object, resource driver and
operation motivation. It is produced as follows: the enterprise production will
produce activities, activities will consume cost resources, and finally, the product
consumes activities, that is, all kinds of resource costs are assigned to each job,
then the homework costs are allocated to the final product or service[7]. With
homework as the link, the cost information and non-financial information can be
well combined, that is, the cost is allocated according to the operation, and the
cost is analyzed and managed according to the operation.
Figure 1 shows the connection between the various elements in this method, assigns the cost of resources consumed to the job center according to the resource driver, and assigns the activity-based cost to the final product according to the activity-based driver.

**Basic Implementation Steps of ABC**

Through the above analysis of ABC theory and its feasibility, it proves the necessity of ABC implementation in enterprise. Generally speaking, figure 2 shows the basic steps of ABC.
APPLICATION OF ABC IN Z COMPANY

Company’s Background

Z logistics co., LTD., was founded in 2003, the company covers multiple services, such as express, LCL, LTL, etc., to meet the needs of customers to innovate, and invest more than 500 million in the new equipment, such as temperature control car, integrated operation warehouse and so on. At present, Z company adopts the traditional accounting method, distributes the cost of the enterprise according to a single quantity standard, and does not assign the cost consumption to the corresponding activity. The daily expenses of the company are all included in the period fee and deducted directly from the profit, so the cost cannot be accurately reflected from the cost that has been calculated. The cost cannot be controlled more effectively. Now activity-based costing is used to help enterprises to carry out cost control better.

Application of ABC in Product Pricing

Last year, Z won two contracts. The plan is to ship 58 production machines from hunan to Beijing in early June. One contract is to ship four machines to the
company's rented warehouse in Beijing every other day, and then deliver the machines to customers every three days. Another contract is to ship seven devices to the Beijing warehouse every three days and then to the customer every seven days. The transporter has two floors, three machines for each layer, and two drivers for each car.

ANALYZE AND DETERMINE RESOURCES

The total expenses in contract period is estimated to include $29,000 for labor, $18,750 for materials, $21,800 for depreciation, and $5,000 for rental housing. For the convenience of calculation, all expenses are charged into the period.

CONFIRM THE ACTIVITY AND SET UP THE ABC POOL

The two contracts include transportation, warehousing, storage, delivery, distribution and other logistics operations. Because the number of assignments is small, each job can be a separate pool.

IDENTIFY THE MOTIVATION AND ALLOCATE THE CONSUMED RESOURCES

The resource allocation driver of artificial cost is the number of staff, the resource motivation of material cost is the amount of material consumed, the motivation of the warehouse resource is the area of the rented warehouse, and the resource driver of the depreciation fee is the book price of the machines and equipment. Transportation: the direct labor cost is 16,500 yuan, and the direct material fee is 18480 yuan, and the depreciation costs 9,000 yuan. Warehouse: the direct labor costs 4500 yuan, rental fee is 5000 yuan; Loading and unloading: the direct labor cost is 2500 yuan, the direct material fee is 1730 yuan, the depreciation cost 3600 yuan; Warehouse work: 1800 yuan; Distribution operation: the direct labor cost is 5,500 yuan, the direct material fee is 540 yuan, the depreciation costs 8,200 yuan.

CALCULATE THE MOTIVATION OF ABC

Based on the calculation of ABC, it is found that the operation motivation is the number of transportation, the quantity of distribution, the storage area and the number of times of loading and unloading. The number of transportation is 18 and 10 times respectively, and the number of unloading is 60. The warehouse area is 600 square meters, the second is 1200 square meters, and the goods is delivered 60 times. The distribution rate of transportation = (16500+18480+9000) ÷(18+10) =1570; The distribution rate of warehouse= (2500+1730+3600)÷ 2÷ (60+60) =32.
The distribution rate of storage = \( \frac{4500+5000}{600+1200} = 5 \); The rate of distribution = \( \frac{5500+540+8200}{60+60} = 118 \).

CALCULATE THE ACTUAL CONSUMPTION RESOURCES OF THE PRODUCT

The calculation process is as follows:

<table>
<thead>
<tr>
<th>Project</th>
<th>cost-driver rate</th>
<th>Motivation a</th>
<th>Motivation b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>reason number</td>
<td>Amount of distribution</td>
<td>reason number</td>
</tr>
<tr>
<td>Transportation</td>
<td>1570</td>
<td>18</td>
<td>28260</td>
</tr>
<tr>
<td>Warehouse</td>
<td>32</td>
<td>60</td>
<td>1920</td>
</tr>
<tr>
<td>Storage</td>
<td>5</td>
<td>600</td>
<td>3000</td>
</tr>
<tr>
<td>Unload</td>
<td>32</td>
<td>60</td>
<td>1920</td>
</tr>
<tr>
<td>Distribution</td>
<td>118</td>
<td>60</td>
<td>7080</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>42180</td>
<td>32620</td>
</tr>
<tr>
<td>Quantity</td>
<td></td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>unit activity cost</td>
<td></td>
<td>703</td>
<td>543.67</td>
</tr>
</tbody>
</table>

As can be seen from the above table, the A contract’s total cost of contract operation and unit operation cost are obviously higher than that of B contract. Through the research and analysis, it is found that although both of them provide similar logistics services, there is a great difference in the number of transportation and distribution frequency, which causes the cost of logistics is different. Using the ABC method, we can get the following results: (1) the contract B distributes every two days, transportation frequency is less than half of contract A, but the transportation cost of contract B is only half of A, (2) although the storage expense of A is half of B, but because the warehouse expense is very small, expense of A contract cannot offset the increased cost because of many times transportation. According to the traditional accounting method: 5000 yuan warehouse rent, 21,800 yuan depreciation charge, 18750 yuan material fee, 29,000 yuan labor cost.

Indirect costs: 29000+18750+21800+5000 = 74550 (yuan)
Indirect cost allocation rate: \( \frac{74550}{120} = 621.25 \) (yuan per unit)
The activity cost of contract A and B: \(621.25 \times 60 = 37275\) (yuan)
The unit activity cost of contract A and B: \(37275 \div 60 = 621.25\) (yuan per unit)

According to the traditional method, the logistics cost of contract A and B is about 672.64 yuan per unit. By using the ABC method, the contract A can gain 37.74\% profit, and the contract B has a loss. In general, the customer purchases the same quantity of goods, the product service cost reflects the procurement cost information. When using activity-based costing, the service cost of contract A and B will change with the service mode and other reasons, and more accurately reflect the cost information.

**CONCLUSIONS**

Through the research and analysis of Z logistics company, this paper discusses the current management and control solutions in most logistics enterprises, and puts forward the active role of ABC method in pricing, we can get a result:
① Compared with the previous accounting methods, the ABC method is a new cost accounting method, which expands the scope of cost accounting based on the original accounting system. The new method obtains the total cost by collecting and calculating the individual operating cost, which includes the period expense that the traditional method has not been calculated, making the cost calculation more accurate.
② Using the ABC method for accounting and management, it is required that the operation has the characteristics of more batch, low output, large indirect cost ratio and personalized production service, and the service provided by the logistics enterprises is coincided with these characteristics.
③ From the current development trend, ABC has become the mainstream, but at present, the application of ABC in China's logistics industry is not as mature as foreign countries. Logistics enterprises should be able to effectively promote the ABC according to the actual situation, and make reasonable and effective use of the ABC to deal with cost-effective analysis.

**ACKNOWLEDGEMENT**

This research was financially supported by the foundation of Subject of Management Science and Engineering (XXKPY1606) of Shanghai Polytechnic University.

**REFERENCES**