Research on Activity-Based Costing Management of Unmanned Supermarket -- Taking Auchan One-Minute as an Example

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Abstract: As an important attempt of new retail, the technology costs and operation costs of unmanned supermarket are higher than expected, which bring severe challenges to its development. Based on the analysis of the types of unmanned supermarkets, this paper takes Auchan One-Minute unmanned supermarket as an example to discuss the problems in the cost management and analyze its cost composition. On this basis, the corresponding activity-based costing system is designed, and the activity-based costing is used to calculate the indirect expenses. This paper points out reasons of indirect cost distortion through trial calculation, and gives the corresponding suggestions of the cost management.

1. Introduction

With the rapid development of Internet and intelligent technology, unmanned supermarkets can not only bring more shopping experience to consumers, but also need to attract customers with low-cost and high-quality goods. However, the cost of technology and operation is higher than expected, which brings a serious challenge to the unmanned supermarket. The outbreak of the new coronavirus in 2020 has created a demand for contactless products, which has led to a resurgence of interest in unmanned retailing. It is urgent for unmanned supermarkets to seize market opportunities, strengthen cost management and give full play to their advantages in the fierce market competition.

The research on unmanned supermarket in the world mainly includes:

(1) The development of unmanned supermarkets. Li Songlin (2017) believes unmanned supermarkets can save space and staff. Moreover, unmanned supermarkets have lower requirements on inventory than traditional supermarkets, and can realize accurate marketing and optimize shopping experience through big data analysis. As smart technology matures, unmanned supermarkets are likely to grow over the next five years. Lee Seong Hoon and Lee Dong Woo (2018) note that unmanned supermarkets in the U.S. and China are playing a leading role in terms of technology and market potential, and will continue to grow in the context of rising labor costs. Lee Eun Joo and Kim Seung In (2019), based on a case study of unmanned supermarkets In China and the United States, put forward that unmanned supermarkets should improve the shopping experience from the following aspects: easy to understand operation process, easy to find products and flexible and reliable process. Wang Zhen (2019) believes that unmanned retailing has significant advantages in reducing labor costs and improving the efficiency of payment and logistics. Zheng Yujing and Park Zhe (2020) consider that the ease of use, spatial arrangement and functional impact of in-store technology in unmanned supermarkets has a positive impact on customer engagement.

(2) Cost management of unmanned supermarkets. Xu Hong and Liu Nannan et Al. (2018) proposed that the most important thing in the development of new retail enterprises is the control of operating costs. They advocate the transformation of physical retailing into new retailing through cost control. Pang Biao (2018) believes that unmanned supermarkets have gone from a battle over

quantity to a battle over quality. The Enterprise needs to realize the profit gradually through the fine management. Chen Yao and Li Yashu et Al. (2019) believe that unmanned supermarkets should strengthen cost management to enhance market competitiveness at this stage. Ding Xiulin (2019) believes that the factors that hinder the promotion of unmanned retail are the depreciation and operating costs of smart devices. Cao Dongming (2019) believes that the cost of unmanned retail technology is higher and the gross profit rate is lower. The key to unmanned supermarkets' survival is cost control. Many studies confirm the positive significance of unmanned supermarket in promoting the development of new retail, and the importance of unmanned supermarket cost management. However, the operating cost of unmanned supermarket is lack of in-depth study, not using activity-based costing to accurate accounting.

Therefore, this paper selects Auchan supermarket as the research object, analyses the current situation of Auchan one-minute unmanned supermarket cost management, and discusses the application of activity-based costing. Finally, the author puts forward some suggestions on cost management to promote the healthy and sustainable development of unmanned supermarkets.

2. Analysis on the Cost Management Problems of Auchan One-Minute Unmanned Supermarket

2.1. The Cost Management Consciousness is Weak, and the Responsibility Center Division is Not Clear

Auchan one-minute unmanned supermarket is a typical glass-framed unmanned supermarket using RFID technology, with semi-open shelves. Auchan one-minute unmanned supermarkets are located within a 3 km radius of each of Auchan traditional supermarkets, integrating purchasing and warehousing into the traditional supermarkets. The routine maintenance work of the unmanned supermarket can be completed when the workers are free from the traditional supermarket. Because the traditional supermarket takes full advantage of large-scale purchase, flexible commodity combination and quick replenishment, the unmanned supermarket does not need to face the stock pressure. Moreover, the passenger flow of the traditional supermarket can be the drainage of the unmanned supermarket, which makes the traditional supermarket and unmanned supermarket form a benign complement. The rapid expansion of stores has been accompanied by overly optimistic cost estimates and a lack of awareness of cost management. Managers tend to focus on the introduction of smart devices, the drainage of publicity reports, etc., the cost management of unmanned supermarket is neglected. The Division of Labor of the management team that did not adapt to the new style of business was not clear enough, and the responsibility center did not give full play to its role.

2.2. The Cost Management Method is Traditional, and Not Helpful for Decision-Making

In the cost management method of unmanned supermarket, the traditional cost management method of traditional supermarket is mostly followed. In calculating the cost of profit, commodity costs, sales revenue directly to the total and calculate the gross profit. The operating cost is deducted from the gross profit to calculate the net profit after it is listed according to the nature of repair fee, water and electricity fee, etc. Although the mode of operation has changed greatly with the development of technology and the cost structure has also changed, the method of cost management has not kept pace with the development of technology. This leads to poor cost control ability of unmanned supermarkets, such as operating costs are not allocated to all types of goods, leading to inaccurate cost accounting results. During operation of unmanned supermarkets, the prices of some unmanned supermarkets are higher than those of traditional supermarkets because of improper cost management methods, unscientific distribution of indirect expenses and unreasonable formulation of target costs, it's hard to attract customers. Faced with the cost constitution and operation process which are quite different from the traditional supermarket, the traditional cost management method cannot adapt to the actual situation of the unmanned supermarket and reflect the cost constitution condition of the unmanned supermarket reasonably. It cannot help the

management decision-making of unmanned supermarket to provide precise cost information and improve efficiency.

2.3. The Cost Structure Changes Greatly, and the Overheads Distribution is Unreasonable

Auchan one-minute unmanned supermarket saves the direct labor cost while facing the high overhead cost. Although unmanned supermarket has got rid of the disadvantages of the traditional supermarket, such as high inventory and high labor cost, it needs artificial intelligence and big data to realize the normal operation of unmanned supermarket. The high cost of acquisition and maintenance and upgrade results in a large proportion of indirect costs in the cost structure, which urgently needs more scientific cost accounting. In addition, unmanned supermarkets sell a wide range of goods, different goods daily shelf maintenance, information input and other work consumed by the time difference. The traditional cost method uses a single variable, such as man-hour and overhead charge in the distribution of shelf space, which will distort the cost information, and the larger the proportion of overhead cost, the more serious the cost information distortion, the final impact of sales area division, cost allocation, commodity strategy and other decision-making.

3. Application of Activity-Based Cost Management in Auchan One-Minute Unmanned Supermarket

3.1. Design of Activity-Based Costing System for Auchan One-Minute Unmanned Supermarket

Divide the operation center and determine the overheads. After on-the-spot investigation, we know that the development of intelligent technology has simplified the work flow of sales and saved a lot of manpower. Therefore, the operation activities of Auchan one-minute unmanned supermarket are divided into 3 operation centers around the core links, and the indirect costs classified into the operation centers are confirmed, as shown in Table 1.

Table 1. Analysis of Resource Consumption in Activity-Based Costing Database

Operation Center	Indirect Cost
Commodity Center	Staff Salaries, electricity fee, low-value consumables, office expenses, Information Consumables
Information Control Center	Electricity fee, low-value consumables, office expenses, information consumables, maintenance cost, depreciation cost
Logistics Center	Staff salaries, electricity, low-value consumables, office expenses, information consumables, maintenance expenses, depreciation expenses

Determine the cost driver for the corresponding activity center. The cost drivers and corresponding units of measurement for each activity center are determined according to the correlation between cost drivers and resource consumption in Auchan one-minute unmanned supermarket operation, as shown in Table 2.

Table 2. Division of Activity Center and Cost Driver

Activity Center	Activity Content	Cost Driver	Measuring Unit
Commodity Center	Commodity purchase, distribution, shelving	Number of incoming shipments	Pieces
Information Control Center	Commodity information input, price adjustment, order summary, replenishment notice	Information processing frequency	Number of times
Logistics Center	Auchan One-minute unmanned supermarket routine maintenance, shelf cleaning, service consulting	Working hours	Hours

3.2. A Trial Calculation of Operating Cost of Overheads in Auchan One-Minute Unmanned Supermarket

This case study uses the operating data of a one-minute unmanned supermarket in a third-tier

city in September 2020, and conducts an activity-based cost trial calculation on the operating costs and indirect expenses of the one-minute unmanned supermarket in Auchan, and with the traditional cost accounting method for comparative analysis. 1. Activity-based cost aggregation of overheads in unmanned supermarkets. A great deal of information processing and order settlement of unmanned supermarket are accomplished by intelligent equipment, which mainly involves the consumption of corresponding electricity and equipment depreciation. Only purchase, goods on the shelves and shelf cleaning, after-sales service and other links need part of the Labor. According to the specific object of resource consumption, assign the cost to each corresponding activity center, and compile the table of activity cost aggregation of overhead, as shown in Table 3.

Table 3. Table of Activity-Based Cost Aggregation of Overhead

Activity Center	Total Activity	Activity Cost (Yuan)							
		Wages	Electricity	Low-value consumables	Office expenses	Information consumables	Maintenance	Depreciation	Total
Commodity Center	1530	670	48	20	15	20			773
Information Control Center	487		118	30	45	75	120	150	538
Logistics Center	75	1180	320	20	15	25	230	1650	3440
Total		1850	486	70	75	120	350	1800	4751

Activity-based cost allocation of overhead in unmanned supermarkets. The distribution rate of activity-driven is calculated by selecting activity-driven (number of incoming shipments, frequency of information processing and working time) and calculating the total activity cost. The total activity cost of each activity center is distributed according to the distribution rate and the activity amount. The activity cost of snack, beverage and department store is calculated in Table 4.

Table 4. Activity-Based Cost Distribution of Overhead

Activity Center	Total Operating Cost	Total Activity	Distribution rate	Snack Sales Area		Beverage Sales Area		Department Store Sales Area	
				Volume of Work,	Cost	Volume of work,	Cost	Volume of Work,	Cost
Commodity Center	773	1530	0.51	475.00	239.98	776.00	392.06	279.00	140.96
Information Control Center	538	487	1.10	134.00	148.03	277.00	306.01	76.00	83.96
Logistics Center	3440	75	45.87	30.00	1376.00	40.00	1834.67	5.00	229.33
Total	4751				1764.02		2532.73		454.25

4. Suggestions on Cost Management of Auchan One-Minute Unmanned Supermarket

4.1. Strengthen the Sense of Cost Management, Clear Responsibility Center Division

Auchan one-minute supermarket is developing rapidly, and the awareness of cost management should be further strengthened while the market of sub-retail is occupied. Auchan one minute should improve the traditional cost accounting and management methods, actively promote the application of activity-based costing. Make full use of the existing technological advantages of unmanned supermarkets, the cost of each link in the operation of the in-depth analysis. In accordance with the dynamic market environment, scientific and reasonable allocation of indirect costs to help enterprises to make decisions with accurate cost driver information. The responsibility of cost control will be more scientific to the corresponding specific departments and personnel, compaction of post responsibilities.

4.2. Use Activity-Based Costing Method, Give Full Play to the Advantages of Intelligent Technology

Auchan one-minute unmanned supermarket usually only covers an area of more than ten or dozens of square meters, the limited storefront needs to be fully utilized and scientifically divided into sales areas. These all rely on the refinement of the activity-based costing. The application of activity-based costing (ABC) to indirect cost allocation can provide more accurate and scientific cost information to help unmanned supermarkets to make rational use of storefronts. Through the trial calculation of this paper, it also shows that the operating cost management process of unmanned supermarket is simple and easy to understand, and has strong practicability. The application of activity-based costing (ABC) can also combine the cost and gross profit data to calculate the profit space of commodities, and help unmanned supermarkets to make a reasonable competitive strategy and gain more advantages in price competition. At the same time, Auchan one-minute unmanned supermarket could use enterprise informatization as an opportunity for information sharing. As a technology-intensive enterprise, unmanned supermarket should make full use of big data system to build enterprise information sharing platform. Achieve the finance department and other departments of the effective docking, reduce the information gap between departments. Provide more accurate and efficient data information for management accounting. In order to ensure the effective operation of the information sharing platform, we should plan the operation and finance in advance, and set up the perfect record, interaction and supervision system.

5. Conclusion

Under the operating characteristics of Auchan one-minute unmanned supermarket, the key point of its cost control is the operating cost, especially the indirect cost. According to the result of trial calculation, because the packaging volume of snacks such as potato chips is large and the shelf space is large, the cost is too high in the traditional cost method. The cost of the drinks section is underestimated due to its small footprint. And in the survey, we can see that there are many kinds of commodities in the department store area, and the consumption of working hours on and off shelves is large. Therefore, we can consider increasing the retail area, reducing the beverage area, and simplifying the merchandise structure of the department store. According to the analysis results of the case supermarket, the activity-based costing can help to further optimize the sales area allocation and formulate strategies.

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