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Logistics Cost Control of Tobacco Enterprises Based on Lean Management

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Abstract

Based on the theory and method of lean management, this paper studies the logistics cost control measures of tobacco enterprises. Firstly, it expounds the content of lean logistics management, and proposes to take "refined process" as the key and realize process reengineering to reduce logistics cost as the goal. Secondly, through a comprehensive study of the data, the composition structure of tobacco logistics cost unit is analyzed, and the input quantity of each tobacco logistics operation unit is found out by establishing a cost control model, so as to find the key points of tobacco logistics cost control. Finally, this paper puts forward the idea of "improving service, improving efficiency and reducing cost" to promote the development of tobacco lean logistics with high quality.

Key words: Tobacco Enterprise; Logistics Management; Lean Logistics

INTRODUCTION

In recent years, the tobacco industry has strengthened the construction of basic management, target management, benchmarking management and other management work, and has also achieved obvious results in the system construction, the establishment of excellent factories and information promotion. And the management level of the entire tobacco industry has been greatly improved. But compared with other advanced level industry enterprise management, tobacco enterprise management still has many deficiencies, the modernization construction time of the tobacco enterprise management is short, and the overall management foundation is still very weak. Especially for the logistics management of tobacco enterprises, on the one hand, due to the short development time, logistics management is still mostly the traditional extensive management mode. On the other hand, the characteristics of urban and rural tobacco distribution are small batch and many batches, and the delivery points are very scattered, which lead to a series of problems such as serious waste of resources, long distribution cycle and low efficiency, poor coordination and poor communication. The logistics management level of tobacco enterprises needs to be improved urgently. To carry out tobacco lean logistics, it is to achieve maximum output with minimum input, provide satisfactory service for users, and show the final results in economic benefits. According to this background, this paper promotes the development of tobacco industry by strengthening logistics construction.

BACKGROUND

As the external environment is changing faster and faster, tobacco consumption is becoming more rational, the conspicuous consumption nature of tobacco is no longer significant, and tobacco products begin to show more general commodity properties. At the same time, there are certain objective obstacles to the expansion of consumption capacity and the improvement of structure of the tobacco industry. Therefore, it is necessary to change the thinking from "open source" to "throttling" in order to pursue the sustainable development of the industry. For the development of the tobacco industry in the future will no longer remain on paper and slogans by reducing cost, saving consumption and improving efficiency, but which will actually be implemented and

guaranteed through the construction of "system, mechanism and system". Based on the above industry situation, the reform and development of tobacco industry must rely on the theory of logistics reform (Tan et al., 2021). On the one hand, it is necessary to build green and energy-saving tobacco logistics and continuously eliminate all kinds of waste in all links of tobacco supply chain logistics (Shen et al.,2022). On the other hand, on the basis of the solid existing operating system and logistics system, the marketing of tobacco should further tap the development potential, realize the efficient integration and optimal allocation of logistics resources within the maximum extent possible, enhance the mobility of logistics elements, and improve the overall utilization efficiency of logistics resources in this industry. Tobacco logistics has been transformed from enterprise logistics to logistics enterprises and from cost center to profit center (Jian & Lu, 2021). China National Tobacco Corporation takes industrial logistics as its "core business" and builds a "big logistics" system, which can not only force provincial and municipal tobacco enterprises to lean logistics, but also integrate and allocate logistics resources of the whole industry at the overall level (Chen et al., 2021). It can not only save costs and reduce consumption in the whole industry, but also show the "vertical management" of the tobacco industry.

Tobacco commercial logistics refers to the spatial transfer process of cigarettes from tobacco production enterprises to retailers and end consumers. The main logistics links include procurement, warehousing and storage, sorting and settlement, as well as delivery and transportation (Danielis et al., 2005). The development of tobacco commercial logistics is still relatively short, and the current management mode is still simple and rough (Ding & Zhu, 2010). The defects and deficiencies of tobacco logistics management are covered up by good performance and not paid attention to. In order to improve the logistics management level of tobacco enterprises, reducing logistics costs is the first problem to be solved (Liu, 2011). The idea of lean logistics management is agility, just-in-time production, eliminating all kinds of waste, such as the waste of resources, operation delay, equipment and machinery idle, personnel surplus, etc. Lean logistics aims to reduce unnecessary activities by simplifying, optimizing activities and adjusting activity sequence, so as to reduce waste and improve efficiency (Wronka, 2016). The corresponding schemes are selected to improve the operation of each process and activity based on the analysis of various logistics processes and activities, and the connection among each process and activity is strengthened, so as to enhance the overall benefit (Alvim & Oliveira, 2020). The fundamental goal of lean logistics is to provide the best service to customers at the lowest cost and maximize the value of service to customers so as to maximize the profits of enterprises. Therefore, it is an inevitable choice for tobacco enterprises to reduce costs and improve benefits by implementing lean logistics management (Tripathi et al., 2021). In a word, lean logistics management conforms to the current development trend of logistics management, which can be used as a new idea for the development of tobacco enterprises' logistics management. Improve the hardware and software level of logistics management, strengthen the systematization, standardization and process of tobacco logistics, and set up a lean logistics work system of "fine service, fine process, precise operation, precise accounting and fine management", so as to reduce costs and improve service level (Rahamneh et al., 2023). It is a necessary consideration to change the development mode to promote the lean management of tobacco logistics, and it is a necessary way to improve the management level of enterprises, and it is an inevitable choice to tap the development potential of enterprises (Ciliberto, et al., 2021).

Logistics control plays a vital role in the development of enterprises, which can reduce the logistics costs of enterprises, indirectly create economic benefits, and create a set of systematic and scientific logistics cost control system for enterprises and feasible practical measures combined with the actual situation of enterprises. At present, the tobacco enterprise management mode is relatively old, and the time of the modern management mode is not long, especially the logistics cost control this aspect. It is easy for people to only see

the huge profit figures, while ignoring a considerable part of logistics costs that can be optimized, so tobacco enterprises often do not pay attention to the logistics cost control. High logistics costs not only hinder the progress of cigarette sales, but also directly hinder the improvement of tobacco logistics management level, and indirectly affect the healthy and sustainable development of the entire tobacco enterprise.

MODELING

The cost control is needed for tobacco logistics project composed of multiple operation units. The paper has the hypothesis 1: There are n tobacco logistics operating units, and Q_i represents the input quantity of the ith tobacco logistics operating unit.

$$Q_i > 0，\ i=1,2,\ldots,n \tag{1}$$

The hypothesis 2: the total utility of n tobacco operation units is:

$$T(w_1,w_2,\ldots,w_n；\ Q_1,Q_2,\ldots,Q_n) = \sum_1^n W_i t(Q_i) \tag{2}$$

Where, $t(Q_{j)}$ represents the utility generated by the logistics operation of tobacco i. W_i is exogenous determination, which represents the weight of the utility generated by the ith tobacco logistics operating unit. That is, the evaluation of a certain tobacco logistics operating unit.

$$w_i > 0，\ \sum_1^n W_i = 1 \tag{3}$$

The hypothesis 3: The total operation utility function of the tobacco logistics is concave function, namely the marginal utility brought by the ith tobacco logistics operation unit.

$$\begin{cases} \frac{\partial T}{\partial x_i} = W_i \frac{\partial t}{\partial x_i} > 0 \\ \frac{\partial^2 T}{\partial x^2{}_i} = W_i \frac{\partial^2 T}{\partial x^2{}_i} < 0 \end{cases} \tag{4}$$

Under the above assumptions, the goal of tobacco logistics optimization is to rationally allocate economic resources and maximize the utility of tobacco logistics operations under the constraints of economic resources, such as time and cost. The mathematical expression is:

$$\begin{cases} \max\limits_{x_i} T(w1, w2, \ldots, wn；\ Q1, Q2, \ldots, Qn) \\ \text{s.t.} \qquad \sum_1^n x_i = E \end{cases} \tag{5}$$

Where, E represents the given amount of economic resources, Lagrange Function is constructed to solve the above optimization problem:

$$Y= T(w_1,w_2,\ldots,w_n；\ Q_1,Q_2,\ldots,Q_n) +\lambda(E-\sum_1^n x_i) \tag{6}$$

The first-order condition of the extreme value is:

$$\frac{\partial T}{\partial x_i} W_i - \lambda = 0 \tag{7}$$

The optimal input quantity is obtained from Q_i and λ of various tobacco logistics units. According to the above calculation formula, it can be concluded that there is a reverse relationship between the marginal utility of tobacco logistics operation unit and the evaluation of a certain operation unit. There is a positive relationship between the optimal input amount of an operation unit and the corresponding evaluation of the operation unit, which is the higher the evaluation of a certain tobacco logistics operation unit, and the more economic resources the corresponding input.

Assume that there are only two types of work units. The total utility function of tobacco logistics operation, $\partial T / \partial x_i$ as reduction function, there is a positive relationship evaluation between the optimal number of tobacco logistics operation unit and the corresponding operation unit, which means that it is the higher evaluation to some kind of tobacco logistics operation unit, and the more economic resources are invested.

CASE SIMULATION

In order to verify the practicability of the above research results, this paper assumes that tobacco enterprise A has 2 logistics operation units, and the total utility function is:

$$T(w_1,w_2;\ Q_1,Q_2) = \sum_1^2 W_i t(Q_i)=\sqrt{x_i} \tag{8}$$

Where, x_i represents the input cost of the ith tobacco logistics operation unit, i=1,2. For the two tobacco logistics operation units of this tobacco enterprise, the weights of evaluation are 0.8 and 0.2 respectively, namely: w1=0.8, w2=0.2. Therefore, the total utility of logistics operation of the tobacco enterprise is:

$$T(w_1,w_2;\ Q_1,Q_2) = 0.8\sqrt{x_1}+0.2\sqrt{x_2} \tag{9}$$

The optimal cost of the two tobacco logistics operating units of the tobacco enterprise can be expressed as:

$$\begin{cases} \max\limits_{x_i} T = 0.8\sqrt{x_1} + 0.2\sqrt{x_2} \\ s.t.\ \ \sum_1^n x_i = x_1 + x_2 = 48 \end{cases} \tag{10}$$

Through the above mathematical optimization process, this paper obtains: x_1=45, x_2=3, which means that the operation input of the first logistics unit of the tobacco enterprise is 45 cost units. The operational input of the second logistics unit is 3 cost units.

RESULTS AND DISCUSSIONS

COST CONTROL APPROACH OF WAREHOUSE MANAGEMENT

Warehouse management mainly includes material management and personnel management. This kind of income is determined by output and transportation frequency. The reduction of this kind of logistics cost is mainly carried out from the following two aspects:

(1) Material management. Firstly, rationally plan the storage area of raw materials and finished products to ensure the optimized distance between raw materials storage area and production line, as well as the optimized distance between finished products storage area and transportation and export. Secondly, the raw materials should be classified according to different products, so as to achieve the classification of raw materials, and set up defective products area and loose container area to effectively carry out inventory management. Finally, the transportation arrangement should be rationally matched between the production line and the finished product area of the warehouse, and the transportation frequency of the raw materials and the finished products should be controlled as far as possible according to the production time.

(2) Logistics personnel management: Firstly, according to the needs of suppliers and customers to arrange working hours reasonably, and try to arrange material production and transportation time reasonably in line with the principle of "less overtime, better work and higher efficiency". Secondly, the relevant professionals should be regularly organized to train logistics personnel and update their knowledge and skills so as to improve work efficiency and reduce personnel costs. Finally, improving the awareness of fuel saving of forklift workers can not only reduce the cost of materials, but also carry out environmental protection public welfare.

COST CONTROL APPROACH OF TRANSPORTATION

The transportation cost can be reduced mainly through the following ways: first, logistics enterprises try to require the raw material suppliers to directly deliver goods to their original equipment manufacturers, so as to avoid the secondary expenditure of transportation costs. Secondly, if the raw materials cannot be directly

delivered to the original equipment manufacturers, they should be classified and summarized according to the location of the original equipment manufacturers, and unified distribution should be carried out for manufacturers with similar locations according to the priority of processing time.

COST CONTROL OF SORTING

Cigarette sorting and packaging of the current site work, fixed work workers need at least dozens of workers. The work division of the logistics automatic sorting line or packaging site is: the rolling tobacco goods are transferred from the outgoing position to the corresponding sorting line, so that the vertical sorting equipment is used to prepare the incoming tobacco picking and packaging. Sorting equipment for in-line picking and replenishing require workers to control equipment. Cigarette printing, posting bar codes and supervision positions need workers; A worker is required for affixing and verifying the ticket. It takes workers to put cigarette rolling goods in orderly piles and carry out internal packaging. At least one worker is required to serve as the shift leader for the entire flow. In addition, the general packaging line of cigarettes needs at least a number of workers to cooperate: such as responsible packaging material selection, packaging box opening and stacking, packaging box sealing work needs many people to complete. Therefore, the sorting and packaging process of cigarette rolling products is very complex. And the ratio of remanufacturing is more, which requires higher labor cost and creates the wave cost of human labor dynamic power source. The tobacco enterprises can consider using automated sorting and packaging equipment to continuously replace or reduce manual labor and save labor costs.

COST CONTROL OF DISTRIBUTION

Through the scientific optimization management of the distribution network, tobacco enterprises will be able to reduce the distribution cost, which can be used as a model. In the distribution network of tobacco, the work can be done very much to reduce the cost, mainly including: vehicle operation expenses, maintenance expenses, vehicle insurance expenses, fuel burning expenses, handling expenses, transportation expenses, travel expenses, and so on. Among them, the highest proportion is the cost of fuel, which is 57 % higher than the total sum of other expenses. Because of this, the tobacco enterprises want to reduce the cost of the working ring section, the key is to reduce the cost of fuel oil. For example, one tobacco enterprises can take advantage of measures such as third-party joint distribution to continuously reduce the number and time of operation of their vehicles and reduce the amount of vehicle fuel, so as to reduce the cost of the tobacco distribution.

COST CONTROL APPROACH OF INTERNATIONAL LOGISTICS

For the variability and complexity of the actual situation, the methods are also diversified to reduce the cost of international logistics. Mainly according to the weight and volume of goods and customer needs, choose a reasonable mode of transportation, determine its associated costs, so as to reduce the overall logistics cost. For example, less than container load cargo takes longer to operate, which means air freight is more expensive than sea freight, but more time-efficient. Generally, customers do not have only one air cargo per day. Due to the different consignee, the multiple air cargo can be arranged in a larger vehicle for transportation, which can reduce certain transportation costs. At the same time, considering the high value of the goods themselves, in order to ensure the safety of transportation and avoid the damage of the goods, the anti-collision right angle is used to strengthen around each pallet and the winding film is sealed. This avoids the increased cost of bumpy breakage. In addition, the general volume/weight is large, the operation time is not particularly urgent cargo transport, can consider using international sea. And compared with the air transportation, the sea transportation is relatively loose, and is suitable for most of the cargo transport.

Conclusion

This paper studies applying lean thinking and its theory and method to tobacco logistics management. Firstly, it expounds the content of lean logistics management, and puts forward that "refined process" is the key to realize process reengineering. Reduce logistics costs on the basis of "accurate accounting" with the support of "accurate operation", and ensure the whole process control, and look "fine service" as the core to build a service brand, and look "fine management" as the guarantee to improve tobacco logistics management measures. Secondly, combined with a large number of literature and field investigation data analysis, this paper conducted a comprehensive study of the data, and analyzed the tobacco logistics cost unit composition structure. Through the construction of cost control model and the quantitative analysis of tobacco logistics cost, this paper finds out the input quantity of each tobacco logistics operation unit, so as to find the key points of tobacco logistics cost control. Finally, the paper raises the fine management of accurate accounting, accurate operation, refined service and studies the implementation methods of the refined process. And this paper puts forward the idea of "improving service, improving efficiency and reducing cost" to promote the development of tobacco lean logistics with high quality.

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