

Performance Evaluation of Distribution Service Efficiency Based on Supply Chain

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Abstract. To save the cost for customers and distribution center is the key issue to survive for distribution centers. The low service efficiency will certainly lead to increased distribution cost. It is a universal concern problem for distribution industry even for logistics industry to improve distribution service efficiency. On the basis of analyzing the characteristics of customer needs and the characteristics of distribution service efficiency based on the supply chain, this paper discusses the challenges of distribution service, puts forward the principles of distribution service to put up the distribution service efficiency, and sets up the evaluation system of distribution service efficiency for distribution center. Then, this article proposes one appraisal method to appraise distribution service efficiency for distribution centers. The method is presented that appraise distribution service efficiency for distribution centers, and has carried on the real diagnosis analysis.

Keywords: *Performance evaluation, Distribution service, Supply chain, Distribution center, Service efficiency*

1. INTRODUCTION

According to the user request, the concept of distribution indicated by the logistics implementation angle is to carry on the cargo distribution in distribution centers or logistics points, and to deliver the storage goods to customer by the reasonable way. The reasonable way is using each kind of resources in high efficiency and low cost.

It has been shown that Consumer's demand has been developing to the fine and the personalization direction day by day in recent years by Fan [1] and Liu [2]. The producer in order to meet populace's need to select the job shop or batch process or mass customization to make the personalization goods. At the same time, the distribution of high frequency and low quantity also appears along with it. Therefore, the specialized labor division value efficiency will be one of development tendencies in circulation industry in the future. To integrate each kind of resources to enhance the efficiency of logistics operation and reduce the logistics cost has become one of most essential topics in the present commercial goals. The function of distribution is the main function of distribution center, which includes certain process. The operation in this series of process can affect directly the efficiency in distribution center.

Therefore, we must obtain from these processes, research the distribution service efficiency in distribution center and discover each kind of limiting factor, and then the distribution center may win the multitudinous match neutrality.

2. THE EVALUATION INDEX SYSTEM OF DISTRIBUTION SERVICE EFFICIENCY

According to the service characteristic of distribution center, we established following index system to evaluate distribution service efficiency. We can get the total evaluation factors of evaluation distribution service efficiency, as Table1.

Table 1. Index System of Evaluation Distribution Service Efficiency

Index system of evaluation distribution	The evaluation factors of the distribution worker burden	The average distribution weight of each person
		The average distribution quantity of each person
		The average distribution distance of each person
		The average distribution coach number of each person
	The evaluation factors of vehicle burden	The average distribution weight of each vehicle
		The average distribution distance of each vehicle
		The average distribution ton-kilometer number of each vehicle
		The average ratio of spatial vehicle
	The evaluation factors of load planning	The migration rate of distribution vehicle
		The average distribution weight of each coach number
		The average distribution distance of each coach number
		The average distribution ton-kilometer number of each coach number
		The load rate

service efficiency		The outside vehicle ratio
		The average distribution speed
	The evaluation factors of time.	The time of running
		The time of waiting unloading cargo
		The time of unloading cargo
		The time of delivery
		The time of returning goods
		The time of return
	The evaluation factors of distribution quality	The rate of distribution detention
		The rate of customer complaint

3. THE EVALUATION METHOD OF DISTRIBUTION SERVICE EFFICIENCY

Based on several recent research of Wu [3] and Liu [4], this paper use the method of “comparing among the distribution center, collect the importance to appraise”, to the above target system, take the essential factor as the unit, allocate the weight to the branch of target, compare the branch of target to the level of profession to get a score, then take the weight and score to the weighted average formula:

$$S = \sum_{i=1}^n \alpha_i * x_i \tag{1}$$

Table 2. The Evaluation Standard of Each Item

Target item	The standard of appraisal	Score
Such as: The average distribution quantity of each person	Above the 150% of the medium level in profession	150
	Between the 100% to 150% of the medium level in profession	125
	The medium level in profession	100
	Between the 50% to 100% of the medium level in profession	75
	Below the 50% of the medium level in profession	50

Then, get the end score, which is the score to compare among the profession, and take the instance: the score is 85. That reveals this item of target the factor efficiency level is only the 85% of same profession level. Take the average distribution quantity of each person as the instance to formulate concrete evaluation standard (table 2).

4. EMPIRICAL AND ANALYSIS

4.1 Assessment Result

Using the above assessment system and assessment methods to assess the M distribution center distribution service efficiency has made an assessment of the findings as follows:

- Staff assessment load factor 87.5
- Delivery vehicle load factor assessment factor 110
- Distribution planning assessment factor 86.25
- Time assessment elements 87.5
- Distribution quality assessment factor 125

Three of the five indicators below average, so the distribution center has lower integrated delivery efficiency.

4.2 Analysis the Results of Assessment

Burden on staff is too low. Average distribution weight of everyone is relatively low (score=75). In the main distribution process, distributing goods needs no physical pay; Loading and distribution center have personnel with specialized; transport and delivery have vehicle loading; And the real needs of labor is discharge, but the distribution center in the performance of labor is paid less, then the whole process, the labor cost is light. However, the average distribution vehicle trips are not few (score=100), belonging to the middle class. In addition, the indicators reflect issues are: the distribution of each turnout personnel were relatively excessive, burden on per person is lighter but burden of vehicle trips are many, resulting in the delivery of

human shop waste.

Carrying rate of vehicles is not high. The distribution center performance is more excellent in vehicles burden (score =110). The advantage project is the average distribution distance per vehicle (score =125) and the empty rate (score =125), which is only to the vehicle. But as the use of space for each vehicle, use of Load is not enough. This makes the cost grows with increasing distance. While long lines transportation is not planned well, resulting in line separated only run the distance, cost and the wear and tear of vehicles, but not contributing for profit.

Outer vehicles are underutilized. The distribution center is 0 on the ratio of outer vehicles (score =100), which belong to the middle class, because the using of outer vehicles the craft brother around distribution center was minimal. But that does not mean that there is no need for such an improvement. In some cases, the cost of using outer vehicles is lower than own vehicles, such as a distribution center in Guangzhou deliver goods to Shenzhen, when this distribution center to have a cargo to Guangzhou, so can use the empty vehicle of other distribution center back, cost certain is lower than their out by itself, and it should not bear the transportation risks.

Returned goods costs much time. Firstly, the empty rate of the distribution center is 0, which means that in every distribution lines will always be at least one shop needing to returned goods, the probability of returned goods is big. Secondly, the measurement results is each shop must spend the time of 13.50 minutes to complete the transfer of returned goods in average in the daily delivery, it is a much cost. There are two aspects to find reasons: the distribution persons in the distribution process resulting in damaged goods for a variety of operational irregularities, and the other is that there are deficiencies in the quality of goods of their suppliers in the contract time without serious examination.

Time of no contribution spend too long. Time of no contribution including many kind of waiting time: waiting unloading time, waiting delivery time, waiting for the return time. Since time of no contribution is too long results in spending a longer delivery time. Because the chain shops are taking no inventory strategy, orders to the distribution center unified placing, and the distribution center with the speed of processing orders is as same as the craft brother. They often drive in the delivery peak.

5. IMPROVING PRIMARY RECOMMENDATION

Developing Business Volume. It must strengthen marketing efforts, so as to have more customers, more orders can be arranged in a reasonable distribution lines, and increase the rate of vehicles. While choosing good customers and reduce product quality defects, thereby reducing returned goods, reduce wasteful.

Training Staff. It must give various professional training to staff, while with a clear set of regulations for institutionalized management.

Teamwork. Adopt the way of a more cooperative spirit in the work. Making up of a team use the drivers and the distribute staff who cooperate with each other well in the distribution center, competition among several teams, the internal staff in the

teams can motor rotate days off after completing the minimum tasks, tasks of distribution center can be changed as specific activation.

Setting Up JIT Order System. This system can be returned in goods time. After one deliverer finishes distributing goods, they need to use certain means of communication to make the consignee to contact with the control room of distribution center, which can confirm the deliverer having the completion of delivery to the shop. If the return time of the deliverer varies greatly from the stated time, he would give reasons for that. In this way, the distribution center can know instance of the distribution in time and control time better.

Developing Common Distribution. There are two forms of common distribution at present: one is that logistics operators play a leading role; another is that producers and wholesalers play a leading role.

6. CONCLUSIONS

Enhancement of distribution service efficiency concerns many factors. On the one hand, distribution center would look for reasons from itself, and then improve technology and operational methods. At the same time, distribution center also would start with management, pay attention to train staffs using all kinds of modern equipments consciously, make person and machine be in effective harmony and achieve the perfect combination of hardware and software. On the other hand, improvement of distribution service efficiency also needs collective effort of social every aspect, such as suppliers, borderers. Only through cooperating each other, a highly efficient supply chain can be formed.

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