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Research Article

The Analysis and Evaluation of Food Enterprise Logistics Consumption

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Abstract: The study uses input-output method to analyze the food enterprise consumption efficiency of Logistics industry to enhance the competitiveness of food manufacturers, to improve the management level of food manufacturers, so as to provide the decision support for the food manufactures competition. Some countermeasure and suggestion were put forward in order to improve indirect food logistics consumption efficiency and direct consumption efficiency of food Logistics.

Keywords: Countermeasure, food enterprise, input-output method

INTRODUCTION

With the development of the economy and society, although people need the food in sufficient numbers, they put more focus towards the quality, safety, freshness, nutrition and environmental concerns. To meet the high requirements of the rapid change, match food manufacture logistics system with food features, enhance food logistics capability of food manufacture, achieve the low-cost, high-quality products and services as well as to capture the market, those are all the issues food manufacturers must solve. Food logistics capability is a comprehensive index. It reflects both the status quo of logistics operation and the level of food manufacture enterprise logistics ability. According to statistics, two-thirds of world oil consumption comes from transportation. Energy consumption in this area has been the general concern of scholars home and abroad (Wenjie, 2007). According to rough statistics, the energy cost of logistics enterprises has occupied 40% of the total cost, or even 80%. High energy consumption has become a bottleneck restricting the development of the food logistics industry. Modern logistics developed on the basis of the traditional transportation and warehousing industry and is considered to be the third source of profits of the food enterprise to reduce material consumption and increase labor productivity. Modern logistics plays an important role in national economic and social development (Zhong-Dong, 2008).

MATERIALS AND METHODS

Food logistics industry based on input-output model: The study of food logistics must be established as the following three premises: firstly, re-examine food logistics of modern logistics. Secondly, we should pay great importance to the different of food and biological characteristics of the different characteristics of food logistics. Thirdly, we should pay importance to characteristics of the links between food logistics (Chen and Yang, 2011).

Energy consumption in the logistics industry in the traditional input-output table is based on the input-output table (Chen and Yang, 2011), the introduction of energy consumption. Energy consumption is the primary energy consumption, including coal, crude oil, natural gas, hydropower, nuclear and other power energy (wind, geothermal, etc.) generating capacity (Department of Energy Statistics and the National Bureau of Statistics of China, 2012). Low calorific value fuel production, biomass, solar energy and the secondary energy converted from the primary energy production. In order to more clearly see the difference of the efficiency of energy consumption between the logistics industry and other industries, the paper re-classified industries in Beijing input-output table. We can calculate the logistics industry's direct energy consumption coefficient to reflect the amount of energy consumed directly per unit of product. Direct energy consumption coefficient which can be defined as direct energy consumption by producing unit production, denoted by a_{ej}, is calculated as follows:

$$a_{ej} = \frac{E_j}{X_j} \tag{1}$$

Direct energy consumption efficiency of food Logistics industry is defined as the amount of energy consumed directly per million Yuan values, i.e., a_{ej} in the input-output table. It reflects the logistics industry energy consumption efficiency, mainly due to the logistics industry technology level. In 2010, the output value, direct energy consumption amount and the direct consumption coefficient values of the various industrial sectors, as shown in Table 1.

Table 1: Direct energy consumption coefficients of industrial sectors table in 2010

	Units	Agriculture	Industry	Construction	Logistics industry	The tertiary industry
Out put	Billion Yuan	2649.5200	328.0200	3169.7500	14389.8200	25084.5500
Total energy consumption	Million tons of standard coal	1104.8000	100.3000	167.0000	2559.7000	1792.6000
Direct consumption coefficient	Tce/million Yuan	0.4170	0.3058	0.0527	0.1779	0.0715

Table 2: Direct energy consumption efficiency of the logistics industry table from 2010 to 2014

	Units	2010	2012	2014
Out put	Billion Yuan	1116.0300	1477.1600	2649.5200
Total energy consumption	Million tons of standard coal	563.4000	840.8000	1104.8000
Direct consumption coefficient	Tce/million Yuan	0.5048	0.5692	0.4170

Table 3: 2014 input-output table in Beijing

		Intermediate use					
Input/output		Agriculture	Industry	Construction	Logistics industry	The tertiary industry	Output
Intermediate inputs	Agriculture	56.46	127.24	7.38	0.21	103.54	328.02
	Industry	68.08	8451.00	1719.27	555.56	4792.50	14389.82
	Construction	0.01	13.51	69.28	12.04	575.10	3169.75
	Logistics industry	13.08	731.66	139.84	1028.29	1449.15	2649.52
	The tertiary industry	66.03	2302.44	609.60	341.41	8275.42	25084.55
Energy consumption		100.30	2559.70	167.00	1104.80	1792.60	

Units: billion Yuan, Tce/million Yuan

The food logistics industry consumed 19% energy, but had the contribution of 6% GDP to national economy. Direct energy consumption coefficient of logistics was 0.4170, the largest in all industries, followed by the agriculture, industry, the tertiary industry and construction. Therefore, the direct energy consumption efficiency of logistics in all sectors in the national economy was the lowest. On the one hand, the industrial features of the logistics industry determine its high energy consumption. According to statistics, about 58% diesel consumption were consumed by Logistics. On the other hand, more extensive development of China's food logistics industry has lower social and professional level and higher logistics costs paid. China's total logistics expenditure shares GDP nearly 20%, while that of the United States and Japan is less than 10%. Extensive and inefficient logistics operation mode is resulted in increased energy consumption and energy waste (Qing-Song, 2001).

In order to analyze the direct energy consumption efficiency of the logistics industry changes, energy consumption calculation table can be seen in Table 2.

Table 2 can be concluded that: direct energy consumption coefficient of logistics industry in Beijing between 2010 and 2014 was declining, falling from 0.5048 tons of standard coal/million Yuan in 2005 to 0.4170 tons standard coal/million Yuan in 2010 it showed that direct energy consumption efficiency of the logistics had continued to increase.

Total energy consumption efficiency in the food logistics industry: Food logistics industry not only directly consumes energy, but also indirectly consumes energy through its indirect investment in other industries. By industry association study, there are 38 directly related with logistics industry in 41 sectors in the national economy and the associated surface is 93%. If the logistics industry requires large amounts of transportation equipment and transportation equipment manufacturing will consume a large amount of energy. Therefore, to fully estimate energy consumption of the logistics industry, it is necessary to analyze the logistics industry total energy consumption coefficient. The logistics industry total energy consumption coefficient is defined as: the sum of direct energy and indirect energy consumption amount per production in j^{th} sector, denoted by b_{ej}:

$$b_{ej} = a_{ej} + \sum_{i=1}^{n} a_{ei} b_{ij} \tag{2}$$

According to the meaning of total consumption coefficient, the logistics industry total energy consumption coefficient is denoted by b_{e4}:

$$b_{e4} = a_{e4} + \sum_{i=1}^{n} a_{ei} b_{i4} \tag{3}$$

where, a_{e4} is the direct energy consumption of logistics, $\sum_{i=1}^{n} a_{ei} b_{i4}$ is due to the needs of logistics industry to other industries triggered the indirect energy consumption. b_{i4} is said total consumption coefficient of intermediate product consumption of the logistics industry to i^{th} sector. Total energy consumption efficiency of the logistics industry is that the efficiency of total energy consumption of logistics industry influenced by two factors: First, the industry's direct energy consumption coefficient values represent the energy consumption technology level; Second, total consumption coefficient value of intermediate product consumption of the logistics industry to other sectors represent non-energy consumption technical standards.

In this study, the 2014 Beijing input-output tables were consolidated; combined with the 2013 Beijing Statistical Yearbook data, seen in the Table 3.

RESULTS AND DISCUSSION

Measures: To develop low-carbon economy in China today, the food logistics industry as a high-energy consumption industry is found that the problems of energy consumption and appropriate solutions development are particularly important. For the above analysis the following three-point proposal was put forward.

Improving the direct consumption efficiency and indirect energy consumption efficiency of logistics: Compared with 2010, the food logistics industry, the direct energy consumption coefficient is only 0.1522 drop in 2014. However at the same period, the indirect energy consumption coefficient is 0.1728 drop. This indicates that the food logistics industry should not only concern the direct energy consumption, while also improving the indirect energy consumption as a policy priority to save energy.

Improving existing means of transport the transport conditions: Wang *et al*. (2004) pointed out that the direct energy consumption in the food logistics industry is mainly consumed to drive vehicles, mainly oil consumption. Factors that affect the use efficiency include vehicle characteristics (such as two models, the load weight, vehicle age and engine displacement), road geometry characteristics and conditions (such as slope, curvature and road maintenance conditions), traffic conditions (such as the free flow of traffic or congestion). Highway vehicle fuel consumption and vehicle speed was U-shaped curve. That is, in the case of low and high speed fuel consumption are high. Therefore, on the one hand, for large vehicles, the improvement of the engine fuel economy, reduction of vehicle weight to reduce the driving resistance can be done. On the other hand, improvements of the traffic conditions include the strengthening of highway monitoring to minimize traffic jams and improvement of the pavement structure and materials to reduce energy consumption in road maintenance.

Strengthen the construction of food logistics and transportation management information: According to statistics, China's load rate of road freight of railway is 46% and load rate of road freight is as high as 50%. Therefore, the information construction, transport organizations and transport management of the food logistics industry should be strengthened, including tonnage composition of freight vehicles and improvement of the mileage rate utilization and implementation.

CONCLUSION

Food logistics capability analysis can also be further strengthened; this study can help food manufacturing enterprise managements finding key logistics capability factors which makes support for decision making.

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