Chapter 19
Performance Evaluation of Food Cold Chain Logistics Enterprise Based on the AHP and Entropy

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ABSTRACT

This article evaluates the performance of food cold chain logistics enterprises based on the analytic hierarchy process (AHP) and entropy method. Based on the analysis of the present situation, an evaluation system of food cold chain logistics enterprises is established from four aspects, including the financial management, cold chain logistics process, development ability and customer service. The AHP method is used to determine subjective weights, and entropy method is used to get experts' own weights. Finally, a comprehensive index fusion weight is conducted. In addition, the result of an empirical analysis proved to be valid.

INTRODUCTION

With the development of economy and the improvement of living standards in China, social demand for low-temperature frozen food products is increasing, and people's demand for low-temperature frozen food products is higher and higher. Therefore, what measures should be taken to ensure the safety, rest assured, nutrition of frozen food by the government and related employees, which has become the primary problem of cold chain food logistics (Zhang, 2004; Xiao & Zhang, 2008). At present, most of

low-temperature frozen food products belong to the agricultural and sideline products, and they have a characteristic of strict seasonal and freshness, which lead to a demand of timeliness, constant temperature and diversity for logistics. A complete cold chain logistics system usually includes raw materials procurement, frozen food processing, frozen food storage, frozen food transportation, frozen food distribution and frozen food sales (Deng, 2007).

In the study of existing literature, there are a lot of evaluation methods for the performance of the enterprise, such as fuzzy comprehensive evaluation method, the BP neural network algorithm and the analytic hierarchy process (AHP) and so on (Ren & Wang, 2006; Xu et al., 2005; Shang & Ning, 2005; Xiong, 2015; Kengpol & Tuominen, 2006). All these evaluation methods have certain applicability, but they still have some limitations. Some methods are too simple, and too much information is missing, so the evaluation results are unconvincing; some methods are too complex and there are too qualitative evaluation indexes, which lead to weak operability and the lack of practical value.

At present, there exist many methods to determine weight (Diego et al., 2012; Biju et al., 2017; Xiu & Chen, 2011; Guo & Wang, 2015; Huo & Wei, 2008); Chen et al., 2014; Wang et al., 2012; Bazulin, 2010; Hertog et al., 2007). The current methods mostly only consider one side of the subjective evaluation, such as analytic hierarchy process (AHP); or they only consider one side of the objective evaluation, such as the entropy value method and the variation coefficient method, etc. Due to one-sided character of the subjective and objective method, they may cause some influence on decision-making results. In order to eliminate or avoid these influences, this study combines the analytic hierarchy process (AHP) with entropy value method to make an evaluation of food cold chain logistics enterprise. In this paper, the analytic hierarchy process is used to determine subjective weights, and entropy value method is used to get experts' own weight, which are given information quality by the all the evaluation experts, finally comprehensive index fusion weights are conducted.

MEANING AND COMPOSITION OF FOOD COLD CHAIN LOGISTICS

Food cold chain refers to a special supply chain system, in which perishable food which is processed, stored, transported, distributed, retailed, until transferred to the final consumer from the place of origin after being purchased or fished. In order to ensure food quality and safety, reduce wastage, and prevent pollution, its various links are always at the required low temperature of the product.

In China's logistics industry standards, these cold chain foods always consist of the following three categories: First, primary agricultural products, mainly poultry, eggs, milk, meat, aquatic products, fruits and vegetables. Second, processing agricultural and sideline food, mainly egg processing, slaughtering and meat processing, aquatic products processing and fruits and vegetables processing and so on. Third, manufacturing food, mainly dairy products, frozen food, canned food and edible ice, quick-frozen food, soft beverages.

Food cold chain logistics refers to a logistics system, in which the fresh or perishable food always is kept in the specified low temperature environment in the production, storage, transportation, sales to the final consumer hands of each link, the best logistics means to ensure food for reducing food loss and product quality.

Food cold chain includes frozen processing, frozen storage, refrigerated transportation and distribution, refrigerated sales and cold chain reverse.

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