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Fresh agricultural products cold chain logistics distribution and path optimization

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ABSTRACT

Based on the reference to the existing research results, combined with the enterprise's current distribution path, to minimize the cost as the research objective, to establish the relevant model, and put forward the control of logistics costs, increase the infrastructure investment in cold chain logistics, the optimization of the path of countermeasure proposals, to further improve the efficiency of the enterprise distribution and increase customer satisfaction at the same time reduces the cost of distribution, increase the core competitiveness of the industry.

KEYWORDS

Fresh agricultural products; Cold chain logistics; Distribution path optimization

1. INTRODUCTION

Nowadays, with the increasing purchasing power of the public and the great change of their consumption concepts, the public's demand for fresh agricultural products is growing. Analysis shows that the current cold chain logistics of fresh agricultural products in China is developing slowly, and there are still many problems. In addition, in order to ensure that the public's daily demand for fresh agricultural products while maximizing economic benefits, cold chain logistics enterprises need to make a more scientific exploration and planning of the distribution program. Therefore, on the basis of the literature of foreign scholars on optimizing the cold chain logistics and distribution path of fresh agricultural products, this paper conducts a literature review at home and abroad from the research related to the logistics of fresh agricultural products to cold chain logistics and the research related to the optimization of cold chain logistics and distribution path.

2. RESEARCH ON FRESH PRODUCE LOGISTICS

Pulina (2012) made a profound and systematic discussion on the information flow and capital chain of the agricultural supply chain from the perspective of economic sustainability [1]; Mehmann . (2016) made a detailed compendium of the positive role and key significance of logistics resource integration for the development of agricultural product logistics, and at the same time, scientifically fused quantitative with qualitative analysis by the division of competence of each part, Qualitative analysis of the proposed innovative analysis [2]; Shabani. (2012) use linear pairing model to provide scientific, rational and effective countermeasures to the selection of dealers in the context of supply chain management uncertainty [3].

3. RESEARCH ON COLD CHAIN LOGISTICS AND DISTRIBUTION

Ricardo(2016)and others have paid great attention to food safety issues in each link of food safety monitoring, and then to ensure the stable and orderly operation of the major links, so that the safety of the product is greatly improved, but also effectively reduce the rate of loss during the distribution of goods [4].Qu(2018) and others use 3G/NFC technology while integrating temperature and humidity sensors to regulate the overall behavior of the logistics chain and explicitly ensure the quality of the cold chain products under a series of processes [5]. Zhao (2019) and others discuss in detail the specific use of refrigeration technology during the cold chain transportation, especially on the relevant issues that should be emphasized in the transportation equipment [6]. Zhang (2021) and others choose to make a specific exploration of the influencing elements of the reliability of fresh food cold chain logistics, covering the facilities and equipment, external and internal logistics. Exploration, covering facilities and equipment, external conditions and information technology and other major levels, and as a premise, constructed a set of controllable cold chain path optimization model, the advantages of which successfully strengthened the stability of its integration with e-commerce, and its information technology to expand the channels of obtaining economic benefits [7].Chang (2016) and others put forward the concept of "service radius", and the logistics time and service of the major nodes have been successfully transformed, which makes the distribution path and time window inseparable, and its customer satisfaction has shown a qualitative leap [8]. Mejjaouli (2018) and others made a specific and detailed explanation of the characteristics of the cold chain products and introduced them into the model, which is of great significance to the enterprises and logistics companies in this field for the reasonable reduction of the logistics and distribution costs, and the enhancement of the economic interests [9].Sing (2020) and others in the study for the degradation of the value of the perishable products, the degree of coordination of the use of big data approximation to make the assessment of the activities of the unit cost of transportation, shelf life and opportunity cost of the three as a standard which provides reasonable reference for scientific site selection in cold chain distribution [10]. With regard to the cost factors in urban cold chain logistics, Zhang (2021) provided a corresponding optimization approach for major enterprises at the level of low-carbon site selection in his study. This approach is beneficial to the cold chain logistics industry to complete the successful transformation of low-carbon aspects, and as a basis for the successful construction of the model, to provide enterprises with a reference, scientific construction program [11]. Liu (2018) and others focused on the cold chain logistics terminal, while focusing on the current stage of the actual situation, and further integrated into the time window, so that the model is easy to be adopted, and the realization of the various links of joint distribution node methods [12].

4. RESEARCH ON OPTIMIZATION MODELS AND ALGORITHMS FOR COLD CHAIN LOGISTICS AND DISTRIBUTION PATHS

Hamza (2018) and others proposed an adaptive large neighborhood search algorithm, the powerful search ability of the algorithm can well show the results of its model and run out of the path diagram is clear and reasonable [13]. Marinakis (2019) and others proposed multi-adaptive particle swarm optimization algorithm This algorithm has three major types of adaptive strategies, which have been popularized nowadays [14]. The above mentioned scholars scientifically researched the algorithm to meet this type of problem, which can be applied to different environments, showing the algorithm's excellent abilities such as stabilization and search. As a result, the intelligent algorithm has also been studied and used by scholars in other fields, while being improved by scholars in various countries. Qin (2021) and others paid more attention to cost, timeliness and other perspectives as a way to construct an intelligent optimization model and solve it using algorithms [15].

Zhang Yunchuan (2019)proposed an innovative modeling approach of service time, constraints, and integrated costs in his study, and selected simulated annealing algorithm to improve and optimize it

[16]. Duan Yan (2019) completed a mathematical model for the optimization of agricultural cold chain logistics vehicle paths that considers the three costs of carbon emissions, customer time window, and cargo loss as the overall cost, and used an improved artificial bee colony algorithm to solve the problem [17]. In terms of GA algorithm, the research of domestic scholars has also achieved some results, for example, scholars such as Xu Hechan (2021) completed the creation of a multi-objective path optimization model, which regarded vehicle mileage minimization as well as vehicle minimization as the final objective, and chose the optimized Pareto in an attempt to find the optimal solution [18]. Wang Jing (2018) completed the creation of a food safety model for fresh cold chain products, and also designed a very specific genetic algorithm to solve it [19]. Zhan Changshu (2018) established a bi-objective function optimization model considering customer satisfaction and distribution cost. The model comprehensively considered factors such as customer time window requirements as well as distribution distance, and used a non-dominated sorting genetic algorithm to solve distribution cases between different demands [20].

5. SUMMARY

Based on the above literature, scholars at home and abroad have carried out detailed and in-depth research activities on the issue of cold chain logistics of fresh agricultural products, and have also obtained corresponding research results. Foreign scholars have optimized some of the logistics cold chain technologies and explored the specific use and future development of fresh produce cold chain logistics technology. In comparison, Chinese scholars prefer to explore the specific conditions and outstanding problems of the current development of fresh agricultural products cold chain logistics from a broad perspective, and put forward targeted and implementable optimization measures. As far as path optimization is concerned, optimization algorithms are scientifically integrated into the research activities carried out, which makes such problems become more and more visualized and intelligent.

The study still has the following three deficiencies: firstly, the total cost involved in the path optimization process includes five cost factors such as vehicle manpower, fuel, cargo damage, and penalties, but previous scholars seldom analyze them comprehensively, and this paper carries out a detailed study on the cost to make it more comprehensive. Secondly, the model and algorithm construction is not fully practical, for different enterprises, their model construction has changed, the model should be fully combined with the characteristics of the enterprise to further innovation, based on which the model is constructed. Finally, most of the previous studies use a certain algorithm alone, which has certain defects (falling into the global or local optimization), and may even fail to find a feasible solution.

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