Research on the Electrical Business Logistics System Optimization Model based on the Evolutionary Game and Node Analysis

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Abstract.

In this paper, we conduct research on the electrical business logistics system optimization model based on the evolutionary game and node analysis. For warehouse layout is not reasonable, do not have a high level of the storage technology, automated storage utilization rate is low, the lack of warehouse management personnel, to optimize the storage management mechanism, the need to pay attention to the following principles: clear the optimization goal, optimization model of the real can type, accurate real-time operational data, data of complete integration, earnestly implement scheme, practical optimization algorithm, instant effective optimization scheme, solid support professionals, scalability optimization process, the overall return on investment evaluation. To achieve this goal, this paper proposes the new countermeasures that will be meaningful.

Keywords: electrical business, logistics system, evolutionary game, node analysis.

Introduction

Electricity logistics in e-commerce platform, service platform service to participate in e-commerce of small and medium-sized enterprises that focus on the information resource of integration of various logistics information subsystem, the use of information system analysis and evaluation function, think that platform provide optimal logistics solution is given priority to, updated in real time over the logistics distribution information and then through the platform system of the evaluation, so that the platform of the customer to choose a better logistics service enterprises.

At present, with the development of globalization, the trade of our country economy also got great development, and the development of economy has got certain development of logistics industry in China. In the process of the development, gradually get rid of the attached to the other industries development pattern, it began to various industries have a certain impact. Electric business enterprise in the fierce market competition, in order to be able to gain a foothold that requires its own effective control of logistics cost, so as to make the business enterprise can be in the fierce market competition to gain a competitive advantage. Based on the literature review, electric business enterprise logistics cost control problems can be generally summarized as the follows.

- In the chain logistics distribution system is not perfect, a logistics distribution system is an important part of electric business enterprise, but the logistics distribution system is imperfect and electricity a big complaint of logistics cost control.
- Return logistics cost problems, electricity enterprises is through Internet and other electronic means trading activities with consumers, consumers can understand the characteristics of the style, function and price of a commodity from the Internet by comparing each electric business enterprise commodity prices to make the consumers to make a choice.
- Logistics cost is high and the system efficiency is low, for a long time, logistics distribution efficiency is most importance to the electricity business enterprise that is also one of the most

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concern for consumers. Compared with the abroad, our country has been in the logistics cost control and system efficiency of relatively large differences.

Optimization of the basic principles of electronic commerce logistic system mainly includes the following several aspects. Should first ensure the scientific and rationalization of logistics distribution process which requires the electronic trade in the process of logistics and distribution on the cargo information, distribution range, the mode of transportation shall be the basic information such as the comprehensive in-depth research and analysis the factors to determine the optimal scheme of logistics distribution, the provisions of corresponding evaluation index to e-commerce logistics distribution as an important standard of evaluating the scientific logistics rationalization; Second electronic trade logistics activities should be combined with the basic rule of the electronic trade which requires the logistics system at the same time of optimized configuration should fully consider the electronic trading activities which reflects some of the basic law, such as peak frequency to electronic trading activity areas of the river to adopt appropriate countermeasures of logistics distribution center, to alleviate the pressure of the high density area of logistics distribution. In the figure one, we show the sample electrical business logistics system, and in the later sections, we will discuss the issues more.

Figure 1. The Sample Electrical Business Logistics System Demonstration.

The Proposed Methodology

The Evolutionary Game Theory. Evolutionary game theory was put forward by biologists first, they will be the natural selection of biological evolution and genetic variation described as an individual and the environment between adjacent individual consecutive game process is a typical example of evolutionary game by some classic game model, such as prisoner's dilemma game, public goods game, shoveling snow, etc., according to the strategy of certain evolution rules of endless repetition. Evolutionary game theory and evolutionary economics has certain complementary, mainly reflected in the following respects. (1) Evolutionary game theory and evolutionary economics are followed the hypothesis of bounded rationality, evolutionary game theory by relaxing the new classical rational hypothesis and try whether new classical rational argument is supported by the evolution process. (2) Evolutionary game theory and evolutionary economics contains three evolution mechanisms namely the innovation mechanism, select mechanism and diffusion mechanism. In evolutionary game theory, the mutation mechanism corresponding to the innovation mechanism, mutations are usually regarded as individual trial and error behavior or system of random disturbance, etc. therefore, it is a relatively simple and naive innovation mechanism. (3) Evolutionary game theory and evolutionary economics using the methodology of the “group thinking”. "Group thinking" is the basic methodology of the evolutionary economics and it emphasizes the individual heterogeneity of population.

Here, we can separate the evolutionary game theory into the listed layers.
• Fitness function. Evolution in the game must be a classic game payoff function into fitness function. Fitness is the core concept of biological evolution theory as it is used to describe the gene's ability to reproduce. In evolutionary game model, a strategy can be simply understood as the fitness of adopting the strategy of toll rate after each game.

• Evolutionary game is different from the traditional game is one of the important features of, it focuses on the evolution of population size and frequency of strategy process. Evolutionary game contains two main mechanisms of general evolution, mutation mechanism and choice mechanism. Similar to traditional Darwinism, evolutionary game also don't look at the genetic mechanism, usually assume that simple genetic was passed through asexual reproduction, generations have the same strategy with the ancestors.

• Like the classic game, evolutionary game first there must be a game framework. Rules of the game framework refers to the structure of the game and. Evolutionary game is always in a particular game structure and rules. And the specific technological and institutional condition determines the specific game structure and rules. This also means that evolutionary game is in a specific technology and system conditions.

![Figure 2. The Evolutionary Game Theory Visualized Demonstration.](image)

**The Logistics Node Analysis.** In different areas of the logistics channel is connected to provide transport function of transport corridor and that mainly focuses on logistics functions of the organic combination of logistics nodes. Specifically, logistics channel has both in transportation and logistics nodes as physical characterization of the structure characteristics of should also have to transport the functions performed by the channel and to have done on the node, storage, packaging, handling, circulation processing, information processing and other logistics functions as the functions and the characteristics of the form of representation. Given by this paper can be seen that the definition of the logistics channel by the connection of logistics area, mainly to provide transport function of transport corridor and give priority to in order to provide other logistics functions and logistics node facilities that can be generally summarized as the following aspects.

• Logistics node mainly includes warehouse, freight yard, large airports, logistics center and distribution center, logistics parks, the large manufacturing enterprises, business centers, etc. Facilities mainly include all kinds of traffic, all kinds of transport infrastructure and all kinds of logistics equipment, etc.

• Region and attract region tend to the development of logistics activities become an important hub node in the logistics channel, in this case, the strong goods distribution functions, is often accompanied by the transport organization and management of change, transfer, loading and unloading, storage, multimodal transport, information flow and ancillary services, and other functions, in the logistics channel to the important role of integrated transport hub.
- Transport channel is connected to the logistics activities have point and point of interest dense zone. Logistics activity of point and point of interest, that is, the beginning and the end of the interconnected area is one of the constituent elements of the channel.

For the node distribution pattern analysis, we should consider the following issues. (1) In the node may produce greater attraction or repulsion, forming greater productivity organization gathered or spread, this to the organization's process is the fundamental factor to the development of the city, region. (2) Logistics activities also depend on the node on the route to organization and contact, if left node and logistics routes of the movement must be paralyzed. Therefore, logistics nodes are very important part of logistics system. (3) Through the analysis of the relationship of lines and nodes can be found that the logistics nodes is the direct manifestation of logistics service production that is the micro channel layout is to provide a large number of the carrier of logistics functions, so compared with the general point on the channel, to form more easily gathered node.

![Figure 3. The Logistics Node Analysis and Distribution Pattern.](image)

**The Logistics System Optimization.** Enterprise logistics management from enterprise logistics integration to supply chain integration, change traditional supply relationship of manufacturers and the relationship between the upstream suppliers and that downstream distributors, to form a kind of the vertical and horizontal integration and operation integration management mode, at the same time, applying modern management technology in logistics management. For achieving this target, we should consider the following aspects. (1) To optimize the distribution route. Timely limited logistics activities not only need scientific distribution center location, at the same time also need to logistics enterprises in the process of the logistics distribution optimization distribution path, to effectively improve the efficiency of logistics cost savings. Specific for logistics center which has been widely applied some basic calculation method can be used, such as the shortest path algorithm, such as the transportation problem algorithm through even the best path and length combining with practice experience of the distance achieves the optimization of distribution activities. (2) Optimization of the logistics distribution mode. Optimization of logistics distribution mode from adjusting focus on the transportation scale economy, transportation economies of the scale is an extremely important in an e-commerce logistics evaluation index.

**The E-Business Logistics System.** Electricity enterprise self-built logistics seems to be becoming a trend, and is increasingly attracting the attention of many scholars. Electricity industry is based on the information network of high-tech industry, is a relatively new business model, and its growth follow Moore's law, on order information flow, and that the traditional logistics construction is the foundation industry, geometric type growth mode speed is even lower than electricity. The mass orders of even a few years ago electricity enterprise drove the rapid growth of the third party logistics, but the third party logistics company delivery ability is the need for the personnel, storage, software and hardware facilities such as vehicles, energy input and improve slowly, from the point of the current reality that can barely keep up with the development of e-commerce enterprises.

Electricity through self-built logistics system that can guarantee the logistics control initiative, a leading role in the whole supply chain, greatly enhance the speed and efficiency of its transport and
distribution, improve logistics service quality. Capable of electricity can transform offline store of information system, service system, product system, payment system, supply chain system, and then collected through online orders, with offline use the self-built logistics capability for stores provide logistics services. Through self-built logistics system can improve the quality of electrical business logistics, and reduce the logistics costs. Generally speaking, the business is concentrated, channel coverage and shipping method is relatively single, and that the enterprise scale, well-funded and management ability of the electric business enterprise suit to build. In addition, the logistics for enterprise core position control of the supply chain and its own resources advantage, business link fairing, end customer control plays a very important strategic status of the enterprise, also can take own logistics mode. So although there are many e-commerce enterprises has been a breakthrough in the self-built logistics mode, but doesn't mean that it is necessary for all the enterprises, have the ability to group themselves goods distribution, self-built logistics system.

CONCLUSIONS

In this paper, we conduct research on the electrical business logistics system optimization model based on the evolutionary game and the node analysis. The arrival of the information age changed people's way of life also brings to the business development more new possibilities. E-commerce is relying on the network information technology in recent years the development of a new type of the commercial operation mode, and constantly in the commercial trade activities play an important role. With this real-world condition, this paper proposes the new perspective of optimizing the current logistic system to form the better performance of the logistic efficiency which will enhance and accelerate the further development of the industry.

References


