

Research on the Development Strategy of Intelligent Logistics System of Live Streaming E-commerce Supply Chain

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Abstract: The rapid development of live streaming e-commerce has brought new challenges and opportunities to supply chain logistics. The purpose of this paper is to study the development strategy of intelligent logistics in live streaming e-commerce supply chain and explore how to optimize the operation of live streaming e-commerce supply chain through intelligent logistics. Firstly, this paper discusses the reality and previous studies on live e-commerce and intelligent logistics. Secondly, this paper also analyzes the case of Arpa's live streaming e-commerce intelligent logistics construction. After that, summarizing the above research, it is found that in the current process of intelligent logistics system construction of live streaming e-commerce supply chain, there are problems such as the lack of professional talents, the lack of standard system, the decline of investment attention and the lack of logistics infrastructure. Finally, this paper puts forward the suggestions for the construction of intelligent logistics system of live streaming e-commerce supply chain from the perspectives of policy, professional talents, investment and technological innovation.

Keywords: Live streaming e-commerce; Intelligent logistics; Supply chain; Optimization strategy.

1. Introduction

In recent years, live streaming e-commerce as an emerging field of e-commerce has rapidly entered the public eye. The outbreak of the internet celebrity economy and the fire of short video platforms, making the demand for the realization of network traffic and the intention of merchants to promote and sell products coincide, in the era of traffic is king, with the help of fans to take the "flow" straight on the network red bloggers, springing up and competing, making the live network sales model with goods has shown explosive growth in recent years. According to the 52nd Statistical Report on the Development of the Internet in China, as of June 2023, the number of online live broadcast users in China reached 765 million, an increase of 14.74 million compared with December 2022, accounting for 71.0% of the total Internet users. Among them, the number of e-commerce live broadcast users was 526 million, an increase of 11.94 million compared with December 2022, accounting for 48.8% of the total Internet users; On the one hand, the rapid growth of e-commerce live broadcasting industry has driven the rapid growth of enterprise revenue; But on the other hand, it also brings great challenges to the existing supply chain logistics system. Traditional logistics is too dependent on labor, service efficiency and service quality are low, so it can meet the challenges brought by live streaming e-commerce. However, by building a live streaming e-commerce smart logistics system, enterprises can improve the quality of logistics services, improve the operational efficiency of the live streaming e-commerce supply chain, and reduce logistics costs. This not only helps to improve the competitiveness of enterprises, but also improves the purchasing experience of consumers, thus further promoting the development of live streaming e-commerce.

Therefore, this paper will summarize the development and research status of live streaming e-commerce supply chain and intelligent logistics system, and carry out in-depth

analysis of relevant cases, in order to sum up the experience and shortcomings in the development and construction of intelligent logistics system of live streaming e-commerce supply chain. Finally, based on the above research, this paper puts forward suggestions on building an intelligent logistics system of live streaming e-commerce supply chain.

2. Live Streaming E-commerce Supply Chain Intelligent Logistics Research Status and Development Opportunities

2.1. Intelligent logistics

Intelligent logistics is an efficient and controllable logistics service mode driven by emerging technologies such as big data, Internet of Things and cloud computing, which realizes industry-wide interconnection, sharing and symbiosis through automation, visualization and informatization of logistics service operation [1]. It has the characteristics of automation, intelligence, visualization, networking, flexibility, etc., and can promote the development of live streaming e-commerce in an all-round way [2]. The biggest difference between intelligent logistics and traditional logistics is that intelligent logistics can plan, manage and control logistics operations (inventory, transportation or order management) in a more intelligent way, so that the entire logistics process is visible, perceptible and real-time adjustable, thus improving the economic efficiency of the entire industry [3].

Some scholars have studied the impact of the development of smart logistics, paying attention to the problems in the development process of smart logistics, and the value of developing smart logistics. Liu et al. suggests that smart logistics policies and policy conferences would bring positive reactions to the stock market [4]. Pan et al. analyze the relationship between smart logistics policies and carbon emissions, and found that the implementation of smart

logistics policies can significantly restrain carbon emissions [5]. Liu et al. construct the smart logistics ecological index to reflect the development status and potential problems of the smart logistics ecological chain [6]. Through further research, Liu et al. suggest that the main factors affecting the intelligent transformation of logistics in China include the inherent risks of transformation, difficulties in organizational adjustment, market obstacles, market drivers and social factors[7].

In addition, some scholars have explored the specific technologies in the implementation process of smart logistics from the perspective of practice. Wang et al. propose an intelligent logistics scheduling system based on the Internet of Things, which well realized the dynamic coordination among customers, order picking robots and cloud technology [8]. In warehouse operations. Lee et al. designed an intelligent logistics warehousing management system based on the Internet of Things, which has solved the challenges faced in the current warehousing operation [9]. Ren et al. propose a one-step integrated optimization decision method S2SCL based on deep learning to realize intelligent inventory optimization and demand forecasting [10]. In terms of cargo distribution, Fan et al. propose an intelligent integration scheme of internal and external transportation that separated trailers and containers, so as to optimize the operation of two kinds of logistics systems, namely domestic truck freight and overseas container short-distance transport, and reduce the total cost to the maximum extent [11]. By integrating intelligent distribution center in e-commerce environment, Barenji et al. propose a dynamic scheduling and real-time control architecture based on multi-agent technology to solve the gap in the current real-time scheduling and control system [12].

2.2. Growth opportunities for intelligent Logistics in the live streaming e-commerce supply chain

The application of intelligent logistics is more and more common in the traditional e-commerce field. In the field of cross-border e-commerce, the intelligent operation of cross-border logistics has become an important factor affecting the transaction quality of cross-border e-commerce with its characteristics of high efficiency, high quality and low cost [13]. In the field of rural e-commerce, intelligent logistics distribution scheme can save the total cost and shorten the delivery time [14]. Therefore, more and more enterprises are applying smart logistics into practice. For example, Amazon launched a drone delivery service in the UK in December 2016, significantly reducing delivery times [15]. Similarly, Alibaba has also established a Cainiao network based on intelligent technology to improve the efficiency of commodity delivery [16]. In addition, scholars have also proposed relevant theoretical frameworks to assess the impact of smart logistics and promote the application of smart logistics. For example, Liu et al proposed the theoretical framework of influencing factors of organizational efficiency of smart logistics ecological chain dominated by e-commerce platform [17]. Through systematic literature review and network analysis, Kalkha et al identified 5 clusters related to the application field of information and communication technology in e-commerce and 5 clusters related to important information and communication technology driving factors in intelligent logistics [18].

Previous studies have provided theoretical guidance for the construction of smart logistics of e-commerce, but in the emerging field of live streaming e-commerce, there is a lack of theories to guide the construction of smart logistics system of live streaming e-commerce supply chain. Through case analysis, this paper discusses the problems and development suggestions in the construction process of intelligent logistics system of live streaming e-commerce supply chain.

3. Practical Application of Intelligent Logistics in Live Streaming E-commerce Supply Chain Based on Arpa

3.1. Background

Linyi is an important market cluster and commodity distribution center in northern China, with 13 professional wholesale markets covering 60,000 varieties in 27 categories. Well-developed small commodities at prices far below market retail prices make Linyi more competitive in live streaming e-commerce. Since 2019, Linyi's live streaming e-commerce industry has entered a period of explosive growth, making it the capital of live streaming e-commerce on par with Hangzhou and Guangzhou. According to the data of Linyi Mall Management Committee, there are more than 5,000 anchors with goods in Linyi, 20 anchors with more than 1 million fans, more than 10 anchors with a monthly GMV of more than 20 million yuan, more than 1.5 million orders of live broadcasting with goods every day, and more than 10 billion yuan of live broadcasting with goods GMV.

Live streaming e-commerce is different from traditional e-commerce and retail, live streaming e-commerce with many kinds of goods, instantaneous commodity transaction flow, high distribution time requirement, and extremely high requirements for supply chain. Although Linyi's local warehousing and logistics industry is large in scale, the overall digitalization level is not high, the cargo turnover rate is low, the cargo difference, the cargo loss is high, the distribution matching degree is low, which can't meet the development demand of live streaming e-commerce, and the transformation and upgrading is imminent.

3.2. Analysis on the application of intelligent logistics in live streaming e-commerce supply chain

In order to promote the transformation and upgrading of Linyi's logistics and meet the development needs of the e-commerce live broadcasting industry, Shandong Robinson Logistics Co., Ltd, a subordinate enterprise of Arpa, relies on Arpa's digital research and development capability and accumulation of digital technology to build Robinson Cloud Warehouse. Robinson cloud warehouse with digital technology and intelligent warehousing as the basis for reshaping the e-commerce supply chain, the establishment of the consumer side and the supply side of the high-speed docking channel, to help Linyi e-commerce live industry high-speed development.

In the process of Robinson cloud warehouse construction, Arpa set up professional and technical personnel and industry solutions expert project team, fully research the current situation of regional warehousing and logistics development in Linyi and the scale of e-commerce live industry, to understand the regional e-commerce live supply chain pains,

difficulties, through the study of the problems and difficulties, to find out the reasons for the full range of exploration and innovation from the technology, equipment, mode, mode, mode, etc., to enhance the actual operational efficiency through technical equipment. The actual operational efficiency, through the exploration of new modes, new forms, promotion of landing, to promote the overall synergy of the supply chain, for e-commerce live entrepreneurs to provide housekeeping, all-in-one household, a full range of storage, picking, distribution and other logistics services. Specific practices are as follows. The first is to make full use of digital technology to improve the efficiency of logistics operations. Real-time and efficient transmission of logistics data is realized through 5G network. Afterwards, data modeling and analysis of the received logistics big data, on the one hand, the transportation path of the goods was optimized, which improved the efficiency of the distribution of goods; on the other hand, the digital management of the warehouse storage space and the intelligent sorting of the goods were realized, which improved the efficiency of the warehousing operation.

The second is the use of intelligent equipment to enhance the level of logistics automation. As a result of a live streaming e-commerce broadcast, the product will often be a surge in sales during the live broadcast, while the product categories involved in live streaming e-commerce are also relatively broad, the traditional logistics system is difficult to meet the requirements. Robinson cloud warehouse using a number of automation and intelligent warehousing technology and equipment, including AGV handling robots, RGV shuttle, intelligent sorting trolley, three-dimensional shelves, automatic sorting

line and RFID, etc., while equipped with warehouse distribution management system. With the help of these technical equipment and systems, Robinson Cloud Warehouse is able to carry out adaptive collaborative scheduling according to the order situation, which makes the automation rate of the warehouse more than 80%, and the operation efficiency has been improved by more than 5 times. In addition, the application of Arpa Express digital pallets and other technologies has realized the consistent transportation of supply chain goods with pallets, effectively improving the loading rate of goods by more than 25%.

Finally, it realizes informationization to improve the level of supply chain integration. Adopting the "front cloud and back warehouse" mode, the barriers between the various links in the supply chain are opened up, making it possible for information to circulate between the various links in the supply chain in a low-cost and highly efficient manner, improving the operational efficiency of the supply chain, and realizing the reshaping of the supply chain of live streaming e-commerce. Specifically, the cloud warehouse is based on EnzoMesa digital platform linking live streaming e-commerce platforms such as Shutterbugs and Jitterbugs to synchronize the order data from the consumer side with the cloud warehouse management system, which in turn enables the consumer's order data to be synchronized in real time with the enterprise's logistics department, realizing the consumer's front-end one-button ordering and the cloud warehouse's one-stop packaging, warehousing, and shipment. In addition, with the advancement of supply chain integration, the front-end data can also help suppliers to make sales forecasts, so as to make timely inventory preparation.

4. Challenges and Development Strategies for The Construction of Intelligent Logistics System of Live Streaming E-commerce Supply Chain

4.1. Challenges

4.1.1. Lack of intelligent logistics standard system

In the field of logistics, when a logistics functional element is optimized or benefits are gained, other functional elements usually suffer losses, i.e., the phenomenon of benefit backlash occurs. In the live streaming e-commerce supply chain, the logistics service is divided into several links, and if there is a problem in one of them, it will eventually affect the consumer's purchasing experience and reduce the efforts of other links to improve the quality of logistics services. In particular, the need for cold chain transportation of products, from the source of the product to the end of the retail, each link needs to be closed to the whole process of cold cabinets, if a link in the middle of the loophole, it will result in a waste of investment in other links. At present, whether urban or rural, "the last kilometer" distribution costs are tens of times higher than the cost of dry logistics. At the same time, the cold chain facilities of outlets and distribution centers can hardly meet the requirements.

4.1.2. Lack of professional intelligent logistics-related talents

In terms of China's current live streaming e-commerce logistics situation, most enterprises engaged in logistics-related activities have a low degree of digitalization and intelligence. All aspects of logistics operations still require manual operation, and a large number of labor resources are invested. For example, sorting, transportation, packaging, etc. Which due to some positions work pressure, and high intensity, so the mobility is also relatively large. At the same time the higher work intensity also affects the staff's service consciousness, the traditional logistics service quality is low, low efficiency. The smart logistics is able to give these simple and repetitive activities to the professional intelligent logistics equipment to complete, greatly enhancing the live streaming e-commerce logistics operation sales and reduce operating costs. Intelligent logistics integration of the Internet of Things, cloud computing, big data and other technical means, in these advanced technologies under the auspices of the logistics system for the overall optimization, to achieve logistics information technology, digitalization, intelligence, a new logistics model. As a product of the integration of such new technologies, smart logistics is currently in a continuous exploration and development stage, in urgent need of various types of specialized personnel, the shortage of talent has become an important factor restricting the development of China's smart logistics, in particular the lack of both mastery of computer technology, network technology, and communications technology and other related knowledge and familiar with the live streaming e-commerce supply chain and the laws of modern logistics operations and other specialized knowledge of the composite talent, which seriously impedes the development of China's smart logistics. This seriously impedes the development of China's smart logistics.

4.1.3. Insufficient investment attention in the field of intelligent logistics

Live streaming e-commerce supply chain intelligent logistics system can not be built without financial support, but the market's attention to intelligent logistics is decreasing year by year. Rogo research data show that as of July 2023 on logistics intelligence, logistics digitization and supply chain logistics services, the number of investments were 22, 10 and 18, respectively, and in 2022, 113, 32 and 26, and in 2021, 127, 29 and 39, the data showed a downward trend, hitting a new low since 2016. The lower investment in smart logistics will inevitably lead to a slowdown in the development of smart logistics, and the situation is serious and may also affect the development of live streaming e-commerce.

4.1.4. Inadequate and uneven development of smart logistics infrastructure

The rapid development of live streaming e-commerce cannot be separated from the support of an efficient logistics system, in recent years, China's live streaming e-commerce is booming. Especially in the field of agricultural products market, following the launch of various types of live broadcast to help farmers related policies, major live platforms have also launched various types of live broadcast to help farmers. Data show that since the launch of Taobao live "village broadcasting program", more than 110,000 farmers anchor to carry out about 3.3 million live broadcasts to help farmers. 2022 September to 2023 September, Jitterbug live to help farmers sell agricultural products 4.73 billion single. Due to the characteristics of agricultural products, the requirements for the logistics supply chain are high, coupled with the huge sales volume brought by live broadcasting e-commerce, which has brought great challenges to the already weak rural logistics system, and the problem of structural imbalance in China's logistics infrastructure is becoming more and more prominent. Specifically manifested as: the geographical distribution of logistics infrastructure is not balanced, the existing logistics infrastructure network in the geographical existence of "east strong west weak", "city strong countryside weak" and so on; in the structure of the supply of logistics services on the demand for the adaptability is not strong, low-end services, oversupply, medium and high-end service supply. In terms of structure, the supply of logistics services is not well adapted to demand, and there is an oversupply of low-end services and an undersupply of medium- and high-end services.

4.2. Development strategies

4.2.1. Improve the standard construction of intelligent logistics system and strengthen the cooperation of all parties

The construction of a smart logistics system requires the collaborative efforts of all parties, and a loophole in any one of these links may result in a waste of investment and resources in other links. There are many participants in the live streaming e-commerce supply chain, so it is difficult to reach cooperation, which increases the difficulty of the construction of the intelligent logistics system. To reach cooperation among all parties, it is inevitable that the equipment is standardized, so a standard generally accepted by enterprises is essential, and is also an important foundation for the construction of the intelligent logistics system. The construction of the standard system also needs to be completed under the joint efforts of all parties. Government level, the introduction of appropriate policies to grasp the

general direction of the construction of standards, while creating a good policy environment for the application of specific standards mentioned system on the ground. And because logistics is a highly practical field, the national standards need to refer to industry standards, industry standards and standards derived from intelligent logistics enterprises or alliances between enterprises. Therefore, at the enterprise level, enterprises should be encouraged to actively participate in the construction process of the standard system, summarize the successful experience in specific applications, and promote them as industry standards. In addition, enterprises should also be encouraged to actively learn from the advanced experience in the construction process of foreign smart logistics systems, in the construction of standards with international standards.

4.2.2. Increase policy support and investment in the field of intelligent logistics

According to the previous study, the development of intelligent logistics in China is still in the exploratory stage and lacks corresponding supporting infrastructure. The initial investment is large, the actual benefits and costs do not match, and the uncertainty of technology research and development is large, requiring a large amount of financial support. However, the investment situation in the field of intelligent logistics has been declining since 2021, so it is necessary for the government to introduce corresponding adjustment policies. On the one hand, it provides appropriate amount of funds and other resources to organize the construction of large-scale smart logistics infrastructure. For example, the development of large logistics hubs, to provide enterprises with preferential land resources to reduce the cost of building warehouses; on the other hand, to provide support and concessions for enterprise financing, to broaden the financing channels of smart logistics enterprises, enterprises to obtain funds to develop smart logistics technology.

4.2.3. Improvement of intelligent logistics personnel training system, improve the industrial organization system

To develop a smart logistics system to make up for the shortcomings of the live streaming e-commerce supply chain, professional talents are indispensable. The rapid development of modern intelligent logistics on the training of logistics personnel has put forward a new challenge, the traditional focus only on logistics operations and other aspects of the talent and talent training system is difficult to support the development of live streaming e-commerce supply chain intelligent logistics system, the industry is in urgent need of both understanding of computer technology, network technology, communications technology, but also proficient in the laws of modern logistics operation of the composite talent. Intelligent logistics talent attraction, use, education, retention of the following aspects. First of all, the government level, should be facilities more active, open, effective talent policy, to actively introduce relevant talents, and the introduction of corresponding preferential supporting policies to retain talents.

Colleges and universities should recognize the current trend in the professional curriculum and student internships and practices, to cultivate talents who can adapt to the needs of the current development of intelligent logistics. Specialized courses, in addition to the traditional logistics operations and other basic courses, should also provide computer technology, network technology and communication technology and

other intelligent logistics technology related courses. Internship practice, should strengthen the cooperation with enterprises so that students can personally to the logistics site to learn, the application of knowledge in practice, and learn from practice experience.

At the enterprise level, regular training should be provided to logistics practitioners to help employees master advanced smart logistics technology and improve work efficiency. At the same time, the organizational structure of the enterprise should also be adjusted according to the needs to adapt to the challenges of intelligent logistics, in order to give full play to the role of talent in the organization.

4.2.4. Encourage innovation and application of new technologies related to intelligent logistics

At present, China's logistics industry is still relatively dependent on manual labor, and the relevant technology of intelligent logistics is still immature, which seriously affects the efficiency of logistics operations, increases the operating costs, and restricts the development of live streaming e-commerce. Therefore, this paper argues that the main focus should be on the innovation of key technologies of smart logistics, as well as the integration and application of intelligent technology and logistics industry. On the one hand, increase the research and development investment in intelligent logistics hardware, such as IoT chips, sensors, etc.; increase the research and development investment in artificial intelligence-related algorithms in order to enhance the data collection and analysis and processing capabilities of the intelligent logistics of the live streaming e-commerce supply chain, and to improve the level of service. On the other hand, encourage the application of related technologies in smart logistics, such as positioning and navigation technologies, to improve the intelligence level of the live streaming e-commerce supply chain smart logistics system, reduce operating costs and improve operational efficiency.

In addition, relevant enterprises set up research and development teams or technology subsidiaries, while strengthening cooperation with research institutes, from the partial use of the talent advantage of the Institute, to achieve technological breakthroughs. It should also strengthen the cooperation between enterprises and scientific research institutions and colleges and universities to enhance the research and development capability of enterprises in intelligent logistics technology.

5. Summary

The rapid development of the live streaming e-commerce supply chain has brought great challenges to the current logistics system, which will inevitably lead to changes and development of the current logistics system, whether it is for the live streaming e-commerce industry chain can be healthy development, to maintain the growth advantage, or to reduce the cost and improve the quality of service in order to retain the customer, we should develop intelligent logistics, breaking through the traditional supply chain system of the barriers between the enterprises to build a new live streaming e-commerce intelligent logistics system.

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