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The Impact of Live E-commerce on Supply Chain Management: Challenges, Adaptations, and Strategic Optimizations

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Abstract: The explosive growth of live e-commerce has accelerated the transformation of supply chain management, where the efficiency and flexibility of the supply chain directly influence the success of live e-commerce. Therefore, optimizing supply chain management has become crucial for industry development. Live e-commerce, with its real-time interaction and instant purchasing characteristics, has profoundly impacted supply chain management. The rise of live e-commerce has driven supply chains to become more streamlined, personalized, and intelligent to meet consumer demands for freshness and customization of products. Additionally, the data-driven nature of live e-commerce enables better demand forecasting, reduces inventory backlogs, and enhances overall operational efficiency. This study explores the specific impacts of live e-commerce on supply chain management, including its effects on supply chain structure, logistics efficiency, inventory management, and the application of information technology. The aim is to provide strategic recommendations for supply chain optimization, helping enterprises enhance their competitiveness and promoting the healthy and sustainable development of the live e-commerce industry.

Keywords: live e-commerce, traditional e-commerce, supply chain.

1. Introduction

In recent years, live streaming e-commerce, as an emerging e-commerce model, has rapidly become an important component of the e-commerce market through real-time interaction, intuitive display, and instant purchasing. With the continuous growth of the live broadcast e-commerce market scale, more and more businesses and enterprises have begun to attach importance to and invest in the field of live broadcast e-commerce. Since 2016, which is regarded as the first year of live broadcast e-commerce, this year, many major platforms such as Taobao, Kwai, Mushroom Street, have launched live broadcast functions, marking the official rise of live broadcast e-commerce. From 2017 to 2018, live streaming e-commerce entered a stage of rapid expansion, and major platforms further improved

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the infrastructure of live streaming e-commerce, including optimizing live streaming functions, building industry chains. At the same time, a large number of entrepreneurs and brands have begun to enter this field, exploring the business model of live streaming e-commerce. From 2019 to the middle of 2020, the live broadcast e-commerce model ushered in a period of full bloom. According to the data of China Internet Network Information Center, 562 million people watched the live broadcast of e-commerce in the first half of 2020, an increase of 129 million people compared with the first half of 2019. In the same period, the number of users of live broadcast of e-commerce was 309 million at the highest, and the users who bought goods in live broadcast of e-commerce also accounted for 66.2% of the total users of live broadcast of e-commerce [1]. It is not difficult to see that live streaming e-commerce has become a common channel for purchasing and selling [2]. With the help of favorable policies, e-commerce live broadcast is moving towards standardization and standardization. However, the e-commerce live broadcasting industry is characterized by a high degree of concentration, and gradually forms a pattern of three giants: Taobao, Tiktok, and Kuaishou. According to the in-depth research report on business model innovation and investment opportunities of China's online live broadcasting industry issued by the industry research institute, the three giants of live broadcasting e-commerce occupy 99.7% of the market of China's e-commerce live broadcasting industry, forming a monopoly trend. In the future, the live broadcasting industry will develop towards standardized management, product diversification, and specialization of live broadcasting [3,4].

However, with the explosive development of live streaming e-commerce, this emerging model has also brought profound impacts and challenges to traditional supply chain management. Therefore, exploring whether traditional supply chains are still applicable to current e-commerce models, and how to effectively combine traditional supply chains with emerging live streaming e-commerce models, is of great significance for promoting the sustained and vigorous development of live streaming e-commerce.

This article aims to analyze the operational mode and characteristics of live streaming e-commerce in depth, optimize supply chain management strategies, improve overall operational efficiency and customer satisfaction, and promote the healthy development of the industry. At the same time, it provides reference and inspiration for relevant enterprises and practitioners, helping them better cope with the ever-changing market and enhance their competitiveness.

This article uses literature research method to integrate and collect relevant literature, reports, and cases on live streaming e-commerce and supply chain management at home and abroad, analyze existing research results, and understand the basic theoretical framework of live streaming e-commerce and supply chain management. The case study method is used to select typical live streaming e-commerce enterprises or platforms as research cases for in-depth analysis, to understand their specific practical experience, problems, and solutions in supply chain management.

2. Traditional E-commerce and Live E-commerce

2.1. Meaning of Traditional E-commerce

Traditional e-commerce refers to the trading activities and related service activities in the form of electronic transactions on the network, it can also be called search e-commerce or traffic e-commerce, which is mainly guided by the paid traffic of merchants. This paper defines traditional e-commerce as an e-commerce model that displays commodity information in the form of pictures and words, allowing consumers to conduct search shopping online in the way of "people looking for goods". Traditional e-commerce platforms are represented by tmall, Taobao, JD [5].

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2.2. Definition of Live E-commerce

Live e-commerce has been developing rapidly since 2015 in China. Initially, it was just some attempts for the purpose of content and traffic construction. However, with the increasing number of users and merchants, it has become a relatively complete and diversified industrial chain. Live broadcast e-commerce is a comprehensive sales platform combining the concepts of live broadcast and e-commerce. The current carrier of live broadcast e-commerce is short video and live broadcast, and the e-commerce behavior is realized based on this carrier. It is also a form of content-based e-commerce, which is a relatively new e-commerce mode compared with traditional e-commerce, and the ultimate purpose is to achieve transactions between merchants and users. The live broadcast e-commerce has a relatively clear process and development path, which integrates various functions such as information, experience and social networking [6]. The form of live broadcast e-commerce, consumers can comprehensively understand products or services based on live broadcast, and the anchor also shares the experience of use through personal practice, so as to further broaden the dimensions of products or services. In the process of demonstrating, explaining and answering questions, the anchors directly built a bridge between consumers and products. The anchors of live e-commerce provided the same service as online shopping guide. In addition, through the form of bullet screen questioning and communication, it can also achieve real-time interaction and become a social tool at the same time. Live e-commerce has advantaged that traditional e-commerce does not have. In the process of product presentation of live broadcast, the anchor gate makes consumers' understanding of products or services more vivid, visual and intuitive through the blessing of software and the rich presentation of videos, which can enhance the credibility of products or services. The live broadcast e-commerce also has the characteristics of activity and synchronization, novel form, entertainment driven consumption, and can attract the curiosity of consumers. Therefore, it is a highly concerned and rapidly developing e-commerce model, and compared with the traditional e-commerce, the live broadcast e-commerce is content-based and can spontaneously generate traffic.

2.3. Differences between Live Broadcast E-commerce and Traditional E-commerce

Compared with traditional e-commerce, live E-commerce makes commodity prices appear cheaper by reducing intermediate links and negotiating prices with manufacturers or brands, reducing the time for consumers to compare prices. However, commodity prices on traditional e-commerce platforms are usually relatively stable, and consumers must always pay attention to the platform in order to find preferential information of commodities in time. At the same time, the information transmission methods of live e-commerce platforms are richer, and consumers' sense of immersion and experience are stronger. However, the information transmission methods of traditional e-commerce platforms are relatively simple, and the interaction between merchants and consumers can only be carried out by means of pictures and texts, which is lack of entertainment. In terms of convenience, e-commerce anchors will select products in advance, which virtually saves consumers' selection time. Out of trust in anchors, consumers can directly place an order to buy the goods they want, while consumers on traditional e-commerce platforms first search for goods, browse goods, compare goods, and then make a purchase decision, which takes a long time. Finally, in terms of conversion rate, when the live e-commerce anchor explains the parameters and functions of the product, he will bring his knowledge and understanding of the product into it and recommend it, prompting consumers to buy the products recommended by the anchor, which makes the live e-commerce have a higher conversion rate than the traditional e-commerce [7].

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3. Development Trend of Modern Supply Chain Management

3.1. Digital Transformation

Digital transformation is the core trend of modern supply chain management. Through big data analysis, Internet of things (IOT), artificial intelligence (AI) and other technologies, enterprises can more accurately predict market demand, optimize inventory management, and realize automatic operation. In the field of live broadcast e-commerce, these digital technologies also play an important role.

The live broadcast e-commerce platform can use big data analysis technology to deeply mine users' viewing habits, purchase behavior and other data, so as to more accurately recommend products and improve user experience and sales conversion rate. Through the Internet of things technology, the live broadcast e-commerce platform can monitor the inventory and logistics status of goods in real time, so as to ensure that the product information can be provided to users timely and accurately during the live broadcast process. In addition, AI technology can be used for intelligent recommendation, voice recognition and other aspects to provide users with a more personalized shopping experience.

3.2. Environmental Protection

With the improvement of environmental awareness, green supply chain management is becoming the choice of more and more enterprises. In the field of live broadcast e-commerce, green environmental protection is also a trend that cannot be ignored. The live broadcast e-commerce platform can give priority to the promotion of products using environmentally friendly materials to meet consumers' demand for environmentally friendly products. It can also reduce carbon emissions and realize green logistics by optimizing the logistics process and reducing unnecessary packaging and transportation. During the live broadcast, the anchor can promote the concept of green environmental protection, guide consumers to pay attention to environmental protection issues, and improve the brand image.

3.3. Supply Chain Collaboration

Supply chain collaboration emphasizes the close cooperation and information sharing among all links of the supply chain. In the field of live broadcast e-commerce, supply chain collaboration is also of great significance. The live broadcast e-commerce platform establishes an information sharing mechanism with suppliers, logistics companies and other partners to ensure the accuracy and timeliness of commodity information. Through the coordination of the supply chain, the live broadcast e-commerce platform can respond to market changes more quickly, adjust commodity strategies and logistics plans in time, help reduce inventory costs, transportation costs, and improve the profitability of the live broadcast e-commerce platform [8].

4. The Impact of Supply Chain Management on Live E-commerce

4.1. Improving Supply Chain Efficiency

4.1.1. Rapid Response and Real-Time Supply

Supply chain management can optimize logistics and warehousing processes, enhancing the responsiveness of live e-commerce. Real-time supply chain management systems enable businesses to promptly address changes in consumer demand, reducing stockouts and overstock issues, thereby increasing sales efficiency. For example, through automated order processing systems, live e-commerce can quickly sort and ship orders, boosting overall operational efficiency. However,

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excessive reliance on real-time supply systems may lead to system overloads, especially during peak sales periods, with system failures or high latency potentially severely impacting customer experience.

4.1.2. Efficient Inventory Management

Using modern supply chain management technologies, such as automated warehousing and inventory optimization algorithms, companies can precisely control their inventory. These efficient inventory management techniques not only reduce inventory costs but also ensure continuous product supply during live e-commerce promotions, which often stimulate impulsive consumer purchases. Real-time inventory monitoring and intelligent replenishment systems allow businesses to restock based on real-time sales data, avoiding stockouts and overstock issues. However, the maintenance costs of these technologies are high, and small to medium-sized enterprises may struggle to afford them. Additionally, inventory management systems that heavily depend on information technology may face operational disruptions if faults occur, posing unnecessary risks.

4.2. Cost Control and Optimization

4.2.1. Reducing Logistics Costs

Optimization strategies in supply chain management, such as centralized purchasing and optimized transportation routes, can effectively lower logistics costs. For instance, live e-commerce can enhance logistics efficiency and reduce transportation expenses by optimizing routes and adopting advanced logistics management systems, thereby increasing profit margins. However, centralized management might reduce flexibility, causing slower responses to emergencies and delayed adjustments to logistics plans, leading to delivery delays.

4.2.2. Optimizing Procurement and Production Costs

By closely collaborating with suppliers, businesses can achieve bulk purchasing and optimized production processes, reducing procurement and production costs, and enhancing the competitiveness of live e-commerce. For example, by establishing long-term partnerships with suppliers, companies can obtain more competitive prices, thereby strengthening their market position. However, relying on a single or a few suppliers can increase supply chain risks, as issues with suppliers (e.g., production interruptions or quality problems) can directly affect normal operations [9].

4.3. Supply Chain Transparency and Traceability

4.3.1. Integration of Information Systems

Advanced supply chain management information systems make data across all stages of the supply chain transparent, helping businesses monitor supply chain conditions in real time and enhancing trust. For instance, by integrating Enterprise Resource Planning (ERP) systems and IoT technologies, companies can track products from production to sales in real-time, increasing supply chain transparency and trustworthiness. However, integrating information systems requires significant initial capital and maintenance costs, and data security and privacy issues could lead to the leakage of sensitive information.

4.3.2. Real-Time Monitoring of Supply Chain Data

Real-time monitoring of data across the supply chain enables businesses to promptly identify and resolve potential issues, ensuring the smooth operation of live e-commerce platforms. Real-time data

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also supports demand forecasting and inventory management. For example, real-time monitoring data can not only support demand forecasting and inventory management but also help businesses quickly respond to market changes and optimize supply chain operations. However, real-time monitoring systems require high data quality, and erroneous or delayed data can lead to misjudgments, impacting decision-making.

4.4. Supply Chain Collaboration and Coordination

4.4.1. Supplier Relationship Management

Good supplier relationships are central to supply chain management. By establishing stable partnerships, businesses can ensure product quality and stable supply, supporting the continuous development of live e-commerce. For example, regular communication and cooperation enable companies and suppliers to collaboratively solve problems, ensuring the smooth operation of the supply chain and supporting the growth of live e-commerce. However, over-reliance on suppliers may put businesses at a disadvantage in price negotiations, and supplier issues can directly affect supply chain stability.

4.4.2. Collaborative Planning and Forecasting

Collaborative planning and demand forecasting in supply chains enhance cooperation across all stages, improving operational efficiency and reducing risks. For instance, by sharing sales data and market forecasts, supply chain participants can better coordinate production and distribution plans, reducing inventory buildup and supply shortages. However, collaborative planning requires a high level of trust among parties, and information asymmetry in any link can decrease overall supply chain efficiency and increase risks [10].

4.5. Technology-Driven Supply Chain Innovation

The application of big data and artificial intelligence in supply chain management provides businesses with more accurate demand forecasts and supply chain optimization solutions. These modern technologies offer strong support to live e-commerce. For example, by analyzing large volumes of data, companies can more accurately predict market demand, optimize inventory management, and enhance supply chain efficiency. Additionally, AI technologies can help businesses automatically handle various complex supply chain management decisions, improving response speed and decision accuracy. However, the application of these technologies also faces data security and technical failure risks, with high-tech reliance potentially leading to significant operational risks during technical faults [11].

5. Case Study: Gree Electric Appliances in Live E-commerce

5.1. Company Overview

Founded in 1991 and listed on the Shenzhen Stock Exchange in November 1996, Gree Electric Appliances primarily manufactures air conditioning products. Its main home appliance products include household and central air conditioners, along with a diversified portfolio of household appliances and small home appliances. Beyond home appliances, Gree has also ventured into new energy and smartphone businesses. Through continuous innovation and channel model reforms, Gree has maintained a leading market share in the air conditioning industry, establishing itself as a market leader.

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5.2. Success Factors in Supply Chain Management

Gree Electric Appliances excels in supply chain management, first through its robust supply chain management capabilities. Gree effectively integrates supplier resources, ensuring product quality and timely delivery. Through live streaming, a direct sales model that interacts with consumers, Gree can rapidly respond to consumer demands and adjust its supply chain to ensure timely product supply. Gree's brand influence also plays a significant role. As a well-known home appliance brand, Gree has strong bargaining power in supplier collaborations, enabling it to procure high-quality raw materials at more competitive prices, thus enhancing product competitiveness.

Moreover, Gree employs innovative sales models, such as live streaming, to communicate directly with consumers, better understanding their needs and market trends. This allows Gree to promptly adjust product strategies and supply chains to meet consumer demands. Gree has also established an efficient logistics distribution system to ensure timely product delivery to consumers, enhancing the shopping experience [12].

5.3. Achievements and Experiences

Through live streaming, Gree has introduced its products to more consumers and, due to its stable supply chain system, has built a positive reputation among consumers. An efficient and stable supply chain is crucial to successful live sales, enhancing consumer trust and boosting Gree's market competitiveness.

6. Insights and Suggestions for Supply Chain Management

6.1. Enhancing Supply Chain Flexibility and Response Speed

The flexibility and response speed of the supply chain have a significant impact on the success of enterprises in many aspects, including improving market adaptability, cost efficiency, customer satisfaction, and competitive advantage. So there are several key strategies and methods to improve supply chain flexibility and response speed.

6.1.1. Adopting Advanced Supply Chain Management Technologies

The supply chain can integrate internal processes using Enterprise Resource Planning (ERP) systems or optimize supply chain operations using Supply Chain Management (SCM) software. Artificial Intelligence (AI) and machine learning algorithms can also be introduced to predict demand changes and adjust inventory and production plans in a timely manner. For example, by analyzing the sales data of the live broadcast room through AI algorithm, the sales volume of a product can be predicted in various time periods, so as to adjust the inventory and production plan in advance to avoid shortage or excessive inventory.

6.1.2. Real Time Inventory Management

Sensors using Internet of things technology are deployed in warehouses, production lines and logistics transportation to monitor inventory, cargo location and transportation status in real time. Based on real-time data analysis and prediction algorithms, optimize inventory levels, reduce inventory backlog and excess, and lower inventory costs and risks. For example, during live streaming sales promotions, a real-time inventory management system is used to monitor the sales and inventory status of products, replenish them in a timely manner, and ensure that sales are not affected by stock shortages during the live streaming process.

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6.1.3. Supply Chain Visualization

A visual management system can be established for the supply chain at each node to monitor and manage key nodes such as raw material supply, production progress, and logistics transportation in real-time. Improving the transparency of supply chain information through visual management systems can help managers understand the operation of the supply chain in a timely manner, and quickly identify and solve problems. For example, through a supply chain visualization system, live streaming e-commerce companies can track the transportation status of each batch of goods in real time, ensuring that the goods can arrive at the warehouse on time and be delivered to consumers in a timely manner [13].

6.2. Strengthen Information Sharing and Collaboration in Various Links of the Supply Chain

In the modern business environment, the efficiency and synergy of the supply chain are crucial for a company's competitiveness. In order to achieve stronger connections between various links in the supply chain, enterprises can establish a data sharing mechanism to achieve information sharing and collaboration among enterprises. Enterprises can also establish partnerships to achieve information sharing and collaboration by establishing good partnerships with suppliers, logistics companies, and other entities. In the implementation process, enterprises also need to pay attention to protecting information security and sensitive information. At the same time, the accuracy and timeliness of information are also important aspects that enterprises need to review. Therefore, strict information verification and update mechanisms need to be established. Through the above steps and strategies, enterprises can establish an effective supply chain information sharing mechanism, improve information sharing and collaboration capabilities, and enhance their competitiveness [14].

7. Conclusion

Supply chain management improves the response speed of live streaming e-commerce by optimizing logistics and warehousing. Real time supply chain management system enables enterprises to respond to changes in consumer demand in a timely manner, reduce stockouts and backlogs, and improve sales efficiency. The optimization of automated warehousing and inventory algorithms helps enterprises accurately control inventory, reduce inventory costs, and ensure the continuous supply of products in live streaming e-commerce.

In terms of reducing logistics costs, centralized procurement and optimizing transportation routes can effectively reduce logistics costs and improve the profit margin of live streaming e-commerce. The optimization of procurement and production costs can be achieved through close cooperation among suppliers in the supply chain. Enterprises can optimize large-scale procurement and production processes, reduce procurement and production costs, and enhance the competitiveness of live streaming e-commerce.

At the same time, the integration of information systems should use advanced supply chain management information systems to make the data of each link in the supply chain transparent, help enterprises monitor the data of each link in the supply chain in real time, and discover and solve potential problems in a timely manner.

Maintaining good supplier relationships is the core of supply chain management. By establishing stable cooperation and care, enterprises can ensure product quality and supply stability, thereby maintaining the sustainable development of live streaming e-commerce.

In terms of technology driven supply chain innovation, the application of big data and artificial intelligence in supply chain management enables enterprises to more accurately predict demand and

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optimize the supply chain, and these technologies also provide strong support for live streaming e-commerce.

This paper provides recommendations for optimizing supply chain management in live e-commerce, aiding enterprises in enhancing their competitiveness and promoting the sustainable development of the live e-commerce industry. The findings have significant implications for companies aiming to improve operational efficiency and customer satisfaction in a rapidly changing market.

This study has limitations, such as potential biases in the selection of case studies and the continuous evolution of technology and market trends. Future research could incorporate more diverse case studies and emerging technologies to analyze the long-term impact of live e-commerce on supply chain management, further optimizing supply chain strategies.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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