Comparative Study of Fresh Grocery E-commerce Supermarket Supply Chain Models from an ESG Perspective: A Case Study of UK's Ocado

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Abstract. In the wave of digitalization, the fresh grocery industry is experiencing unprecedented significant changes. As living standards improve, consumers' demands for quality and convenience of fresh products are continuously increasing, making the optimization and innovation of the fresh grocery e-commerce supermarket supply chain models extremely important. This paper focuses on the flattened supply chain management of the UK's Ocado and the omnichannel layout of China's Freshippo as the subjects of study, deeply analyzing the advantages of their supply chain models. Through comparative analysis, it explores how Ocado builds its core competitiveness by adopting automated warehousing technology and efficient delivery systems, while also noting that Freshippo achieves rapid responsiveness through the integration of physical stores and online platforms. This paper reveals the challenges and opportunities in cold chain construction, technology application, and distribution model innovation in China's fresh grocery e-commerce, which is beneficial for promoting the sustainable development of China's fresh grocery e-commerce industry and meeting the growing practical consumption needs of the people.

Keywords: ESG, fresh grocery e-commerce supermarket, supply chain model, Sino-UK comparison, Ocado, Freshippo

1. Introduction

In the context of global digital transformation, the fresh grocery industry is facing many unprecedented changes. For fresh grocery e-commerce supermarkets, digital platforms connect fresh suppliers with target users, emphasizing convenience in daily life. Therefore, the innovation and optimization of their supply chain models undoubtedly become key to enhancing consumer satisfaction and achieving sustainable industry development. With the increasing demands of consumers for quality and convenience in fresh products, along with the rapid development of information technology, the fresh grocery e-commerce sector is reshaping traditional market structures at an unprecedented pace.

This study focuses on the flattened supply chain management of Ocado in the UK and the omnichannel layout of Freshippo in China. These two fresh grocery e-commerce supply chain models have not only achieved significant success in both China and the UK but also demonstrate that building a sustainable supply chain has become a new trend and direction for supply chain development. Compared to traditional supply chains, sustainable supply chains rely on more visible supply chain environments, demanding higher standards for information communication and sharing, interaction, and collaboration between upstream and downstream supply chain partners. This enhances the ESG performance of supplier companies [1], illustrates how companies can achieve positive impacts on the environment and communities while pursuing economic benefits, and significantly influences the global agricultural e-commerce sector.

2. Sino-UK Fresh Grocery E-commerce Supermarket Supply Chain Management Models

2.1. Supply Chain Management Model of UK's Ocado Fresh Grocery E-commerce Supermarket

Ocado is the largest B2C retailer in the UK and the largest fresh grocery e-commerce platform [2], as well as the world's largest

online food retailer. The supply chain management model of UK's Ocado is centered on flattening, which by reducing intermediaries, directly connects suppliers with consumers, achieving efficient management of food from the source to the table. Its innovative and efficient approach has had a profound global impact [3].

In terms of operational mode, Ocado primarily uses an online platform supplemented by offline collaborations, forming a unique strategy combining B2C and O2O [Online-to-Offline] [4]. Its online platform focuses on the sales of high-end food, beverages, and household items. The initial cooperation with Waitrose supermarket opened new market opportunities, providing consumers with new avenues for offline experiential purchasing. Moving from online to offline greatly enhances the zero-distance experience for consumers.

In its supply chain structure, Ocado has adopted a self-operated Customer Fulfillment Center (CFC) [5], achieving direct delivery from suppliers to consumers, thereby significantly shortening the supply chain and logistics time. This ensures that goods can be delivered to consumers swiftly. The CFC's innovation in full-category automation management, through the use of intelligent warehousing systems, automates and transparently handles all aspects from order receipt to picking, packing, and dispatching, greatly enhancing work efficiency. This innovative logistics model, while reducing corporate costs and improving operational efficiency, also lays a solid foundation for Ocado's business development.

In terms of product logistics and distribution, Ocado uses refrigerated trucks to provide precise temperature control services, ensuring the freshness of perishable goods. Ocado's business covers over 70% of UK households, offering users a convenient and fast one-stop shopping experience. Ocado's logistics network delivers high-quality service experiences and has established a reliable logistics and distribution system globally [6].

Overall, the core competitive strength of Ocado's supply chain management model is its innovative flattening. This model utilizes automation and technological innovation to optimize the supply chain structure; while improving logistics efficiency, it also increases the transparency of the supply chain. Therefore, this model is key to enhancing industry competitiveness and has set a benchmark in the global fresh grocery e-commerce industry, holding a pivotal position in the sector.

2.2. Supply Chain Management Model of China's Freshippo Supermarket Fresh Grocery E-commerce

As an O2O model "fresh grocery e-commerce" supermarket, Freshippo was established in January 2016. It is a supermarket that integrates "online and offline" operations, striving to deliver high-quality fresh products to consumers within 30 minutes, while also focusing on consumer experience [7].

Freshippo's operational model is characterized by an online and offline, omnichannel layout designed to provide a seamless shopping experience. The first innovative point of Freshippo's offline business module is the combination of "e-commerce + offline supermarket + dining," centering on physical stores while integrating online e-commerce with offline outlets. The second innovation introduces a dining option within the supermarket, offering fresh produce processing services, which extends the time customers spend in-store and increases customer loyalty.

The supply chain management structure of Freshippo employs a dual-level warehouse system, comprising "forward-deployed warehouses" and "central warehouses." The "forward-deployed warehouses" are closer to consumers, handling rapid order responses and localized delivery. The "central warehouses" are responsible for replenishing the "forward-deployed warehouses" and handling large-scale procurement. This dual-level storage model ensures the freshness and delivery efficiency of goods while maintaining a rich variety and stable supply of products, thus gaining consumer trust and recognition.

In its operations, Freshippo emphasizes direct cooperation with agricultural producers and manufacturers, reducing intermediate redundancies through direct sourcing at the origin, thereby ensuring product quality. Additionally, Freshippo utilizes big data technologies to precisely predict market demand and manage dynamic inventories, minimizing product loss and enhancing overall operational efficiency [7].

Technologically, Freshippo effectively integrates various tools such as the Internet of Things and artificial intelligence for intelligent management. For example, Freshippo uses self-checkout and electronic price tags to enhance service efficiency. It also employs intelligent algorithms to optimize inventory management, delivery routes, and promotional strategies, achieving refined operations. Furthermore, Freshippo actively uses emerging methods like live-streaming e-commerce to enhance interaction with consumers, increasing brand loyalty and recognition.

The development of Freshippo is strongly supported by Chinese government policies aiding agricultural e-commerce. Subsidies and preferential measures provided by the government, along with investments in cold chain logistics infrastructure, have created favorable conditions for optimizing Freshippo's supply chain management, reducing costs, and enhancing its market development and competitive advantage.

The characteristics of Freshippo's supply chain management model are "omnichannel layout + direct sourcing + technological innovation + government support." It is dedicated to integrating convenient and quality services, demonstrating the vitality of China's fresh grocery e-commerce in local innovation and serving as a model for other e-commerce enterprises. However, Freshippo still needs to continuously optimize and innovate to maintain a unique competitive advantage in the ever-changing market and consumer environment.

3. Comparative Analysis of Sino-UK Fresh Grocery E-commerce Supermarket Supply Chain Models

3.1. Flattened Supply Chain Management

Flattened supply chain management is an organizational form aimed at reducing intermediaries and enhancing efficiency, primarily reflected in supply chain structure, operational efficiency, and response speed.

In the UK, Ocado's flattened supply chain model is prominently manifested in its self-operated Customer Fulfillment Centers (CFCs) that directly connect suppliers with consumers, significantly reducing the middle stages typical of traditional supply chains. The intelligent warehousing systems and robotic technology at CFCs enhance the transparency and efficiency of the supply chain. Additionally, Ocado's direct collaborations with farms ensure the origin quality and freshness of products throughout the logistics process. In a sense, Ocado achieves efficient management throughout the entire journey from storage to delivery, from supermarket to table, capable of rapidly responding to market demands and providing efficient delivery services [8].

In contrast, the flattened supply chain management of China's Freshippo revolves around an omnichannel layout and local integration, implementing a dual flattening in the supply chain through the "forward-deployed warehouse + central warehouse" model. The forward-deployed warehouses, being closer to consumers, enable rapid order response, while the central warehouses ensure stable supply sources. Direct collaboration with farms and big data predictions allow Freshippo to achieve dynamic management while reducing inventory and waste. However, Freshippo's omnichannel model also challenges the principles of flattened supply chain management to some extent, such as synchronizing online and offline inventories and integrating multi-channel orders, which adds complexity [9].

In terms of response speed, Ocado benefits from an automated, efficient delivery system that quickly meets consumer needs. Freshippo, through the integration of forward-deployed warehouses and online-offline operations, achieves rapid pickup or delivery, but its omnichannel complexity may limit its response speed in some cases compared to Ocado.

Both Ocado and Freshippo have achieved significant success in flattened supply chain management, yet there are differences in their model design applications and market adaptability. Ocado's model design primarily emphasizes technology-driven operational efficiency; whereas Freshippo combines technology with the market to form a unique Chinese-style omnichannel model, showing innovation in market adaptability. This reflects the differences in market characteristics and consumer behavior between China and the UK, providing insights and inspiration for optimizing sustainable supply chain models.

3.2. Omnichannel Layout for Online and Offline Channels

The omnichannel layout that integrates online and offline channels has become a key strategy in fresh grocery e-commerce supermarkets to enhance consumer experience and expand market share.

Ocado's online platform is its primary sales channel, focusing on the online sale of high-quality products and offering consumers a convenient one-stop shopping experience. Through its collaboration with Waitrose supermarket, it has achieved an integration of the O2O (Online-to-Offline) model, meeting increasingly diverse consumer needs and strengthening brand recognition. Additionally, through virtual window shopping and offline physical store interactions, Ocado not only provides more premium products but also increases face-to-face contact with consumers, compensating for the lack of interactivity and immediacy in a purely online model [10]. As a result, it has gained greater trust and recognition from consumers.

In contrast, China's Freshippo has a richer and more localized omnichannel layout. Freshippo offers an instant consumption experience to its target customers, integrating supermarket, dining, and delivery functions into one, with "Hema stores" at the core of its offline operations. Additionally, Freshippo's online platform—the Freshippo APP—allows consumers to enjoy delivery services as fast as 30 minutes after placing orders via their smartphones. This combination of "online + offline" and "in-store + home delivery" dual modes enables Freshippo to quickly respond to consumer needs in various scenarios.

The "forward-deployed warehouse + central warehouse" model in Freshippo's supply chain management integrates well with its omnichannel layout, providing robust support. The forward-deployed warehouses ensure the freshness and speed of delivery, acting as rapid response hubs, while the central warehouses take on the responsibility of stabilizing overall inventory and supply. This dual assurance mechanism enables Freshippo to achieve seamless omnichannel integration, quickly responding to order fluctuations and providing consistently high-quality service.

Technology plays a crucial role across the entire channel layout. Ocado's automated warehousing systems and intelligent delivery technologies, and Freshippo's applications of the Internet of Things and artificial intelligence, such as self-checkout and smart algorithms, all enhance operational efficiency and improve the shopping experience. Both utilize big data for personalized recommendations and efficient merchandise allocation, engaging in precise marketing and dynamic inventory management.

The policy environment also significantly impacts the omnichannel layouts of e-commerce in both countries. Support from the Chinese government for agricultural e-commerce, including subsidies and infrastructure development, has laid a solid foundation for the growth of Freshippo; meanwhile, the market environment and regulations in the UK have greatly supported Ocado's innovation. The policy environments and market receptivity in both countries to some extent determine the feasibility and speed of their respective omnichannel layouts.

The comparison of omnichannel layouts between Ocado and Freshippo reflects their distinct characteristics and advantages in market environments, consumer behavior, and technology application. Ocado emphasizes optimizing the online experience and

integration with physical outlets, while Freshippo, based on its omnichannel layout, places greater emphasis on localized service and immediate consumer experiences. Freshippo's approach, which leverages the complementarity of online and offline modes, provides a wealth of practical examples for sustainable innovation in the global fresh grocery e-commerce industry.

4. Research Conclusions and Prospects

In the 21st century, green and sustainable development has garnered widespread attention, with fresh food and its supply chain being a focal point for sustainable development efforts. By analyzing the success experiences and development strategies of the UK's Ocado in sustainable development concepts and supply chain operations, and comparing these with the supply chain model of China's Freshippo, several conclusions can be drawn.

Firstly, the innovation of sustainable supply chain models is extremely important. Ocado, with its highly automated and flattened supply chain, has successfully established a global model for fresh grocery e-commerce, while Freshippo has achieved success in meeting diverse consumer needs through its omnichannel layout and localization strategy. Secondly, Ocado's automated warehousing system and Freshippo's extensive application of the Internet of Things and artificial intelligence demonstrate that technology is key to optimizing supply chains, utilizing big data and new information technologies to provide precise product marketing and personalized services. Lastly, market adaptation and localization of fresh supermarkets play a crucial role when entering a new environment. Ocado's success in the UK is due to the market's demand for high quality and efficient delivery. Freshippo, on the other hand, has tailored its approach to fit the preferences of Chinese consumers, creating a unique Chinese-style fresh grocery e-commerce model through the integration of online and offline channels and an omnichannel layout.

To address potential risks in e-commerce supply chain management, the related industries should innovate digital supply chain models, focusing on information risk and collaboration risk. Furthermore, integrating online and offline resources with relevant retail chains to strengthen the flexible design of supply chains is advisable. Most importantly, advancing the standardization and application of cold chain logistics and improving the execution efficiency of cold chain transportation management will promote sustainable development in the future. The diversified strategies adopted by the fresh grocery e-commerce industry supply chain, such as integrating innovative technologies, strengthening upstream and downstream supply chain relationships, enhancing information transparency, and improving crisis response capabilities, are conducive to promoting sustainable development and efficiency enhancement of the entire supply chain.

Through these digital and sustainable strategies, the related industries should focus on technology integration and upgrades, ensuring transparency in information sharing across the supply chain, and engaging in localized market innovations aligned with ESG sustainable development principles. The fresh grocery e-commerce industries in China and other countries are expected to further enhance supply chain efficiency, reduce corporate cost wastage, and pay attention to environmental protection, social fairness, and governance transparency. This aims to achieve sustainable development and meet consumer demands for green and responsible consumption. Additionally, the successful experiences of Ocado and Freshippo provide valuable references for the global fresh grocery e-commerce industry, facilitating supply chain synergies, offering valuable lessons, and driving the entire fresh grocery e-commerce supermarket industry towards higher levels of development.

Authos' Contributions

Qifan Huang and Mengmeng Chen contributed equally to this paper.

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