

Digital Technology Coverage of China's Fresh Food Retail Industry Chain in the Digital Context

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Abstract. China's fresh food retail industry is quickly evolving digitally as a result of COVID-19. At this time, researchers have discovered challenges in the application and execution of China's fresh food retail industry, but these concerns have not been uniformly studied and explained. This paper discussed the impact of digital technology on the retail industry. This paper concluded that the market share of the farmers' market took the biggest proportion, and there was a change in the demand of consumers because of COVID-19. The digital platform was growing while there was a lack of digital technology implementation of logistics links and storage. The implementation of digital technology lacked a fully covered digital process which may lead to the absence of transparency and the instability of sourcing ingredients. The application efficiency was low because of severe challenges in reconstructing the operation and retail concept and the issue of controlling cost. This paper provided suggestions to improve product quality and industrial efficiency.

Keywords: Fresh food retail industry, digital technology, product quality.

1. Introduction

The COVID-19 epidemic is one of the most serious worldwide health crises in contemporary history. Like every other industry, China's fresh food retail sector has been severely impacted by the current pandemic which continues to hold back consumption spending and retail revenue. But this shock of uncertainty is both a challenge and an opportunity. The fresh retail industry has been compelled to adjust to the contemporary social setting because of the limits imposed by the epidemic. With changes in customer demand and government policy constraints, the fresh retail industry has also shifted its industrial chain from traditional to more digital and efficient working techniques, resulting in the flourishing of new retail technologies and online channels. In 2022, 70% of the digital capacity building focuses on the retail industry are front-end channels and Omnichannel operations. However, only 36% focuses on Digital supply chain and 21% on automatic inventories, which indicates that the Chinese fresh retail industry lacks a digital process that covers all businesses. In recent years, the available research has primarily focused on the digital transformation and future evolution tendencies of China's fresh retail industry. In recent years, the available research has primarily focused on the digital transformation and future evolution tendencies of China's fresh retail industry. This paper used qualitative analysis to elaborate on the application of digital technology in the fresh retail industry and analyzed the main problems that existed in the current operation of the fresh retail industry, including the lack of digital translations on logistics and inventories. And will explain the disadvantages of the digital industry's inability to cover the complete business process and offer related recommendations [1].

2. Overview of Digital Technology in China's Fresh Food Retail Industry

With the acceleration of new e-commerce models and technologies, the penetration rate of fresh food e-commerce is rapidly increasing. In 2021, the size of China's fresh food e-commerce market was 311.7 billion yuan, a year-on-year increase of 18.2%, and it is expected to reach 419.8 billion yuan by 2023, according to the data of the State Administration of Market Supervision and management of the supervision and administration of China.

The change of 5G to the retail industry is unpredictable, and it has brought earth-shaking changes to the retail industry. With the development prospects of low delay and large capacity, consumers in the 5G era have more complete knowledge of goods, ever-changing habits of expensive consumption, and more possibilities for personalized experiences based on customer data. The consumption scenarios presented in front of users are diversified, shopping has become fragmented, and the touch points of merchants and consumers have grown. Although physical retailers are aware of the importance of digital transformation, limited by human and financial resources, they cannot subdivide the individual needs of consumers, and cannot label the management of consumers, resulting in the backward problem of personalized consumption experience in online operations.

Under the development of the digital economy, customers' consumption habits are constantly changing, the market share of the traditional retail industry is declining, and the competition in the homogenized physical retail industry is intensifying. Due to obvious brand differentiation and low added value of products, more and more retail enterprises are faced with a survival crisis. In 2017, the total domestic retail sales increased, but more than 90 shopping malls in China were closed, which shows that the individual retail industry faces homogenization competition and has no opportunity for transformation and development [2].

2.1. Current situation of the fresh food retail industry

COVID-19 has significantly impacted the fresh retail industry, disrupted existing supply and demand chains while created new ones. In China, fresh retail channels can be broadly categorized into farmers' markets, supermarkets, and fresh e-commerce suppliers. Farmers' markets still dominated in 2021, The proportion of private markets in farmers' markets was relatively high, about 47.50%. The number of mixed ownership markets was relatively small, about 10.84%. The proportion of state-owned farmers' markets was about 23.33%; The collective ownership market accounted for about 18.33%, according to the information from the China Chain Store & Franchise Association.

2.2. Application of digital technology in the Fresh food retail Industry

Digitalization became more than just expanding channels as the retail industry faced a slowdown and declining profits. It also needed to drive efficient stores, goods, and supply chain operations to reduce costs and improve efficiency. The era of relying on "traffic dividends" for retail, whether online or offline, has passed. The previous model of "subsidies for growth" is no longer sustainable. Retail enterprises now need essential capabilities such as omnichannel strategies, refined traffic management, and basic user operation skills to maximize the value of their customer base.

Consumer demands have become more rational and personalized. Therefore, retailers should focus on the core aspect of "commodity operation" by offering high-quality products that meet users' needs. Stores have evolved from mere purchase channels to playing multiple roles, such as user experience centers, operational hubs for customer interactions with the brand, and instant delivery fulfillment centers.

To adapt to these consumer behavior and market dynamics changes, retail enterprises must undergo digital transformation by upgrading their stores and improving front-line personnel operations.

A recent study by the Food and Nutrition Development Institute of the Ministry of Agriculture and Rural Affairs revealed that the weight-weighted average loss and waste rate of seven categories of vegetables, fruits, aquatic products, grain, meat, milk, and eggs in China is 22.7% per year, about 460 million tons, of which 300 million tons of food are lost in the production and circulation link. The reporter's investigation found that extensive sowing in the production link, poor harvesting, and imperfect cold chains in the storage and transportation links are the main reasons for food loss. The existing challenges within fresh cold chain logistics pose significant obstacles to industry development [3].

However, with the increasing emphasis on quality control and enhancing consumer shopping experiences by today's fresh e-commerce sector, investments are gradually being made at both ends of the cold chain – namely, production warehouses located near agricultural hubs and offline stores

or pre-warehouses situated close to consumption areas – aiming to address the critical issues associated with "first kilometer" and "last kilometer" demands in fresh e-commerce.

However, consumers prioritize the safety and quality of products and trendy organic options in the market (organic food consumption growth rate is twice that of regular food according to the data from the online shopping platform, Jingdong). China's production links follow an overall pattern of small-scale and large-scale circulation. Scattered small farmers characterize the production landscape as the primary producers. Geographically, China encompasses various landforms, these diverse topographies, combined with monsoon circulation patterns, result in a range of climates such as tropical, subtropical, and temperate monsoon climates and temperate continental, plateau mountain, and marine climates. Land fragmentation coupled with variations in light distribution, heat levels, water availability, gas composition, and soil characteristics contributes to the "small-scale production" pattern observed in fresh agricultural products across China. This leads to fragmented distribution channels, forming the "small-scale production and large-scale circulation" model for fresh agricultural products within the country.

Consequently, the supply chain becomes lengthy with multiple levels due to connecting dispersed producers with relatively scattered consumer markets through market configuration. According to statistics from the China Logistics Statistical Yearbook, China's fresh produce supply chain generally consists of more than five links. The United States operates on a large-scale production and circulation model where nearly 80% of agricultural products reach consumers directly from their origin. In comparison, the remaining 20% are sold through graded wholesale channels. Circulation infrastructure conditions are poor, resulting in high losses, according to a China Cold Chain Committee report.

3. Problems in the Implementation of Digital Technology in the Fresh Food Retail Industry

3.1. Lack of Digital Technology Implementation of Logistics Links

Farmers' markets predominantly dominate the fresh retail industry since they are the primary source of agricultural goods. Unlike other players, such as supermarkets and online vendors, who rely on purchasing from farmers before transferring items across different platforms for selling purposes, this approach introduces a significant delay between consumers and their desired produce. Given that freshness is crucial due to limited shelf life, alternative logistics systems are inadequate for meeting this sector's demands. Conversely, traditional farmers' markets encourage direct consumer engagement through physical visits while allowing producers (i.e., farmers) to showcase and vend their offerings. What is more difficult for the distribution of online cold chain food is that the lack of cold chain storage cabinets after the delivery of the goods by the distributor is affected by the weather, which can easily lead to food safety problems. In addition, the cold chain logistics service network should be promoted to sink to the countryside, the government and market should encourage and guide postal express delivery services, supply and marketing cooperatives, e-commerce, and commercial circulation entities to make use of the advantages of existing circulation networks to improve the functions and service capabilities of cold chain logistics facilities, optimize the transport of goods in the first place, trunk and branch connections, and rural express distribution, extend the cold chain logistics service network to rural areas, and create new two-way cold chain logistics channels for agricultural products to go up and fresh consumer goods to go down [4].

3.2. Lack of Digital Technology Implementation of Storage Links

The fresh market of goods from a variety of sources, many types of goods, and many categories of goods require special temperature and humidity storage conditions, and based on food safety and seasonal consumer requirements for freshness, warehousing needs to have a high degree of timeliness, resulting in higher prices of fresh food warehousing. A digital system is needed to carry out statistics

and detection functions, so as to achieve timely information updates and efficient information integration. The adjustment of the freezer and the taking and placing of the goods are not suitable for manual operation, and some mechanical devices such as mechanical arms can be applied to the operation through system control. Some of the above measures in the current domestic fresh market application are not enough for the entire industry. The number of cold stores in China reached 52.24 million tons, which can only meet less than 20% of the demand. The number of refrigerated trucks with legal entities reached 143,649, but the refrigerated transportation rate of fruits and vegetables, meat, and aquatic products was only 35%, 57%, and 69%, far lower than the average level of 90% in Western developed countries. Most cold chain warehouses are small and scattered, the number of subscribers is small, from the production site to the consumer terminal has not established a unified data network, greatly extending the shelf time of products, and goods at all levels of transit and coordination increased costs and prices.

3.3. Insufficient Coverage of the Implementation of Digital Technology

Due to the limited shelf life of fresh products, the cold chain and local warehouses must be highly compatible. However, digital technology faces challenges in penetrating traditional farmers' markets. An information exchange platform must share valuable resources among different operational links. Domestic enterprises have yet to significantly improve data collection and information exchange, resulting in a flat communication system. This absence of a platform leads to a lack of real-time communication, joint operations, and standardized information collection and exchange methods. This issue significantly influences warehouse aspects such as scheduling, with insufficient macro and micro decision support information.

Consequently, without unified information implementation throughout the system, differences arise in technology, organization, and other aspects at each link. This can even lead to distorted or delayed data needing more generality and accuracy. As interconnectedness between various links is affected by these challenges, complete information sharing becomes impossible. Accurate transmission of demand cannot be achieved either, which ultimately hampers high levels of unity and coordination within warehousing operations – similar to warehouse management systems.

3.4. Absence of Traceability

Food traceability is critical for minimizing and managing food safety risks across the supply chain. Nowadays, numerous factors, such as severe weather during shipping, poor warehouse management, delays, and so on, can have an impact on the quality and safety of goods. Most sectors have used digital technology to improve accuracy, speed, and efficiency in food packing and distribution. However, because of the lack of transparency in the transportation process, it is impossible to track which procedure the product went wrong in case of quality and safety issues, allowing statistics and improvement to be conducted [5].

Sharing information from every stage of the food supply chain improves food safety, brand integrity, and customer loyalty. From the consumers' side, many clients today regard traceability, or the ability to track a food product through all phases of the manufacturing process, to be a requirement rather than a request. Many consumers demand to know where all their products and materials, including trace ingredients, come from.

3.5. Low Implementation Efficiency of Digital Transformation

Now, many grocery retail businesses are aggressively researching digital transformation and all channels. Walmart, for example, has adjusted and shuttered stores with inadequate performance in recent years while actively discussing digital and omnichannel transition. However, digital transformation also faces inevitable challenges for the fresh retail industry including reconstructing the operation and retail concept and the issue of controlling cost.

3.5.1. Reconstructing the operation and retail concept

The omnichannel transformation of retail stores demands systematic planning and thorough reconstruction rather than merely relying on existing stores, products, and models. Like the operation of Freshippo, it is required to abandon the current retail concept and model, which is primarily focused on arriving at stores, and rebuild the retail concept and model, which is primarily focused on arriving at home.

Demand differs significantly between home and shop, with various target groups, supply chains, and demand models. So, for current retail firms to transition to Omni channels, it is required to first predict the direction of anticipated future retail transformations precisely. If online fresh retail is to become the primary retail route, alterations and adjustments must first be made to the current store-based retail [6].

3.5.2. issue of controlling cost

Fresh e-commerce has had a period of highlight and is now in a phase of adjustment, with Miss Fresh Limited losing 3.8 billion yuan per year. The APP is no longer working effectively, indicating the vulnerability of new e-commerce. The shortcomings of new e-commerce are clearly obvious. It is difficult to control fresh food loss in the supply chain, and the high cost of contract fulfillment makes profiting from fresh e-commerce challenging. The supply chain for fresh retail is relatively long, with at least five phases involved. The more stages of circulation there are, the more price rises there are [7].

4. Suggestions

Fresh food has a high market penetration and is a significant source of traffic and loyalty.

It also has a strong halo effect, which means that if customers are pleased with a retailer's new goods, their perception of the retailer's other departments increases as well, resulting in increased consumer traffic and greater overall sales. If the modern retail industry focuses on the insurance of the quality and safety of products and integrates digital technology into every process of the supply chain, the fresh food retail industry will be in a good position.

4.1. Apply Blockchain Technology

Blockchain technology is a distributed digital platform that allows users to store and exchange data across a network. This technology allows users to view all transactions concurrently and in real-time.

Because transaction recording is reasonably persistent, verification may be trusted. Daily, hundreds of transactions are completed in the retail business, and it has become extremely difficult to record them simply on the computer due to storage and retrieval limits.

This technology has the potential to provide the transparency, traceability, and trust that has long evaded the food sector. Because of its unchangeable data, the system can provide manufacturers, suppliers, distributors, retailers, and consumers with reliable information on the origin and state of each product [8].

4.2. Ensure the quality and safety of fresh food

The process of making high-quality items and assuring their safety begins with the careful selection of ideal raw materials and the strict adherence to acceptable manufacturing standards [9]. To protect both the freshness and safety features inherent in the items, the prudent use of appropriate packaging materials and processes is critical. The final phase necessitates the careful selection of a reputable logistics partner. The use of telematics technology allows for real-time monitoring of supply chain dynamics, including the flow of goods and the maintenance of specified temperature settings, which is especially important for refrigerated or cold chain items [10].

5. Conclusion

Through the above research and analysis, we concluded that the digitalization of China's fresh retail industry was the only way to go. However, due to the particularity of fresh food, other retail models cannot be directly applied, and warehousing and logistics technologies and applications that are highly consistent with the industry are needed. There has been some implementation of digitization in some areas, but there is a lack of complete coverage of the digital process. The use of digital technology will promote the unification and informatization of the fresh retail industry, but it is worth noting that for the fresh market that is still dominated by traditional sales methods, digital transformation is a long-term process, and some digital fresh retail enterprises that have grown up also lack the support of management experience and theoretical system. This paper focused on the development of emerging enterprises in the industry, and there is a lack of research on the transformation of traditional markets. Therefore, it is necessary in future studies to continuously strengthen the depth and comprehensive coverage of digital technology for the upstream-to-downstream industry chain of the industry, so as to provide support and impetus for enterprise competition and industry development.

Authors Contribution

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

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