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Digital Applications for the Catering Industry in the Context of New Infrastructure Construction

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Abstract: Along with the policy implementation of new infrastructure construction, the penetration of digitalization into various industries has intensified. This paper takes the catering industry as an object, analyses its current situation, and studies its main development directions characterized by digitalization. It also explicitly selects three aspects supply chain, ordering mode, and financial management, and points out the problems that exist in each of them, such as platform construction, human and material resources, and the inability to meet the new demands of the industry. It also analyses the immediate digitization achievements and relevant cases, affirms the current application to enhance the catering industry, and clarifies the digitization. The study concludes that the digitalization of the catering industry is still at a preliminary stage of uneven development and low level. However, it has developed rapidly and has a promising future, driven by the new infrastructure background. Help the catering industry improve quality and efficiency, and promote high-quality development.

Keywords: new infrastructure construction, catering industry, digital applications

1. Introduction

After years of development and market competition, China's catering industry has entered a new stage of diversification of investment subjects, diversification of business modes, chaining of business models, and industrialization of industry development. In recent years, the market size of China's catering industry has continued to grow, breaking through 2 trillion in 2011, 3 trillion in 2015, and 4 trillion in 2018, reaching 4.27 trillion, accounting for 4.7% of the national economic output. However, as the traditional catering industry has high operating costs, especially fixed costs such as rent, the homogenization of similar merchants' products is serious. A significant information barrier between merchants and consumers brings enormous operating pressure to catering merchants. In the context of the development of "digital new infrastructure", the catering industry can use cloud computing, big data and other technologies related to the development of new infrastructure to dig deep into the catering consumption needs of social groups, effectively provide personalized solutions through artificial intelligence algorithms, and help visualize catering service orders, service processes and

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service results. The company has been able to improve the efficiency of customer management in the catering industry and thus achieve the digital transformation and upgrading of the catering industry.

New infrastructure and the food and beverage industry have received much attention and research from scholars due to their importance. At present, existing studies have shown that new infrastructure is characterized by "new dynamics, new scope and new area" [1]. New infrastructure is usually built on the basis of traditional infrastructure, not only to make up for the shortcomings of traditional infrastructure, but also to emphasize the use of data as a factor in the construction of information networks, accelerate industrial innovation and integration, and give birth to new business models [2]. In the context of the new infrastructure, there is also more research on the Internet economy related to the restaurant industry. For example, Internet economy and catering industry are studied from the perspective of consumers. Some scholars have studied the development of catering industry under the O2O model from the perspective of the consumer psychology and behavior of college students and the characteristics of catering industry. And put forward some suggestions to grasp consumer groups [3]. There are also qualitative analyses to study the impact of the Internet economy on the catering industry, and it is proposed that the fundamental way for enterprises to survive is the development of products and services [4].

Based on the development report of the traditional catering industry and previous studies, this paper explains the problems of the traditional catering industry in terms of the product supply chain, ordering, and financial aspects. In the context of vigorous development of new infrastructure construction, it analyses the role of 5G infrastructure, Internet+, artificial intelligence, big data centers, and urban rail transportation in helping the catering industry solve the above problems. And then put forward the aspect channels of digital application in solving these problems, combined with case studies, and propose the digital transformation of the catering industry in these three aspects.

Under the strategic background of the country's vigorous promotion of new infrastructure construction, this study adopts the literature analysis method to study relevant literature at home and abroad, so as to provide research ideas and development direction inspiration for the transformation and upgrading of the catering industry. At the same time, it will help promote the integration of new infrastructure and the catering industry, and contribute to accelerating the digital transformation of the catering industry, so as to help the catering industry improve quality and efficiency and promote high-quality development.

Due to the lack of domestic and international research on the analysis of the multifaceted connection between the background related to new infrastructure and the catering industry, this paper can provide a complete development idea for the related field.

The structure of this paper is as follows: the first part introduces the research background of the paper, analyses the current situation of related literature at home and abroad, and elaborates on the research content and significance of digital application in the catering industry in the context of "new infrastructure"; the second part analyses the current situation of the catering industry, and puts forward the problems of the supply chain, ordering system, and financial management in the traditional business model; the second part analyses the current situation of the catering industry. The third part introduces the application of digital technology in the supply chain, ordering mode, and financial management in the context of new infrastructure. The fourth part summarises all the work in this paper, makes suggestions for the digital application of catering, and points out better development ideas for the digital application of catering to provide a necessary reference for the following research work.

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2. Current Situation and Problems of the Catering Industry

2.1. Development Status

2.1.1. The Current State of the Catering Industry

The overall size of China's catering industry is on the rise. According to the National Bureau of Statistics, the size of the catering industry exceeded RMB3 trillion in 2015 and RMB4 trillion in 2018, reaching RMB4.27 trillion, and grew to RMB4.7 trillion in 2019, up 9.4% year-on-year. Despite the severe impact of COVID-19 in 2020, the catering industry revenue fell by 16.6% year-on-year to RMB3.95 trillion. The catering industry has gradually recovered to pre-epidemic levels in 2021 and is expected to exceed RMB6 trillion in 2024 [5].

Figure 1: Revenue of China's catering industry from 2016 to 2024.

In addition, the ability of social media to drive the catering industry is becoming increasingly evident, and the digital transformation and capitalization of the catering industry are in full swing, with the development of takeaway as a new element driving the industry.

2.1.2. The Current Development of the Leading Companies

In terms of revenue, the driving effect of head enterprises in the catering industry is evident. Many listed catering enterprises, such as Haidilao, Jiumaojiu, and Zhongke Yunnet, achieved positive year-on-year revenue growth in the first half of 2021. In terms of the number of shops, according to the China Chain Store and Franchise Association report, the number of net new shops per year remains stable for both listed catering companies and unlisted head catering companies [6]. In terms of digitalization, the penetration rate of the shops of the top catering brands in the front-end aspects, such as cashier and membership system, is high, reaching 60-80%. At the same time, there is still more room for improvement in the digitalization of shop location and back-end approval [7].

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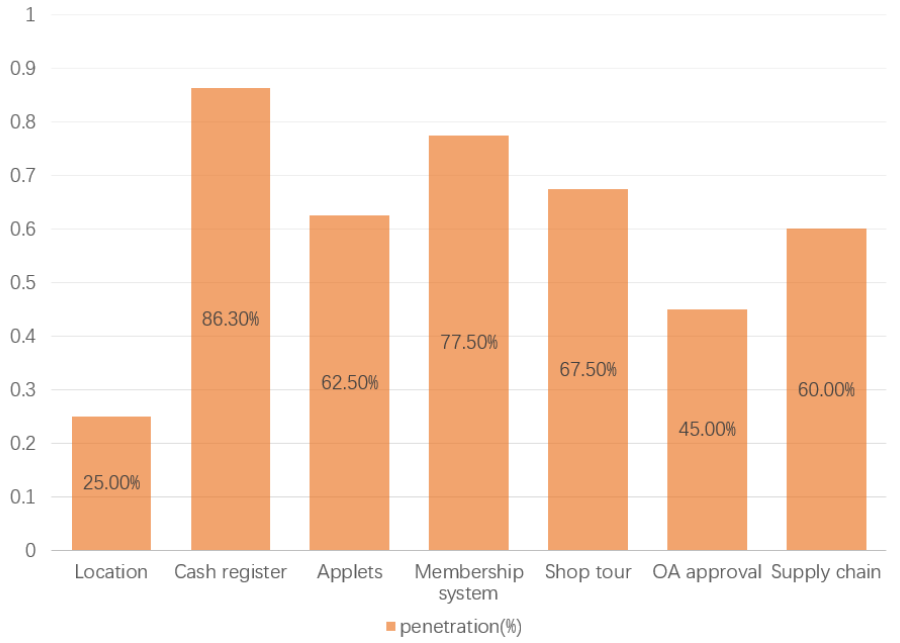

Figure 2: Digital service penetration rate of China's top catering brands in 2021.

2.2. Existing Problems

Along with improving people's living standards, there are new requirements for the quality of the traditional catering industry. This paper selects three perspectives on the supply chain, ordering, and finance to analyze the problems.

2.2.1. Problems with Supply Chain

Currently, small and medium-sized enterprises (SMEs) are still the mainstay of the market, and the companies themselves solve supply chain problems. However, the supply chain covers an extensive range, and SMEs cannot operate a complete set of supply chains on their own, which makes it difficult to standardize the industry. Moreover, at the same time, the enterprise is not strong, and there is a risk of the capital chain breaking, making it difficult to form a scale effect. Furthermore, China's rich culinary culture and the apparent differences between different cuisines make the catering industry have a high demand for diversity of ingredients. The diversity of ingredients can lead to a strong cyclicality upstream of the supply chain, making integrating the industry more challenging.

The supply chain, from the beginning to the end, requires the participation and linkage of logistics. However, there is no standardized logistics standard in the industry at present. The logistics resources used by enterprises of different magnitudes are also vastly different, and unfair competition is typical. As far as the supply chain is concerned, there is still a lack of a platform with sufficient resources and corporate recognition, which does not facilitate the flow of relevant information.

2.2.2. Problems with Traditional Ordering Models

For a long time, the catering industry has been suffering from the problem of high labor costs. Labor costs in the catering industry accounted for 21.4% of operating revenue in 2019. They still remained one of the three core costs of the catering industry in 2021, accounting for 15-20% of operating revenue [7]. In addition, the education level of restaurant staff is generally low, and companies are

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spending more on staff training. In the trial stage of digital application and transformation, many restaurants still use only or more manual ordering.

In the traditional ordering mode, long queues of ordering on-site during peak periods, slow food delivery, and wrong dishes are frequent, thus reducing the dining efficiency and dining experience of customers. At the same time, information asymmetry is more likely to occur in the traditional ordering mode, making it more difficult for service staff to communicate with the back of the house. Not being able to learn about ingredient stocks instantly is also a cause of low dining efficiency.

2.2.3. Problems with Finance

When the catering industry purchases raw materials, the characteristics of raw materials, such as diversity and price volatility, and the profit-seeking mentality of purchasers, such as misrepresentation of prices, second best, and unplanned purchases, significantly increase the cost of the business.

Accounts receivable in the catering industry are mainly in the form of cash, swipe cards, and sign-offs, which, together with favors and other reasons, lead to discrepancies between the book price and the actual price. At the same time, when a settlement of accounts uses the public money signing method, as the signing is decided by the leaders and executed by the staff, thus conflicts may arise with the customers during the collection process.

Many financial departments in the catering industry in China still retain the bookkeeping, collection, and entry model, thus resulting in more information barriers and a lack of a sound information management system in the catering industry. If there is more business in the catering industry, this can significantly slow down the level of business and ultimately affect the level of revenue of the catering industry.

3. Digital Applications in the Catering Industry

3.1. The Digitalization of the Supply Chain

3.1.1. Intelligent Supply Chain

Catering companies emphasize cooperation with upstream enterprises by relying on big data and the Internet of Things to develop logistics plans. With the addition of 5G technology, sharing resources and information will be more timely and fast. Furthermore, logistics enterprises are developing into supply chain management companies nowadays. They monitor the cyclical growth of ingredients in artificial intelligence as well as ensure the ingredients' quality and freshness with more mature cold chain logistics networks, and then promote the professional development, integration of logistics and supply [8].

Taking the entry point to the catering enterprises, the big data is gradually extended to the whole supply chain, including upstream suppliers, distributors, logistics enterprises, and central kitchens, until the final consumers realize the standardization of catering industry processes through information and automation. The transparency of the whole process of catering serves IoT technology so that consumers can eat safely and securely. In addition, catering enterprises can enhance the coordination and cooperation with the upstream and downstream of the industry chain through the digital platform, connect the data in the whole chain to achieve intelligent ordering and intelligent supply, and reduce inventory to avoid waste.

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3.1.2. Case Study

The U.S. Xiahui Group, a logistics company with the world's leading multi-temperature food distribution technology, undertakes all aspects of McDonald-related supply chain services.

McDonald's requirements for logistics services are relatively strict. McDonald's requires Harvest to provide a one-stop logistics service, including production and quality control. In this way, all of the bakery factories in Taiwan were equipped with unified auto-production lines, and manufacturing areas were separated from the deli areas, abide from which, air conditioning and ceilings were installed in the factories to isolate dust so that it can make them easy to clean, and strict food as well as operational safety standards were also applied. McDonald's uses the logistics centre by Xiahui to complete a series of work for each of its restaurants, such as ordering, storage, transportation, and distribution, so that the entire McDonald's system can function correctly. Through its coordination and connection, each supplier and each restaurant can achieve smoothness and harmony, providing the best guarantee for the food supply of McDonald's restaurants [9].

3.2. The Digitalization of Food Ordering

3.2.1. Intelligent Ordering Systems

Intelligent ordering integrates traditional menu with Internet information technology to form an electronic menu system which directly connects customers' demand with the front and back kitchen and reduces the different links, interaction of personnel, the problem of serving the wrong dish, the reliance on manual labour, as well as the labour costs. At the same time, the ordering interface is connected to the back kitchen to reduce the inefficiency caused by information asymmetry and to realize the improvement of dining efficiency.

Docking intelligent ordering system and membership management system is also significant reflection of the digitalization of ordering. Compared with 2020, the survival rate of stores with a membership system will increase 2021, while the survival rate of stores without a membership system will decrease [7]. Some companies not only integrate "membership + ordering + shopping mall" with other businesses combining big data, the Internet and digital technologies to communicate store offers and features with consumers in real-time, but also develop them into program software with the function of attracting new traffic and marketing, and then develop private domain operations to achieve increased profits.

3.2.2. Case Study

Founded in 2003, Home Original Chicken is a Chinese fast food brand mainly produced in the Chinese cooking style, serving the daily dining needs of Chinese families.

Based on the minor program, Home Original Chicken integrates the business of 3membership + ordering + mall + community + activities" and launched the Alipay small program in June 2021, jointly with Alipay, to create a "full domain membership operation" ecosystem to improve the member experience. The company has developed a set of exclusive private domain operation methods. That is, through searching engine, public domain operation and the traffic from the public domain to the private area of Home Original Chicken, use the new and old user benefits, point mall, membership day discounts, new product offers and other methods to improve users' loyalty so that drive the consumption. In the general environment of the epidemic, Home Original Chicken achieved 500,000 new members pulled in just one month on Alipay and sold over 30,000 paid membership cards [10], significantly improving customers' stickiness.

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3.3. Digitalisation of Finance

3.3.1. Intelligent Financial System

Based on advanced financial theory and using human-computer collaborative work, Smart Finance can solve a variety of financial accounting, analysis, forecasting, and management tasks, and it is a kind of intelligent management involving the whole process.

Intelligent finance not only can improve the cost management process and use the Internet and big data, but also exhaustively investigate the market price of materials and determine a more accurate cost estimate table as well as reach a purchase agreement with material suppliers through online communication, accordingly the purchaser becomes engaged so that use accounting technology to design the process plan to form a monitoring mechanism, and thus avoid the emergence of problems such as inflated prices, blind purchases as well as the substandard quality which can achieve efficient cost control.

Sound financial management software can improve the management efficiency of food service enterprises to ensure the effectiveness of corporate financial information and the efficiency of capital operations. The incoming accounts take financial management software to unify the receipts, record each incoming payment in detail and upload it to the network, not only to ensure that the incoming records are perfect but also to avoid the loss of materials.

Relying on financial intelligence can enhance the level of informatization of financial management so that finance can improve from traditional bookkeeping to the digital brain of the catering industry and break the information barriers in financial work with new technologies such as artificial intelligence, big data, cloud computing as well as blockchain, and also can realize transparent work. Through intelligent financial transformation, the role of finance will transform from accounting to management and tend to standardize and integrate, changing the traditional business model of the catering industry and enabling it to develop by leaps and bounds.

3.3.2. Case Study

Sichuan Haidilao Catering Co., Ltd. was established in 1994 as a sizeable cross-province product direct-run hot pot restaurant. It currently operates with service features, which are prone to homogenization under the traditional business model. It uses intelligent applications and innovates its financial management system so that its operations remain at the front end of the same type of domestic catering enterprise. Developed by Ali cloud, Haidilao has built an APP that has uploaded the financial shared service platform formed by eight subsystems as well as developed by Haidilao at different times and developers so that the whole back kitchen is intelligently managed, and it contains the overall operation status of Haidilao's kitchen, production status, inventory status, shelf life status, etc. This system saves nearly 37% of labor costs in the back kitchen [11].

4. Future Outlook

In response to the current state of development of digital applications in the catering industry, this study would like to raise the following issues to be addressed in subsequent research:

1. how to strike a balance between efficiency and cultural heritage,
2. how to form intelligent ordering systems and even intelligent restaurants for all ages and all social groups,
3. how to break down barriers as the demand gap for financial technicians grows with the accelerated development of innovative finance.

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5. Conclusion

In general, the digital transformation of the industry is still in its infancy, and most catering companies are still in the preliminary stage of preparation or practice. Focusing on the supply chain, ordering methods, and finance, three essential components of the catering industry, this paper examines and analyses the digital applications and upgrades of the catering industry in the context of the new infrastructure construction. By exploring the problems that arise in related aspects, this paper leads to the specific applications of the digital supply chain, intelligent ordering, and innovative finance and analyses relevant enterprise cases. Through these analyses, this paper provides experience and references for the digital upgrading of catering enterprises and suggests the digital development of the F&B industry.

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