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Research on Digital Innovation of Community Group-Buying Supply Chain in Post-Epidemic Era

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Abstract: The development and application of digital technology have brought new development directions for the community group buying industry and promoted the rapid development of the digital community group buying industry. Based on reviewing and sorting out relevant research on digitalization, this paper discusses the concept of community group-buying, its development history, and influencing factors of supply chain digitalization innovation. Using online questionnaire distribution and factor analysis, three main influencing factors are extracted: digitalization technology, enterprises internal and external ability to use digitalization, and national policies. Finally, from the perspective of these three influential factors, three suggestions are put forward to provide a reference for the digital development of the community group-buying supply chain.

Keywords. Community group buying, supply chain, supply chain digitization

1. The introduction

Community group buying means that community residents place orders in WeChat groups or mini-programs. The next day, the group buying platform will deliver the goods to the designated pickup point according to the time of the user's order, and then the user will pick up the goods [1]. Community group buying effectively combines online platforms with offline communities, greatly facilitating the shopping of community residents. After the outbreak of COVID-19 in early 2020, community group buying gained rapid development with its unique advantages. In addition, with the development of big data, blockchain, 5G, and other information technologies, the digital transformation and application of community group buying supply chains are increasingly widespread. The digitalization of the supply chain is the combination of the supply chain and digital technology. China attaches great importance to the digital construction of the supply chain. Since 2018, the Ministry of Commerce and other departments have started to promote the pilot work of supply chain innovation and application, which focuses on the digitalization of the supply chain, develops new economic growth points, and enhances the risk resistance ability of the supply chain [2]. The Fifth Plenary Session of the 19th CPC Central Committee also stressed the need to unswervingly build a digital China and speed up digital development. Most categories of community group buying are mainly supplied directly from the origin. Affected by

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the epidemic, the supply and price are extremely unstable, which brings great pressure to the operation of community group buying. In such an environment, community group buying can maintain sustainable development only by actively coping with various risks, and digital innovation of the supply chain is one of the effective measures to actively cope with risks.

At present, the research of supply chain digitalization is in the initial stage in China. In 2016, the white paper "Digital Supply Chain" issued by the Global Enterprise Center pointed out that the digitalization of supply chain is the trend of the future development of enterprises. Gulcin Buyukozkan et al. reviewed and analyzed previous literature and defined digital supply chain as an intelligent, value-driven and efficient process that can create new forms of revenue and business value for organizations [3]. Most of the existing researches believe that supply chain digitalization is essentially the innovation of traditional supply chain digitalization, which mainly includes the innovation of supply chain management and structure. In the past, supply chain management mainly solved information transmission barriers in supply chain operation process [4]. Now, the content of supply chain management has been expanded to include the relationship management, operation management and business model management of each link subject of the supply chain [5].

With the development of digital technology, there is a consensus that digital innovation is an important driver of supply chain upgrading. Digital innovation is a process in which enterprises or organizations change their original products, services, processes, or business models driven by digital technologies such as big data, cloud computing, artificial intelligence, and blockchain [6]. Wang et al. took digital technology innovation as the background and pointed out that digital innovation is an important way for enterprises to improve their competitive advantages [7]. In addition, Uhl et al. analyzed the characteristics of the supply chain and pointed out that the high integration of digital technology and supply chain transformation is the key to realizing the digitalization of the supply chain [8]. Literature review shows that domestic and foreign experts and scholars have studied the impact of digital innovation on enterprises, for example, the impact of digital innovation on enterprise performance [9]. The impact of digital innovation on the digitalization of internal processes in organizations [10]. With the in-depth study of digitalization, the understanding and understanding of digitalization in different fields become increasingly clear. Most researchers pay attention to the enterprise organizations that gain development advantages due to digital innovation, and the research perspective is more focused on the macro level, while the research on the micro level is insufficient. Therefore, it is very important to clarify the research on the digital innovation of the supply chain of specific enterprises based on sorting out the relevant literature on the existing supply chain digital innovation.

2. Community group purchase supply chain status

2.1 Community group purchase development process and supply chain structure

Community group buying can be traced back to 2016. After the economic crisis, such as market grabbing and capital chain breaking, online group buying did not disappear, but got a new life in the community. In 2016, community group buying started to develop. At this time, community group buying was mainly sold by wechat and QQ (A

public platform for multi-person chat, users can not only chat, but also use group photo albums, file sharing and other ways to communicate [11] groups, and the product types were very limited. In 2017, Tencent launched small program, with the assistance of small program, community group buying gradually tends to scale, community residents can use wechat small program for shopping orders; By 2018, due to the rapid development of community group buying, the capital of various Internet platforms favored it and successively financed and established a number of community group buying platforms, such as Xingsheng Optimization, Squirrel and so on. The total financing amount of these community group buying platforms exceeded 4 billion yuan. In 2019, due to price war and blind expansion of platforms by major enterprises, most community group buying platforms closed down. In 2020, due to the outbreak of COVID-19, community group buying showed vitality again and achieved rapid development [12].

In the supply chain of community group buying, the upstream is mainly the commodity origin base, brand owners, manufacturers, and other suppliers, the middle is the community group buying platform, and the downstream is the group buying consumers. Throughout the supply chain process is: the consumer by WeChat group or small program order, community group-buying platform system every single point cut, will transmit the order information to each supplier, the supplier platform will deliver goods to the warehouse, warehouse to quality inspection and storage of goods, the next day, by the order information to send goods to our strengths, head of distribution or remind consumers to pick up the goods in time.

2.2 Influencing factors of digital innovation of community group-buying supply chain

Through empirical analysis, Han Xiao et al. concluded that the integration of business processes, organizational synergy, intelligent financial management, digitalization of human resource management and innovation of organizational culture will significantly affect the digital empowerment of enterprises [13]. Kalle Lyytinen et al. began to pay attention to digital products, including digital technology and digital infrastructure, in their research on enterprises' digital innovation capability [14]. Khrais Laith T et al. believe that the Internet of Things, digital platforms and digital orientation have a positive and substantial impact on the sustainability of digital innovation [15]; Sun Zhongjuan and other scholars divided the key influencing factors of digital innovation into environment, enterprise and industry for analysis [16]. Through empirical analysis, Tahirkheli Khan Sheryar et al. concluded that the influencing factors of organizational digital innovation strategy include organizational culture, organizational structure and organizational dynamic capability [17]. Existing studies have proved that digital technology, digital infrastructure, organizational culture and structure, environment and government support are important factors affecting enterprise digital innovation from different perspectives, which lays an important theoretical foundation for this study to construct the index of influencing factors of digital innovation. However, since the influencing factors of digital innovation are relatively complex, and the influencing factors of digital innovation of different enterprises have different focuses, the above scholars and other scholars' thoughts on the evaluation of digital innovation capability of enterprises are referred to, and the development characteristics of community group-buying supply chain are combined. Fourteen measurement indexes were extracted, including the investment and popularization of digital technology, the coverage of enterprise digital infrastructure, the perfect information management

system inside the company, and the degree of enterprise operation to digital application. And constitute the main content of the questionnaire.

The questionnaire was distributed online, data was collected, and SPSS28.0 processing and analysis were conducted. Firstly, reliability analysis was conducted on 14 measurement indicators, and the results showed that the Cronbach α coefficient was 0.933, indicating the high-reliability quality of the research data. Then the KMO measure and Bartlett sphericity test was carried out, and the results showed that the KMO value was 0.575 and the P value was less than 0.05, indicating that the research data was not suitable for factor analysis. Moreover, the phenomenon of "the flat organization structure" in the measurement index appeared, so it was deleted and analyzed again. In the next factor analysis, it was found that "corporate culture that encourages digital operation and innovation" appeared in "a lot", so it was deleted and analyzed again. Until the KMO value is 0.712 and the p-value is less than 0.05, the research data is suitable for factor analysis. When extracting factors, the number of eigenvalues with a cumulative contribution rate of 80.273% was selected as the main component factor representing the feature of the factor (Table 1).

Table 1 Variance interpretation rate table

Number of factor	Root of characteristic			Rotational front difference explanation rate			Explanation rate of variance after rotation		
	Root of characteristic	Variance interpretation rate %	Cumulative %	Root of characteristic	Variance interpretation rate %	Cumulative %	Root of characteristic	Variance interpretation rate %	Cumulative %
1	7.105	59.210	59.210	7.105	59.210	59.210	4.111	34.255	34.255
2	1.489	12.407	71.617	1.489	12.407	71.617	3.060	25.503	59.758
3	1.039	8.656	80.273	1.039	8.656	80.273	2.462	20.515	80.273
4	0.785	6.540	86.813	-	-	-	-	-	-
5	0.645	5.378	92.191	-	-	-	-	-	-
6	0.303	2.528	94.719	-	-	-	-	-	-
7	0.274	2.286	97.004	-	-	-	-	-	-
8	0.178	1.486	98.491	-	-	-	-	-	-
9	0.082	0.687	99.177	-	-	-	-	-	-
10	0.052	0.436	99.613	-	-	-	-	-	-
11	0.031	0.255	99.868	-	-	-	-	-	-
12	0.016	0.132	100.000	-	-	-	-	-	-

According to the table of factor load coefficient after rotation (Table 2), the three-factor variables are explained respectively. It can be seen from the results that the investment and popularization of digital technology, the coverage of enterprise digital infrastructure, the perfect internal information management system of the company, the degree of digital application of enterprise operation, the digitalization level of the industry, these influencing factors can be summarized as digital technology. The enterprise can effectively capture the personalized needs of users, the enterprise has efficient internal cooperation ability in the process of digital application, the organization's ability to integrate data resources through digitalization, the degree of data and information sharing between organizations, and the degree of competitors' emphasis on the digitalization of supply chain, these factors can be summarized as the enterprise's internal and external digitalization ability. The state's policy support for the digitalization of enterprise supply chain and the state's protection of enterprise's digital intellectual property rights can be summarized as national policies.

Table 2 Table of factor load coefficient after rotation

Index of measurement	Factor load coefficient			Common degree (variance of common factor)
	Factor 1	Factor 2	Factor 3	
Coverage of enterprise digital infrastructure	0.577	0.481	0.557	0.874
Company internal perfect information management system	0.648	0.693	0.086	0.908
The extent to which digitization is applied to business operations	0.126	0.870	0.164	0.800
Investment and popularization of digital technology	0.720	0.432	0.437	0.896
The digital level of the industry	0.292	0.692	0.275	0.640
Enterprises can effectively capture the personalized needs of users	0.752	0.337	0.169	0.707
Enterprises have efficient internal cooperation ability in the process of digital application	0.464	0.783	0.180	0.861
The organization's ability to integrate data resources through digitalization	0.941	0.087	0.162	0.920
The extent to which data and information is shared between organizations	0.750	0.244	0.116	0.635
How much emphasis competitors have placed on digitizing their supply chains	0.680	0.267	0.108	0.545
National policy support for enterprise supply chain digitization	0.170	0.176	0.938	0.940
The state's protection of enterprises' digital intellectual property rights	0.136	0.173	0.927	0.907

Note: If the numbers in the table have colors, blue indicates that the absolute value of the load coefficient is greater than 0.4, and red indicates that the common degree (variance of common factor) is less than 0.4.

3. Development Countermeasures

3.1 Set up community group purchase supply chain digital coordination concept

To establish the digital coordination system of the community group purchasing supply chain, the government can start from the following three aspects: First, strengthen a series of digital infrastructure construction of community group buying. The government actively participates in digital infrastructures such as blockchain technology and the Internet of things to provide basic conditions for the digitalization of community group buying supply chain. The second is to optimize the environment for the digital and high-quality development of the community group buying supply chain. The government gives certain policy support to community group buying, so that suppliers, manufacturers, sellers, and leaders in the supply chain can actively participate in the long-term development of community group buying. To improve the environment of high-quality development, the government should give certain policy support to community group buying, so that suppliers, manufacturers, sellers and leaders in the supply chain can actively participate in the long-term development of community group buying. Third, relevant departments have provided policy support in terms of material transportation and platform special loans for community group purchases to alleviate the difficulties of logistics and capital flow caused by the epidemic.

To establish the digital coordination system of the community group-buying supply chain, enterprises can start from the following three aspects: First, establish a perfect information-sharing platform, remove information barriers [18], help staff timely grasp the market dynamics and relevant policies, especially in the post-epidemic era, and improve the ability of the platform to deal with risks. Second, all departments within the enterprise should strengthen cooperation and information coordination. Once there is a problem at each node of the supply chain, it is convenient to find out the problem quickly and solve the problem. Third, innovate the business model, increase the categories, and continue to inject power into the digital collaboration of the supply chain.

3.2 Establish a digital early warning mechanism for community group-buying supply chain

The digital early warning mechanism means to identify the development of important events or adverse events as soon as possible through information sharing and virtual simulation, and to start emergency plans in advance according to the Internet early warning information, to minimize the impact and reduce losses [19]. At present, according to the various links in the supply chain, the risks are divided into six major risks: warehouse distribution risk, external environment risk, head of a service risk, procurement and supply risk, cooperative relationship risk, and information technology risk [20]. Community group buying, as the "last mile", mainly focuses on community residents. Due to the impact of the epidemic and government control, risks of all links in the entire supply chain should be taken into account, to reduce and even prevent risks. In particular, suppliers, middlemen, and sellers in the supply chain of community group buying need to timely use the information platform to transmit information and strengthen the vertical and efficient collaboration of all links of the supply chain. It is very important to pay attention to the external environment and internal situation of community group buying in time, and comprehensively reduce the possibility of supply chain risk, to establish an early warning mechanism for the community group buying supply chain.

3.3 Strengthen the digital infrastructure construction of community group buying supply chain

New infrastructure is an important way to implement supply-side structural reform under the new normal background of China's economic development, which is conducive to the optimization and upgrading of industrial structure and plays a strong role in promoting the digitalization of the supply chain [21]. With the help of digital infrastructures such as cloud computing, big data, and 5G information technology, community group-buying realizes digital technology-oriented supply chain innovation. The construction of supply chain digital infrastructure by community group purchasing includes two aspects: the first is information infrastructure. With the help of digital management software, enterprises at each node of the supply chain can reduce the bullwhip effect and reduce costs. The second is the integration of infrastructure. Community group purchasing can introduce big data, artificial intelligence, and other technologies, use the Internet to connect with the market and source, form a complete digital infrastructure network, and realize the visualization and management of the whole industrial chain .

4. Conclusion

The world has entered the digital supply chain era. The digital innovation of the supply chain is not only an opportunity but also a challenge for the development of community group-buying. Through literature analysis and combined with the development characteristics of the community group-buying supply chain, this paper identifies 14 factors affecting digital innovation. However, two measurement indicators are deleted in the analysis process, and three categories of factors are extracted through factor analysis, which are digital technology, internal and external application of digital capability of enterprises, and national policies. Based on these three perspectives, this paper proposes three suggestions for the digital innovation and development of a community group-buying supply chain: establishing the concept of community group-buying supply chain digital collaboration, establishing the digitalized early warning mechanism of community group-buying supply chain, and strengthening the digital infrastructure construction of community group-buying supply chain, to improve the digitalized efficiency of the entire industry supply chain and further enhance consumer satisfaction.

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