

Selection of E-commerce Mode of Yiwu Small Commodity Market based on Analytic Network Process

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Abstract—In order to choose the suitable e-commerce mode for different kinds of small commodities in various parallel e-commerce modes of Yiwu small commodity market, this paper uses the four indicators of internal organization management level, e-commerce hardware conditions, supply chain management level, logistics and distribution management as the matching basis of commodity types and e-commerce modes, and through Super decisions software, using Analytic Network Process (ANP) to achieve the above purpose. It is found that small objects are suitable for local transaction platform, daily chemical products, food, fabric and cloth are suitable for the third-party e-commerce service platform mode, and clothing and leather products are suitable for cross-border e-commerce service platform mode. This study puts forward some suggestions for the future "Yiwu mode" to promote the coordinated development of Yiwu small commodity market as a whole.

Keywords—Small commodity market; e-commerce mode; e-commerce platform; Analytic Network Process; Yiwu Mode

I. INTRODUCTION

In the market competition, the research and application of e-commerce mode matching with the market development is conducive to the core functions of the virtual market and fundamentally improves the competitiveness of the professional market [1]. In recent years, e-commerce has mushroomed and developed. Yiwu, as the largest small commodity wholesale market in China, has formed a situation where a variety of e-commerce modes coexist. In the field of selection of e-commerce mode of Yiwu small commodity market, scholars at home and abroad have done a lot of research, but there are various views on which e-commerce mode should be used in different commodity markets. Some scholars think that the domestic mature third-party e-commerce platform can better serve the Yiwu small commodity market, and the local government should relax the B2B, B2C, C2C market in all directions, and vigorously introduce the mature third-party e-commerce platforms such as Alibaba and JD into the local market [2][3]; Zhang Youfeng (2010) thinks that it is necessary to introduce multiple energy products while creating a fully competitive e-commerce trading platform [4]. Most of them think that e-commerce should be actively developed, but they mostly hope to enhance the competitiveness of the market through the participation of the third-party e-commerce

platform [5], ignoring the particularity of Yiwu small commodity market and the limitations of the third-party platform. Yan Houyan (2014) and other scholars believed that overseas e-commerce platforms such as Amazon and eBay should be actively introduced [6]. They saw that cross-border e-commerce played a huge role in the development of professional markets, but ignored the matching degree of different e-commerce platforms and different product characteristics. The vigorous growth of cross-border business is not the most important factor in choosing overseas e-commerce platforms.

At the same time, the growing development of local merchants suggests that Yiwu small commodity market should have an e-commerce platform representing local characteristics. The development of e-commerce in Yiwu has great advantages: the entity businesses pay more and more attention to the development of e-commerce and regard it as an extension of the existing business mode. Due to the support of offline business, public brand, goods supply, sales leasing and other resources, the "point-to-point" and "one-to-one" three-dimensional business mode of offline entity stores and online stores may be more robust, convenient and safe, it has more market competitiveness than other secondary network e-commerce. In order to serve local merchants better, Yiwu small commodity market launched the local e-commerce platform called "Yiwu Shopping" in the early stage. At present, the e-commerce service in Yiwu market presents the situation of "fighting alone and fighting for one's profit". The rationality of the e-commerce mode adopted by the merchants of different kinds of commodities and the standards applied for comparison still need to be studied.

According to the Analytic Network Process (ANP) Theory put forward by T. L. Satty in 1996, the relationship of factors in complex system can be expressed by network structure [7]. ANP method can be divided into objective layer, criterion layer and scheme layer in practical operation. The relationship between objective and scheme is constructed through decision-making analysis of the hierarchy weight. The elements determined by this method are more persuasive than sorting vectors, so it can evaluate complex systems more objectively. In this study, Yiwu small commodity market and local relevant departments were investigated by questionnaire, 250 questionnaires were issued, 178 questionnaires were recovered,

and 143 valid questionnaires were collected. Through the four internal indicators of internal organization management level, e-commerce hardware conditions, supply chain management system and logistics distribution management, this paper analyzes the existing e-commerce mode and commodity types in Yiwu, and then uses Super Decisions software to match different commodity types with the corresponding e-commerce mode based on ANP network analytic hierarchy process. Those will promote the development of Yiwu small commodity market in a proper way. The research methods and approaches are novel, and the results have certain theoretical and practical significance.

II. ANALYSIS OF E-COMMERCE MODES

A. Four E-commerce Modes in Yiwu

According to the research of Zhao Weidong and Huang Lihua (2006), the e-commerce mode of Yiwu small commodities has emerged from 2003 to now, including four e-commerce modes: simple information release platform, local transaction platform, cross-border e-commerce service platform, third-party e-commerce service platform [8].

Simple information release platform refers to the market, investors to inject funds to set up a website, to provide market operators and customers with information about supply and demand, but lack of corresponding payment and distribution system. This mode is the earliest operation mode of e-commerce in Yiwu. The typical representative is a website called Yiwu China Small Commodity City. It is a small commodity information service platform integrating the tangible market and intangible market in Yiwu. However, due to the large amount of capital investment in the early stage of the platform development, it has not introduced venture capital and matched online transaction and payment functions, so its influence and development level are far lower than Taobao, JD and other websites.

Local transaction platform is an e-commerce platform with online trading, offline logistics distribution and other purposes set up by the government or investors. Market operators can publish news and link websites on the platform, communicate and negotiate with customers, achieve online payment and logistics distribution through the integrated integrity and supervision management system of the website platform, and achieve the networking and intelligence of all processes of e-commerce transactions. China Yiwu Foreign Trade Network has taken the lead in using the third-party payment platform function in the foreign trade e-commerce platform of Yiwu.

The cross-border e-commerce service platform is an international business activity, which belongs to the trading subjects in different countries. It can achieve the success of bilateral transactions, payment and settlement through the e-commerce platform, use cross-border logistics to transfer goods and services, and finally achieve the transaction. For example, Amazon, eBay, AliExpress, etc. play a greater role in the domestic e-commerce trade in foreign countries Platform. At present, there are more than 3000 B2B companies engaged in foreign trade business in Yiwu, more than 6000 members of Alibaba Chengxintong. In 2017, the retail sales of cross-border

e-commerce in Yiwu exceeded the 100 billion mark, and the annual transaction volume of Yiwu fast-selling merchants ranks the third in China. The cross-border e-commerce service platform helps promote the development of small and medium-sized enterprises, open up overseas marketing channels, not limited to the trade bottleneck and ceiling of enterprises themselves, and is becoming an important mode for small and medium-sized enterprises in Yiwu to develop cross-border e-commerce.

Outsourcing to a third-party e-commerce service platform means that a well-known domestic third-party e-commerce platform has set up a service point in Yiwu, market operators pay rent and publicity fees, and use the third-party e-commerce platform to achieve online marketing, warehousing and distribution, software supporting and other purposes in the transaction process. There are more than 10 well-known third-party e-commerce platforms in Yiwu, such as Alibaba and Global Resources. Among them, Global Resources has established its headquarters in Jinhua, Zhejiang Province. Alibaba's trading and payment platform accounts for more than 90% of Yiwu's online market. Third-party group buying platform is also popular in Yiwu market. More than 50 online businesses, such as Langsha group and Aijiutuimen, participated in the Group Buying Festival planned by the platform such as "Juhuasuan". They refreshed their sales and business records again and again, followed by the exponential growth of group buying websites. Now there are more than 40 group buying websites in Yiwu, not only limited to the local group buying websites (such as Tudou Group, Yiwu Group, etc.), but also some national group buying websites (such as Buy Together, Manzuo Network, etc.).

B. Evaluation of E-commerce Modes in Yiwu

As shown in TABLE I, this study selects four indicators of internal organization management level, e-commerce hardware conditions, supply chain management level and logistics distribution management to evaluate and analyze those e-commerce modes [9]. The following is a brief description of the basis for indicator selection.

- Internal organization management refers to the activities of planning, organizing, leading and controlling organizational activities in order to achieve the objectives, arrange the division of work, cooperation and coordination. The high level of organizational management means that the internal division of labor is reasonable, the organizational objectives are clear, and the efficiency and quality are high.
- The e-commerce hardware condition is the basic foundation of e-commerce platform, which plays a vital role in enterprises. It includes information technology, network payment means technology, supporting hardware and software facilities, network technical personnel for operation and maintenance, etc. enterprises developing websites should also include conventional operation institutions and supporting facilities, as well as development, training, maintenance, etc.

- Supply chain management means to optimize the operation of supply chain through a series of management measures. Whether the supply chain system of e-commerce service platform is perfect or not is directly related to whether it can meet the needs of e-commerce rapid and flexible production.
- Perfect and healthy logistics distribution management is very important for the development of e-commerce in small commodity market. If there is no quality problem in the commodity itself, but as long as the transportation of a single commodity cannot be guaranteed, or the logistics cost is high and the transportation time is long, it is enough to make customers lose confidence and interest in the e-commerce platform.

TABLE I. EVALUATION OF E-COMMERCE MODES

Mode	Internal Organization Management Level	E-commerce Hardware Conditions	Supply Chain Management Level	Logistics Distribution Management Level
Simple Information Release Platform	Low	Poor	Low	Low
Local Transaction Platform	Has certain organizational management, but the effect is not good	Not perfect	Factories are located in the local area, and the supply chain management can be better completed through the local platform	Has its own logistics distribution system, but efficiency needs to be verified
Cross-border E-commerce Service Platform	Good organization and management ability, and high management level	Good	Good, but may not be optimal due to geographical constraints	High level, but slow speed
Third-party E-commerce Service Platform	Good organization and management ability, and high management level	Mature large-scale e-commerce platform with good e-commerce hardware conditions	Good	High level, and fast speed

According to TABLE I, we believe that local transaction platform, cross-border e-commerce service platform and third-party e-commerce service platform are three modes with less risk, higher income, greater influence and better development prospects. Therefore, we choose the above three modes as our next research object.

The four indicators of internal organization management level, e-commerce hardware conditions, supply chain

management system and logistics distribution management are detailed, and eight detailed indicators are used to investigate these three types of e-commerce platforms. The data of the scale is used for analysis, and the score is from 1-4 points. 1 point means particularly unimportant, 2 points is less important, 3 points is relatively important, and 4 points is particularly important. TABLE II is an approximate assignment of the questionnaire results.

TABLE II. ANALYSIS OF DIFFERENT INDICATORS OF E-COMMERCE MODES

Mode	Internal Organization Management Level		E-commerce Hardware Conditions		Supply Chain Management Level		Logistics Distribution Management Level	
	Operating labor cost	Operation cycle	Computer equipment	R & D capability	Cargo sufficiency rate	Clearance rate	Speed	Integrity
Local Transaction Platform	2	2	2	2	4	4	2	2
Cross-border E-commerce Service Platform	4	3	3	3	2	2	2	3
Third-party E-commerce Service Platform	3	2	4	4	3	3	3	3

III. COMMODITY CATEGORY ANALYSIS

According to the attributes of small commodities, we divide the commodities in Yiwu small commodity market into six categories: small objects, daily chemical products, clothing, fabric and cloth, leather and food, each of which is subdivided

into one or more varieties, and analyze the demand for each index of e-commerce platform mode. The scale data are used for analysis, and the score is from 1-4 points. 1 point means unnecessary, 2 points is not very necessary, 3 points are comparative needs, and 4 points are special needs. TABLE III is an approximate assignment of the questionnaire results.

TABLE III. DEMAND ANALYSIS OF E-COMMERCE MODES OF DIFFERENT COMMODITY TYPES

Indicator	Small Objects				Daily Chemical Products		Clothing		Fabric and Cloth		Leather	Food	
	Handicraft	Stationery	Toy	Hardware	Cosmetics	Daily Necessities	Shoes	Dress	Furniture	fabrics	Bag	Domestic Food	Imported Food
Internal Organization Management Level	2	2	2	2	4	4	3	3	2	2	2	3	3
E-commerce Hardware	3	3	3	3	3	3	3	3	3	3	3	3	3

Conditions														
Supply Chain Management Level	4	4	4	4	1	2	3	3	4	4	3	4	2	
Logistics Distribution Management Level	3	3	3	3	4	4	2	2	2	2	2	4	4	

First of all, we will see the demand for the organization and management level of e-commerce platform. All kinds of goods need management and marketing. Small items with low added value and fabrics are relatively low (the average value of the questionnaire is 2.28); daily chemical products need to be sold by using new online marketing methods, and organizational management ability is the key to improve sales (average value is 3.69); clothing and food demand elasticity is relatively small, but the product differentiation is large, if the sales volume needs to be improved, the group needs to be improved Organization management level and network sales level (average value is 3.23).

In terms of e-commerce level hardware, the variance of questionnaire results is small. This is due to the rapid development of e-commerce and the rapid development of information technology. The hardware condition is the rigid demand of each seller using an e-commerce platform, so it is assigned as 3 (average value is 2.84).

As for the level of supply chain management, the more commodities with obvious price advantage, the higher the requirements for the level of supply chain management. This is because the enterprises that require price advantage need to achieve economies of scale through vertical integration, so as to further reduce the marginal cost. And a good supply chain management level is conducive to improving efficiency and reducing inventory backlog, so goods with high demand for sales volume will urgently require a higher level of supply chain management.

In the aspect of logistics level, we mainly investigate the speed and security of logistics. Due to the relatively high value of daily chemical products in small commodities, which are easy to be squeezed and damaged, the demand for logistics safety is relatively high (average value is 3.62); due to the greater impact of food taste freshness, the demand for logistics level is also very high (average value is 3.87); although small commodities are also easy to be squeezed and damaged, their individual value is relatively low Therefore, the demand for logistics security is not very high (the average value is 3.13); the demand for logistics level of clothing, fabric and leather products is not as high (the average value is 2.42) in terms of urgency and security.

IV. CHOICE OF E-COMMERCE MODE FOR DIFFERENT KINDS OF GOODS

Combined with the results of TABLE II and TABLE III, this paper builds a system and matches different commodity types and e-commerce modes through ANP network analytic hierarchy process. This system contains three levels of multiple indicators, using Super Decisions software to sort three types of e-commerce modes. In the analysis process, the three e-commerce modes are respectively simplified as A, B and C; the internal organization management level, e-commerce hardware conditions, supply chain management system and logistics distribution management are respectively recorded as M, F, T

and S; the six categories of commodities are recorded as 1, 2, 3, 4, 5 and 6. Fig. 1. shows the decision process and TABLE IV shows the decision results.

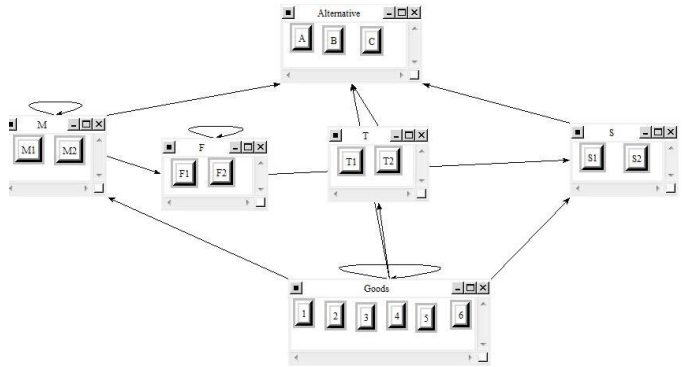


Fig. 1. The decision process based on ANP.

TABLE IV. ANP ANALYSIS RESULTS

Commodity Type	E-commerce Mode
Small Objects	Local Transaction Platform
Daily Chemical Products	Third-party E-commerce Service Platform
Clothing	Cross-border E-commerce Service Platform
Fabric and Cloth	Third-party E-commerce Service Platform
Leather	Cross-border E-commerce Service Platform
Food	Third-party E-commerce Service Platform

As shown in TABLE IV, small objects are suitable for local transaction platform. They have the advantages of quality and price, but at the same time, due to the serious homogenization, they are domestic goods that depend on sales volume, so we should base on the scale effect produced by the local trading platform and reduce the transaction cost. Besides, this feature requires excellent supply chain conditions, and Yiwu's local self-built storage and distribution system play a very good supporting role.

The third-party e-commerce service platform is suitable for daily chemical products, fabrics and cloth and food. The product characteristics and packaging characteristics of these commodities require the safety and timeliness of logistics. The third-party platform provides a good platform for the promotion of such commodities with years of construction experience and influence.

Clothing and leather products are suitable for cross-border e-commerce service platform. Compared with similar foreign products, these commodities have price advantages. Therefore, we should seek cooperation from cross-border e-commerce institutions and actively expand overseas markets.

V. CONCLUSION

The rapid development of e-commerce in today's era catalyzes the constant upgrading of market competition in Yiwu's e-commerce market, which is dominated by the competition of similar commodities. More and more factors such as service time, quality, safety and cost constitute the

focus of product competition, symbolizing more and more stringent customer requirements. For Yiwu Municipal People's government, small commodity industry group, industry management association and other departments, they are also expected to work together with other departments and operators from all sides to help the entity merchants find a matching e-commerce mode from top to bottom, increase the total volume and volume of transactions in the market, activate the E-commerce market in Yiwu, and explore more reasonable and feasible "Yiwu mode". To sum up, competition and cooperation have gradually formed the common experience of e-commerce operations in Yiwu.

In this study, ANP method is used to explore which e-commerce mode should be used for various commodities. Under the guidance of the exploration ideas and methods, the future research can combine the current Yiwu e-commerce trading platform, the reality of operators from the initial "fighting for their own" to today's "group heating", as well as the blank of supporting service supervision and management, and other factors, more accurately and practically dig and solve the local problems in Yiwu. Only by adjusting measures to local conditions, city conditions and industry conditions, can different kinds of commodities find a matching e-commerce mode, so as to promote the overall coordinated development of Yiwu small commodity market.

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