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Analysis of the New Retail Model of E-Commerce in China*

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| Contents |

| Abstract |

By applying advanced technology in the Fourth Industrial Revolution, businesses are upgrading and transforming all links from the production stage to the final delivery of goods to customers, thereby reshaping the entire e-commerce ecosystem. This paper analyzes the new retail model of e-commerce, and discusses its differences with the traditional model of e-commerce. The goal of this research is to explore which model is more in line with the current trends by utilizing the Analytic Hierarchy Process (AHP) methodology. Experts working at top Chinese e-commerce companies were surveyed on four main criteria (technology, consumer, merchandise, and operation). By analyzing their responses, the reasoning behind why these four major criteria obtained their corresponding weights was studied. The results show that the customer is the most important factor among the four criteria, while technology seems to be less significant. Among the

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sub-criteria, the convenience of consumption is found to be the most important. The new retail model of e-commerce, which has started to flourish in China, is found to be more in line with current trends. This paper shows the reasons why the new retail model of e-commerce is important at a practical level, and provides a better understanding of its current status in China.

▪ Key words: New Retail Model of E-Commerce, Traditional E-Commerce, Fourth Industrial Revolution, AHP Model, China

Ⅰ. Introduction

Jack Ma conceptualized the new retail model for the first time in 2016, believing it will eventually supersede the traditional model of e-commerce that individuals had become accustomed to. There appears to be an emerging consensus that this new retail model can be realized only through in-depth cooperation of online platforms, offline stores, and modern logistics (Zhang & Zhao 2018; 杜睿云·蔣侃 2018; 李國華 2018).

With the emergence of the Fourth Industrial Revolution, production relations are expected to change substantially. Based on data from the Chinese National Bureau of Statistics, the natural population growth rate in 2019 was 3.34 per thousand, the lowest in six decades. The structural contradiction of the market relationship is becoming increasingly apparent due to the decline of demographic dividend. Meanwhile, the dividend period of the Internet ended around 2019, and the rapid development of e-commerce has entered a deceleration stage in China (于天懿 2019, 1). The traditional e-commerce platform[1] is now plagued by a low level of

1) The traditional e-commerce platform mainly focuses on transaction activities and

users' sustained activity, an increase in business dissatisfaction, and the bottleneck of the profit model. Whenever an existing business model can not resolve the structural impediments of market relations, new models are bound to emerge in order to address the issue at hand. The emergence of a new retail model seems inevitable, as new market opportunities and prospects need to be found (Zhao & Xu 2017, 13-15).

Masao (1996) argued that technological progress would drive changes in business formats. By using high tech and therefore, greatly enhancing clients' shopping experience, consumption habits can be changed, and a consumer-centric, big data-based, and omni-channel retail can be achieved. Such alterations will minimize costs, boost efficiency, enhance customer experience, and serve shoppers better. Nevertheless, realizing the new retail model can not be taken for granted since it requires a seamless connection of online shopping malls, offline stores, and modern logistics.

This paper aims to find which factors are essential to the current and future success of e-commerce. Moreover, through an in-depth analysis of twelve factors that are subordinate to technology, customer, merchandise, and operation with the Analytic Hierarchy Process (hereafter, AHP) model, as well as a comparison between the new and old e-commerce models, this work ponders whether China's new retail model of e-commerce is a better business model than the traditional e-commerce model. The analysis finds that the customer is the most important factor among all the factors that affect the e-commerce model. The results show that the development of e-commerce still depends on traditional factors that influence the business model, such as customers, while at the same time it is necessary to explore a new approach to keep pace with the changes brought forth by the Fourth Industrial Revolution by

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related services via the network, which is compared with and differentiated from physical stores.

applying the latest technology.

This paper contributes to better understanding of this topic by expanding the scope of the factors which affect the new retail model of e-commerce, in contrast to most prior research which concentrate on a single factor (李穎悟 2018; 佘碧蓉, 2018; 王先慶·雷韶輝 2018). Compared with prior research which use qualitative research methods (Wang 2017; Wang & Xiang 2018; 杜睿云·蔣侃 2017), this paper used the AHP model to objectify the subjective data, and shows the essential factors that influence the new retail model of e-commerce and the reasons why they are vital at the implementation level by establishing an original database.

A literature review follows this introduction. Then, a description of the research methodology and the analysis of the original findings are followed by the conclusion.

Ⅱ. Literature Review

A review of prior research on the topic identifies technology, customer, merchandise, and operation as significant factors that can affect the profitability of e-commerce. According to an analysis of the front-end, middle-end, and back-end framework of the new retail model of e-commerce (阿里研究院 2017), the differences between the new retail model and the traditional e-commerce model mainly include the aforementioned four aspects. Hence, this paper chose these factors as the main criteria for analyzing the new retail model of e-commerce in China. Of course, this does not mean that other factors such as infrastructure, cloud, network, domain name, etc. are insignificant. With further development of the market and technology, the importance of each factor will change accordingly. These other factors may have higher significance in the future.

1. Technology

The first important factor that may affect e-commerce is big data. State-of-the-art technologies from the Fourth Industrial Revolution era can facilitate the circulation of internal and external resources of enterprises, synchronize its aggregated data, and connect with various online platforms, enabling companies' operations and management to better meet the needs of shoppers (于天懿 2019, 2). Using big data, the new retail company can record and analyze consumer preferences, utilize the large potential value of data, and achieve intelligent promotions. As such, companies should utilize it more and scrutinize customer consumption data, such as frequency, amount, preferences, and other indicators needed to plan effective promotional programs for different categories of consumer groups and to cultivate customer spending habits and loyalty (劉宇軒·馮霞 2019, 89). For example, *Jingdongdaojia* utilizes big data to organize user feedback, and analyze the typical users and their corresponding consumption scenarios (Zhao & Xie 2019, 107).

Artificial Intelligence (hereafter, AI) is the second significant factor that may influence e-commerce. The application of AI to e-commerce enables intelligent management, which can promote the intellectualization, scenario, and humanization of the whole industry (劉曉楠 外 2018). Additionally, it can help minimize repetitive labor tasks and reduce costs (王先慶·雷韶輝 2018, 8). In fact, AI could empower new retail, reconstructing essential elements of people, goods, and markets efficaciously, thus enhancing the consumers' shopping experience (中金公司 2018). Taking intelligent stores as an example, the local processing system of Alibaba smart supermarket uses the convolution neural network of AI. Through machine vision and biometric technology, it can store clients' identities and the identity of the products that purchasers take away or put back (張媛媛 2019, 13), therefore recording each purchaser's consumption

habits. This helps customers in finding the products that they need more quickly and achieves more accurate product recommendations. At the same time, as each item has radio frequency identification (hereafter, RFID) tags, product identification does not require human intervention (林州波 2018, 24-25).

The third important factor is blockchain technology. Through its use, the new retail model can improve the distribution of retail industries and businesses, reduce their operating costs, and enhance consumer satisfaction (曹湛 2018, 82). Together with prompt rewards, penalties, and safe payments, the unification of information, management, and service of multi-stores and the enhancement of quality, distribution, after-sale, and settlement can therefore be achieved. This is a result of blockchain technology, that allows all products to be traced to the source, which in return helps guarantee product quality and after-sales service (陳大偉 2018). Currently, a major issue is figuring out how to resolve the difficulties of the new retail model by using blockchain technology. However, scholars have discovered that the function of time stamp and traceability technology can help ensure the quality of products, and that distributed account books and data can help secure the risk-free delivery of merchandise (楊婷·趙广林 2018, 248).

2. Customer

Changes in consumer behavior is the fourth important factor that can influence e-commerce. Consumer scenarios, expectations, and experiences differ every day and competition between companies is gradually changing, from a price-based one to one that focuses on superior quality, product variety, and personalized service. As enhancing client experience is a long-term goal of businesses, their business platforms need to continuously strengthen their applicability, ease of use, and availability of

business scenarios (Wang & Wang 2020, 30). Meanwhile, as customers' positive experience has become more important than ever, their demand is becoming increasingly individualized. Improvements in product quality, as well as individualization, instantaneity, convenience, interaction, precision, and fragmentation in the shopping process, have become essential to meet customers' expectations (杜睿云·蔣侃 2018, 5-6). Wang and Lei (2018) contended that providing a broad range of experiential customer services and realizing scenario-based consumption is the future direction of the new retail model. As changes in client behavior are mostly irreversible, firms have little choice but to adjust to this trend.

The fifth key factor is consumption convenience. When companies adopt the new retail business model, they need to make full use of leading-edge technology, so that customers can purchase products whenever they want. Businesses should be able to obtain relevant data from online and offline stores and integrate their resources, enabling shoppers to order through convenient online services, and suppliers to deliver merchandise via nearby intelligent distribution networks (李國華 2018, 112). On the one hand, they may utilize online payment platforms and provide consumers with convenient payment methods. A successful example could be Amazon, which saved shoppers much time and effort (廖凌云 外 2018, 81). On the other hand, businessmen should launch omni-channel along with borderless logistics and management to mobilize the enthusiasm of physical stores to join the distribution of online stores, and to enhance the efficiency of distribution, especially during busy times, such as holidays (Zhao & Xu 2017, 19).

The community-based individual impact is the sixth important factor that substantially influences e-commerce. By exploring why young shoppers utilize social networking media instead of face-to-face interaction, Kim et al. (2015) attempted to study the possible impact and mechanism of new technologies on the retail industry from the

perspective of social relations. In China, the extensive use of new platforms such as *Weibo* and *WeChat* made shopping behavior based on social interaction and sharing economy prevalent. Content marketing and sharing interactions have become increasingly important as consumers now care more about personalizing merchandise, social experiences, identity-values, and participation (Xue & Wang 2017, 68). By providing distinct consumption experiences through the configuration of scenario -based business models, enterprises could create an unconventional entrance to consumption (Accorsi et al. 2018). They may be able to form community-based client relationships (沈國梁 2020). For example, *Xiaomi* regards the *Xiaomi House* as a bridge for online fans' emotional belonging as it enhances consumer loyalty through activities such as display, experience, and social networking.

3. Merchandise

"Species explosion" is the seventh significant factor. The new retail model's core value is promoting the efficiency of circulation to its greatest extent by reconstructing the three main elements of the retail chain (namely, people, goods, and markets). For the first time, the new species[2] have emerged as keywords in the new retail business model (阿里研究院 2017). As clients demand more differentiated and personalized products, they progressively have higher requirements for online and offline merchandise (張得銀·鄭莉 2019, 33). Hence, Ye and He (2018, 13) explored a new diversified retail form. They pointed out that catering, cultural entertainment, logistics, and other diversified industries can extend to a new retail model with the help of information technology (hereafter, IT). More species in the new retail will hatch, resulting in an

2) Businessmen need to provide new services and products through the mining of new consumption scenarios that customers need. These new consumption scenarios, new services, and new products are defined as the new species.

ecological circle of new retail for all. In January 2017, the first super species store called *Jingdongjingxuan Space* was opened in Fuzhou, China, so that *Jingdong* customers may enjoy the offline experience.

The eighth important factor is commodity duality. According to Ali Research (阿里研究院 2017), the duality of commodities refers to any retailer, consumer, or commodity in both physical and digital forms. This is a reflection of a new era of retail with the dual structure of the atomic and bit worlds. Accordingly, the value chain among companies can be reshaped. It is worth noting that in the new retail era, people, goods, and markets are both entities and data (陳歡·陳澄波 2018). Therefore, Cheng (2018) discussed the social dominance of new retail through the application of IT, the upgrading of consumption, and the form of competition. Simultaneously, she reexamined the new retail model from two perspectives (virtual and realistic), pointing out its duality.

Upstream and downstream unification is the ninth essential factor for e-commerce. It is significant to realize the convergence of merchandise, logistics, and channels, which requires close cooperation between offline and online retailers. The ultimate objective is to attain complementary channels and win-win with modern logistics, and avoid the disunity of services and commodities and the uneven quality between the upstream and downstream providers (Wang 2014). By unifying the quality, e-commerce companies can provide quick delivery during peak periods by mobilizing commodities from adjacent stores. They can also sell similar products at fair prices on both sides while providing a convenient service (Zhao & Xu 2017, 14). In addition, such integration enables online merchants to select an optimal source of agricultural products to purchase, guaranteeing freshness, low delivery costs, and reduced product losses during transportation (万秋璇 外 2019, 80).

4. Operation

The new supply chain is the tenth important factor that could influence e-commerce. Pramatari et al. (2009) suggested that optimizing the logistics network and operation, improving inventory management, realizing decentralization, enhancing distribution efficiency, and exploring consumers' dynamic preferences are essential for upgrading the supply chain. Zhang and Zhao (2018) argued for a digital, flexible, flat, shared, and ecological supply chain platform that is individualized and consumer-oriented by remodeling the three main elements of the retail chain (people, goods, and markets). Undoubtedly, e-commerce platforms can minimize the number of links in the resource transaction process from the client to the platform and finally to the supplier (林寅含 外 2020, 6). Furthermore. a logistics system with a complete ecosystem can ensure the enterprises' rapid response to orders (何瑛·李雯琦 2019, 26) by launching the online and offline sales simultaneously and selecting the front warehouse model to streamline the logistics distribution model. Besides, businesses can bank on a takeaway platform to ensure regular distribution and offline stores' customer flow while meeting the product distribution's needs of office workers (万秋璇 外 2019, 80).

Cross-border integration is the eleventh factor. Due to the amalgamation of online and offline consumption, the globalization of consumption, the proliferation of cross-border e-commerce, and other global brand services, consumption scenarios will be equal and parallel in the future (周云霞 2018, 83). The range of physical retailing is usually less than ten kilometers, while online retail is less limited by physical distance. As a result, in the case of unrestricted logistics, a product's sales are almost unrestricted by physical distance and can cover nationwide and global markets. Lin and Hong (2019) uncovered that in cross-border e-commerce, the online sales channel could be maintained

through the online shopping mode, while cross-border retailers in the comprehensive reform pilot area can open online platforms and offline experience stores to serve shoppers in a dual-channel mode.

The last essential factor for e-commerce is digital marketing. New retail enriches clients' channels of purchasing goods and receiving services, as well as the overall digitalization of the whole ecosystem. However, it leads to higher requirements for digital marketing (Zhang & Zhao 2018). Companies should explore entertaining marketing which combines publicity and sales with deeper clients' interaction (Xue & Wang 2017). After all, the new system's essential goal is to create customer value, and simultaneously, by applying up-to-date technologies, meet consumer needs and improve customer satisfaction and loyalty (劉宇軒·馮霞 2019, 89). They also need to fully utilize their marketing strategies to promote mobile payments, enhance customer engagement and client entertainment, offer more diversified experiential sales scenarios, promote Virtual Reality shopping, offer convenient communication channels, and big data storage, and then complete the accurate mining of consumer demand (尹梨 外 2018). Furthermore, to boost traffic conversion rate, e-commerce platforms and online retailers should utilize social media, online and offline interaction and services, product reviews, and product descriptions to ameliorate customer trust, signal quality, and enhance consumer perception (Bao & Yuan 2019).

Ⅲ. Research Methodology

1. Definition of AHP

AHP allows the decomposition of factors related to the final decision-making process into the goal, criteria, and alternatives. One must first

find the eigenvectors of comparison matrices, and then find the priority of each factor to the previous level respectively (Saaty 1980). The main application areas of AHP are in the cases of uncertainty and decision-making with involute evaluation criteria. It can systemize complex problems by establishing hierarchical structures with mutual influences at various layers. AHP simplifies assessments through quantitative judgments for difficult problems, uncertain situations of risk, or different judgments. However, as AHP combines qualitative and quantitative research methods to process subjective judgments into a quantitative approach, it is limited to a certain degree (Cheng & Li 2001).

Generally, there are three layers in the hierarchy. The target level is the first one, and is followed by the criterion / sub-criterion level. At the bottom, there is the alternative level. When comparing factors, the scale of importance is from one to nine. Supposing a_{ij} can represent the comparison results of the i^{th} factor with respect to the j^{th} factor, a pairwise comparison matrix A is constructed.

The first step is the hierarchical single sorting, meaning that the degree of influence of each factor of the upper layer should be determined. For the pair-wise comparison matrix A, λ_{max} is the largest eigenvalue and $\lambda_{max} = n$ in the consistent matrix. Nevertheless, $\lambda_{max} = n$ may not be necessarily valid, and it may not hold true for some factors. Therefore, λ_{max} is equal to n if and only if matrix A is consistent.

If the pair-wise comparison matrix is not consistent, Saaty (2002) suggested using the normalized eigenvector corresponding to its largest eigenvalue as the weight vector. This method of determining weight vectors is called the eigenvalue method (Sekitani & Yamaki 1999).

It should be noticed that the more λ is larger than n, the bigger the inconsistency of A, and the greater the judgment error. Then a consistency test can be conducted.

<Table 1> Definition of Degree

Degree	Definition
1	Equal Importance
3	Weak Importance
5	Essential Importance
7	Very Strong Importance
9	Absolute Importance
2, 4, 6, 8	Importance is between the above scale
Reciprocal	If the ratio of the importance of factor I to factor J is A_{ij}, the ratio of the importance of factor I to factor J is $a_{ij} = 1/A_{ij}$

▪ Saaty(1990, 15)

$$\mathbf{A} = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{pmatrix}$$

▪ Saaty(2002, 88)

The consistency index (hereafter, CI) and the consistency ratio (hereafter, CR) are defined below (Saaty 1990, 13):

$$CI = \frac{\lambda - \mathrm{n}}{\mathrm{n} - 1}$$

$$CR = \frac{\mathrm{CI}}{\mathrm{RI}}$$

Random index (hereafter, RI) is the consistent index value formed via the positive reciprocal matrix generated by the evaluation scale from one to nine under certain degrees and n is the sum of the diagonal entries, also known as the sum of the eigenvalues. Generally, when the

consistency ratio is less than 0.1, the degree of inconsistency of A is considered to be within the allowable range and its normalized feature vector can be used as the weight vector. Otherwise, the pair-wise comparison matrix should be reconstructed to adjust A. The reason for this judgment is based on the concept of the consistency test (Saaty 1988). Consistency test means the process of testing A which utilizes the CI, RI, and CR. According to <Table 2>, the RI is as follows:

<Table 2> Values of the Random Index (RI) for Small Problems

m	2	3	4	5	6	7	8	9	10
RI	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.51

▪ Saaty(1980)

After the hierarchical single sorting takes place, the next step is to conduct the hierarchical total sorting. The total order of the layers of layer B is the weight of the i^{th} factor of layer B for the total target $\sum_{j=1}^{m} a_j b_{ij}$ (Lei 1992). Let layer B (B_1, B_2,⋯, B_n) rank the hierarchical single-order consistency index of factor A_j (j=1, 2,⋯, m) in the upper layer A as CI_j, the random consistency index as RI_j, and the consistency ratio of the total order of the layers as the consistency ratio hierarchy (hereafter, CRH):

$$CRH = \frac{a_1 CI_1 + a_2 CI_2 + \ldots + a_m CI_m}{a_1 RI_1 + a_2 RI_2 + \ldots + a_m RI_m} = \frac{CIH}{RIH}$$

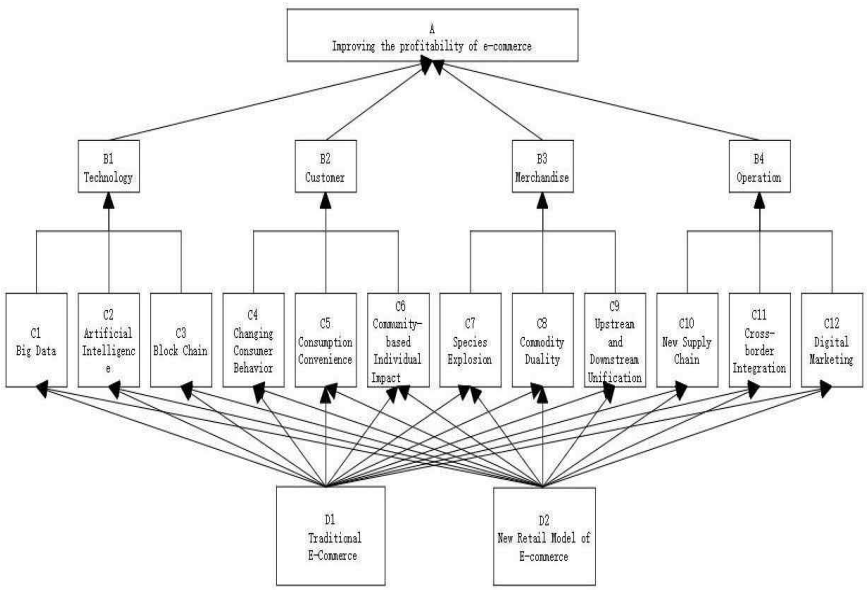
Here CIH refers to the consistency index of the hierarchy. RIH refers to a random index of the hierarchy. The total ranking of the hierarchy can pass the final consistency test only when CRH < 0.1. The next procedure is to calculate the weights of all factors for the target layer, and then the sum of the weights of the alternative layer can be calculated (Wang 2006).

2. Original Survey

(1) Identification of Criteria, Sub-criteria, and Alternatives

This paper adopted the AHP methodology to analyze the new retail model and the traditional e-commerce model during the Fourth Industrial Revolution. Since AHP's factors are qualitative and can not be measured quantitatively, it is necessary to carefully review prior studies first to determine which factors can be defined as important criteria or sub-criteria by relying on the intuition and experience of the respondents. In this paper, the literature review showed that prior professional research that supports the importance of all the selected factors could be adequately found. The goal (layer A) is to improve the profitability of e-commerce. Criterion layer B consists of four criteria: B1 Technology, B2 Customers, B3 Commodities, and B4 Operation (Please refer to <Figure 1>).

<Figure 1> The Hierarchical Structure of the New Retail Model of E-commerce



Sub-criterion layer C consists of twelve factors, C1 Big Data, C2 Artificial Intelligence, C3 Blockchain, C4 Changing Consumer Behavior, C5 Consumption Convenience, C6 Community-based Individual Impact, C7 Species Explosion, C8 Commodity Duality, C9 Upstream and Downstream Unification, C10 New Supply Chain, C11 Cross-border Integration, and C12 Digital Marketing, respectively.

These factors are clear and equal sub-criterion of each criteria. For instance, even though the functions of big data, AI, and blockchain may seem to overlap when they are applied to the new retail model of e-commerce, the differences among them are quite obvious. Big data is used to capture, manage and process data. It focuses more on providing solutions for various intelligent businesses, personalized service, accurate marketing solutions, and strengthening supply chain collaboration. AI is based on a large number of data for machine learning. The ultimate goal is to replace human labor with machines, obtain lower cost, achieve better output and service, and improve the customer shopping experience. As for blockchain, it is a shared database, with multiple features such as unforgeability, traceability, joint participation, openness, and transparency. The final purpose is to build a secure platform, which will profoundly affect the e-commerce industry in terms of digital identity, commodity traceability, supply chain, and other links. In other words, they are very important specific technologies for the new retail model of e-commerce, with different main functions.

There are two alternatives in this paper. Traditional e-commerce is defined as the e-commerce operational model that individuals have used in the past and in which offline and online businesses are separated. The new retail model of e-commerce is a brand-new model which involves deep integration of the online, offline, and new logistics through an all-around high-tech upgrade. Specific explanations for the criteria, sub-criteria, and alternatives are shown in <Table 3>.

<Table 3> Identification of Criteria, Sub-criteria, and Alternatives

Goal	Criteria	Sub-criteria	Explanation
A Improving the profitability of e-commerce	B1 Technology	C1 Big Data	Fully analyzes customers' needs, and then creates a variety of business scenarios to enhance customers' shopping experiences, and improves the operation as well as the management of the company effectively.
		C2 Artificial Intelligence	Accurately predicts consumer demand, creates personalized and customized scenarios around customers, meets customers' interaction requirements, helps businesses greatly reduce repetitive tasks, reduces costs, and empowers the new retail.
		C3 Block Chain	Enhances the distribution of retail industry and enterprises, reduces their operating costs, and improves consumer satisfaction.
	B2 Customer	C4 Changing Consumer Behavior	The consumer scenarios, expectations, and experiences have been changing, experiential consumption scenarios, customization, seamless omni-channel shopping experience, and lifetime value, etc. are becoming more momentous.
		C5 Consumption Convenience	Global consumption, in-time consumption, and anytime-anywhere shopping experiences, etc.
		C6 Community based Individual Impact	Customers' personal experiences have a greater impact through new media; community-building through social media platforms became the key.
	B3 Merchandise	C7 Species Explosion	The emergence of many new consumption scenarios, services, and commodities.
		C8 Commodity Duality	Commodities have both physical and digital attributes.
		C9 Upstream & Downstream Unification	Online and offline stores are unified, and product quality from upstream providers is consistent with downstream suppliers.
	B4 Operation	C10 New Supply Chain	Comprehensive upgrading of internal and external supply chains, thus the ecological supply chain platform via reshaping people, goods, and markets can be established.
		C11 Cross-Border Integration	Integration of cross-border e-commerce and merchandise trade, consumption scenarios will be equal and parallel in the future.
		C12 Digital Marketing	Practical activities to promote products and services through digital channels, which focus on the overall digitalization of the whole ecosystem.

(2) Data Collection

In this paper, a stratified sampling method was adopted to collect data. Considering that the population is vast and the differences between subpopulations are also important, it is necessary to classify the population, and then randomly select samples from various subpopulations. The essence of stratified random sampling is in the simple random sampling which is carried out on the basis of stratification (Singh & Mangat 1996). AHP has no specific requirements for the number of experts. In principle, an odd number is preferred, as it is considered more convenient for comparison and final decision purposes.

121 questionnaires were collected, fifty of which passed the consistency test, and the number of samples matched the expected requirements. Specifically, the top ten e-commerce companies in China were selected for this research. To ensure the credibility of the responses, the questionnaire was randomly sent to those working in the R&D and market development departments. The respondents' age ranged from twenty-eight to fifty-four and they all obtained at least a bachelor's degree. Among the fifty respondents who passed the consistency test, ninety-six percent of the surveyees submitted their replies to the questionnaire through *WeChat*, while the rest sent it through an external link that was provided. Besides, thirty-six percent were female, and fifty-eight percent were from Guangdong Province.

IV. Analysis

1. Analysis of the Findings

(1) Basic Analysis Based on the AHP Model

The pairwise comparison matrix was constructed based on the hierarchical structure, and the rank-ordered weight of each comparison matrix was obtained. All results were aggregated and the λ_{max} and weights of all factors were calculated. Moreover, the hierarchical total sorting and consistency test was conducted. Yaahp was used for the calculations, applying a method called group decision-making based on the AHP model.

<Table 4> The Weights of Each Sub-Criteria to the Relevant Criteria

Criteria	Sub-criteria	Weight
B1 Technology	C1 Big Data	0.42948
	C2 Artificial Intelligence	0.36511
	C3 Blockchain	0.20541
B2 Customer	C4 Changing Customer Behavior	0.35766
	C5 Consumption Convenience	0.39020
	C6 Community-based Individual Impact	0.25214
B3 Merchandise	C7 Species Explosion	0.34872
	C8 Commodity Duality	0.33422
	C9 Upstream and Downstream Unification	0.31705
B4 Operation	C10 New Supply Chain	0.25320
	C11 Cross-border Integration	0.32825
	C12 Digital Marketing	0.41856

According to <Table 5>, it can be observed that the new retail model can make more profit for e-commerce when compared with the traditional

model. The weight of the new retail model is 0.7511, while the weight of the traditional one is 0.2489. As for the criterion layer, B2 Customer was deemed the most essential with a weight of 0.2919, followed by B3 Merchandise (0.2621), B4 Operation (0.2425), and B1 Technology (0.2035).

B2 Customers and B3 Merchandise turn out to be the most crucial factors of trade in goods. On the one hand, the essential foundation for the enlargement of the new retail is the gradual improvement of consumers' requirements for individualization, which manifested the importance of shoppers (Wang 2017). On the other hand, merchandise is experiencing revolutionary breakthroughs such as "species explosion" and commodity duality (阿里研究院 2017). These transformations are fundamentally transforming the pattern of retailing and circulation domain in China.

<Table 5> Rank Ordering Weights of All Factors to Target Layer A

Alternative	Weight
D2 New Retail Model of E-Commerce	0.7511
D1 Traditional E-commerce	0.2489
Criteria	**Weight**
B2 Customer	0.2919
B3 Merchandise	0.2621
B4 Operation	0.2425
B1 Technology	0.2035
Sub-criteria	**Weight**
C5 Consumption Convenience	0.1139
C4 Changing Consumer Behavior	0.1044
C12 Digital Marketing	0.1015
C7 Species Explosion	0.0914
C8 Commodity Duality	0.0876
C1 Big Data	0.0874
C9 Upstream and Downstream Unification	0.0831
C11 Cross-border Integration	0.0796
C2 Artificial Intelligence	0.0743
C6 Community-based Individual Impact	0.0736
C10 New Supply Chain	0.0614
C3 Blockchain	0.0418

According to the survey, a handful of experts believe in the significant role of customers. From their work experience, once clients have strong faith in a given product, they willingly pay for it. On the contrary, if the product does not match customers' demands and expectations, they will not care for it even if that product has a positive value. At the same time, some experts would vote for merchandise, since they harbor the idea that products are everything, that e-commerce can not make money without a proper product, and that no one would pay for defective goods.

B4 Operation placed third, mainly because C12 Digital Marketing is vital (蔡骅 2019, 58). As for the other two factors included in B4, creating an ecological chain of the new retail industry and achieving parallel and equal consumption are the keys to building the new supply chain and cross-border e-commerce respectively. Nevertheless, these are not easy to achieve. Considering the huge impact of the Fourth Industrial Revolution, it is interesting to find that the experts place B1 Technology in last place. Many cutting-edge technologies can not be fully applied to all consumption scenarios and the related supporting technologies are still under development. Although innovative new technologies can enhance firms' operations, convert people's lifestyle, promote industry structure, and create a whole new world, their impact still takes time to develop. However, we should remember that the progress of all factors is inseparable from the advancement and support of technology innovation (劉禹佐 2019).

When we look at the sub-criterion level, the top three factors are C5 Consumption Convenience (0.1139), C4 Changing Consumer Behavior (0.1044), and C12 Digital Marketing (0.1015), with the top two coming from B2 Customers, and the third one deriving from B4 Operation. When it comes to C5 Consumption Convenience, omni-channel and borderless logistics are gradually changing clients' demand for convenience, because when shoppers' enthusiasm is stimulated, purchasing goods anytime and

anywhere becomes the most indispensable factor (Wang 2017, 04; 廖凌云 外 2018, 81; 周云霞 2018, 83). As for C4, it should be remembered that meeting the multi-dimensional needs of clients is an important factor in the strategies for the new retail model in the future (Wang & Xiang 2018, 6-10). In terms of C12 Digital Marketing, due to the transition of the whole ecosystem of e-commerce, digital marketing is everywhere (吳浩 2018). It is indispensable than anything else in this phase because it is an era that requires businesses to do everything possible to attract shoppers' attention (高超超·錢敏 2020, 13). In conclusion, the boost of e-commerce should acclimate to conversions in client habits, and even predict changes in purchaser spending habits and make coping strategies timely. Meanwhile, due to the enhancement of technology and the ubiquity of personal electronic devices, the marketing work of e-commerce needs to combine the latest social environment to afford shoppers more abundant and better-quality goods and to customize the provision of services with more convenience (Chen 2021). Afterall, clients are invariably the most important factor.

(2) Analysis of Sensitivity Based on the AHP Model

The vertical analysis of sensitivity tests the influence of conversions in the weights of the criterion layer and the sub-criterion layer on the total rank-ordering weight of decision-making. This is, in fact, an analysis of the stability of the model. The definition of sensitivity index is the final weights' maximum range of variation caused by the current varieties of weights in the factors. The larger the index, the greater the impact of the change of weights in the factors on the overall ranking results, and the higher the sensitivity. The basic range of sensitivity is from 0.0 to 1.0. The sensitivity index ranges from 0.0027 to 0.0349 for this paper's model, and there is no variation point. Therefore, no matter how the selected

factor converts, the rank of alternatives will not change. This means that the ranking of the alternatives is insensitive to each factor in the criterion level and sub-criterion level in the current model, and the final optimal choice is a stable result under present data.

(3) Limitations

The AHP model combines experts' subjective perspectives, and the presentation of results may vary slightly according to the range of samples. In addition, e-commerce involves a wide range of industries. Different types of industries may have other choices for the criterion layer and the sub-criterion layer. For example, technology is probably not as important as operation when it comes to tempered glass film. However, technology is essential for industries such as Bluetooth headsets. Therefore, with a larger number of experts and represented sectors, a more general result might be obtained.

2. Analysis of the Digital Revolution of E-commerce

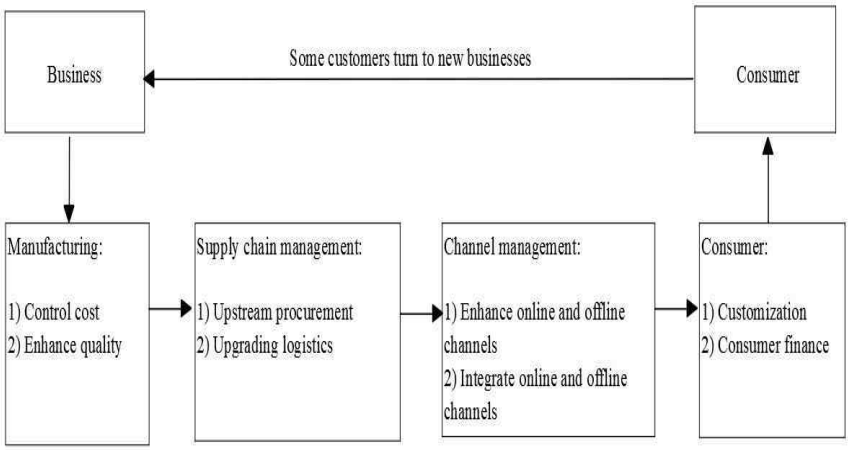
(1) The Value and Data Flow of E-commerce

To cope with the various changes under the Fourth Industrial Revolution, the value flow and data flow of e-commerce have been reformed accordingly. However, it should be underlined that the new value is not totally new, to some extent. It involves the extension and upgrading of traditional e-commerce. Changes in the manufacturing department, the supply chain department, the channel department, and the customer department are also trying to empower customers. In the value flow, there are four different stages involved. Every time a product passes through a stage, marginal value should be added. From the

manufacturing stage to the supply chain to the channel, and then on to the customer, the new retail model of e-commerce adds new value to the final product.

Specifically, manufacturing needs to pursue cost reduction, and quality enhancement. The new supply chain requires businesses to purchase upstream directly, rather than through intermediaries. E-commerce companies should also have modern and efficient logistics. Channels should facilitate online and offline channels, shorten, and expand them. The priority of the customer department should be personalized customization, and include not only value-added customization of products but also personalization of services. Consumer finance in China has room for further development and improving that aspect may promote clients' willingness to purchase.

<Figure 2> Value Flow of the New Retail Model of E-commerce



With the Fourth Industrial Revolution, data has become particularly crucial. Shoppers generate data and pass it on to manufacturing, the channel, and sometimes to the cloud directly. The data center gets full feedback from internal producers and partial feedback from external

suppliers. In terms of the data flow between the customer and other parts, this may look like a one-way process. But it is, in fact, partially bidirectional when it comes to the data flow between the data center and consumers. The e-commerce platform can send information to clients based on their interest and demand. The interaction between the channel and the data center is bidirectional, which means it would speed up convergence construction in the whole structure.

(2) Comparison between the New Retail and the Traditional E-commerce Model

First, the new type of e-commerce is based on the circular operation of the database regarding technology, whether it is value or data flow. Analysis of big data can help e-commerce companies improve their services, enhance customer loyalty, and raise repurchasing rates. Meanwhile, AI can effectively curtail costs from all spheres. If the e-commerce industry can take the lead in breaking the bottleneck of AI to replace human labor, it will greatly boost the quality of service and efficiency, by mitigating the pressure of logistics. Finally, blockchain's progress extends the operation of the traditional model of e-commerce and creates a new supply chain platform to business (S2B) model.

Second, consumers have become more essential than ever. They are not only shoppers who purchase goods from e-commerce companies, but also sources of data. The concordance of online and offline e-commerce and the enhancement of service will enhance consumers' experience, making it a perfect example of smart stores. Simultaneously, global consumption and in-time consumption have increased convenience for consumers. Finally, the appearance of social e-commerce has broken the traditional one-way output model and purchasers can also be converted into merchants, which in return can inject new vitality into e-commerce.

Third, the available types and quantity of merchandise, the quality of goods, and personalized customization have become topics of great interest for customers when it comes to merchandise. With the rapid development of the Chinese economy, more and more consumers are paying attention to elements other than price. E-commerce companies are well aware of this opportunity. As such, they will preempt the opportunities in these three areas by improving the diversity of products, providing customized goods and services, and guaranteeing high quality.

Fourth, there are many differences between the traditional model and the new model in terms of operations. For instance, efficient modern logistics has broken the limitation of time and space. The new retail model of e-commerce has opted for more channels, scenarios, and technologies to expand its influence. Finally, the relationship between the suppliers and the business is stable, because, in the new retail model, these two are combined into service providers who offer value products for their customers.

Ⅴ. Conclusion

In June 2020, there were 940 million Internet users in China, an all-time high, representing a 36.25 million person increase from March 2020. Internet penetration rates have reached 67.0 percent, a 2.5 percentage point increase from March 2020 figures (中國互聯网絡信息中心 2020). Moreover, with the rapid growth of the Chinese economy, consumer demand and standards for products and services are also increasing. From a practical point of view, the popularity of diverse new types of e-commerce models indicates the potential capability of China's e-commerce industry. In the future, the main function of the online platform will be transaction and payment, the offline entities would

provide the first-hand experience for customers, and the efficient logistics can integrate the online platform and offline stores, thus forming a closed loop business model (杜睿云·蒋侃 2018, 7). Therefore, it is meaningful to explore the new retail model of e-commerce.

China is currently at the forefront of e-commerce progress, encountering bottlenecks before other countries. As such, Chinese e-commerce companies need to rely on their own expertise to tackle these bottlenecks. Numerous factors other than technology, customer, merchandise, and operation need to be considered. Furthermore, the key for the new retail model can be regarded as the reduction of inventory, the diminution of consumer payment costs, the decrease of intermediate links, the improvement of customer experience, and the enhancement of modern logistices (Wang & Xiang 2018, 10). The main force driving the new retail model's development is still economic interest, which makes the significance of technical content behind the proposed new retail model somewhat ambiguous. After all, the factors directly related to economic interests seem more important when they contribute more obviously to sales.

China's e-commerce is currently in a transition stage. An interesting phenomenon is that many companies are still thriving under the condition of insufficient technology, due to the fast-growing Chinese economy and vigorous advancement of industry related to the Fourth Industrial Revolution. High tech is important, but if those technologies can not recover fixed costs or achieve profits within a certain period, most e-commerce companies may prefer to adopt a more secure and traditional approach.

This paper contributes to existing research in four ways, all based on experts' opinions on the current status of the new retail model of e-commerce in China. First, this work selected four factors (technology, customers, merchandise, and operation) as research targets. Those factors

influencing the new retail model of e-commerce were explored more specifically and comprehensively. Second, by surveying e-commerce professionals, primary data and original results were obtained, which are helpful for readers to understand the new retail model in China from a practical point of view. Third, this paper utilized the AHP methodology, which combines qualitative and quantitative research methodology to objectify subjective data and, therefore, allowed the results to be as objective as possible. Lastly, the results revealed that technical factors are not as important as many may have proposed. Consumption convenience is still the most important factor. With a large number of high tech being applied in business scenarios, customers have become used to an efficient and convenient way of shopping. In fact, customers have even higher requirements for convenience now. Compared with other factors, convenient consumption is the biggest driving force when customers make a decision on purchasing commodities. Meanwhile, the results also clarified the importance of the new retail model of e-commerce in China.

Some limitations should be borne in mind when interpreting the results. Firstly, there are many factors that may affect the new retail model of e-commerce, but this paper focuses only on four aspects. Secondly, this study relies on a limited number of experts who replied to the survey. With a larger number of experts and represented sectors, a more general result might be obtained. As the AHP model combines experts' subjective perspectives, the presentation of results may vary slightly according to the range of samples.

It is difficult to draw a perfect conclusion based on a limited survey. Nevertheless, no matter what the purpose of the new retail model proposed by businessmen is, it is undeniable that the Fourth Industrial Revolution is rapidly changing the living environment of human beings. As such, even if the transformation and upgrading of the industrial

structure are extremely difficult, the new retail model's progress is still essential. Moreover, although the weight of technology lags behind the other three factors, it is important to stress that the progress of all links in e-commerce can not be separated from the support of cutting-edge technology.

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| 국문초록 |

중국의 전자상거래 뉴 리테일 모델에 대한 분석

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4차 산업혁명에서 기업들은 첨단기술의 적용을 통해 생산단계에서부터 고객에게 재화를 전달하는 최종단계까지 모든 연결고리를 업그레이드 및 변화시키며 전자상거래 생태계 전반을 재구축하고 있다. 본 논문은 전자상거래의 새로운 유통모델을 분석하고, 이 새로운 모델과 기존 전자상거래모델 사이의 차이점을 비교한다. 본 논문의 목적은 AHP 기법을 활용하여 전자상거래의 새로운 유통모델과 전통적 전자상거래모델 중 어느 방식이 현재 흐름에 더 부합하는지를 탐구하는 것이다. 중국의 대표적인 전자상거래 업체에 종사하는 전문가들을 대상으로 한 설문 결과를 통해, 네 가지 요인(고객, 상품, 사업 운영, 기술)의 상대적 중요성을 상세히 분석하였다. 그 결과, 고객이 가장 중요한 요소이며, 기술은 상대적으로 덜 중요한 것으로 나타났다. 또한, 하위 세부 기준 중에서는 소비의 편리성이 가장 중요한 것으로 나타났다. 아울러, 최근 중국에서 번성하기 시작한 전자상거래의 새로운 유통모델이 현 추세에 더욱 부합하고 현지 상황을 더욱 잘 설명하는 것으로 나타났다. 본 논문은 전자상거래의 새로운 유통모델이 실용적인 면에서 중요한 이유를 부각하여 중국 현지 상황을 더 잘 이해할 수 있도록 하였다.

▪ 주제어: 전자상거래의 새로운 유통모델, 전통적인 전자상거래모델, 4차 산업혁명, AHP 기법, 중국