Research on Reconstruction of New Retail Triangle Driven by AI

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Abstract. With the continuous application of AI technology, the business model of retail industry is also developing rapidly. Through the case study of Freshippo and the literature review by CiteSpace, this article aims to explore the new retail Triangle business model. The study helps us identify the evolution mechanism of the new retail triangle through EGM analysis method and AHP data analysis method. Besides, this paper sums up the most key factor of the new retail triangle, and helps reconstruct it.

Keywords: New retail · AI · Reconstruction · New Retail Triangle · Freshippo

1 Introduction

In the context of continuous global economic growth, rapid development of AI and upgrading of consumer demand, new retail was put forward and gradually overturned the traditional retail industry. Facing the increasing impact of technology on business model reform, it is significant to explore influence mechanism of AI within the reform.

2 Research Basis

2.1 Research Background

In 2016, Jack Ma, the founder of Alibaba Group, proposed the concept of "new retail", which immediately led to a wave of transformation of the two-way linkage layout of online and offline consumption. Because of its product characteristics and broad market demand, the fresh market industry has been able to enter online retail channels with the help of the Internet, big data, AI and other technologies. With the integration of online and offline development, "new retail" has become the blue ocean strategy of many fresh supermarkets.

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2.2 Research Purpose

In the context of the rapid development of AI, the normalization of the COVID-19 epidemic and the upgrading of consumer demand, new retail has gradually overturned the traditional retail after six years of development. Therefore, in order to explore the transformation of the new retail business model under the new situation and study the influence mechanism of AI on the new retail, we carried out this study.

2.3 Freshippo

Founded in 2016, Freshippo is a brand of Alibaba, which focuses on fresh products. It was Freshippo that pioneered the new retail model. Freshippo uses Alibaba's powerful artificial intelligence data processing and other high-tech, changes the supply chain to improve operational efficiency and achieve accurate prediction of consumer demand. Thus, a new retail model, characterized as "fresh supermarket + catering service + online APP + logistics distribution" was created.

As we can see from Fig. 1 and Fig. 2, Freshippo has been through a rapid increase from 2017 and involves the most densely populated areas in China nowadays, which proves the feasibility of the new retail model with its continued growth and an expanding number of stores. Therefore, Freshippo is taken as an example to explore how it uses AI technology to develop new retail, which can provide reference for the innovation and development of other retail enterprises.

Fig. 1. Number and geographical distribution of Freshippo's current stores in 2022. Figure is made by the authors.

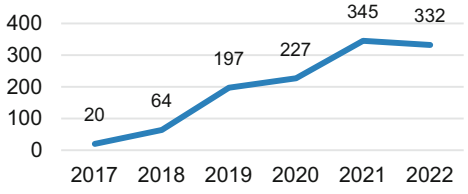

Fig. 2. Number of Freshippo's stores from 2017 to 2022.

2.4 Miryoku Engineering

Miryoku engineering, proposed by a Japanese scholar Masato Ujigawa and his group in 1991, aims to create attractive products and spaces by adopting a design philosophy centered on consumer preferences. The EGM (Evaluation Grid Method) is a significant method of Miryoku engineering [7]. According to EGM, factors that attract consumers can be found out and analyzed scientifically. Therefore, EGM method usually be used to assess and improve the user experience of products and services and further elucidate the deep user demands. In terms of theoretical implementation steps, the EMG method extracts core elements through in-depth interviews with many relevant people. Core elements are composed of original reasons, specific reasons and abstract values, which can jointly reflect the core needs of users.

2.5 Current Research Gap

We use CiteSpace to analyze the current research status of new retail, and import the download information based on the literature in the WOS into CiteSpace. According to the data of the publishing area from 2016 to 2022, the most articles came from the United States (338), followed by China (178), and the third was the United Kingdom (69), followed by Australia, Canada, and New Zealand, as shown in Fig. 3.

We can find in the keyword co-occurrence of time series that the hot research vocabulary in the relevant field in 2021 includes satisfaction in Fig. 4, price discrimination, consumer behavior and other highly related content to consumer experience, which shows that the current research topic has gradually shifted from technology to how technology and consumers are closely linked and promote each other.

In the Top9 keyword co-occurrence, we can see that the keyword about the model actually lasted from 2019 to 2022 from Fig. 5, while e-commerce, intervention, point of sale, and product all lost their popularity in 2020.

In previous research on new retail, researchers have focused on the research of Consumers, Goods and Scenes about new retail. In terms of the triangle about user demand, scholars extracted three key words: Cheap, Convenient and Abundance, respectively based on the price, position and product. And then on the base of Freshippo's business model, a new retail triangle was composed of Discount, Optimization and Experience. However, few people have studied this model.

Therefore, the analysis of the new retail triangle focusing on the user perspective is relatively innovative. Furthermore, we have successfully explored the impact mechanism

Fig. 3. Network map of the country's cooperation.

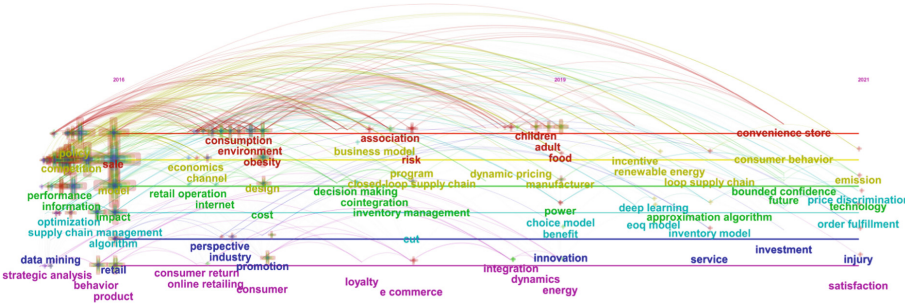

Fig. 4. Timeline of co-occurrence keywords.

Top 9 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2016 - 2022
channel coordination	2016	2.36	2016	2017	
dominant retailer	2016	2.36	2016	2017	
performance	2016	2.49	2017	2018	
risk	2016	3.79	2018	2019	
e commerce	2016	2.16	2018	2020	
intervention	2016	2.16	2018	2020	
point of sale	2016	2.4	2019	2020	
model	2016	2.22	2019	2022	
product	2016	2.19	2019	2020	

Fig. 5. Keywords with strongest citation bursts.

of AI on new retail and clearly understood how AI technology can better promote user experience.

3 Research Method

3.1 EGM Method

In order to reveal the most crucial elements of new retail attracting customers to improve the retail triangle, this study adopts the EGM based on Miryoku Engineering to explore factors that attract consumers in Freshippo compared to the traditional shopping malls.

We conduct the following steps. First, we found 56 respondents, including 28 males and 28 females, who used to shop in Freshippo. And then, we ask them in what ways do Freshippo attract them compared to the traditional shopping malls. The reasons respondents answered were recorded as the original reasons for the evaluation. Based on the original reasons, we continued to ask them for specific reasons. For example, when they said the experience was good, we asked them what specific experiences made them impressive to Freshippo, and recorded the corresponding abstract feelings. Finally, we take out the top original reasons in order of rank, as well as the corresponding specific reasons and values.

The result from Fig. 6 shows that, the original reasons we refined are: optimization, efficiency, experience, discount, which compose the key attraction of Freshippo compared to traditional retail. For special reasons, the most frequently mentioned are “online and offline”, which has appeared 40 times; The second is fashionable goods, which have

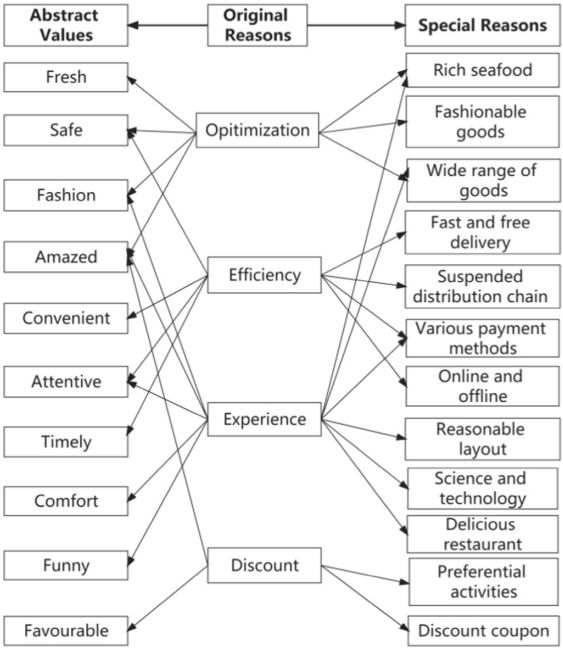

Fig. 6. Evaluation diagram of Freshippo.

appeared 30 times. At the value level, the most mentioned keywords are fresh (appeared 42 times), timely (appeared 38 times) and funny (appeared 36 times).

Through the EGM method, we can clearly find that "experience" is the most original reason mentioned by respondents. It has been mentioned 50 times in total, accounting for 89.2%, followed by preference, mentioned 42 times. However, just by the frequency that respondents mention, it is not possible to determine to what extent each factor can motivate users to purchase and whether "experience" is the most important user need. Therefore, on the basis of this survey, we further analyzed it through questionnaire and analytic hierarchy process.

3.2 AHP Method

The analytic hierarchy process (AHP), a decision-making method developed by Saaty, is mainly used in cases with uncertainty and decision problems with various evaluation criteria. AHP method takes a complex multi-objective decision-making problem as a system, decomposes the goal into multiple goals or criteria, and then decomposes it into several levels of multi indicators. Further, the hierarchical single ranking and total ranking are calculated by the qualitative index fuzzy quantitative method, so as to make multi scheme optimization decision.

After obtaining the original reasons through EGM qualitative interview, in order to further explore the correlation between the four attractive factors and the satisfaction with Freshippo, we conducted a questionnaire survey, further judging the weight of the four original reasons for satisfaction through analytic hierarchy process. By sending out questionnaires on the Internet, we collected 132 effective questionnaires in total. Male respondents accounted for 42.2%, female respondents accounted for 57.8%. The questionnaire is mainly a matrix scale, which consists of two parts: the first is to score the satisfaction of discounts, experience and other factors in Freshippo. The second is to score the overall satisfaction in the process of shopping in Freshippo.

In order to compare the importance of relevant variables, assign weights and analyze the correlation between independent variables and dependent variables, we further analyze the data by AHP, and SPSS26.0 was used for data processing. We set optimization, efficiency, discount and experience as independent variables and the shopping satisfaction of Freshippo as dependent variables. And set optimization, efficiency, discount and experience as indicator 1, indicator 2, indicator 3 and indicator 4 respectively (Fig. 7).

From the following table, we can see that for optimization, efficiency, discount, experience, a total of four items to build a fourth-order judgment matrix for AHP hierarchical study (calculation method is: sum product), the eigenvector is obtained (0.448, 0.634, 1.180, 1.738), and the corresponding four weight values are 11.208%, 15.849%, 29.489%, 43.455%. In addition, the maximum eigenvalue (4.259) can be calculated by combining the eigenvectors, and then the CI value (0.086) can be calculated by using the maximum eigenvalue, which is used in the consistency test as shown in Fig. 8.

Generally, the smaller the CR value, the better the consistency of the judgement matrix. Generally, if the CR value is less than 0.1, the judgement matrix satisfies the consistency test. In this analysis, the CI value is 0.086 for the fourth-order judgment matrix and 0.890 for the RI value lookup table, so the CR value is $0.097 < 0.1$, which means that the judgment matrix in this study satisfies the consistency test and the weights calculated are consistent (Figs. 9 and 10).

Through analysis, we can see that experience takes the highest weight and has the greatest impact on the satisfaction of Freshippo, which is the most critical factor affecting customer satisfaction.

High weight of "experience" is consistent with the user centered concept of new retail. The other three factors still correspond to price, place and products. Simultaneously,

AHP Data				
	Optimization	Efficiency	Experience	Discount
Optimization	1	0.5	0.333	0.4
Efficiency	2	1	0.323	0.4
Discount	3	3.1	1	0.357
Experience	2.5	2.5	2.8	1

Fig. 7. AHP Data

AHP analysis results				
Criteria	Eigenvector	W Weight value	Eigenvalue of maximum	CI
Optimization	0.448	11.21%	4.259	0.086
Efficiency	0.634	15.85%		
Discount	1.18	29.49%		
Experience	1.738	43.46%		

Fig. 8. AHP analysis results

Consistency test results				
The largest eigenvalue	CI	RI	CR	Results
4.259	0.086	0.89	0.097	PASS

Fig. 9. Summary of consistency test results

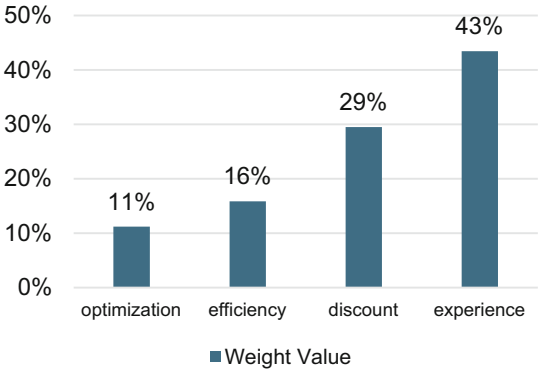

Fig. 10. Weight value of the independent variables

given that experience has a broad meaning, and it can be associated with almost all specific reasons. Hence we take experience as the core of the new retail triangle model, further reconstituting the original new retail triangle to help us analyse the influential mechanism of AI on the new retail. The new retail triangle model reconstructed based on EGM and AHP is shown in the Fig. 11.

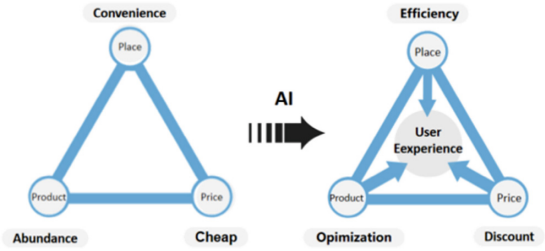

Fig. 11. The evolution of retail triangle.

4 Influence Mechanism of Artifical Intelligence on New Retail Triangle

4.1 Product: Abundance to Optimization

In traditional retail, the key point for retails to attract consumers is to offer as abundant products as possible, whereas in the new retail, the core competitiveness is to provide customers with the most suitable products [1, 8].

In order to make products better correspond to consumer needs, AI technologies including machine learning, deep learning, mapping knowledge domains and NLP can help the application of user data such as basic data, behavioral data and social data, providing users with better service experience from the product level [5].

Freshippo, for example, has been revolutionized both online and offline by AI. In offline supermarkets, Freshippo uses AI for intelligent product selection to ensure that the products displayed in the store are more in line with market trends. Second, based on sales history, location, weather and other information, AI can identify demand for specific products and help Freshippo replenish supplies. In this way, Freshippo prevents against underperforming products and stores products that customers are likely to purchase. For online products, Freshippo utilizes AI to analyze consumer data and learn user preferences. Furthermore, it can recommend more interesting products for each user in the APP, so that users can find more desirable products in a shorter time, thus greatly improving the shopping experience.

4.2 Price: Cheap to Discount

At the price level, traditional retail stores attract customers through low prices. However, constantly lowering prices does not increase profits. In new retail, merchants use AI to calculate more accurate discounts, rather than lower prices, to capture consumers. AI can show retailers the likely results of different pricing strategies so they can propose the best promotional offers, gain more customers and increase sales. To do this, algorithms typically collect data about competitors' products, promotions, and sales, as well as non-store data about events such as local events [11].

As an example, Freshippo uses AI to better set prices and discounts. For one thing, they use machine learning to predict the price trend and demand quantity of products. In this way, they can efficiently make smarter choices, and subsequently generate more

reasonable pricing strategy. At the same time, Freshippo can effectively save the cost and time of transportation, and finally effectively improve the inventory turnover rate. Through these operations, they can ensure that the same product is produced at a lower cost than their competitors, so that they gain higher gross profit. For another, by means of machine learning, they can also provide differentiated discounts for diverse customer groups. This can effectively enhance the stickiness between customers and enterprises, and also benefit more customers. In general, not only can AI give Freshippo a competitive advantage in price and profitability, but also allow consumers to gain more attractive deals.

4.3 Place: Convenience to Efficiency

In terms of efficiency, traditional retail attracts consumers by choosing geographical locations closer to consumers. However, in the era of new retail, the business model changes to O + O, so the original geographical restrictions are broken. New retail creates a more efficient retail model by combining online and offline [6, 10]. In addition, intelligent supply chain is also one of the embodiments of improved efficiency.

In the selection of offline stores, after calculation and repeated tests on community distribution, population consumption characteristics, distribution time and other data, Freshippo set the location of store near 3 km of the community. In terms of store design, its innovation lies in the integration of store and warehouse. Each Freshippo store is half facade and half warehouse [3]. It takes the store as the experience and distribution center, builds its own logistics system, and provides distribution services for consumers free of charge, and the distribution time is within 30 min. On the line, Freshippo also ensures the efficiency of distribution. In order to achieve "Freshippo speed", it not only needs the appropriate range, but also needs the support of the best route calculated by AI. Therefore, combining online and offline. Freshippo creates a convenient geographical location and efficient distribution system to ensure efficiency.

4.4 Customer Experience

Technology can serve as an important touchpoint to change the consumer experience. In a narrow sense, experiential value can be divided into interaction and social interaction with the activities involved by consumers in the retail industry [9].

At the interactive level, in Freshippo, AI directly improves the user experience through the construction of scenes and the optimization of services. Freshippo has carefully set up the scene of restaurant in the shopping mall, and serves customers through the meal delivery robot to interact directly with them, so as to improve customers' sense of consumption interaction in the store. Moreover, the setting of VR experience hall can also make users more immersed in enjoying services [4].

At the social level, AI promotes the development of mobile social media platform, so that consumers can interact on social media in real time, share commodity information and shopping experience for word-of-mouth communication. "Hot topics", "Selected Topics", "Concerns" and other contents are set in Freshippo app. When consumers open the Freshippo app, the algorithm will recommend high-profile food notes for consumers

and push the food experts concerned by consumers, so that consumers can get a social experience online and stimulate their purchase intention.

There is no doubt that experience is more than a feeling in a broad sense; Experience is also an indicator of the degree to which user needs are met. Therefore, in addition to the sense of experience, consumers enjoy better services in optimization, discount and efficiency, all of which enable consumers to obtain a better sense of experience.

4.5 Influence to Customer

In the four aspects of product, price, place and experience, AI enables new retail to divide different user portraits, precisely locate consumer needs, break the spatial distance with an efficient supply chain, and increase the added value of products with diversified scenarios. Therefore, these enable consumers to get a richer scene experience, better service experience and diverse shopping experience. Finally, the higher level of consumer demand has been satisfied.

5 Conclusions

In the new retail phase, EGM and AHP method has led to the understanding that the key attractors of new retail to consumers are mainly optimization, efficiency, experience and discounts. It is argued that the new retail triangle is a business model that is more in line with market demand trends.

AI enables new retail to focus on meeting the personalized user requirements in a shift from abundance to optimization. From cheap to discount, AI creates more sophisticated and rich pricing strategies. From convenience to efficiency, AI improves the efficiency of new retail supply chains. Together with the interactive experience directly facilitated by AI technology, these layers contribute to the improvement of user experience. So that the new retail can meet the users' higher level of experience demand than the traditional retail.

In conclusion, through the integrated use of various AI technologies such as machine learning, knowledge mapping and natural language processing, human-computer interaction, computer vision, biometric recognition, and VR/AR, a breakthrough innovation shift from traditional retail to new retail is achieved in various aspects such as sales strategy, supply chain logistics, price strategy, and physical shop experience.

Ultimately, in spite of the application of AI in retail facing personal privacy protection, technical barriers, humanitarian issues and other barriers. Whereas, the future is still promising.

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