Global Business and Management Research: An International Journal
Vol. 16, No. 4s (2024)

# 4Ps marketing strategy innovation of fresh food e-commerce in the background of big data

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**Abstract**

**Purpose:** The purpose of this paper is to explore how big data can optimize the product, price, place, and promotion strategies of fresh food e-commerce (FFE) enterprises to better match consumer needs and improve customer satisfaction and enterprise competitiveness.

**Design/methodology/approach:** Based on the relevant literature to understand the principles and functions of big data and the research results of FFE marketing strategies, analyze the characteristics of consumers purchasing fresh food and the external environment faced by FFE enterprises, and finally propose ways for FFE enterprises to apply big data in the process of developing marketing strategies.

**Findings:** This paper identifies that big data can play an important role in developing marketing strategies for FFE and tries to propose methods for FFE companies to apply big data to develop product, price, place, and promotion strategies.

**Research implications:** This study emphasizes the changes in consumer purchases of fresh food in the context of big data, provides insights into the impact of big data on FFE, and offers new insights into how FFE companies can utilize big data to develop 4Ps marketing strategy.

**Practical implications:** This study provides feasible insights for FFE companies to help them improve the effectiveness of their 4Ps marketing strategy through big data, which can lead to better customer satisfaction and competitive advantage in a rapidly developing market.

**Originality/value:** This study explores how big data can be applied to the 4Ps marketing strategy of FFE, which is a new perspective to help FFE enterprises improve their marketing effectiveness through innovative 4Ps marketing strategies. The value of this study is that it expands the traditional 4Ps marketing theory by emphasizing the role of big data in FFE marketing strategies and can provide a reference for FFE enterprises to develop marketing strategies.

**Keywords**: Fresh food e-commerce, 4Ps marketing strategy, big data

## Introduction

In the era of high-speed development of information technology and the Internet, the generation and transmission speed of information is becoming more and more rapid, while the capacity of storage equipment is improving, but the cost is decreasing, so that massive data can be preserved, and modern society has entered the era of big data (Shen & Dang, 2016). Big data has huge commercial application value. Through advanced data analysis technology for

massive data processing, it can mine hidden information and value to provide a basis for decision-making and formulate more scientific development strategies. In the era of big data, fresh food information (e.g., price, origin, safety, nutritional value, cooking methods, etc.) can be rapidly disseminated on the Internet, and consumers can obtain the information they want about fresh food in a variety of ways, which is much more comprehensive and transparent than in the past, and therefore consumers can easily compare a variety of fresh food information. This also leads to consumers having more choices when purchasing fresh food, becoming more and more picky and making choices that better match their individual needs, and previously successful marketing strategies may now be less effective or even ineffective. How FFE businesses can effectively carry out marketing campaigns in the era of big data is a matter of concern.

The development of big data technology has brought opportunities for marketing strategy innovation. Data is turning into an important asset, and marketing strategies are increasingly relying on the integrated analysis of data based on a profound understanding of consumer preferences, more targeted to meet the personalized needs of different consumers, to create a broader space for the development of enterprises (Li & Zhang, 2021). This paper argues that big data is the key to the sustainable development of FFE enterprises, and through the use of big data in marketing, companies can achieve innovation in marketing strategies to implement their marketing campaigns more effectively, strive to attract and retain customers, and gain a competitive advantage.

## Literature Review

### *The characteristics of consumers purchasing fresh food in the context of big data*

Consumers of fresh food have changed significantly compared to the past. The purchasing decision-making process of consumers in the retail market is different from before (Kleisiari et al., 2021). Big data provides consumers with more information, the emergence of FFE provides consumers with more choices, and the variety of fresh food that consumers can purchase is tremendously enriched and no longer limited to the local market, which means that retaining customers has become difficult, and FFE companies are faced with fierce competition in the market. Insight into consumer characteristics is the starting point for FFE marketing activities, so it is crucial to judge and predict consumer behaviour in advance.

### *More rational consumption decisions*

In the past, when consumers purchased fresh food from offline channels, if they were not satisfied with the food from the provider and wanted to switch to another provider, it would result in a purchase process that took a lot of time. To avoid wasting time, consumers might purchase fresh food even if they are not very satisfied with the current fresh food. In the era of big data, consumers can have more information about fresh food so they can compare fresh food from different providers, including quality, price, origin, etc. They are becoming more and more professional, with an increasing sense of autonomy, and are more inclined to use their judgement to make consumption decisions and become more rational.

### *More personalized consumer demands*

As people's income level has increased, they have the ability to pursue products that better meet their requirements and seek maximum psychological satisfaction. Due to the restriction of venue space, the quantity and variety of fresh food provided by offline channels are limited and cannot meet the different requirements of all customers. The variety and quantity of fresh foods provided by FFE can better meet the needs of consumers. In the era of big data, the personalized needs of consumers and the unique selling points of some existing fresh foods can

be better matched, and the possibility of using personalized fresh foods to match the individual requirements of consumers is greatly enhanced.

***More demand for convenience***

Before the emergence of FFE, consumers could only purchase fresh food from offline channels, which usually required more time and effort. However, the rise of FFE has provided consumers with great convenience when purchasing fresh food. The most notable change is that instead of going to offline shops to purchase in person, consumers can easily select and place orders on FFE platforms, and they can do so anytime and anywhere without being restricted by time and space.

***More interactivity***

In the background of big data, information exchange has become easy. Before making a purchase, consumers can communicate with the FFE platform and other consumers or view reviews from past customers to get more complete information about the fresh food they are about to purchase. After the purchase, consumers can easily share their experience, and they can influence potential consumers by leaving reviews on FFE platforms or commenting on social media. This internet word-of-mouth not only affects consumers' purchasing decisions and loyalty but also the reputation and image of the company, and FFE companies need to pay attention to the effect of the internet word-of-mouth (Liu et al., 2018).

***Opportunities and challenges of FFE in the background of big data***

*Enormous development potential of the FFE market*

As consumers are increasingly concerned about food safety, the quality of food is a key consideration when purchasing food, and FFE can provide fresh and organic food to meet this demand. FFE is also attracting more consumers with the convenient purchasing methods and diversity of food choices offered by FFE (Lin et al., 2021). In addition, during the COVID-19 epidemic, people were restricted from going out shopping, and to meet their daily needs for fresh food, FFE was the first choice for many people, and many people who did not have the experience of purchasing in FFE began to try to purchase on FFE platforms (Huy & Phuc, 2023), which has further raised the status of FFE.

*Technological advancement contributes to the development of FFE*

The development and application of various information technologies can effectively improve the operational efficiency of FFE. For example, the development of big data technology allows FFE companies to better understand the needs of consumers based on their consumption records and browsing records, so as to make more accurate recommendations and increase the probability of consumer purchases (Jiang & Sun, 2020). The use of Internet of Things technology to better manage the FFE supply chain, optimize the procurement, warehousing, and transportation processes, and reduce the spoilage of fresh food, thereby reducing operating costs. The traceability information system allows FFE platforms and consumers to understand the information in each link.

*Intense competition in the FFE market*

The rapid development of the FFE industry has also attracted many companies to enter the field and evolved into a variety of FFE models, which has intensified the competition within the industry. It also has to face competition from offline fresh food purchasing channels, while offline purchasing is still the main way of purchasing fresh food. This is because consumers

have not yet formed the habit of purchasing fresh food online (Shen, 2021). Therefore, FFE companies face many types of competitors.

*High operating costs for FFE*

Fresh food requires a high level of storage conditions, and to maintain the freshness and quality of fresh food, it needs to be transported and stored using cold chain logistics, and the cost of cold chain logistics is much higher than that of normal temperature logistics, which results in FFE not being able to have a price advantage like conventional e-commerce. Meanwhile, the imperfection and low coverage of the cold chain logistics system cannot adequately meet the demand for cold chain logistics of fresh food and lag behind the development of FFE (Shen, 2021), resulting in a high decay rate of fresh food, which also limits the development of FFE.

**Methods**

This study adopts a qualitative research method, mainly based on the 4Ps marketing theory and literature review, to explore the characteristics of fresh food consumers and the opportunities and challenges faced by FFE in the context of big data, and finally proposes the 4Ps marketing strategy innovation path for FFE based on big data.

**Findings**

The 4Ps marketing strategy innovation path for FFE based on big data

The role of marketing strategy is for enterprises to meet customer requirements and create profits. This paper argues that consumers, as a source of profit for FFE enterprises, should pay great attention to the changes in their consumption characteristics, and at the same time, taking into account the changes in the market environment, FFE enterprises need to adjust the 4Ps marketing strategy promptly to cope with these changes. And the 4Ps marketing strategy is crucial (Lantarsih et al., 2023).

*Product strategy*

Products for FFE businesses are valuable fresh foods that are used to sell, and consumers choose the suitable fresh foods to pay for to create profits for the business, so products are the key thing to focus on. Although FFE companies can provide a wide range of food products, it is impossible to operate all of them due to the limitations of the enterprise's resources and capabilities. To keep the enterprise able to achieve long-term sustainable development, FFE companies must determine the appropriate product variety and scale from a large number of products to manage them more effectively. At the same time, factors such as changes in consumer structure and consumption habits, adjustments in competitors' product strategies, the emergence of new products, and negative news about products can have a significant impact on the sales of the products being operated. Therefore, FFE enterprises must regularly make adjustments to the products they are operating, introduce new products, eliminate slow-selling products, and continuously optimize the product structure according to changes in the external environment.

The pace of the current market is gradually accelerating, opportunities are fleeting, and those who can grasp the first opportunity in the competition, take the lead in meeting consumer demand, and continuously cultivate competitive advantages will be able to gain the initiative. FFE enterprises are generally in accordance with past sales records combined with the manager's judgement of changes in the external environment and consumption trends to determine the range of products and product structure adjustments. In the past, the dissemination of information was not very advanced in the environment. This approach has a certain degree of reasonableness. In the present view, over-reliance on historical sales data and adjusting product structure after discovering market changes from sales records have a certain

lag, which will put enterprises in the market in a passive state. In the era of big data, the product life cycle is gradually shortened. The continuous emergence of new products and information dissemination speed to make product iteration faster may be today's best-selling products, but tomorrow there will be new alternatives that will become popular. If enterprises cannot detect changes in trends and react in advance, some products will not sell out while the best-selling products are out of stock.

Under the background of big data, FFE enterprises can collect more data and predict the trend of fresh food consumption based on data analysis, so that the determination of the product range and the adjustment of the product structure can be more compatible with the needs of consumers, and the consumers can have a better consumption experience.

*Price strategy*

Setting the price of a product is a difficult task for all businesses, as consumers have different psychological expectations of the same product, leading to differences in the price they are willing to pay. It is difficult for FFE enterprises to form a monopoly in the market, but to earn as much profit as possible, it is also very important to understand the consumer's willingness to pay. If the consumer is asked directly about their willingness to pay before they buy, it is very likely that everyone will quote a price that is far lower than their willingness to pay, and therefore they cannot ask the customer directly. Big data brings the possibility for FFE enterprises to understand consumers' willingness to pay, as the database of FFE enterprises is rich in consumers' historical transaction data and other information, from which it is possible to find out the frequency of consumers' purchases as well as their price sensitivity to the products and predict the expected price of the products by the customers to implement personalized pricing. However, this type of pricing is likely to cause dissatisfaction among consumers who have paid higher prices.

Therefore, FFE companies can set thresholds to distinguish between consumers with different willingness to pay when adopting differential pricing. For example, a part of the value of the product can be exchanged for coupons or reward points obtained by completing the task, and those consumers who are willing to complete the task indicate that they are willing to put in extra effort to get a lower price and take the reward points or coupons as a reward for putting in extra effort. And consumers who are not willing to complete the task indicate that they are willing to pay more for that part of the product's value. FFE companies can set prices based on consumer engagement and demand.

In the background of big data, through an in-depth understanding of consumers' consumption records, interests, and preferences, FFE enterprises can more easily set and adjust prices, achieve personalized pricing strategies, make prices more attractive, and meet the needs of different consumers while maximizing enterprise profits (Liu et al., 2023; Zhang, 2021).

*Place strategy*

Nowadays, many consumers will make comprehensive use of multiple channels in the process of completing a purchase, such as learning about the product information in advance on online platforms, then going to offline shops to examine the details of the product closely, and finally deciding whether or not to buy it; or placing an order on online platforms and delivering or picking up the goods in offline shops. Omnichannel sales reflect the essence of retailing, that is, how to provide consumers with a better shopping experience. Consumers in all channels can find the enterprise, which at the same time also allows companies to gain a more comprehensive understanding of consumers. This model is being adopted by an increasing number of companies. Online and offline channels have their own applicability. The integration of online and offline channels is the trend of today's business development and provides a variety of

options for shopping. To meet the needs of different consumers, FFE companies need to use the omnichannel model to broaden sales channels (Zheng et al., 2021).

In order to avoid conflicts between channels, it is necessary to dig out the characteristics of consumer demand through big data analysis and clarify the functions and positions of different channels to manage different retail channels more effectively. For example, Hema Fresh, a famous brand of FFE in China, provides both online and offline purchasing channels and provides consumers with a good consumption experience with the help of an omnichannel strategy. Hema Fresh's online platform serves as a platform for consumers to learn about fresh food information and place orders, while its offline shops can sell fresh food directly to consumers, and they can also serve as a restaurant to cook for consumers， in addition, they can also be used as delivery stations for customers who place orders online (Wang & Coe, 2021).

*Promotion strategy*

In the background of big data, FFE enterprises can mine valuable information from a large amount of data to guide the formulation of promotional strategies. For example, predicting consumer demand trends and preparing inventory in advance to prevent stock-outs Based on the consumption records and preferences of previous consumers to develop a personalized recommendation scheme, the information that consumers may be interested in is pushed directly to consumers to achieve accurate promotions, which can largely improve consumer satisfaction and loyalty and can increase the conversion rate of consumer purchases or even generate repeat purchases. Capturing current hot events or public opinion trends, planning targeted marketing campaigns, and encouraging consumers to actively promote on their social media, thus increasing the visibility of FFE companies. Some consumers may need some special food, such as imported, low-fat, or organic food. With the convenience of information collection, the personalized needs of consumers can be aggregated to become a market segment with scale, which in turn guides the procurement of FFE enterprises, providing conditions to meet the personalized needs of consumers, forming a competitive advantage of differentiation, and also providing the possibility of profitability for FFE enterprises. Another important role of big data is reflected in the use of correlation rules to analyze massive amounts of data to achieve the optimization of the product mix. Correlation rules are generally referred to as the analysis of the same consumer in a purchase of products purchased together, also known as "shopping basket analysis" (Xu, 2022). All the sales records of FFE platforms can be preserved, and more correlations between products can be found. Using such correlations, FFE enterprises can be guided to recommend product combinations to their customers, which not only saves time for the consumers but also improves the sales volume for the enterprises (Reardon et al., 2021).

## Discussion and Conclusion

Product, price, place, and promotion are the controllable elements of FFE enterprises, and from the perspective of the enterprise, satisfying consumer demand needs to be done through the synergy of these four aspects. Big data provides key technical support for the marketing strategy innovation of FFE enterprises, and there is huge business value hidden in a large amount of data. Decision-making is more and more dependent on the comprehensive analysis of data. FFE enterprises must actively respond to the current fierce market competition and continue to deepen the innovation of marketing strategies centred on products, prices, places, and promotions to fulfil the needs of different consumers, improve customer loyalty, maintain competitive advantages, and achieve sustainable growth.

### *Theoretical Implications*

This study combines the traditional 4Ps marketing strategy with the current big data study together, which not only extends the 4Ps marketing theory but also analyzes the value of big data and the way of its application and reveals the potential opportunities of FFE in the aspects of products, price, place, and promotion. Big data allows FFE companies to analyze consumer preferences in a real-time manner, enabling them to offer products and services that are more consistent with consumers' needs, thereby increasing customer satisfaction and loyalty. In addition, it can guide subsequent research on marketing strategies in the field of FFE.

***Practical and Social Implications***

This study can provide a reference for managers of FFE enterprises when they formulate marketing strategies, and by applying big data technology to the marketing strategies of FFE enterprises, the enterprises are able to satisfy consumers' needs more efficiently to attract and retain customers and increase the sales and profits of the enterprises. This paper argues that combining big data with traditional marketing theories not only helps the FFE industry achieve a competitive advantage but also provides other industries with innovative ideas for marketing strategies. Promote the application of big data in various industries, in line with the current development trend of the digital economy.

***Limitations and Suggestions for Future Research***

There are some limitations in this paper. This study is mainly analyzed through relevant literature, lack of survey data and interview results, and the effectiveness of the proposed relevant marketing strategies is yet to be tested. In addition, this article only considers the impact of big data technology on fresh e-commerce marketing strategies, which is not comprehensive enough.

Future research can use questionnaires, interviews, case studies, and other means to obtain data and materials to form more reliable conclusions through quantitative and qualitative analyses. Secondly, it can compare the influence of factors such as culture and consumer characteristics in different regions on the development of marketing strategies for FFE. Finally, it can explore how other information technology can be applied to FFE marketing strategies or apply big data to other business areas of FFE.

**Acknowledgement**

This work was supported by School of Management, Guangzhou College of Technology and Business, Study on Risk Management of Cold Chain Logistics for Fresh Agricultural Products in Guangdong Province, a provincial and ministerial research cultivation project in 2023 (Project No.: GLXYKYPY004).

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