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# *Research on Collaborative Strategy of Supply Chain Management under the Background of NIKE Mass Customization*

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***Abstract:*** With the continuous advancement of technology and the popularization of the Internet, consumers' demand for personalized products is increasingly high. Traditional production modes have been unable to meet consumers' demands for product uniqueness and personalized experiences, which requires manufacturing enterprises to shift towards mass customization modes with unique advantages in production efficiency and cost control. Taking Nike as an example, this paper analyzes its supply chain problems based on its financial report. It then explores Nike's mass customization process using C2M and 3D printing, as well as information collaboration methods in the supply chain. Additionally, the paper analyzes AR-based virtual fitting technology and evaluates Nike's internal matrix organizational structure for customization and collaboration. From the perspectives of Nike's technology level and internal organizational structure, this paper analyzes the supply chain management and information collaboration process in its mass customization process, aiming to provide references for related manufacturing industries in enterprise operation and technology application during the mass customization process.

***Keywords:*** Mass customization, Supply chain management, Information collaboration.

## 1. Introduction

With the vigorous development of social economy, the material living standards of consumers have been significantly improved, and consumers are not only satisfied with the basic needs of products, but also pursue deeper personalized experience. In today's competitive market stage, consumer demand and preference are increasingly showing the distinctive characteristics of diversification and individuation. In this context, mass customization came into being, it from the actual needs of

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consumers, relying on flexible production process and cutting-edge information technology, to achieve the perfect integration of product customization and mass production.

Mass customization, as a production mode that closely combines large-scale production with individual needs, not only achieves cost reduction through large-scale production, but more importantly, it can provide consumers with unique personalized products and services. Driven by science and technology, especially the rapid development of digital manufacturing technology, such as the wide application of 3D printing, computer numerical control (CNC) processing and automated assembly lines, coupled with the help of information technology, such as the improvement of customer relationship management (CRM) and supply chain management (SCM) systems, as well as the deep integration of big data and artificial intelligence technology, Enterprises can deeply analyze customer data and accurately capture market trends, so as to flexibly adjust production plans, quickly respond to the personalized needs of consumers, and efficiently complete the manufacturing and delivery of products. Such a production mode not only satisfies consumers' pursuit of personalized products, but also brings greater market competitiveness to enterprises. This article delves into the core elements of Nike's mass customization strategy, aiming to reveal how Nike can accurately grasp and meet the individual needs of customers in its unique business model. The research focuses on Nike's supply chain management decision-making, technological innovation frontier and marketing strategy, and comprehensively analyzes the supply chain coordination mechanism under the background of mass customization, so as to further explore the significant role of supply chain coordination management in improving production efficiency, reducing costs, optimizing resource allocation and other aspects, to strive to find the best balance between cost and personalization. In the face of changes in consumer demand, brand enterprises need to adopt advanced and flexible supply chain management strategies. Through this strategy, Nike provides consumers with customized products while ensuring cost effectiveness, and perfectly integrates the economic benefits brought by mass production with the individual needs of consumers. In view of the current market situation, this paper provides relevant enterprises with practical suggestions on supply chain coordination strategies, aiming at ensuring that the individual needs of consumers are fully met and helping enterprises to achieve sustainable profits.

Taking Nike's mass customization strategy as an example, the author deeply analyze its successful practices and potential challenges, aiming to provide valuable references for other companies to help them make more rational and scientific decisions in the development and implementation of mass customization strategies.

## 2. Relevant Theoretical Analysis

### 2.1. Mass Customization

Mass customization is not to replace or subvert the traditional model, but to supplement and improve it, from the traditional mass production to customized mass production, increasing the demand matching link. In the premise of integrating resources to provide consumers with relatively customized services, and can quantify its production, to quickly respond to changes in the market, flexible to meet the diversified, personalized consumer demand state, so as to promote corporate profit maximization.

### 2.2. Supply Chain

In fact, it is a business process model, which refers to the value chain composed of raw material and parts suppliers, product manufacturers, distributors and retailers to the end users, completing the whole process from the beginning of customer demand to providing customers with the required products and services [1]. Supply chain management is to plan, coordinate and control the logistics,

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information flow and capital flow among all participating organizations and departments in the entire supply chain. Its purpose is to improve the speed of all relevant processes by optimizing them and determine and maximize the net added value of all relevant processes, so as to improve the operational efficiency and benefits of the organization.

### 2.3. Digital Lean Production

Through digital information technology, the digital management of the production process makes the production process efficient, and the operation production can achieve the maximum value of the production process. Through advanced digital information technology can optimize the allocation of resources, improve production efficiency, reduce production costs, in order to minimize costs, improve profits, and meet market demand.

### 2.4. Information Sharing Collaboration

In the whole supply chain process of realizing consumer demand, information is shared and exchanged by means of information big data and technology to promote the rapid flow of information and accurate identification, so that information can be properly used and the collaboration ability of production chain can be improved. On the basis of information sharing, all parties collaborate and cooperate to achieve common goals.

## 3. About NIKE

### 3.1. Basic Introduction of NIKE

NIKE is headquartered in Portland, Oregon, USA. The company produces a wide range of sporting goods, such as clothing, footwear, and sports equipment. NIKE is a world-renowned sports brand. Its English name originally refers to the Greek goddess of victory, and its Chinese translation is Nike. As a powerful brand, Nike has a rich product line and has been committed to scientific research and design in recent years. The Nike Group has always attached great importance to customer experience and market feedback and is committed to improving consumer loyalty to the company's products and helping to achieve long-term revenue growth. Nike advocates keeping pace with the times and is good at using the most cutting-edge technology, such as customized mobile phone apps, to attract and retain consumers. In the third fiscal quarter ending February 29, 2024, Nike's total revenue was US$12.4 billion, a slight increase of 0.3% year-on-year, and its gross profit margin increased by 150 percentage points year-on-year to 44.8%, but it has not yet returned to the same period of fiscal years 21 and 22. In addition, Nike has finally reversed the inventory growth of about 15% in the past three years, reducing this figure by 13% year-on-year. However, Nike's profitability is weakening. Its net profit in the third quarter decreased by 5% year-on-year, while sales and administrative expenses increased to 34% due to the impact of restructuring, reaching the highest level in the same period in the past five years.

### 3.2. Introduction to Nike's Supply Chain Process

Nike's supply chain has four main characteristics, including direct sales channels, diversified supply networks, digital transformation and technological innovation.

Most of Nike's sales channels are directly connected to consumers, that is, they are mainly based on direct sales channels. Nike emphasizes that it will continue to enhance digital channels and direct sales channels for sales to strengthen interaction between consumers. Nike's direct stores, discount stores, and large e-commerce platforms have strong commodity management capabilities, and almost

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manage inventory management to the extreme. By further expanding the direct sales ratio, expanding its own inventory management level, and strengthening inventory management capabilities.

At the same time, Nike has established cooperative relationships with more than 10,000 suppliers around the world, with suppliers located in more than 50 countries and regions, forming a diversified supplier network, thereby dispersing supply risks. In terms of raw material procurement, Nike always adheres to the concept of sustainable development. The company will select suppliers that meet environmental protection requirements and have a sense of social responsibility to ensure that the source of raw materials is legal and environmentally friendly. At the same time, Nike will also formulate detailed procurement plans based on market demand and product design requirements to ensure the quality of raw materials and the stability of supply [2]. In terms of supplier management, Nike always adheres to strict standards and principles. From preliminary screening to final confirmation of cooperation, every link is carefully designed and strictly controlled. The company will conduct a comprehensive assessment of potential suppliers' production capacity, quality, technical level, corporate social responsibility to ensure that the suppliers can meet Nike's high standards [3]. At the same time, Nike will regularly conduct performance evaluations on suppliers in order to promptly identify relevant problems and take measures to improve them.

Nike has accelerated product development and optimized corporate planning to achieve digital transformation in all aspects of the industry chain, including production, operations, and logistics, driving a significant improvement in the operational efficiency of the entire industry chain. Nike uses an intelligent supply chain management system to ensure the accuracy and efficiency of production planning, inventory management, and logistics distribution through real-time monitoring and data analysis. When products are completed, they will enter the logistics link. NIKE has an efficient logistics network and advanced logistics management system that can quickly and accurately deliver products to distribution centers and retailers around the world. During the logistics process, NIKE will use advanced tracking and monitoring technologies to ensure the safety and integrity of products [4].

Finally, when the products reach distribution centers and retailers, they will go through a series of sales and promotion activities before finally being presented to consumers. Nike has established close ties with consumers through numerous digital platforms, such as Nike+basketball, Nike+Kinest, Nike+Fuelband, and has conducted all-round marketing. It has also used big data to quantify the effects, get immediate feedback, and adjust marketing strategies.

## 4. NIKE Company’s Problems and Challenges

In the absence of accurate forecasting of consumer demand, businesses face significant challenges in inventory management. This situation can lead to two extremes, one is excess inventory, the other is inventory shortage. These issues can have a serious impact on operating margins, cash flow, and overall business health. In order to effectively respond to consumer demand for Nike products, the company adopted a strategy of purchasing products from manufacturers in advance, going beyond futures ordering plans and customer order needs, and storing these products in inventory before selling them to customers. However, this strategy is not without risks, mainly reflected in the inability to smoothly sell products purchased from manufacturers. If the inventory exceeds market demand, it may have to be sold at a discount, which will adversely affect the company's image, performance, financial condition and cash flow.

On the contrary, if the consumer demand for Nike products is underestimated, or Nike manufacturers fail to provide the required products on time at a critical moment, the company will face the risk of stock shortages. This can result in delayed shipments to customers, which can affect relationships with retailers, distributors and consumers, which in turn can affect the company's market reputation and long-term business development. Therefore, effective demand forecasting and

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inventory management strategies are critical to maintaining a healthy operating environment, taking into account market trends, consumer behavior, and changes in the supply chain to minimize risk and achieve sustained growth. In the absence of accurate forecasting of consumer demand, businesses face significant challenges in inventory management. This situation can lead to two extremes: one is excess inventory; the other is inventory shortage. These issues can have a serious impact on operating margins, cash flow, and overall business health. In order to effectively respond to consumer demand for Nike products, the company adopted a strategy of purchasing products from manufacturers in advance, going beyond futures ordering plans and customer order needs, and storing these products in inventory before selling them to customers. However, this strategy is not without risks, mainly reflected in the inability to smoothly sell products purchased from manufacturers. If the inventory exceeds market demand, it may have to be sold at a discount, which will adversely affect the company's image, performance, financial condition and cash flow.

## 5. Policy Upgrades

### 5.1. Strategic Background

The application of Nike's technology has significantly improved the efficiency of supply chain management, and the automation and intelligence technologies have enabled NIKE to achieve rapid and accurate exchange of information between all parts of the supply chain, so as to respond more quickly to market changes and flexibly adjust production and inventory strategies. These technologies not only reduce labor costs and error rates, but also optimize inventory management and logistics distribution, effectively reducing inventory costs and transportation costs.

In addition, NIKE adopts a matrix organizational structure to optimize the synergies between the upstream and downstream of the supply chain, so that NIKE enterprises can better adapt to market changes, improve resource utilization efficiency, and enhance the flexibility and responsiveness of the overall supply chain. The optimized matrix organizational structure promotes the effective sharing and optimal allocation of resources, and further improves the operational efficiency of the overall supply chain.

### 5.2. The Combination of C2M Mode and 3D Printing Technology

Nike's clever use of C2M mode and 3D printing technology in its personalized production process enables it to better meet the needs of consumers and achieve synergy between consumers and manufacturers.

In the C2M model, Nike collects the specific needs of consumers through a variety of digital tools and platforms. The most typical is NIKEiD, a platform in which consumers can personalize a variety of products, such as choosing shoes and clothes in different colors, adding personalized logos, names and numbers, using different upper materials, clothing materials. In this way, Nike strengthens its interaction with consumers, while also allowing users to participate in the design process, making it a win-win for both suppliers and consumers – the former can make their products more competitive and profitable. The latter can buy goods at a lower price that are more in line with their own consumption needs, thus achieving a higher consumer surplus [5].

After capturing consumer data, Nike uses 3D technology to create complex and customized footwear product. For example, at the 2016 Olympics, Nike used research from its Nike Sports Research Lab, as well as athlete test data and coach feedback, to develop running shoes for gold-medal-winning ·United States sprinter Allyson Felix. The shoe is 3D printed to tailor the fit to Felix's unique contours and preferences, allowing Nike to quickly prototype and make design adjustments in a short period of time, enabling instant feedback and rapid iteration to create a better end product from the ground up, fully customized for athlete performance. At the same time, Nike's technology,

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Flyknit, is being used to personalize athletes with different foot shapes [6]. This capability allows Nike to respond more quickly to market demand and consumer feedback, enabling small-scale mass production of customized footwear products, such as personalized products such as athletes' shoes. It provides feasibility for Nike to realize mass customization services for the mass market in the future.

Nike also uses recyclable materials and high-performance polymers to ensure that the products are lightweight and durable. Not only that, 3D printing technology also enables Nike to greatly reduce its production costs in the production process, for example, 3D printing technology in the personalized production of products, unlike the traditional manufacturing process, it does not require special molds and tools, just by modifying the digital model, changing the design ideas, thereby eliminating the cost of molds.

3D printing technology allows Nike to manufacture globally distributed, i.e., produce products in multiple geographic locations, and Nike can flexibly adjust the location and scale of production according to market demand to achieve rapid production and distribution of personalized products that meet local consumers. This localized production reduces the number of intermediaries in the supply chain and improves efficiency and responsiveness. At the same time, 3D printing technology supports build-to-order, meaning Nike can start production when it receives an order, significantly reducing inventory carrying costs and the risk of obsolescence.

Through this more environmentally friendly and efficient production process, Nike not only achieves its production goals of greater efficiency and scale, but also achieves sustainable development of the company to a certain extent.

### 5.3. AR Technology

In practical settings, the majority of manufacturing companies are still in the early stages of embracing advanced digital technologies. Managers encounter the challenge of determining which digital technologies to adopt, how to implement them, and understanding their impact on supply chain structure and performance. This comprehension can assist managers in assessing the potential influence of digital technologies on supply chains and support them in developing appropriate business strategies at different levels of digitalization [7].

Augmented reality (AR) is gaining a growing dominance in the realm of e-commerce, having transformed into an interactive medium that facilitates the convergence of the real and virtual spheres. The deployment of AR technology within the e-commerce industry offers a substantial prospect for shaping consumer behavior and altering the trajectory of the commercial sector [8]. Augmented Reality (AR) technology facilitates real-time visualization and modification of design concepts within a virtual milieu, thereby diminishing the expenses and time associated with tangible prototyping. Moreover, it enables designers and consumers to engage in synchronous collaboration on a worldwide basis, fostering design adaptability and productivity. This type of cross-border cooperation is particularly advantageous in a market landscape marked by globalization, allowing designers to tailor their products more effectively to the diverse preferences of consumers across various regions.

Augmented Reality (AR) technology can also enhance production efficiency by optimizing the layout and workflow of production lines through virtual simulation. By utilizing the consumer fitting data and preference information collected via AR technology, companies like Nike can perform data analytic to gain a profound understanding of consumer preferences and purchasing patterns, thereby optimizing product design and ensuring that new releases are more aligned with market demands.

In the domain of logistics distribution, Augmented Reality (AR) technology offers real-time route optimization and up-to-date traffic condition data, aiding distribution personnel in selecting the most efficient distribution paths. Consequently, this significantly enhances distributional efficacy. Moreover, throughout the distribution process, AR technology has the capability to monitor the status of goods in real-time, thereby ensuring the integrity and safety of the cargo.

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With the rise of virtual fitting technology, CAGAN model is proposed, which can directly learn the garment mask from the original clothing image, and then integrate the figure image with the garment mask to get the fitting result [9]. Nike uses AR technology to develop the "Nike Fit" application, consumers can scan their feet through the mobile phone, get personalized shoe size recommendation and try on shoes experience. This technology allows consumers to preview the combination of different colors, materials and styles in a virtual environment. It will enhance the personalization of the shopping experience. With accurate sizing and virtual fitting, consumers are able to more accurately select the right shoe size and style for them, reducing the risk of returns or remakes due to inappropriate sizing or unsatisfactory design. Consumers can use a smartphone or AR device to scan their feet and then try on different shoes in a virtual environment. This real-time preview capability helps consumers better understand how design elements affect the final product and make more satisfying choices. AR technology allows customers to see designs in the real world, and Nike's "Nike Fit" app uses AR to scan consumers' feet, generate an accurate three-dimensional model, and recommend the appropriate shoe size based on this data.

### 5.4. Matrix Organization Structure

Matrix organizational structure is a hybrid form that "loads" a level of project management structure on top of the conventional functional hierarchy [10]. Nike's global organizational structure is divided into, global headquarters, regional headquarters, and national and its regional headquarters. This matrix organization structure facilitates collaboration at different levels of the supply chain to ensure the smooth operation of the supply chain around the world. Among them, the global headquarters is responsible for the overall strategic planning and resource allocation, while the regional headquarters conducts market analysis and strategy adjustment according to the regional characteristics, while the national and its regional headquarters are more focused on the specific situation of the local market for corresponding implementation.

Although Nike's current matrix organizational structure facilitates collaborative production and information exchange to some extent, it may also have some adverse effects on its supply chain. First of all, it will bring about obvious problems in the distribution of rights and responsibilities. The rights and responsibilities brought by the dual management will soon give the project leader limited management power and incentive means for the project members, which will affect the implementation efficiency of the project and the work enthusiasm of the members. The company need to reduce employee role conflicts, and thus improve the effectiveness of dual leadership [11]. Secondly, there will be a waste of relevant resources, which are scattered among multiple projects and departments to reduce the efficiency of resource allocation, resulting in some links in the supply chain being affected by insufficient resources, or resource waste and repeated labor.

The strategy of optimizing supply chain according to the synergy of global matrix organizational structure, a clear coordination mechanism is established between global headquarters, regional headquarters and national and regional headquarters, such as information sharing of relevant content, the process and standards of decision making and action implementation. Promoting the supply chain information share platform worldwide to ensure that relevant organizations at all levels can understand the state of the supply chain in real time and improve collaborative efficiency. Developing relevant comprehensive supply chain standards, including product standards, quality standards, logistics standards to ensure the stability and reliability of the supply chain. At the same time, it should clarify resource allocation. NIKE global headquarters should allocate resources on a global scale according to relevant market demand, capacity distribution and cost and benefit to ensure the flexibility and efficiency of the supply chain. The regional headquarters should actively participate in the decision of resource allocation to ensure that the special needs of the regional market are met. All managers should communicate with each other for better consistency, especially in a matrix

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organizational structure with limited location power, where leadership can obtain many benefits of high leadership members' communication [12].

Matrix organization optimization can obviously help and support the whole supply chain. During the initial procurement process, NIKE organization allows NIKE to adjust its procurement strategy according to market changes to ensure that raw materials and components meet local needs. In the relevant production process, NIKE adopts matrix organization structure to strengthen communication and technical cooperation between production and research and development departments to ensure that product design is consistent with market demand and reduce the waste of relevant resources. In the warehousing and logistics link, NIKE's matrix organization structure enables it to establish a more flexible and efficient warehouse management system. Through the intelligent inventory management system, the inventory status is monitored, and the inventory strategy can be timely adjusted according to the changes of market demand. In the organization of transport.

## 6. Conclusion

NIKE combines C2M mode and 3D printing technology to quickly customize personalized footwear and use recycled materials and polymers to ensure lightweight and durable products and reduce associated costs. Optimizing AR technology design can optimize and enhance the shopping experience. Matrix organization promotes global supply chain collaboration to improve the efficiency of each link. Various related technologies and organizational structure strategies help NIKE meet customer needs more efficiently and achieve low-cost and efficient mass customization. This study aims to in-depth analysis of how NIKE company in mass customization strategy accurately grasp and meet the customer personalized demand method, reveals the supply chain collaborative management in improving production efficiency, cost reduction, optimize the allocation of resources, seek to find the best balance between cost benefit and personalized demand. This study is conducive to each manufacturing enterprise to learn NIKE balance between personalized service and their own cost and benefit strategy measures. This paper lacks the different degrees of synergistic influence of each technology and structure strategy on the supply chain. The future research will further explore how much investment in each technology and structure can achieve the maximum benefit while meeting the personalized customer needs.

## Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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