Industrial Engineering and Innovation Management (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/ieim.2025.080104
ISSN 2522-6924 Vol. 8 Num. 1

Exploration of Collaborative Optimization Strategies for Fast Moving Consumer Food Store Operations and Environment from the DEMATEL Perspective

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Keywords: Fast-consuming food stores; Collaborative optimization of environment; DEMATEL method; Sustainable development; Green transformation

Abstract: The purpose of this article is to discuss the collaborative optimization between the operation of fast-consuming food stores and the environment. With the rapid development of fast-consuming food industry, the impact of its operation activities on the environment has become increasingly prominent, and how to achieve a win-win situation between economic benefits and environmental protection has become an urgent problem to be solved. Therefore, this article defines the operating characteristics of fast-food stores and their interaction with environmental factors. Then, based on the perspective of Dematel (decision making trial and evaluation laboratory), these relationships are deeply analyzed, and the key factors and their interaction mechanisms are identified, which provides a scientific basis for formulating collaborative optimization strategies. The research shows that the optimization of supply chain management, energy saving and emission reduction and energy management, product and service innovation, and consumer education and guidance are effective ways to realize the coordinated optimization of fast-food store operation and environment. This study not only provides theoretical support and practical guidance for the green development of fast-consuming food stores, but also provides useful reference for environmental protection work in related industries and fields.

1. Introduction

In today's society, with the accelerated pace of life and the diversification of consumer demand, the fast-consuming food industry has ushered in an unprecedented development opportunity [1]. It also faces severe environmental challenges. This industry is famous for its convenience and diversity, but there are hidden problems such as large resource consumption and heavy environmental pollution behind it [2]. With the increasing global attention to the issue of sustainable development, how to reduce the impact on the environment while ensuring food safety and service quality has become an important issue that fast-consuming food enterprises must face [3]. This study is carried out under this background. It aims to explore a new path of collaborative optimization between the operation of fast-consuming food stores and the environment. Through in-depth analysis of the interaction mechanism between store operation and environment, it can

provide scientific basis for enterprise transformation and upgrading, and promote the green development of the whole industry. This is of great theoretical and practical significance.

The core purpose of this study is to reveal the internal relationship between the operation of fast-consuming food stores and the environment, identify the key factors that affect their collaborative optimization, and put forward corresponding strategic suggestions. Looking back at the existing literature, the operation management and environmental impact assessment of fast-consuming food industry have become the focus of academic and practical circles. On the one hand, scholars have discussed the sustainability of industry development from the perspectives of supply chain management, product innovation and consumer behavior [4]. On the other hand, the theory of environmental collaborative optimization has been widely used in many fields, but the specific research on fast-consuming food stores is still relatively scarce. DEMATEL method, as an effective system analysis tool, has demonstrated its powerful analytical ability in decision support, risk assessment and other fields, but it is still rare in the study of environmental collaborative optimization in fast-consuming food industry [5]. Therefore, this study will integrate the theoretical achievements in related fields and combine the unique advantages of DEMATEL method to provide a new research perspective for the collaborative optimization of the operation and environment of fast-consuming food stores.

2. Theoretical analysis on the operation and environmental impact of fast-consuming food stores

2.1. Operating characteristics of fast-consuming food stores

As an indispensable part of modern urban life, fast food stores have distinctive and diverse operating characteristics [6]. These stores are usually located in crowded commercial areas or residential areas to meet consumers' demand for convenient and fast catering services. They provide a wide range of food, from traditional fast food to emerging light food, which meets the taste preferences of different consumers [7]. In terms of operation mode, fast-moving food stores emphasize efficiency and standardization, uniformly produce or distribute semi-finished products through the central kitchen, and quickly process them in the store to ensure the freshness and taste of the food are consistent.

With the development of science and technology, many stores have also incorporated intelligent elements, further improving service efficiency and customer experience [8]. However, behind this efficient and standardized operation mode, there are also hidden environmental problems such as high resource consumption and waste discharge, which need to be improved by environmental collaborative optimization strategy.

2.2. The connotation and objectives of environmental collaborative optimization

Environmental collaborative optimization refers to achieving a win-win situation of environmental protection and economic development by comprehensively applying various management, technology and policy means while ensuring economic benefits [9]. In the operation of fast-food stores, the objectives of environmental collaborative optimization are mainly reflected in reducing resource consumption, reducing pollution emissions, improving resource utilization efficiency and promoting green consumption, as shown in Table 1:

The ultimate goal of environmental collaborative optimization is to build a fast-consuming food store operation mode that not only meets the needs of consumers, but also is responsible for the environment, so as to realize the double promotion of economic benefits and ecological benefits.

Table 1: Goals and Manifestations of Environmental Synergistic Optimization in Fast Consumer Food Outlet Operations

Goal	Specific Manifestations
Reduce Resource Consumption	Optimize supply chain management to minimize raw material waste; Utilize energy-efficient equipment such as LED lighting and energy-saving refrigerators; Streamline packaging to reduce the use of disposable materials
Lower Pollution Emissions	Wastewater treatment and recycling; Oil fume purification and emission control; Waste classification and management
Enhance Resource Utilization Efficiency	Reuse food scraps for making soups or animal feed; Implement energy management systems to monitor and optimize energy consumption; Recycle and reuse old equipment or packaging materials
Promote Green Consumption	Promote healthy and environmentally-friendly menu options; Offer biodegradable or reusable utensil alternatives; Conduct environmental education activities to raise consumer awareness of environmental protection

2.3. Applicability analysis of demetal method in environmental collaborative optimization

As a system analysis tool, DEMATEL method is especially suitable for analyzing the interaction between various factors in complex systems. DEMATEL method can play an important role in the study of collaborative optimization between the operation and environment of fast-consuming food stores [10]. It can help researchers systematically sort out the complex relationship between store operation and environment, and identify key influencing factors and their interaction paths. By constructing the matrix of influencing factors, DEMATEL method can quantify the direct and indirect effects among various factors, and provide scientific basis for formulating targeted optimization strategies. The visual output of DEMATEL method can intuitively show the correlation network between various factors, which is convenient for decision makers to understand the internal structure of complex systems and make more accurate decisions.

3. Analysis on the relationship between the operation of fast-consuming food stores and environmental factors from the perspective of DEMATEL

Based on the perspective of DEMATEL method, the analysis of the relationship between the operation of fast-food stores and environmental factors provides us with a systematic framework to understand and optimize the complex interaction between them.

From the operational point of view, the operation of fast-consuming food stores is affected by many factors, including supply chain management, inventory management, customer service, marketing strategy and so on. These factors not only directly affect the operational efficiency, cost control and customer satisfaction of stores, but also indirectly affect the impact of stores on the environment. For example, efficient supply chain management can reduce the waste of raw materials and transportation, thus reducing the environmental burden; Innovative marketing strategies may guide consumers to choose more environmentally friendly products and services. Environmental factors also play a vital role in the operation of fast-food stores. Environmental factors include but are not limited to energy use, waste management, water resources utilization and pollution control. These environmental factors not only affect the operating costs of stores, but also may have a far-reaching impact on the operation of stores through channels such as legal compliance, brand image and social responsibility. For example, strict environmental regulations

may force stores to adopt more environmentally-friendly packaging materials, which may increase costs in the short term, but in the long run it will help to enhance brand image and attract environmentally-conscious consumers.

Through the DEMATEL method, we can make a systematic quantitative analysis of these operational and environmental factors and identify the key factors and their interaction paths. This helps store managers to consider not only the optimization of a single factor, but also the synergy among multiple factors when formulating strategies, so as to achieve a win-win situation of store operation efficiency and environmental sustainability. DEMATEL method can also help us identify the "leverage point" factors that have the greatest impact on the system. By giving priority to improving these factors, we can more effectively promote the optimization of the whole system.

To sum up, the analysis of the relationship between the operation of fast-moving food stores and environmental factors from the perspective of DEMATEL provides us with a comprehensive and systematic perspective to understand and optimize the complex interaction between store operation and environmental protection. Through this method, we can make strategies more scientifically and realize the harmonious symbiosis between the economic benefits and environmental benefits of stores.

4. Suggestions on cooperative optimization strategy between operation and environment of fast-consuming food stores

4.1. Strategy formulation principles and goal setting

When formulating the cooperative optimization strategy between the operation of fast-food stores and the environment, this article follows four principles: scientific, feasible, systematic and sustainable. See Figure 1 for details:

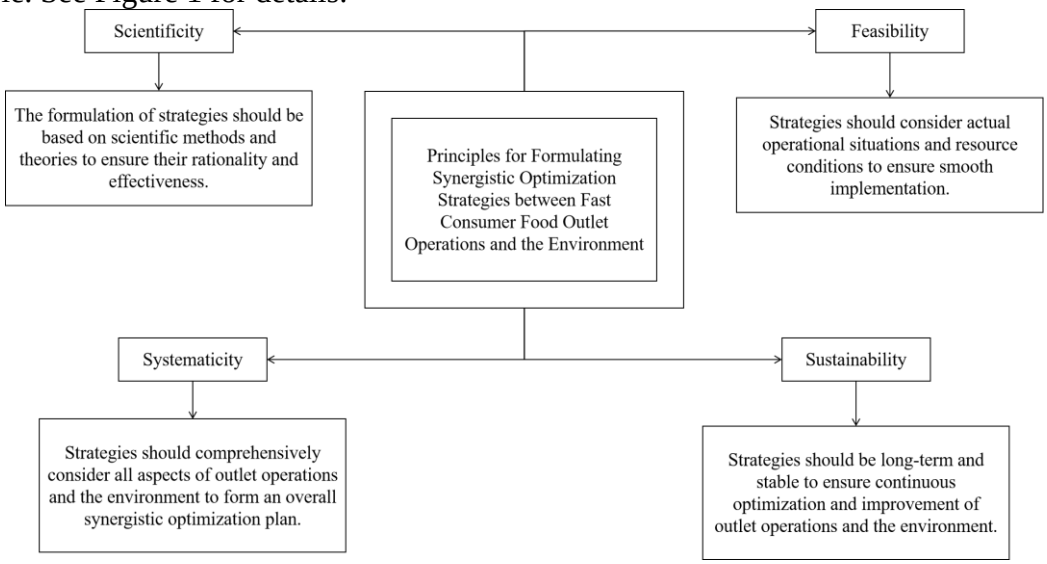

Figure 1: Principles for Formulating Synergistic Optimization Strategies between Fast Consumer Food Outlet Operations and the Environment

In terms of goal setting, this article aims to achieve specific goals such as significantly reducing resource consumption, effectively controlling pollution emissions, widely promoting environmentally friendly products and services, and significantly improving consumers' awareness of environmental protection through collaborative optimization strategies. These goals not only reflect the core concept of environmental collaborative optimization, but also meet the trend and requirements of green development of fast-consuming food industry.

4.2. Specific optimization strategies

Aiming at the key problems between the operation of fast-food stores and the environment, this section puts forward a series of concrete and feasible optimization strategies. In supply chain management, we emphasize strengthening the green management of suppliers, promoting environmental protection procurement, ensuring the sustainability of food sources, and optimizing the logistics network to reduce energy consumption and emissions. At the store level, this article believes that it is needed to pay attention to energy conservation, emission reduction and energy management, and effectively reduce the environmental impact of store operation by adopting advanced energy-saving equipment and technology and implementing garbage sorting and recycling. Merchants should also devote themselves to product and service innovation, develop environmentally-friendly packaging and degradable products, and introduce green menus to guide consumers to choose healthy and low-carbon diets.

4.3. Implementation path and safeguard measures

In order to ensure that these optimization strategies can be effectively implemented, it is needed to design implementation paths and safeguard measures. This article advocates promoting strategies by stages, and making detailed implementation plans according to the importance and urgency of each strategy, and gradually implementing them. Relevant departments need to establish a strict supervision mechanism, set up an environmental protection supervision team, and regularly check and evaluate the environmental protection measures of stores to ensure the effective implementation of the strategy.

This article holds that it is needed to attach importance to employees' environmental protection training, improve their environmental awareness and operational ability, and make the strategy truly land at the store level. At the same time, we need to actively seek cooperation and exchanges with government departments, environmental protection organizations, suppliers and other stakeholders to jointly promote the development of environmental protection and contribute to building a green and sustainable fast-consuming food industry.

5. Conclusions

After systematic research and analysis, this study has conducted in-depth discussion on the cooperative optimization of the operation and environment of fast-consuming food stores. The research summary shows that there is a complex and close interaction between the operation activities of fast-consuming food stores and environmental factors. By using DEMATEL method, the main findings of this article include: The optimization of supply chain management has a significant effect on reducing resource consumption and pollution emissions; The implementation of energy saving and emission reduction and energy management strategy can effectively reduce the energy consumption and carbon emissions of stores; Product and service innovation can not only meet consumers' demand for green and healthy products, but also enhance the brand image and market competitiveness of stores; Consumer education and guidance is an important way to promote green consumption and enhance consumers' environmental awareness.

This study provides strong theoretical support and practical guidance for the sustainable growth of fast-consuming food industry. Through the proposed collaborative optimization strategy, this article finds a new path for the harmonious symbiosis between store operation and environment. The implementation of these strategies will not only help to reduce the impact of store operation on the environment, but also enhance the sense of social responsibility and brand image of enterprises, thus enhancing the trust and support of consumers. In the long run, this will help promote the green

transformation and sustainable growth of the whole industry and contribute to building a more environmentally friendly and healthy food consumption environment.

References

[1] Wu Jianjun. Innovation and Development Trends of China's Nutritional and Health Food Industry in the Context of the National Nutrition Plan [J]. Journal of Food Safety & Quality, 2021, 12(08): 3164-3171.

[2] Wang Ling'en, Ni Xiaowen, Li Yunyun, et al. Characteristics of Food Consumption and Waste During the Spring Festival Based on Household Weighing Surveys [J]. Journal of Natural Resources, 2022, 37(10): 2544-2558.

[3] Yu Rong, Pei Xiaowei, Tang Run. Research on the Collaborative Mode of Green Food Supply Chain Actors Based on Food Greenness and Reputation [J]. Soft Science, 2018, 32(01): 130-135.

[4] Zhao Li, Zhao Hui, Wang Biao. Evolutionary Game Strategies of Green Food Suppliers and Consumers in the Context of Innovation Drive [J]. China Condiment, 2023, 48(3): 204-209.

[5] Zhao Jiankun, Yang Yuantong, Li Xianjun, et al. Research on the Contribution of Green Food to Agricultural Green Development [J]. Hubei Agricultural Sciences, 2021, 60(9): 185-189.

[6] Song Qiyuan, Geng Yude. The Impact of Brand Building on the Marketing Performance of Forestry Green Food Processing Enterprises [J]. Journal of Northeast Forestry University, 2021, 49(02): 83-88.

[7] Du Jianguo, Zhang Yuqi. Research on Guiding Policies for Green Food Purchasing Behavior from the Perspective of Both Supply and Demand [J]. Soft Science, 2023, 37(11): 122-130.

[8] Zhou Guangliang, Wu Ming. Analysis of the Coupling and Coordination between China's Green Food Industry and Economic Development [J]. Forecast, 2020, 39(02): 90-96.

[9] Zhu Ling, Kong Xinxin. Optimization of Processing Technology and Study on Factors Affecting the Storage Life of Green Tofu [J]. China Condiment, 2023, 48(4): 143-147.

[10] Li Boqiang, Chen Yong, Xing Mengyang, et al. Production Mechanism and Contamination Prevention Strategies of Patulin in Food [J]. Journal of Food Science and Technology, 2023, 41(4): 16-25.