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An innovative model for implementing artificial intelligence in green marketing of organic products in Iraq: Opportunities and challenges

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Abstract

The objective of this research is to develop an innovative model for implementing Artificial Intelligence (AI) in the green marketing of organic products in Iraq, examining the associated opportunities and challenges. Based on its objective, the research methodology is applicable. In terms of execution, it is quantitative; and in terms of nature and method, it is descriptive-correlational. The statistical population comprises customers and stakeholders in the organic product supply chain in Iraq. Sampling was conducted using a simple random method. Considering Morgan's table and adhering to the sample adequacy criterion, 400 questionnaires were distributed, and ultimately, 390 analyzable questionnaires were collected. A standard questionnaire based on a 5-point Likert scale was used for data collection. Content validity of the instrument was confirmed by specialists and experts. To assess the reliability of the instrument, Cronbach's alpha and composite reliability methods were employed. Following questionnaire distribution, the instrument's validity was measured using three methods: construct validity (outer model), convergent validity (AVE), and discriminant validity. The AVE value for all variables must be greater than 0.5. SPSS and PLS software were used for data analysis. Customer engagement has an impact on crisis management, supply chain optimization, and sustainable marketing. Crisis management impacts supply chain optimization.

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Extended Abstract

Introduction

In recent years, increased awareness of the negative effects of chemical products on health and the environment has led to a significant growth in demand for organic products (Little et al., 2022). Since 1940, the term “organic” has been used in several studies addressing topics related to public health, social issues, food systems, and well-being (Raksha Shenoy et al., 2024). Organic agriculture means cultivating agricultural products and raising livestock without the use of chemical fertilizers, pesticides, and genetically modified organisms or products; and is often considered a healthier and safer option than conventional products (Pouralijan et al., 2021). Organic food refers to natural foods free from any synthetic chemicals, meaning foods that are generally recognized as beneficial for individual health, the environment, and society as a whole (Roseira et al., 2022).

Organic agriculture, as one of the most important alternative agricultural systems, is gaining attention for producing healthy food without any chemical substances (Pouralijan et al., 2021). In the last decade, environmental and social concerns have increased, and consumers have become interested in food products with environmental, health, and social characteristics; in other words, sustainable food products (Aqhasafari et al., 2020). Currently, the development of organic agriculture is being promoted worldwide, not just in a specific region, to improve the nutritional health of families (Ayaviri-Nina et al., 2022).

Green marketing, as a vital strategy in the marketing world, has been constantly evolving. This evolution stems from growing concerns about environmental sustainability and consumer preferences for environmentally friendly products and services (Sharma, 2021). The goal of companies adopting green marketing practices is to reduce environmental impacts, enhance corporate image, and meet the needs of the green consumer segment (Chen et al., 2020).

Artificial Intelligence (AI), as a transformative technology, can play a key role in addressing these challenges. In Iran, the application of AI in marketing is developing, but its primary focus is on digital products and services. However, in the field of green marketing, particularly in the organic industry, this technology has not yet been widely adopted. Studies suggest that AI can increase consumer trust by analyzing consumer behavior, predicting needs, and creating personalized messages (Khalaji, 2022).

Iraq, despite its potential in producing organic products, is grappling with infrastructural and security crises and constant economic fluctuations. The main issue is that traditional marketing models are inefficient in this context, and on the other hand, the use of modern technologies like AI also faces serious challenges. Preliminary evidence suggests that, unlike developed markets, digital tools and market machine analyses in Iraq have not yet directly led to sustainable marketing. This deep gap between the “theoretical capabilities of AI” and the “operational realities in the Iraqi market” arises from overlooking mediating variables such as deep customer engagement, management of local crises, and ethical branding in the supply chain. Therefore, the researcher’s concern led to the question: What are the innovative models for implementing AI in the green marketing of organic products in Iraq?

Theoretical Foundations

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Green Marketing

In recent years, green marketing has gained attention as a new approach in Iran. According to studies, many consumers pay attention to environmental and health factors, but they still face challenges such as a lack of brand trust and a lack of transparency in verifying the organic nature of products (Aqhasafari et al., 2022).

Artificial Intelligence in Marketing

Artificial intelligence plays a key role in green marketing; as by analyzing big data, it can identify consumer behavior and predict their needs (Grewal et al., 2020). This technology uses machine learning to detect purchasing patterns related to organic products, reduced energy consumption, and sustainable transportation. AI enhances marketing effectiveness and strengthens consumer trust by creating personalized messages (Kotler, 2019).

Andruszkiewicz et al. (2024) investigated the "comparative analysis of the behavior of young generation consumers in Poland and Germany to evaluate the behavior of consumers of this generation in the context of organic food market trends." The results showed that the COVID pandemic and the war in Ukraine have led to increased social uncertainty and inflation, reducing consumers' purchasing power.

Shampy Kamboj et al. (2023) conducted a study on the "motives for organic food purchase intention." This research was performed on 294 Indian consumers using a questionnaire. Findings indicated that functional value, quality, social norms, consumer innovativeness, and green trust have the greatest impact on purchase intention. Additionally, health benefits, convenience, and accessibility had a significant influence on consumer choices.

Research Methodology

This research is applicable in terms of its objective, and descriptive-correlational in its method. The statistical population consists of customers and supply chain actors of organic products in Iraq. Simple random sampling was used, and according to the Morgan table and meeting the sample adequacy criterion (KMO = 0.867), 400 questionnaires were distributed, and finally, 390 analyzable questionnaires were received. A researcher-made questionnaire on a five-point Likert scale was used for data collection. The findings from the Cronbach's alpha and composite reliability tests to assess the reliability of the research instrument are reported in Table 2. Content validity (expert opinion) was used to examine the validity of the instrument, and its credibility was confirmed. Then, by distributing the questionnaire, the validity of the instrument was measured using three methods: construct validity (outer model), convergent validity (AVE), and discriminant validity. The AVE value for all research variables must be greater than 0.5. To test the research hypotheses, structural equation modeling was employed using the SmartPLS 2 statistical software.

Research Findings

The research findings indicate that customer engagement is the most crucial driver in strengthening crisis management, optimizing the supply chain, and achieving sustainable marketing. Furthermore, the results confirm that crisis management and ethical branding play significant roles in improving supply chain performance. However, the rejection of other hypotheses suggests that, within the context of this study, variables such as content production and market analysis do not individually

have a direct impact on sustainable marketing. Ultimately, it was determined that the primary path to achieving sustainability in this industry necessarily involves deep customer interaction and optimal supply chain management.

Discussion and Conclusion

The results showed that customer engagement has a positive and significant impact on crisis management. To explain this finding, it can be said that in unstable environments like Iraq, active customer participation serves as a vital source for receiving real-time feedback. These interactions allow organizations to adopt adaptive solutions before crises arising from market instability escalate. This finding aligns with the results of Wut et al. (2021) and Gong et al. (2023), who consider customer participation a determining factor in enhancing organizational resilience and performance sustainability in critical situations.

Based on the findings, customer engagement positively impacts supply chain optimization. Given the infrastructural and security challenges in Iraq, data derived from customer engagement replaces secondary data analysis systems and contributes to transparency in demand forecasting. This leads to reduced resource waste and agility in the distribution network. This result supports the studies by Gong et al. (2023), which emphasize the role of stakeholders in improving logistics processes in developing markets.

The results indicate a positive impact of customer engagement on sustainable marketing. Deep interaction with organic product consumers in Iraq leads to the formation of loyalty and acceptance of environmental values. In fact, customer engagement facilitates the process of educating and promoting sustainable consumption. This finding is consistent with the results of Wut et al. (2021), who believe that active participation is the foundation for changing consumer behavior towards sustainable patterns.

The results showed that content production does not have a significant impact on sustainable marketing. This is mainly due to the weakness of information technology infrastructure and low acceptance of environmental values in current digital platforms in Iraq, where advertising content has not yet been able to bring about deep attitudinal changes in consumers. This result is consistent with the view of Abdullah & Saud (2022), who believe that in transitional societies, the transformation of sustainable marketing requires institutional changes and cannot be achieved solely through technological tools.

The findings showed that crisis management has a positive impact on supply chain optimization. Organizations that utilize learning and responsive systems when facing economic or logistical challenges can maintain the sustainability and efficiency of their supply chains in high-risk environments. This finding is consistent with the studies by Araújo et al. (2022) and reinforces the necessity of adopting a proactive crisis management approach to defend supply systems.

The results showed that ethical branding has a positive impact on supply chain optimization. Ethical commitment and transparency in business relationships increase trust among stakeholders. In an environment where formal sustainability standards are

weak, this branding acts as a substitute for regulatory mechanisms and reduces transaction costs.

The results indicate that operational reforms in the supply chain, without cultural backing and national sustainability policies, do not automatically lead to green consumer behavior. This finding aligns with the results of Wortel et al. (2024), who emphasize that sustainability in marketing stems more from social capital and attitudinal shifts at macro levels rather than from technological advancements in the supply chain.

Based on the research results, the following practical suggestions are offered:

- Utilize digital platforms (social networks, applications, and websites) for quick and transparent communication with customers.
- Provide customers with information regarding the origin, production methods, and environmental impacts.
- Employ artificial intelligence and blockchain for demand forecasting, inventory management, and waste reduction.
- Design integrated policies to increase flexibility and responsiveness during crises.
- Continuously evaluate supply chain performance and sustainable marketing.
- Use customer feedback to improve processes.