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Larchenko Oksana
Candidate of Agricultural Sciences, Docent,
Associate Professor at the Department of Management,
Marketing and Information Technology,
Kherson State Agrarian and Economic University
(Kherson / Kropyvnytskyi)
ORCID: https://orcid.org/0000-0001-7857-0802

Ларченко О.В.
Херсонський державний аграрно-економічний університет
(м. Херсон / м. Кропивницький)

DIGITAL INNOVATIONS IN AGRICULTURAL MARKETING: ORGANIZATIONAL AND ECONOMIC FOUNDATIONS OF INTEGRATION

ЦИФРОВІ ІННОВАЦІЇ В МАРКЕТИНГУ АГРАРНОГО СЕКТОРУ: ОРГАНІЗАЦІЙНО-ЕКОНОМІЧНІ ОРІЄНТИРИ ІНТЕГРАЦІЇ

The presented scientific study explores the organizational and economic determinants of integrating digital technologies into the marketing strategies of enterprises within the agricultural sector. The urgency of this research is driven by the growing need to adapt agribusiness marketing activities to the realities of globalization, digital transformation, and intensifying competition in international agri-food markets. In this context, digital tools are considered a strategic resource for enhancing competitiveness and ensuring sustainable development. This paper identifies and systematizes the most promising digital technologies that can significantly optimize marketing processes in agricultural enterprises. These include big data analytics (Big Data), the Internet of Things (IoT), mobile applications, blockchain technology, and customer relationship management (CRM) systems. Each of these tools is analyzed in terms of its functional capacity to enhance communication with consumers, automate marketing operations, and improve the accuracy of strategic decisions in agromarketing. Based on empirical analysis, the study reveals the economic benefits of marketing digitalization for agrarian businesses. These benefits are reflected in the reduction of promotional costs, increased effectiveness of advertising campaigns, and more efficient management of consumer relationships. The research emphasizes the importance of sector-specific characteristics in the development and implementation of digital marketing strategies. In particular, it highlights the seasonal nature of agricultural production, sensitivity to agro-climatic conditions, and difficulties in product standardization as key factors influencing the success of marketing efforts in this domain. As a result of the research, scientifically grounded approaches are proposed for adapting digital marketing strategies to the specific needs and constraints of the agricultural industry. These approaches aim to support enterprises in achieving greater marketing efficiency, enhancing resilience to external challenges, and securing long-term competitive advantages. The findings contribute to the broader discourse on digital transformation and underscore the necessity of a complex, system-based approach to integrating digital innovations into the marketing activities of agribusinesses under the framework of the emerging digital economy.

Keywords: *digital technologies, marketing strategy, agricultural enterprises, digital marketing, organizational and economic approach, Internet of Things (IoT), CRM systems, competitiveness, digital transformation.*

У представленому науковому дослідженні розглядаються організаційні та економічні детермінанти інтеграції цифрових технологій у маркетингові стратегії підприємств аграрного сектору. Актуальність теми зумовлена зростаючою потребою адаптації маркетингової діяльності агробізнесу до реалій глобалізації, цифрової трансформації та загострення конкуренції на міжнародних агропродовольчих ринках. У цьому контексті цифрові інструменти розглядаються як стратегічний ресурс, що сприяє підвищенню конкурентоспроможності та забезпеченню сталого розвитку. У статті ідентифіковано та систематизовано

найбільш перспективні цифрові технології, які мають значний потенціал щодо оптимізації маркетингових процесів в аграрних підприємствах. До таких технологій належать аналітика великих даних (Big Data), Інтернет речей (IoT), мобільні додатки, блокчейн-технології та системи управління взаємовідносинами з клієнтами (CRM). Кожен із зазначених інструментів проаналізовано з точки зору його функціональних можливостей у сфері покращення комунікації зі споживачами, автоматизації маркетингових операцій і підвищення точності стратегічного планування в агромаркетингу. На основі емпіричного аналізу дослідження виявляє економічні переваги цифровізації маркетингу для аграрного бізнесу. Ці переваги проявляються у зниженні витрат на просування, підвищенні ефективності рекламних кампаній і більш ефективному управлінні взаємодією з клієнтами. У роботі наголошується на важливості урахування галузевих особливостей при розробці та впровадженні цифрових маркетингових стратегій. Зокрема, акцент зроблено на сезонному характері аграрного виробництва, чутливості до агрокліматичних умов і труднощах зі стандартизацією продукції як ключових чинниках, що впливають на успішність маркетингових зусиль у цьому секторі. У результаті дослідження запропоновано науково обґрунтовані підходи до адаптації цифрових маркетингових стратегій відповідно до специфічних потреб і обмежень аграрної галузі. Запропоновані підходи мають на меті підвищення ефективності маркетингу, зміцнення стійкості підприємств до зовнішніх викликів та забезпечення довгострокових конкурентних переваг. Отримані результати роблять внесок у ширший науковий дискурс щодо цифрової трансформації та підкреслюють необхідність комплексного, системного підходу до інтеграції цифрових інновацій у маркетингову діяльність агробізнесу в умовах становлення цифрової економіки.

Ключові слова: *цифрові технології, маркетингова стратегія, аграрні підприємства, цифровий маркетинг, організаційно-економічний підхід, Інтернет речей (IoT), CRM-системи, конкурентоспроможність, цифрова трансформація.*

Formulation of the problem. In the context of intensified globalization and growing competition in the international agricultural product market, agribusiness companies face the challenge of updating their marketing strategies to remain competitive and to enter new sales markets. The implementation of digital tools opens up vast opportunities for improving product promotion channels, enhancing communication with customers, increasing the efficiency of business processes, and making well-informed managerial decisions based on large-scale data analysis.

At the same time, the digitalization of marketing activities in the agricultural sector requires a systemic organizational and economic approach that takes into account industry-specific features, the current resource capacity of enterprises, and potential risks associated with the transition to a digital model. In this regard, scientific research on the integration of digital technologies into agrimarketing is both timely and essential for developing effective models for using advanced technologies. These models aim not only to boost competitiveness but also to expand distribution networks and improve customer relationships.

An additional factor that reinforces the relevance of this topic is the need to respond to the demands of the digital age, where consumers increasingly prefer online communication and digital purchasing channels. In today's environment, the effective use of digital technologies becomes a critical driver of agility, resilience, and competitive advantage for agribusinesses amid constantly shifting market dynamics.

Scientific analysis of the organizational and economic dimensions of digital marketing in agriculture is also vital from the perspective of strengthening methodological foundations and developing practical recommendations for modernizing business processes, improving the return on marketing investments, and ensuring the sustainable development of enterprises in the digital economy. Therefore, the selection of this research topic is justified by the urgent need for a comprehensive academic understanding of digital marketing transformation in agribusiness, which in turn will enhance the global competitiveness of Ukraine's agricultural sector and foster its innovative advancement [2].

Analysis of recent research and publications. Recent scientific studies demonstrate a growing interest within the academic community in the integration of digital technologies into the marketing activities of agricultural enterprises (Husha I., Zhurba A. [7], Morozov D.

et al. [1]). In particular, the authors emphasize the evolution of digital marketing tools and the adaptation of new customer engagement models within the agricultural sector.

A review of contemporary publications (Mushka D., Bondarenko V. [2], Azhazha M. et al. [3], Rosario & Dias [6]) indicates the gradual formation of a comprehensive understanding of the current state and future prospects of digital marketing in agriculture. The researchers highlight the importance of transitioning toward the concept of Marketing 4.0, which integrates innovative technologies, automation, artificial intelligence, and interactive communication in the digital environment (Rose-Collins [4], Alan Pérez [5]).

At the same time, as noted by both Ukrainian and international scholars [7, 6], the organizational and economic foundations for integrating digital tools into marketing strategies of agricultural enterprises remain insufficiently systematized. This underscores the need for further applied research focused on developing effective models for implementing digital technologies in real agribusiness conditions.

Formulation of the purpose of the article. This research paper aims to conduct a comprehensive analysis of the integration of digital tools into the marketing strategies of agricultural enterprises. The primary objective is to evaluate the impact of digital technologies on the effectiveness of marketing decision-making and the ability of agribusinesses to sustain and strengthen their competitive advantage.

The study seeks to identify the most promising digital technologies capable of optimizing marketing processes in the agricultural sector. Additionally, it aims to develop scientifically grounded, practical recommendations for their effective implementation, with consideration of industry-specific conditions and operational requirements.

Presentation of the main material. The integration of digital solutions into agricultural practice offers enterprises new opportunities to enhance their competitive positioning compared to traditional farming methods. Contemporary technologies significantly improve the accuracy of managerial decisions and the efficiency of resource utilization. For instance, the use of sensors, satellite systems, and GPS monitoring provides agricultural producers with real-time, detailed data on soil conditions, crop development, and weather patterns. This enables more precise application of agrochemicals, optimized irrigation planning, and targeted crop protection, resulting in increased yields, improved product quality, and reduced production costs.

Moreover, automation and the adoption of robotics contribute to substantial gains in labor productivity while decreasing dependency on human resources—an especially important factor given the labor shortages in rural areas. The implementation of digital platforms and supply chain management systems facilitates coordinated actions among all stakeholders in the agri-food value chain, from producers to end consumers. This integration helps minimize losses during storage and transportation, reduce logistical expenses, and ensure transparency across all stages of supply.

In addition, big data analytics and artificial intelligence offer powerful tools for forecasting market trends, refining pricing strategies, and personalizing customer engagement. Such capabilities allow agricultural enterprises to respond more effectively to fluctuations in consumer demand and competitive market dynamics [3].

Beyond their economic impact, digital technologies play a pivotal role in enhancing the environmental sustainability of agricultural production. Precision farming technologies, powered by sensor-based and satellite-derived data, enable farmers to utilize natural resources more efficiently while minimizing negative environmental effects. These approaches help reduce soil degradation, lower water consumption, and limit the use of chemical inputs, thereby increasing the resilience of production systems to external stressors.

In the face of intensifying global competition, rising consumer expectations for transparency and eco-friendliness, and the escalating effects of climate change, the future development of agricultural enterprises without digital innovation becomes increasingly unfeasible. Ensuring greater production efficiency and consistent product quality demands

the adoption of advanced technological solutions. Today's consumers expect full traceability throughout the production chain – from field to fork – which is achievable only through the application of digital monitoring and control tools.

Furthermore, with increasing climate instability, agricultural producers must be able to respond rapidly to changing conditions. In this context, predictive analytics and simulation systems support effective production planning, help avoid losses, and mitigate operational risks.

Among the digital solutions with the greatest potential to improve marketing performance in the agricultural sector, several strategic directions can be identified. Most notably, big data analytics and artificial intelligence (AI) provide agricultural enterprises with the ability to collect, process, and interpret large volumes of information related to consumer behavior, market dynamics, and the outcomes of marketing initiatives. These technologies enable accurate demand forecasting, dynamic pricing adjustments, and personalized customer interactions.

The Internet of Things (IoT) also plays a crucial role by providing real-time data on crop conditions, soil health, and the status of agricultural machinery. This enables timely and informed decision-making, particularly in the context of marketing planning and operational adjustments.

Mobile applications are emerging as effective tools for communication with customers and business partners, offering convenient access to product information, pricing, and delivery terms. Social media platforms and content marketing strategies contribute to building long-term relationships with target audiences, enhancing brand recognition, and promoting agricultural products more broadly.

Marketing automation through Customer Relationship Management (CRM) systems and email campaigns streamlines customer interactions, improves communication efficiency, and boosts the overall effectiveness of marketing initiatives.

The integration of these technologies not only modernizes marketing processes but also drives the broader digital transformation of the agricultural sector, making it more agile and competitive in the global marketplace [5; 6].

The integration of digital technologies into the marketing activities of agricultural enterprises generates substantial economic benefits. One of the key advantages lies in the reduction of advertising and promotional costs. Through advanced targeting capabilities provided by social media platforms, search engines, and email marketing tools, businesses can deliver advertising messages directly to relevant audiences. This increases campaign efficiency while minimizing customer acquisition costs.

In addition, digital technologies enhance transparency across business processes and improve customer interaction. For instance, supply tracking systems enable clients to access real-time updates on the status of their orders, thereby strengthening trust in the brand and contributing to a positive corporate image.

Thus, digitalization not only reduces operational expenses and increases marketing effectiveness but also reinforces the company's reputation – an essential factor for long-term sustainability and competitive success in the marketplace [4].

When developing an effective digital marketing strategy for the agricultural sector, it is essential to account for several industry-specific characteristics.

One of the primary factors is the seasonality of agricultural production, which dictates the operational rhythm of agribusinesses and influences product demand. As such, marketing activities must be aligned with production cycles, particularly intensifying during harvesting and distribution periods.

Another critical aspect is the sector's strong dependence on climatic conditions, which introduces a high degree of uncertainty into production processes. Therefore, digital strategies must remain flexible and capable of adapting swiftly to unpredictable changes. The use of predictive analytics and meteorological monitoring systems is advisable to support marketing planning and more effective risk management.

It is also crucial to consider the specific nature of agricultural products: their limited shelf life, sensitivity to transportation conditions, and challenges in standardization. These features necessitate well-established logistics solutions and the deployment of digital tools for supply chain management to ensure timely delivery without compromising product quality [7].

Standardization of agricultural goods is often complicated by natural factors that affect their appearance, taste, or texture. This presents challenges for online sales and requires the development of high-quality visual content and detailed descriptions for each product batch.

Another important consideration is the heterogeneity of target audiences. Agricultural products are marketed not only to end consumers but also to large processing enterprises, retail chains, and export-oriented companies. This diversity calls for differentiated communication strategies. For instance, B2B platforms and marketing automation tools can be particularly effective in serving business clients [1].

Equally significant is the establishment of trust in the producer, especially in the domain of food products. In this regard, social media, content marketing, and transparent representation of production processes become key instruments for building a positive brand image and fostering long-term customer relationships.

Conclusions. The findings of this study confirm that digital technologies offer substantial benefits to agricultural enterprises across all core operational areas - including production, marketing, and logistics. Their implementation enhances resource efficiency, improves product quality, streamlines business processes, and strengthens competitive positioning in the global marketplace.

In an era marked by intensifying competition, climate change, and shifting demographic trends, digital transformation is no longer merely an advantage but a critical necessity for ensuring the long-term viability and sustainable development of agricultural businesses.

Integrating digital technologies into marketing strategies leads to significant economic advantages, such as reduced promotional expenditures, improved campaign effectiveness, deeper insights into consumer needs, market expansion, and enhanced overall competitiveness.

However, the development of a successful digital marketing strategy in the agricultural sector requires careful consideration of specific industry characteristics – seasonality, climate dependence, product perishability, logistical complexity, difficulties in standardization, a diverse customer base, and the importance of producer reputation. An effective strategy must be flexible, adaptive, and focused on building long-term customer relationships, fully leveraging the potential of digital technologies to address sector-specific challenges and unlock growth opportunities.

Investing in the digital transformation of agribusiness is not only economically rational but also strategically essential for safeguarding food security and fostering the sustainable future of agriculture. Further research in this domain should focus on deepening the theoretical and methodological framework, designing innovative approaches to digital integration, and developing practical mechanisms for implementation across agribusinesses of varying scales.

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