Digital Marketing as a Strategic Tool for Promoting Agricultural Products

Nataliia Trushkina[1], Maryna Popova[2], Rahayu Relawati[3], Bambang Yudi Ariadi[3] and Yelyzaveta Loiko[4]

[1]*Research Center for Industrial Problems of Development of the National Academy of Sciences of Ukraine, Inzhenernyi Lane 1a, 61165 Kharkiv, Ukraine*

[2]*Anhalt University of Applied Sciences, Bernburger Str. 57, 06366 Köthen, Germany*

[3]*Department of Agribusiness, Faculty of Agriculture and Animal Husbandry, University of Muhammadiyah Malang, Jalan Raya Tlogomas No. 246, 65144 Malang, Indonesia*

[4]*Department of International Economics, Borys Grinchenko Kyiv Metropolitan University, Levka Lukianenka Str. 13-B, 04212 Kyiv, Ukraine*

nata_tru@ukr.net, Maryna.Popova@hs-anhalt.de, rahayurelawati@umm.ac.id, bambang_y@umm.ac.id, y.loiko.asp@kubg.edu.ua

Keywords: Digital Marketing, Agribusiness, Digital Agriculture, Agri-food Systems Resilience, Bibliometric Analysis, Digital Transformation, Marketing Promotion, Agricultural Product, Customer Relationship Management (CRM), Marketing Strategy, Data-driven Marketing, Supply Chains, Sustainability, Sustainable Development.

Abstract: In the context of the digital transformation of the economy, the agricultural sector is undergoing significant changes in the mechanisms of production, promotion, and distribution of products. Digital marketing is evolving from a communication tool into a strategic component of agribusiness development, enabling the integration of production, logistics, and market processes within agri-food systems. The aim of the article is to identify the structural and thematic patterns in the development of scientific research on digital marketing in the agricultural sector and to substantiate its role as a strategic tool for promoting agricultural products based on a bibliometric analysis. The study is based on a bibliometric analysis of scientific publications indexed in the Scopus database, using science mapping techniques, including keyword co-occurrence analysis, overlay visualization, and country citation analysis, with the application of VOSviewer software. The results reveal key thematic research clusters, their evolution over time, and the geographical distribution of scientific activity. It is shown that the research landscape is formed at the intersection of digital agriculture, e-commerce, digital platforms, and marketing communications. At the same time, a structural imbalance is identified, with a predominance of technological studies and limited attention to marketing and behavioural aspects. The findings contribute to a deeper understanding of digital marketing as an integrative element of agri-food digital ecosystems and can be used to develop effective marketing strategies in agribusiness.

1 INTRODUCTION

The rapid development of digital technologies is transforming the global economy and reshaping the ways products are produced, distributed, and promoted. These processes are particularly significant for the agricultural sector, which plays a crucial role in ensuring food security and supporting national economic development. According to the Food and Agriculture Organization of the United Nations, agriculture accounts for approximately 4 percent of global gross domestic product, while its contribution is considerably higher in many developing countries [1].

The digitalization of agriculture contributes to the transformation of traditional agribusiness models through the integration of digital platforms, electronic commerce, customer relationship management systems, and data analytics tools. These technologies create new opportunities for promoting agricultural products, improving market access, and strengthening interaction between

producers and consumers. As noted by L. Klerkx, E. Jakku, and P. Labarthe [2], digital transformation facilitates the emergence of new agribusiness models that combine production processes, information technologies, and digital communication tools.

A key component of this transformation is the growing use of digital marketing technologies. Digital marketing includes social media, e-commerce platforms, online communication channels, and digital analytical systems that enable enterprises to improve consumer engagement and expand their presence in global markets. Research demonstrates that the implementation of digital marketing strategies contributes to higher competitiveness, sales growth, and more effective market positioning of enterprises [3].

In addition, digital technologies support the development of sustainable agriculture and improve the efficiency of agri-food value chains by enhancing production transparency, product traceability, and consumer trust [4]. They also facilitate the integration of small and medium-sized agricultural producers into international markets and expand opportunities for economic development [5].

Despite the rapid expansion of digital technologies in agriculture, the role of digital marketing as a strategic instrument for promoting agricultural products remains insufficiently explored. In particular, there is a need to identify current trends in the development of digital marketing in agribusiness and to analyse the structure and evolution of scientific research in this field.

2 LITERATURE REVIEW

2.1 Digital Transformation of Agriculture

Contemporary scientific research increasingly focuses on the digital transformation of the agricultural sector. Digital technologies are being actively integrated into agricultural production, enterprise management, and agri-food value chains, contributing to more efficient resource use, higher productivity, and the emergence of new business models.

Studies emphasize that technologies such as big data analytics, sensor systems, digital platforms, and artificial intelligence form the technological basis of smart agriculture and support data-driven decision-making processes [4]. Digital platforms and internet technologies also improve the coordination of agri-food supply chains, enhance production transparency, and strengthen interaction among market participants [6]. In addition, the application of digital analytical systems significantly improves resource management and operational efficiency in agriculture [7].

Recent research further demonstrates that the digital transformation of agri-food systems contributes to greater transparency, resilience, and sustainability of agricultural supply chains [8]. As a result, digital technologies are increasingly regarded not only as production tools, but also as strategic mechanisms for transforming agri-food systems and market interactions.

2.2 Digital Marketing and Digital Communication in Modern Business

Another important research direction concerns the role of digital marketing in the development of modern business. In the scientific literature, digital marketing is considered a set of technologies and communication tools used to promote products and establish interaction with consumers through digital channels.

Researchers note that digital marketing transforms traditional marketing approaches by expanding the use of social media, mobile technologies, online platforms, and electronic commerce [3]. The development of digital communication tools creates new opportunities for enterprises to strengthen customer engagement, improve market positioning, and build competitive advantages in the digital economy [9].

Contemporary studies also emphasize the growing importance of big data analytics and artificial intelligence in marketing activities. Digital analytical systems enable enterprises to better identify consumer needs, personalize marketing communications, and improve the effectiveness of product promotion [10]. Consequently, digital marketing is increasingly integrated with platform-based business models and data-driven decision-making processes [11].

2.3 Digital Marketing in Agribusiness

A separate strand of scientific research is devoted to the application of digital marketing in the agricultural sector. Under conditions of digital transformation, agricultural enterprises increasingly use online platforms, electronic commerce, and

social media to promote products, develop brands, and strengthen interaction with consumers.

Research demonstrates that digital platforms and e-commerce systems expand market access for agricultural producers and facilitate direct communication with consumers [12]. The use of internet marketing tools contributes to broader distribution channels, stronger brand recognition, and higher levels of consumer trust in agricultural products. Social media also plays an important role in disseminating information about product quality, sustainability, and food safety, while supporting the formation of positive brand images for agricultural enterprises [13], [14].

At the same time, existing scientific literature is still largely concentrated on technological aspects of agricultural digitalization, including precision farming, big data, and digital platforms [15]-[17]. Comparatively less attention is devoted to digital marketing as a strategic mechanism for promoting agricultural products and transforming market interactions within agri-food systems.

In addition, insufficient attention has been paid to the systematic analysis of the intellectual structure and thematic evolution of research in this field, including the identification of major research clusters, publication dynamics, and emerging scientific trends [18]-[22]. Therefore, bibliometric analysis represents an appropriate methodological approach for identifying the main directions of research development and assessing the role of digital marketing in the transformation of agribusiness.

Accordingly, the aim of this study is to identify the structural and thematic patterns in the development of scientific research on digital marketing in the agricultural sector through bibliometric analysis and to substantiate its role as a strategic tool for promoting agricultural products in the context of the digital transformation of agri-food systems.

3 METHODOLOGY

This study applies bibliometric analysis to examine the development of scientific research on digital marketing in the agricultural sector. Bibliometric methods are widely used to analyse publication dynamics, identify thematic research areas, and assess the intellectual structure of scientific fields [18]-[20].

The bibliometric dataset was obtained from the Scopus database, which provides extensive interdisciplinary coverage of peer-reviewed scientific publications and is widely used in bibliometric and science mapping studies. Scopus was selected due to its high-quality indexing standards, comprehensive metadata, and compatibility with bibliometric visualization tools such as VOSviewer (Table 1).

The search process focused on publications related to digital marketing and the agricultural sector. The search was conducted within the title, abstract, and keyword fields using the following query:

TITLE-ABS-KEY (“digital marketing” AND (agriculture OR agribusiness OR “agri-food” OR “food marketing”)).

The analysis primarily covers the period 2017-2026, which reflects the active stage of development of research on digital marketing in agribusiness. At the same time, earlier highly cited publications were also included to capture the theoretical foundations of the research field.

Table 1: Search strategy and dataset description.

Parameter	Description
Database	Scopus
Search fields	Title, Abstract, Keywords
Search query	“digital marketing” AND (agriculture OR agribusiness OR agri-food OR food marketing)
Document types	Articles, Review papers
Language	English
Data extraction	February 2026
Export format	CSV
Analysis tool	VOSviewer

3.1 Data Selection and Processing

The selection and processing of publications were conducted in several stages. Only research articles and review papers indexed in the Scopus database and published in English were included in the analysis. Duplicate and irrelevant records were excluded after examining titles, abstracts, and keywords.

After the data cleaning procedure, the final bibliometric dataset was exported in CSV format and included information on authors, publication sources, keywords, countries, and citation indicators. The processed dataset was subsequently used for bibliometric mapping and visualization.

3.2 Bibliometric Analysis and Visualization Tools

To analyse the intellectual structure and thematic development of research on digital marketing in agribusiness, bibliometric and science mapping methods were applied [20]-[22]. Visualization and network analysis were performed using VOSviewer software, which enables the construction of bibliometric maps based on citation and keyword relationships [22], [23].

The study applied the following bibliometric techniques [23]:

- keyword co-occurrence analysis to identify major thematic clusters;
- overlay visualization to examine the temporal evolution of research topics;
- country citation analysis to assess the geographical distribution of scientific activity.

The application of these methods made it possible to identify the dominant research directions, relationships between thematic areas, and the overall structure of scientific research on digital marketing in the agricultural sector.

4 RESULTS

This section presents the results of the bibliometric analysis of scientific publications on digital marketing in the agricultural sector. The analysis identifies major research trends, thematic structures, and geographical patterns of scientific activity related to the digital transformation of agribusiness.

4.1 Dynamics of Scientific Publications

The analysis of publication dynamics based on the Scopus database demonstrates the rapid expansion of research on digital marketing in agriculture. Prior to 2018, publication activity remained limited and fragmented. However, beginning in 2019, the field entered a phase of intensive growth characterized by increasing scientific interest and the gradual formation of a stable research domain.

As shown in Table 2, the number of publications increased from 10 in 2019 to 37 in 2025, reflecting a 3.7-fold increase over the period. The most significant growth was recorded in 2019 and 2022, indicating the acceleration of research activity related to digital transformation processes in agribusiness.

Table 2: Dynamics of scientific publications on digital marketing in the agricultural sector (scopus, 2017-2026).

Year	Number of publications	Absolute increase	Growth rate, %
2017	4	-	-
2018	2	-2	50.0
2019	10	+8	500.0
2020	11	+1	110.0
2021	13	+2	118.2
2022	22	+9	169.2
2023	26	+4	118.2
2024	30	+4	115.4
2025	37	+7	123.3
2026	12	-25	32.4

Note: Data for 2026 are partial and reflect the status of the Scopus database at the time of data extraction (February 2026).

The observed growth dynamics are associated with the rapid expansion of digital technologies, the increasing use of online marketing channels in agribusiness, and the acceleration of digitalization during the COVID-19 pandemic. At the same time, the decline in 2026 is explained by incomplete database coverage at the time of data collection and should not be interpreted as a negative trend.

To identify the intellectual foundations of the research field, an analysis of the most cited publications in the Scopus dataset was conducted (Table 3).

The results indicate that the intellectual core of the field extends beyond narrowly defined digital marketing and includes broader issues related to digital agriculture, supply chain transformation, electronic commerce, social media, and agri-food resilience. The most cited publications primarily focus on digitalization processes, online market interaction, and technological transformation of agricultural systems.

The analysis also demonstrates the interdisciplinary nature of the field, which integrates digital technologies, marketing, logistics, and agri-food management. Consequently, digital marketing in agriculture should be considered not only as a promotional instrument, but also as a component of broader digital ecosystems connecting production, communication, and distribution processes.

Additional insight into the disciplinary structure of the field is provided by the analysis of leading academic journals publishing research on digital marketing and digital technologies in agriculture (Table 4).

Table 3: Most cited publications in the scopus dataset on digital technologies and marketing in the agricultural sector (scopus, 2000-2024).

Authors	Year	Citations	Main scientific focus
D. J. Choruma et al. [24]	2024	107	Digitalization of agriculture, technology adoption practices, barriers and opportunities for small-scale producers
M. Alkahtani et al. [25]	2021	64	Electronic management of agricultural supply chains, blockchain technologies, cooperative strategies
L.A. Duram [26]	2000	59	Socio-economic and institutional factors of agricultural sector development
A.U. Din et al. [27]	2022	49	Impact of the pandemic on food supply chains and the role of electronic commerce
M. Prosper Bright et al. [28]	2021	36	Digital and organizational transformations in agricultural consulting and food provision systems
A. Elghannam et al. [29]	2017	36	Social media and the development of short agri-food supply chains
K.A. Nagaty [30]	2023	29	Artificial intelligence-powered Internet of Things in commercial and industrial applications
I. Grigorescu et al. [31]	2022	28	Resilience of peri-urban small-scale farming under pandemic conditions
S. Ravi & S. R. C. Rajasekaran [32]	2023	26	Digital marketing in rural areas
K.M.I. Bashir et al. [33]	2019	26	Marketing strategies and competitiveness of agri-food companies in international markets

Table 4: Leading academic journals publishing research on digital marketing and digital technologies in the agricultural sector.

Rank	Journal	Publisher	Research focus	CiteScore 2024	SJR 2024	Quartile
1	Computers and Electronics in Agriculture	Elsevier	Digital technologies and smart farming	13.5	1.85	Q1
2	Agricultural Systems	Elsevier	Agricultural innovation and sustainability	9.8	1.65	Q1
3	Technological Forecasting and Social Change	Elsevier	Digital transformation and innovation	12.2	2.30	Q1
4	International Journal of Information Management	Elsevier	Digital technologies and information systems	20.0	3.50	Q1
5	Journal of Business Research	Elsevier	Digital marketing and business transformation	11.0	2.10	Q1
6	Journal of the Academy of Marketing Science	Springer	Marketing research and strategy	25.0	4.50	Q1
7	International Journal of Production Research	Taylor & Francis	Digital supply chains	8.5	1.75	Q1
8	Journal of Retailing and Consumer Services	Elsevier	Consumer behaviour and digital retail	10.5	1.90	Q1
9	British Food Journal	Emerald	Agri-food marketing	5.2	0.85	Q2
10	Journal of Rural Studies	Elsevier	Rural development and agricultural innovation	8.0	1.60	Q1

Note: CiteScore and SJR indicators are presented according to Scopus and SCImago data for 2024.

The results show that the research field is largely shaped by interdisciplinary journals focused on digital transformation, innovation, information systems, and agricultural development. Journals such as Computers and Electronics in Agriculture, Agricultural Systems, and Technological Forecasting and Social Change occupy leading positions, indicating the close connection between digital marketing research and broader processes of technological modernization of agri-food systems.

At the same time, the presence of marketing-oriented journals, including Journal of Business Research and Journal of the Academy of Marketing Science, reflects the growing attention to strategic,

behavioural, and communication dimensions of digitalization in agribusiness.

Overall, the results confirm that digital marketing research in agriculture is characterized by a high degree of interdisciplinarity and combines technological, managerial, and market-oriented perspectives.

4.2 Keyword Co-Occurrence Analysis

To identify the thematic structure of the research field, a keyword co-occurrence analysis was conducted using VOSviewer (Fig. 1).

The analysis demonstrates that the concepts marketing and digital marketing occupy central positions within the network and are connected with several major thematic clusters. The first cluster is related to electronic commerce and digital distribution channels and includes terms such as e-commerce, online marketing, and marketplaces. The second cluster focuses on strategic management and supply chain coordination, including concepts such as marketing strategy, decision support systems, and supply chains.

Another cluster is associated with sustainability and agricultural innovation, reflecting the growing importance of transparency, traceability, and sustainable production within agri-food systems. In addition, socio-behavioural topics related to social media marketing, consumer interaction, and COVID-19 are also strongly represented in the network.

Thus, digital marketing in agribusiness functions as an integrative research domain connecting technological, managerial, and socio-economic dimensions of agricultural development.

4.3 Evolution of Research Directions Over Time

Overlay visualization analysis reveals a gradual evolution of scientific discourse in the field (Fig. 2). Earlier studies were primarily focused on information technologies, electronic commerce, and rural digitalization. Subsequently, research attention shifted toward online marketing, digital platforms, and supply chain integration.

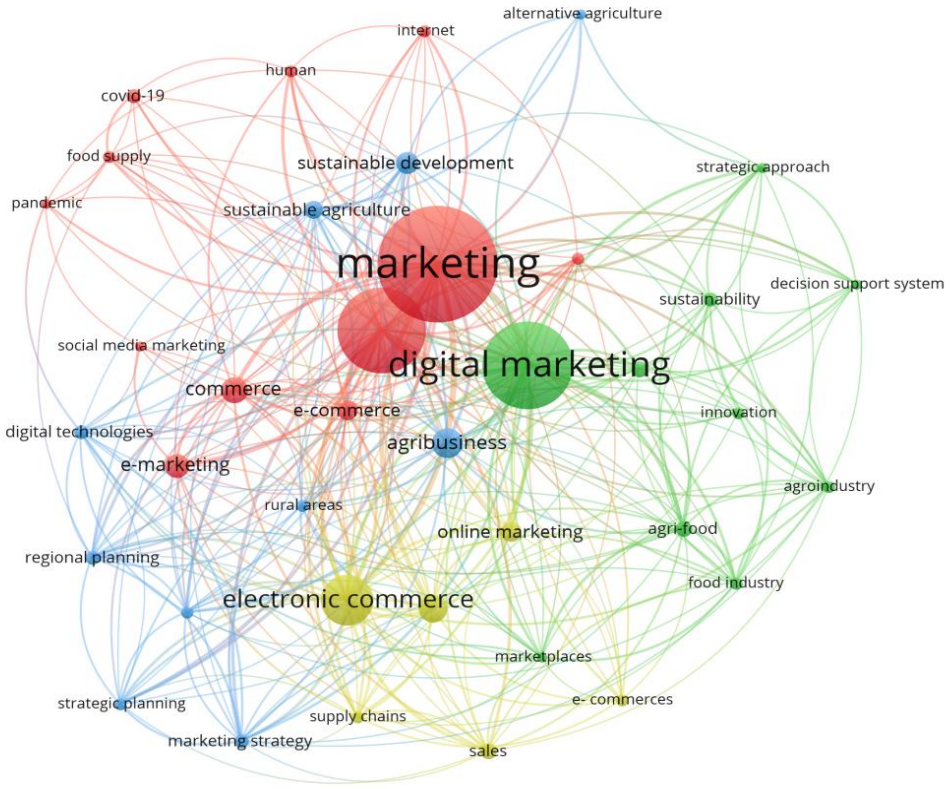

Figure 1: Co-occurrence map of keywords in research on digital marketing in the agricultural sector.

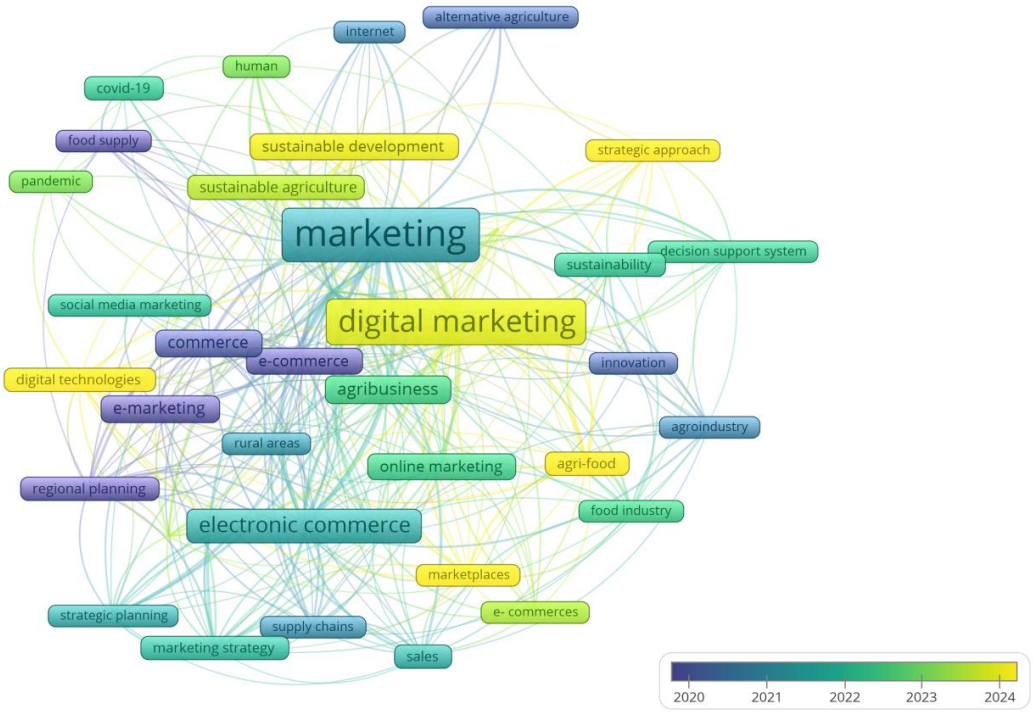

Figure 2: Overlay visualization of the evolution of research on digital marketing in the agricultural sector.

More recent studies increasingly emphasize sustainability, innovation, decision support systems, and data-driven management approaches. This transformation indicates a transition from purely technological perspectives toward more integrated approaches in which digital marketing is considered a strategic tool for value creation and market coordination within agri-food systems.

4.4 Geographical Structure of Scientific Publications

The geographical analysis demonstrates that scientific activity is concentrated primarily in countries with advanced digital economies, including the United States, China, and European Union member states (Fig. 3). These regions benefit from developed digital infrastructure, high levels of innovation investment, and active implementation of digital technologies in agriculture.

At the same time, developing countries remain comparatively underrepresented despite the growing importance of digital transformation for agricultural modernization. This indicates the need to strengthen international collaboration and expand research related to regional and institutional specificities of agribusiness digitalization.

The obtained results confirm that digital marketing research in agriculture is increasingly shifting from isolated technological applications toward integrated models combining electronic commerce, supply chain management, sustainability, and consumer interaction.

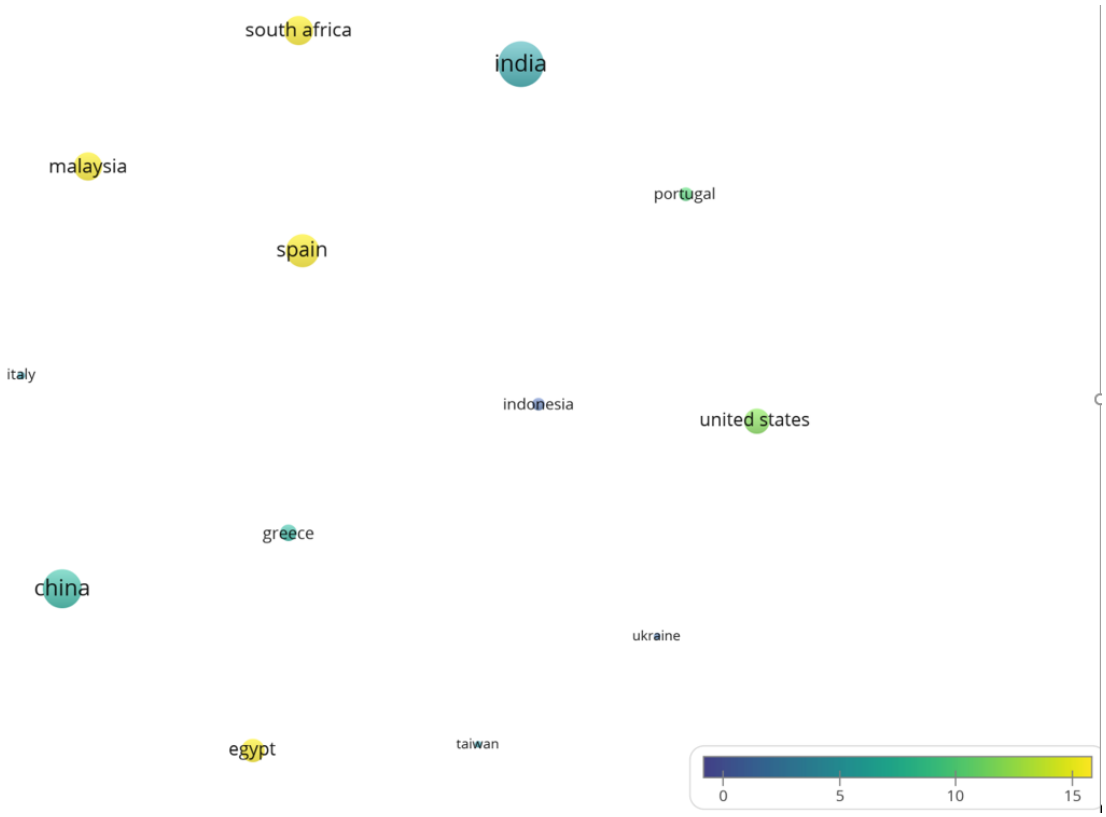

Figure 3: Geographic distribution of scientific publications on digital marketing in the agricultural sector.

4.5 Conceptual Framework of Digital Marketing in Agribusiness

The bibliometric analysis demonstrates that research on digital marketing in agriculture is formed at the intersection of digital agriculture, information technologies, electronic commerce, and marketing. Based on the obtained results, a conceptual framework of digital marketing development in agribusiness is proposed (Fig. 4) [23], [34], [35].

The framework reflects the interconnection between digital transformation drivers, agricultural technologies, digital marketing instruments, and business outcomes. At the first level, global digitalization processes and technological innovation shape the external environment of agribusiness. At the second level, technologies such as big data analytics, IoT, artificial intelligence, and digital platforms support data-driven decision-making and operational efficiency.

At the third level, digital marketing tools — including social media marketing, e-commerce platforms, content marketing, and digital communication channels — facilitate interaction with consumers and strengthen market presence. The integrated application of these technologies contributes to market expansion, stronger brand recognition, improved traceability, and increased competitiveness of agricultural enterprises.

Thus, digital marketing in agribusiness should be considered not only as a communication tool, but also as a strategic mechanism integrating technological innovation, market coordination, and consumer interaction within agri-food systems.

The proposed framework reflects a logically structured interconnection between the key elements of digital transformation and the strategic development of agribusiness in the digital economy.

At the first level, a determining role is played by global processes of digital transformation, including the development of the digital economy, the globalization of agri-food markets, the formation of sustainable food systems, and technological innovation. These factors shape the external environment in which agricultural enterprises operate and determine the conditions for the digital modernization of agri-food markets.

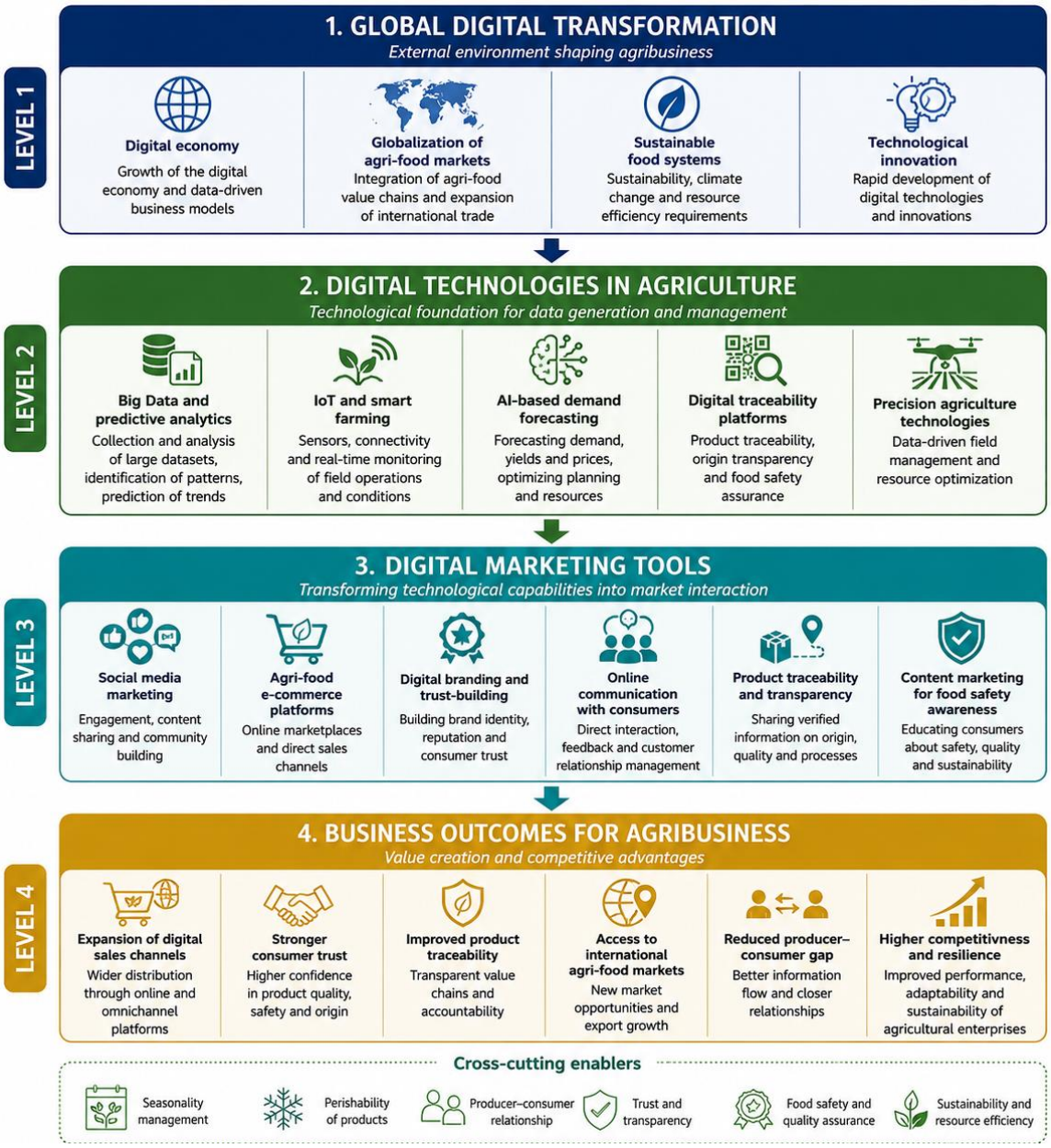

Figure 4: Conceptual framework of digital marketing development in agribusiness.

The second level is represented by digital technologies in agriculture. The use of big data and predictive analytics, the Internet of Things, artificial intelligence, precision agriculture technologies, and digital traceability platforms enables the accumulation, processing, and analysis of information. In the agricultural sector, these technologies are particularly important for managing seasonality, forecasting demand fluctuations, monitoring product quality, and ensuring traceability throughout agri-food supply chains. As a result, agricultural enterprises can improve managerial decision-making, optimize resource use, and increase operational efficiency.

At the third level, digital marketing tools transform technological capabilities into market interaction mechanisms. Social media marketing, agri-food e-commerce platforms, digital branding, online communication channels, and content marketing contribute to the development of direct relationships with consumers and the strengthening of market presence. In addition, digital marketing

tools help agricultural enterprises reduce the communication gap between producers and consumers, increase transparency regarding product origin and food safety, and strengthen consumer trust in agricultural products.

The fourth level reflects the key business outcomes for agribusiness. These include the expansion of digital sales channels, stronger brand recognition, improved product traceability, access to international agri-food markets, reduction of the producer-consumer gap, and increased competitiveness and resilience of agricultural enterprises. The integrated application of digital technologies and digital marketing tools also contributes to improving the adaptability of agri-food systems to market, logistical, and external disruptions.

Thus, digital marketing in agribusiness should be considered not only as a communication tool, but also as a strategic mechanism that integrates technological innovation, market coordination, consumer interaction, and sustainable development within agri-food systems (Table 5).

Table 5: Key components of the conceptual framework of digital marketing in agribusiness. Source: compiled by the authors based on [23], [34], [35].

Component	Key elements	Expected impact
Digital transformation drivers	Digital economy, technological innovation, globalization of agri-food markets	Transformation of the business environment
Digital technologies in agriculture	Big Data, IoT, artificial intelligence, digital platforms	Improved decision-making and operational efficiency
Digital marketing tools	Social media marketing, e-commerce, digital communication channels	Enhanced interaction with consumers
Business outcomes	Brand development, market expansion, competitiveness	Sustainable growth of agribusiness

The developed framework makes it possible to systematically represent the transformation of digital technologies into marketing value, consumer interaction, and competitive advantages within agri-food systems. Its practical significance lies in its potential to serve as a conceptual basis for the development of integrated digital growth strategies for agricultural enterprises, taking into account the specific characteristics of agri-food markets.

To deepen the understanding of interaction processes within the digital environment of agribusiness, an integrated digital marketing ecosystem model is proposed (Fig. 5). Unlike generalized digital ecosystem models, the proposed framework reflects the specific features of agri-food systems, including supply chain integration, food safety requirements, product traceability, sustainability challenges, and the growing importance of trust-based communication between producers and consumers.

The proposed ecosystem reflects a multi-level system of interaction among institutional, technological, production, logistical, and market actors within the agri-food sector.

Government institutions form the regulatory and institutional environment by supporting agricultural digitalization, food safety standards, sustainable development policies, and the expansion of digital infrastructure. Their role is particularly important in ensuring transparency, traceability, and the implementation of digital standards within agri-food markets.

Technology companies and research institutions contribute to the development of innovative digital solutions, including artificial intelligence systems, IoT technologies, predictive analytics, blockchain tools, and digital traceability platforms. These technologies enable agricultural enterprises to optimize production processes, improve demand forecasting, and strengthen data-driven decision-making.

Digital platforms act as an integrating element of the ecosystem by connecting producers, consumers, logistics operators, retailers, and other market participants. E-commerce systems, CRM platforms, social media, and online marketplaces facilitate communication, information exchange, and the coordination of agri-food supply chains.

Agri-food supply chains occupy an important place within the ecosystem because digital marketing in agriculture is closely interconnected with logistics, storage, distribution, and product delivery systems. The integration of digital technologies into supply chains contributes to improving product traceability, reducing transaction costs, and increasing the resilience of agri-food systems.

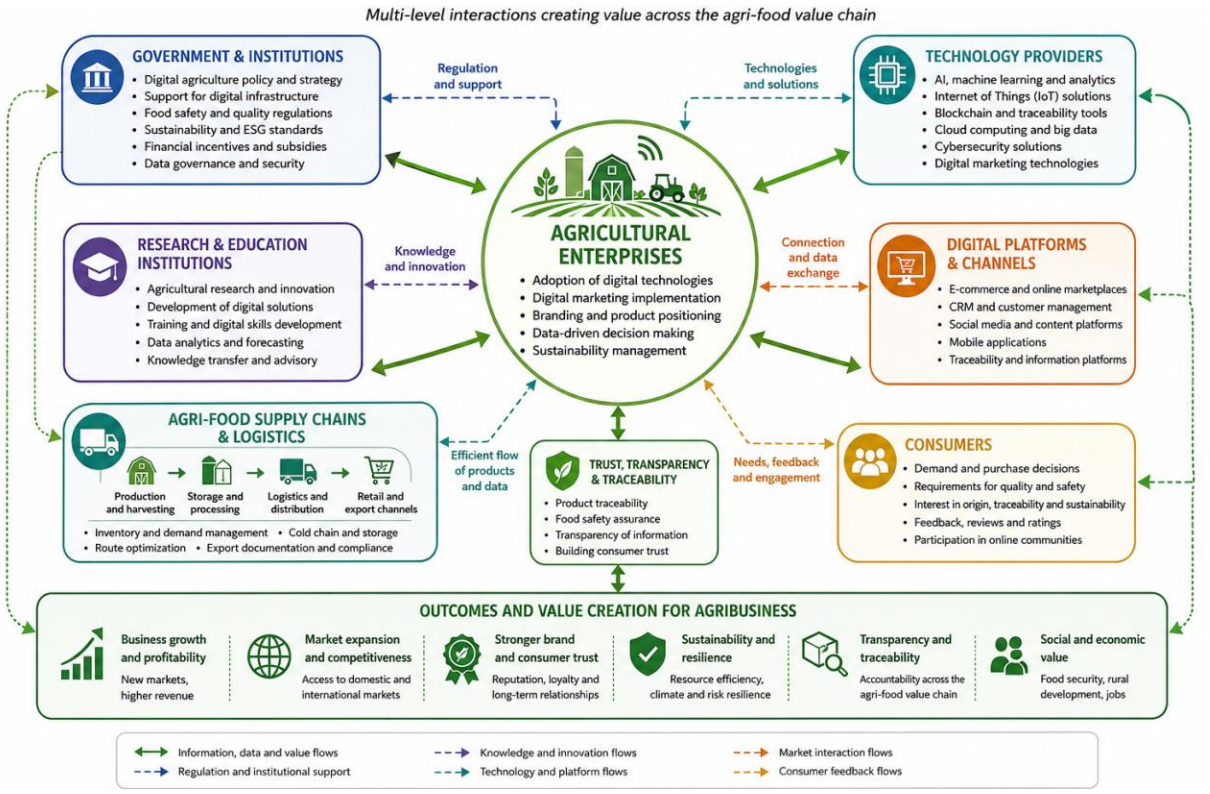

Figure 5: Integrated digital marketing ecosystem in agribusiness. Source: developed by the authors based on [23], [34], [35] using AI tools.

Table 6: Digital marketing tools used in agribusiness. Source: compiled by the authors based on [3]-[4], [7], [8], [10], [11].

Digital marketing tool	Application in agribusiness	Expected outcomes
Social media marketing	Promotion of agricultural products via social media platforms	Increased brand awareness and customer engagement
E-commerce platforms	Online sales through marketplaces and digital platforms	Expansion of sales channels and market access
Content marketing	Creation of digital content about product quality and origin	Increased consumer trust and loyalty
Data-driven marketing	Use of analytics to study consumer behavior	Personalization and higher campaign effectiveness
Digital platforms	Integration of producers, suppliers, and buyers	Improved coordination and market transparency
Mobile marketing	Use of mobile applications and communication tools	Faster interaction and broader access to information

Agricultural enterprises occupy the central position within the ecosystem, as they implement digital technologies and digital marketing tools in production, communication, branding, and sales activities. The use of digital marketing channels enables agricultural producers to establish direct interaction with consumers, reduce the producer-consumer gap, and strengthen trust in agricultural products.

Consumers, in turn, shape market demand and define requirements for product quality, environmental sustainability, transparency of origin, and food safety. In the digital economy, consumers increasingly influence the formation of marketing strategies through feedback mechanisms, digital communication, and participation in online agri-food communities.

Thus, digital marketing in agribusiness operates within a complex ecosystem of technological, institutional, and market interactions, where the strategic importance of communication, transparency, sustainability, and trust becomes increasingly significant for the development of competitive and resilient agri-food systems.

For the practical implementation of the proposed model, it is advisable to consider the key digital marketing tools (Table 6) and their applications.

As shown in Table 6, digital marketing combines communication and analytical tools. Their integrated application enables enterprises not only to promote products, but also to better understand consumer needs and adapt marketing strategies accordingly.

Overall, the implementation of digital marketing tools enhances the flexibility of agricultural enterprises, strengthens their market adaptability, and supports long-term competitiveness.

4.6 Research Gaps and Emerging Trends

Despite the rapid growth of scientific publications on digital marketing in agriculture, the conducted bibliometric analysis reveals several structural imbalances and research gaps within the existing scientific discourse.

First, the contemporary research landscape is largely dominated by technological studies focused on smart farming, artificial intelligence, IoT systems, big data analytics, and digital platforms. While these areas form an important technological basis for the digital transformation of agriculture, considerably less attention is paid to marketing, communication, and behavioural dimensions of digital interaction within agri-food systems.

Second, the analysis demonstrates the insufficient development of studies related to consumer behaviour, trust formation, customer engagement, and digital communication between producers and consumers. At the same time, in the context of increasing consumer requirements regarding food safety, sustainability, product origin, and transparency, these issues are becoming strategically important for agricultural enterprises.

Third, a significant geographical imbalance in scientific research is identified. The majority of publications are concentrated in developed countries, whereas developing economies and small-scale agricultural producers remain underrepresented in the global scientific discourse. This limits the understanding of regional specificities of digital marketing implementation in agribusiness under different institutional and technological conditions.

In addition, the results indicate the insufficient integration of digital marketing research with studies on agri-food supply chains, logistics, and sustainability management. Most existing studies examine digital technologies either from a technological or marketing perspective, while integrated interdisciplinary approaches remain relatively underdeveloped.

At the same time, the bibliometric analysis demonstrates the emergence of new promising research directions associated with digital traceability systems, AI-driven marketing analytics, sustainability-oriented branding, food transparency, and platform-based interaction models within agri-food ecosystems.

Thus, the future development of scientific research in this field requires a transition from fragmented technological approaches toward more integrated interdisciplinary models that combine digital technologies, marketing strategies, supply chain management, sustainability, and consumer interaction within agri-food systems.

5 DISCUSSION, LIMITATIONS AND FUTURE RESEARCH

5.1 Discussion of Results

The results of this study provide a more nuanced understanding of the positioning of digital marketing within contemporary agribusiness research. The bibliometric evidence indicates that the field emerges at the intersection of digital agriculture, information systems, supply chain management, e-commerce, and marketing communications. Rather than forming an isolated discipline, digital marketing operates as an integrative layer linking technological innovation with market interaction, consumer engagement, and value creation in agri-food systems.

These findings align with previous research suggesting that digital transformation in agriculture leads to the emergence of interconnected ecosystems involving producers, technology providers, platform operators, logistics actors, and research institutions [2]. The growing adoption of big data analytics, IoT solutions, artificial intelligence, and digital platforms supports a shift toward more data-driven and adaptive management models in agriculture [4], [6].

At the same time, the results refine earlier perspectives that primarily emphasized technological modernization and smart farming solutions. The current analysis shows a gradual but

clear shift toward marketing-oriented and behavioural dimensions of digital transformation. In this context, digitalization extends beyond production efficiency and increasingly shapes communication strategies, consumer engagement, digital branding, trust-building, and demand creation.

Digital marketing tools such as social media platforms, CRM systems, mobile applications, and e-commerce environments enable agricultural enterprises to develop more direct and personalized relationships with consumers [3], [9]. In parallel, data-driven technologies and artificial intelligence enhance segmentation accuracy, forecasting capabilities, and strategic decision-making processes [10].

However, the analysis also reveals a persistent fragmentation in the literature. Technological, marketing, and behavioural perspectives are still often studied in isolation. Limited attention is given to integrated digital ecosystems that combine communication, logistics coordination, sustainability, traceability, and consumer trust. This suggests a need for more holistic and interdisciplinary research frameworks.

Another important observation concerns geographical imbalance. Scientific output is concentrated mainly in developed economies, while developing regions and small-scale agricultural producers remain underrepresented. This restricts the generalizability of findings and limits understanding of how digital marketing functions under diverse institutional and infrastructural conditions.

Finally, sustainability, transparency, and traceability are becoming increasingly central to agri-food systems. As consumer expectations evolve, digital marketing is no longer limited to promotion; it also plays a strategic role in building trust, ensuring product transparency, and supporting sustainable value chains.

Overall, digital marketing is gradually shifting from a tactical communication instrument to a strategic component of agribusiness transformation.

5.2 Research Limitations

Several limitations should be acknowledged when interpreting the findings.

First, the analysis is based exclusively on the Scopus database. Although Scopus provides extensive coverage and high-quality indexing, relevant studies indexed in Web of Science, Dimensions, or Google Scholar may not be fully represented. This may lead to partial coverage of the global research landscape.

Second, bibliometric methods are inherently limited in terms of interpretative depth. While they are effective for identifying patterns, trends, and structures, they do not allow for detailed assessment of theoretical frameworks, methodological rigor, or practical effectiveness of digital marketing tools.

Third, the study presents aggregated global trends without fully capturing regional differences in digital readiness, institutional environments, and technological infrastructure. These contextual factors are critical for understanding the real-world implementation of digital marketing in agriculture.

Finally, the study does not include empirical validation at the enterprise level. As a result, conclusions remain conceptual and should be interpreted as descriptive rather than explanatory of causal relationships.

5.3 Future Research Agenda

Future research should address several key directions.

First, expanding the dataset beyond a single database would improve the comprehensiveness and robustness of bibliometric findings. Combining multiple scientometric sources would provide a more complete view of the research landscape.

Second, methodological triangulation should be encouraged. Integrating bibliometric analysis with systematic literature reviews, qualitative synthesis, and empirical case studies would allow for deeper insights into both structure and substance of the field.

Third, further studies should focus more strongly on behavioural and relational aspects of digital marketing in agribusiness, particularly consumer trust, engagement, transparency, and food perception in digital environments.

Fourth, stronger integration between digital marketing, supply chain management, logistics, sustainability frameworks, and platform ecosystems is needed. This would support the development of more realistic and applicable models for modern agrifood systems.

Overall, future research should move toward interdisciplinary approaches that combine technological, economic, and behavioural perspectives in a unified analytical framework.

6 CONCLUSIONS

This study provides a structured overview of the development of research on digital marketing in the agricultural sector based on bibliometric analysis. The results confirm that the field is highly

interdisciplinary, emerging at the intersection of digital agriculture, information technologies, supply chain management, e-commerce, and marketing communication.

A key trend identified in the study is the gradual transition from a technology-centred perspective toward a more integrated view that incorporates marketing strategies, consumer interaction, and value creation processes. While technological themes such as IoT, artificial intelligence, and big data remain dominant, increasing attention is being paid to their application in market-oriented and consumer-focused contexts.

At the same time, the study highlights several important gaps. Research on consumer behaviour, trust formation, digital branding, and value co-creation remains relatively underdeveloped compared to technological studies. In addition, geographical concentration of research in developed countries limits the inclusiveness of current scientific discourse.

The contribution of this study lies in systematizing existing knowledge and positioning digital marketing as an integrative mechanism connecting technological innovation with market and consumer dynamics in agribusiness. The proposed conceptual framework and ecosystem model provide a basis for understanding how digital technologies are translated into marketing value and competitive advantage.

From a practical perspective, the findings highlight the importance of integrated digital marketing strategies for agricultural enterprises, including e-commerce systems, CRM tools, data analytics, and omnichannel communication. For policymakers, the results emphasize the need to strengthen digital infrastructure and support digital transformation in rural areas. For researchers, the study highlights the importance of interdisciplinary approaches and empirical validation of theoretical models.

In conclusion, digital marketing in agribusiness should be understood not merely as a promotional function, but as a strategic mechanism integrating technology, communication, supply chains, and consumer trust within modern agri-food systems.

ACKNOWLEDGMENTS

We acknowledge support by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) and the Open Access Publishing Fund of Anhalt University of Applied Sciences.

REFERENCES

[1] Food and Agriculture Organization of the United Nations, The State of Food and Agriculture 2023. Revealing the True Cost of Food to Transform Agrifood Systems, Rome, 2023, [Online]. Available: https://doi.org/10.4060/cc7724en.

[2] L. Klerkx, E. Jakku, and P. Labarthe, “A review of social science on digital agriculture, smart farming and agriculture 4.0: New contributions and a future research agenda”, NJAS: Wageningen Journal of Life Sciences, vol. 90-91(1), 100315, pp. 1-16, 2019, [Online]. Available: https://doi.org/10.1016/j.njas.2019.100315.

[3] Y. K. Dwivedi, E. Ismagilova, D. L. Hughes et al., “Setting the future of digital and social media marketing research: Perspectives and research propositions”, International Journal of Information Management, vol. 59, 102168, 2021, [Online]. Available: https://doi.org/10.1016/j.ij.infomgt.2020.102168.

[4] S. Wolfert, L. Ge, C. Verdouw, and M. J. Bogaardt, “Big data in Smart Farming - a review”, Agricultural Systems, vol. 153, pp. 69-80, 2017, [Online]. Available: https://doi.org/10.1016/j.agsy.2017.01.023.

[5] K. Fuglie, M. Gautam, A. Goyal, and W. F. Maloney, Harvesting Prosperity: Technology and Productivity Growth in Agriculture, World Bank, Washington, DC, 2020, [Online]. Available: https://doi.org/10.1596/978-1-4648-1393-1.

[6] C. Verdouw, S. Wolfert, and B. Tekinerdogan, “Internet of Things in agriculture,” CABI Reviews, vol. 11(35), pp. 1-12, 2016, [Online]. Available: https://doi.org/10.1079/PAVSNNR201611035.

[7] A. Kamilaris, A. Kartakoullis, and F. X. Prenafeta-Boldú, “A review on the practice of big data analysis in agriculture”, Computers and Electronics in Agriculture, vol. 143, pp. 23-37, 2017, [Online]. Available: https://doi.org/10.1016/j.compag.2017.09.037.

[8] A. Kumar, S. Mangla, P. Kumar, and M. Song, “Mitigate risks in perishable food supply chains: Learning from COVID-19”, Technological Forecasting and Social Change, vol. 166, Art. 120643, 2021, [Online]. Available: https://doi.org/10.1016/j.techfore.2021.120643.

[9] J. R. Saura, P. Palos-Sánchez, and M. Correia, “Digital marketing strategies based on the e-business model: Literature review and future directions”, in Organizational Transformation and Managing Innovation in the Fourth Industrial Revolution, IGI Global, Hershey, Pennsylvania, 2019, [Online]. Available: https://doi.org/10.4018/978-1-5225-7074-5.ch005.

[10] T. H. Davenport, A. Guha, D. Grewal, and T. Bressgott, “How artificial intelligence will change the future of marketing”, Journal of the Academy of Marketing Science, vol. 48(7553), pp. 1-19, 2020, [Online]. Available: https://doi.org/10.1007/s11747-019-00696-0.

[11] P. C. Verhoef, T. Broekhuizen, Y. Bart et al., “Digital transformation: A multidisciplinary reflection and research agenda”, Journal of Business Research, vol. 122, pp. 889-901, 2021, [Online]. Available: https://doi.org/10.1016/j.jbusres.2019.09.022.

[12] M. Hingley and A. Lindgreen, "Marketing of agricultural products: Case findings", British Food Journal, vol. 104(10), pp. 806-827, 2002, [Online]. Available: https://doi.org/10.1108/00070700210448908.

[13] X. Y. Leung, B. Bai, and K. A. Stahura, "The marketing effectiveness of social media in the hotel industry: a comparison of Facebook and Twitter", Journal of Hospitality & Tourism Research, vol. 39(2), pp. 147-169, 2015, [Online]. Available: https://doi.org/10.1177/1096348012471381.

[14] E. Pantano, G. Pizzi, D. Scarpi, and C. Dennis, "Competing during a pandemic? Retailers' ups and downs during the COVID-19 outbreak", Journal of Business Research, vol. 116, pp. 209-213, 2020, [Online]. Available: https://doi.org/10.1016/j.jbusres.2020.05.036.

[15] M. Ben-Daya, E. Hassini, and Z. Bahroun, "Internet of things and supply chain management: A literature review", International Journal of Production Research, vol. 57(15-16), pp. 4719-4742, 2017, [Online]. Available: https://doi.org/10.1080/00207543.2017.1402140.

[16] E. D. Lioutas and C. Charatsari, "Smart farming and short food supply chains: Are they compatible?", Land Use Policy, vol. 94, Art. 104541, 2020, [Online]. Available: https://doi.org/10.1016/j.landusepol.2020.104541.

[17] C. Eastwood, M. Ayre, R. Nettle, and B. D. Rue, "Making sense in the cloud: Farm advisory services in a smart farming future", NJAS: Wageningen Journal of Life Sciences, vol. 90-91(1), 100298, 2019, [Online]. Available: https://doi.org/10.1016/j.njas.2019.04.004.

[18] N. Donthu, S. Kumar, D. Mukherjee, N. Pandey, and W. M. Lim, "How to conduct a bibliometric analysis: An overview and guidelines", Journal of Business Research, vol. 133, pp. 285-296, 2021, [Online]. Available: https://doi.org/10.1016/j.jbusres.2021.04.070.

[19] M. Aria and C. Cuccurullo, "Bibliometrix: An R-tool for comprehensive science mapping analysis", Journal of Informetrics, vol. 11, iss. 4, pp. 959-975, 2017, [Online]. Available: https://doi.org/10.1016/j.joi.2017.08.007.

[20] I. Zupic and T. Čater, "Bibliometric methods in management and organization", Organizational Research Methods, vol. 18, iss. 3, pp. 429-472, 2015, [Online]. Available: https://doi.org/10.1177/1094428114562629.

[21] M. J. Cobo, A. G. López-Herrera, E. Herrera-Viedma, and F. Herrera, "Science mapping software tools: Review, analysis, and cooperative study among tools", Journal of the American Society for Information Science and Technology, vol. 67, iss. 7, pp. 1382-1402, 2011, [Online]. Available: https://doi.org/10.1002/asi.21525.

[22] N. J. van Eck and L. Waltman, "Software survey: VOSviewer, a computer program for bibliometric mapping", Scientometrics, vol. 84, pp. 523-538, 2010, [Online]. Available: https://doi.org/10.1007/s11192-009-0146-3.

[23] A. Kwilinski, N. Trushkina, Yu. Remyha, and T. Patlachuk, "Impact of artificial intelligence on customer relationship management: A bibliometric analysis", Proceedings of International Conference on Applied Innovation in IT, vol. 13(1), pp. 295-303, [Online]. Available: http://dx.doi.org/10.25673/119246.

[24] D. J. Choruma, T. L. Dirwai, M. J. Mutenje et al., "Digitalisation in agriculture: A scoping review of technologies in practice, challenges, and opportunities for smallholder farmers in sub-saharan africa", Journal of Agriculture and Food Research, vol. 18, 101286, 2024, [Online]. Available: https://doi.org/10.1016/j.jafr.2024.101286.

[25] M. Alkahtani, Q. S. Khalid, M. Jalees et al., "E-agricultural supply chain management coupled with blockchain effect and cooperative strategies", Sustainability, vol. 13(2), 816, 2021, [Online]. Available: https://doi.org/10.3390/su13020816.

[26] L. A. Duram, "Agents' perceptions of structure: How Illinois organic farmers view political, economic, social, and ecological factors", Agriculture and Human Values, vol. 17(1), pp. 35-48, 2000, [Online]. Available: https://doi.org/10.1023/A:1007632810301.

[27] A. U. Din, H. Han, A. Ariza-Montes et al., "The Impact of COVID-19 on the Food Supply Chain and the Role of E-Commerce for Food Purchasing", Sustainability, vol. 14(5), 3074, 2022, [Online]. Available: https://doi.org/10.3390/su14053074.

[28] M. Prosper Bright, N. Terrence Kudzai, and C. Ngavaite, "The impact of COVID-19 on agricultural extension and food supply in Zimbabwe", Cogent Food and Agriculture, vol. 7(1), 1918428, 2021, [Online]. Available: https://doi.org/10.1080/23311932.2021.1918428.

[29] A. Elghannam, M. Escribano, and F. Mesias, "Can social networks contribute to the development of short supply chains in the Spanish agri-food sector?", New Medit, vol. 16(1), pp. 36-42, 2017, [Online]. Available: https://www.scopus.com/pages/publications/85028706185?origin=resultslist.

[30] K. A. Nagaty, "IoT Commercial and Industrial Applications and AI-Powered IoT", in Frontiers of Quality Electronic Design (QED): AI, IoT and Hardware Security, Cham, Springer International Publishing, pp. 465-500, 2023, [Online]. Available: https://doi.org/10.1007/978-3-031-16344-9_12.

[31] I. Grigorescu, E.-A. Popovici, N. Damian et al., "The resilience of sub-urban small farming in Bucharest Metropolitan Area in response to the COVID-19 pandemic", Land Use Policy, vol. 122, 106351, 2022, [Online]. Available: https://doi.org/10.1016/j.landusepol.2022.106351.

[32] S. Ravi and S. R. C. Rajasekaran, "A perspective of digital marketing in rural areas: A literature review", International Journal of Professional Business Review, vol. 8(4), e01388, 2023, [Online]. Available: https://doi.org/10.26668/businessreview/2023.v8i4.1388.

[33] K. M. I. Bashir, J.-S. Kim, M. Mohibbullah, J. H. Sohn, and J.-S. Choi, "Strategies for improving the competitiveness of Korean seafood companies in the overseas halal food market", Journal of Islamic Marketing, vol. 10(2), pp. 606-632, 2019, [Online]. Available: https://doi.org/10.1108/JIMA-03-2018-0056.

[34] A. Kwilinski, L. Hnatyshyn, O. Prokopyshyn, and N. Trushkina, "Managing the logistic activities of agricultural enterprises under conditions of digital economy", Virtual Economics, vol. 5(2), pp. 43-70, [Online]. Available: https://doi.org/10.34021/ve.2022.05.02(3).

[35] R. Relawati, B. Y. Ariadi, and N. Trushkina, "Digital marketing strategies for agriculture: Indonesia and Ukraine", BIO Web of Conferences, vol. 201, 03003, 2025, [Online]. Available: https://doi.org/10.1051/bioconf/202520103003.