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## ADAPTIVE MODEL OF MARKETING COMMUNICATIONS MANAGEMENT IN AGRO-INDUSTRIAL ENTERPRISES UNDER THE DIGITALIZATION OF AGRI-FOOD MARKETS

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**Abstract**

Digitalization is transforming marketing communications in agro-industrial enterprises by expanding communication channels, increasing the volume of available market data, and accelerating interaction with consumers and other stakeholders. These changes require a transition from campaign-oriented communication management to an integrated and adaptive management system. The purpose of the study is to develop an adaptive model of marketing communications management based on the development of the author's conceptual approach proposed in 2006. The study applies systems, process, structural-functional, comparative and content-analysis methods, as well as conceptual modeling. The proposed model integrates analytical, strategic, instrumental, interactive and control-adaptive functions into a continuous management cycle. The model combines traditional and digital communication instruments, expands interaction from the enterprise-consumer relationship to multiple stakeholders of the agri-food value chain, and introduces continuous feedback between communication results and managerial decisions. An integral indicator of communication effectiveness combining communication, digital, relationship, reputation and economic dimensions is proposed. The study demonstrates that the author's 2006 concept can be transformed into a data-driven and adaptive management system corresponding to the current digital environment of agri-food markets.

**Keywords:** *marketing communications, agro-industrial enterprises, agri-food markets, digitalization, adaptive management, digital marketing, marketing analytics, omnichannel communication, communication effectiveness*

### Introduction

Digitalization is changing the conditions under which agro-industrial enterprises interact with consumers, partners and other market participants. Websites, social media, electronic commerce, CRM systems, digital analytics, online reviews and artificial intelligence have expanded the traditional set of

marketing communication instruments. At the same time, communication has become more interactive and less dependent on individual advertising campaigns.

The development of global agri-food markets increases the importance of effective market communication. According to the OECD-FAO Agricultural Outlook 2026–2035, global agricultural and fisheries production is projected to increase by approximately 13% over the next decade, mainly due to productivity growth and intensification. The gross value of agricultural production is expected to reach approximately USD4.01 trillion by 2035. In this environment, market access, trade, digital technologies and resilience become increasingly important for agricultural producers and other participants in food value chains (OECD/FAO, 2026).

Marketing communications should therefore be considered not merely as a set of promotional instruments but as a management subsystem connecting market information, strategic decisions, communication activities, stakeholder interaction and performance evaluation.

This approach was proposed by the author in 2006. Marketing communications were considered as a specialized management subsystem of agro-industrial enterprises performing functions related to goal setting, development of management methods and instruments, environmental monitoring, analysis of factors determining the communication system, evaluation of communication effectiveness, improvement of efficiency and coordination of communication resources (Karpovich, 2006). The model was based on continuous information collection, periodic analysis and managerial correction.

During the following two decades, the technological environment has changed substantially. Environmental monitoring has developed into continuous digital market intelligence; information collection is supported by CRM and Big Data technologies; analytical procedures increasingly use predictive methods; communication channels have become integrated into omnichannel systems; and effectiveness assessment includes not only sales but also engagement, customer relationships and reputation.

Recent studies confirm these changes. Caiazza and Bigliardi (2020) emphasize user behavior tracking, CRM and brand value in web marketing. Rini et al. (2024) demonstrate the growing role of social media in food consumer behavior. Fernández-Uclés et al. (2024) identify online reputation as an important factor in the digital presence of agri-food companies. Other studies emphasize digital marketing strategies, customer analytics, relationship marketing and digital platforms as important components of modern agri-food value chains (Gelgile & Shukla, 2024; Kanellos et al., 2024 a, 2024 b; Slot et al., 2025).

However, existing research frequently focuses on individual digital technologies or communication channels. The methodological problem is therefore to integrate these instruments into a unified management subsystem capable of continuously adapting communication decisions to changes in the market environment and stakeholder responses.

The purpose of the study is to develop an adaptive model of marketing communications management for agro-industrial enterprises through the development of the author's conceptual approach proposed in 2006. The research hypothesis is that the integration of marketing analytics, digital communication instruments, multi-stakeholder interaction and continuous feedback can increase the adaptability and effectiveness of marketing communications.

## Methods

The study applies a systems approach, treating marketing communications as an integrated management subsystem interacting with the internal and external environment of an agro-industrial enterprise. The process approach is used to determine the sequence of management actions from environmental diagnostics and information collection to communication impact, feedback, effectiveness assessment and corrective action.

A structural-functional approach is used to identify the main components of the proposed model. Comparative analysis makes it possible to determine the transformation of the author's 2006 concept under digitalization. Content analysis of recent scientific publications is used to identify the main trends in digital marketing communications

in the agri-food sector. Conceptual modeling is applied to construct the adaptive management system and determine relationships between its components.

The effectiveness of marketing communications is represented by an integral indicator:

$$E_{MC} = w_1 E_{com} + w_2 E_{dig} + w_3 E_{rel} + w_4 E_{rep} + w_5 E_{eco},$$

where $E_{MC}$ is the integral effectiveness of marketing communications; $E_{com}$ is communication effectiveness; $E_{dig}$ is digital-channel effectiveness; $E_{rel}$ is relationship effectiveness; $E_{rep}$ is reputation effectiveness; $E_{eco}$ is economic effectiveness; and $w_i$ are weighting coefficients.

The coefficients satisfy the condition:

$$\sum_{i=1}^{5} w_i = 1.$$

The weights may be determined by expert assessment, statistical procedures or the strategic priorities of a particular enterprise.

## Results

The transformation of the author's 2006 model does not require rejection of its fundamental principles. Instead, digitalization changes the technological and organizational mechanisms through which these principles are implemented. Environmental monitoring becomes continuous digital market intelligence; information collection is supplemented by CRM, web analytics and social-media data; periodic analysis is complemented by real-time and predictive analytics; traditional communication tools are integrated with digital channels; one-way communication develops into interactive and omnichannel interaction; and periodic correction becomes continuous adaptation.

The proposed model consists of five interconnected functional blocks: analytical, strategic, instrumental, interactive and control-adaptive. The analytical block provides continuous monitoring of markets, competitors, consumers, digital behavior, customer reviews, online reputation, prices and external environmental changes. Its output is an integrated information base for managerial decisions.

The strategic block transforms analytical information into communication objectives, target audiences, segmentation, positioning, value propositions, communication priorities and resource requirements. The instrumental block integrates traditional and digital communication tools, including advertising, public relations, exhibitions and events, direct communication, websites, social media, e-commerce, CRM, digital analytics and artificial intelligence.

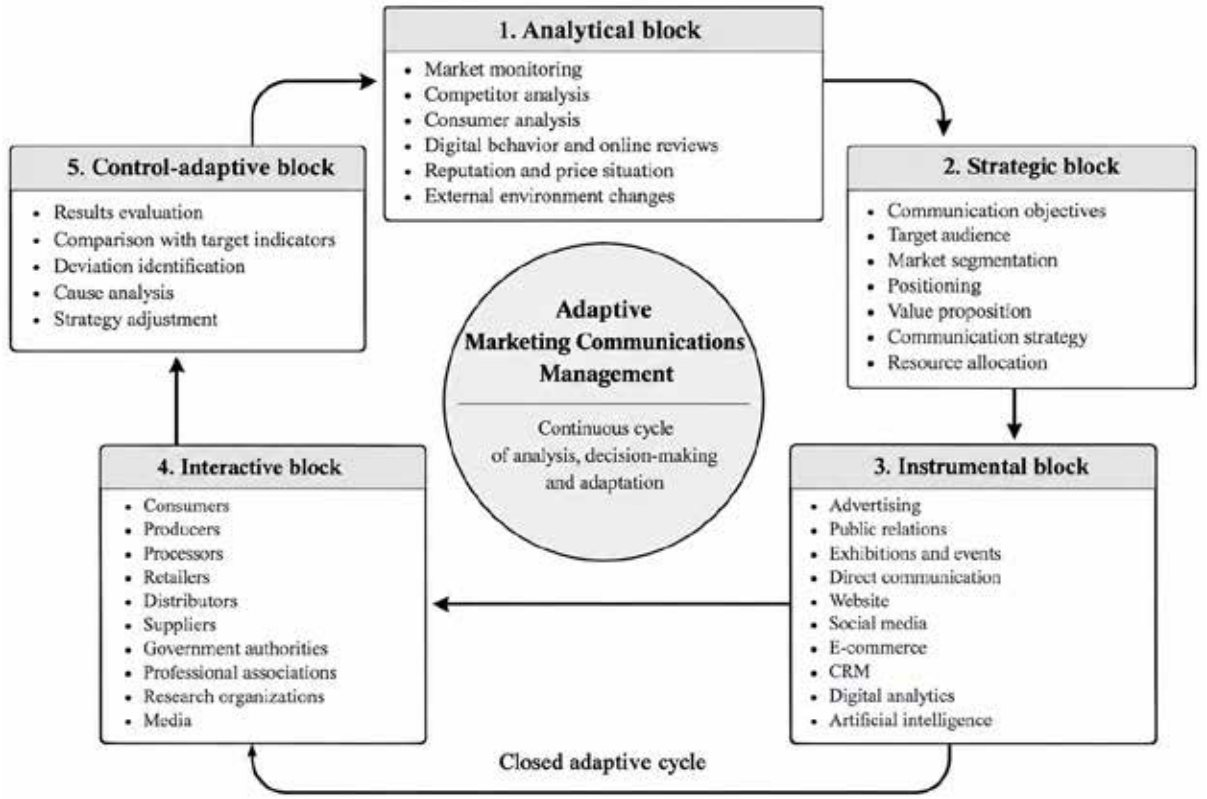
The interactive block reflects the transition from predominantly one-way communication to continuous interaction among consumers, producers, processors, retailers, distributors, suppliers, governmental authorities, professional associations, research organizations and media. Thus, the communication system extends beyond the traditional enterprise-consumer relationship and becomes part of the broader agri-food value-chain ecosystem.

The control-adaptive block compares actual results with target indicators, identifies deviations, determines their causes and initiates corrective actions. Consequently, the results of one communication cycle become information for the next cycle.

The proposed closed management cycle is based on a continuous sequence of diagnostics, information collection, analytics, strategy development, communication impact, omnichannel interaction, feedback, effectiveness assessment and corrective action. This sequence creates a feedback mechanism in which the results of communication activities directly influence subsequent managerial decisions. The model therefore differs from a traditional campaign-oriented approach in which evaluation is frequently performed only after a communication campaign has been completed.

The proposed effectiveness indicator expands the conventional assessment of marketing communications. Communication effectiveness reflects achievement of communication objectives; digital effectiveness characterizes the performance of digital channels; relationship effectiveness reflects customer retention and relationship development; reputation effectiveness captures changes in the enterprise's market and online reputation; and economic effectiveness reflects the contribution of communication activities to sales and other economic results.

**Figure 1.** *Adaptive model of marketing communications management in agro-industrial enterprises*




The scientific novelty consists in the development of the author's 2006 model in four interconnected directions. First, marketing analytics is integrated directly into communication management. Second, traditional and digital communication instruments are combined within a single management framework. Third, the communication environment is expanded from enterprise-consumer interaction to multi-stakeholder interaction throughout the agri-food value chain. Fourth, a closed control-adaptive mechanism is introduced, connecting communication results with subsequent managerial decisions.

## Discussion

The proposed model corresponds to the principal directions identified in contemporary research. Studies of web marketing emphasize the importance of user behavior tracking, CRM and brand value (Caiazza & Bigliardi, 2020), while research on social media demonstrates its increasing influence on food consumer behavior (Rini et al., 2024). The importance of online reputation identified by Fernández-Uclés et al. (2024) supports the inclusion of reputation as a separate component of communication effectiveness.

Research on digital marketing and relationship marketing emphasizes the role of digital technologies in developing relationships with consumers (Gelgile & Shukla, 2024). Studies of digital marketing strategies and customer analytics in the agri-food industry further demonstrate the importance of integrating digital data into marketing decision-making (Kanellos et al., 2024a, 2024b). The systematic review by Slot et al. (2025) highlights digital platforms, communication technologies, value co-creation and open innovation within agri-food value chains.

The proposed approach differs from studies focused on individual digital tools because its object is the management subsystem as a whole. Data, strategy, communication instruments, stakeholder interaction, feedback and effectiveness assessment are considered as interconnected elements of a single adaptive system.

The model has several limitations. Its integral effectiveness indicator requires empirical validation using data from specific agro-industrial enterprises. The weighting co-

efficients may vary according to enterprise objectives and market conditions. Practical implementation also requires appropriate digital infrastructure, data quality and organizational capabilities. These limitations determine directions for further empirical research.

## Conclusion

Digitalization transforms marketing communications in agro-industrial enterprises from a relatively autonomous promotional function into an integrated management subsystem based on continuous information exchange, analytics, interaction and adaptation.

The study developed an adaptive model integrating five functional blocks: analytical, strategic, instrumental, interactive and control-adaptive. The model combines traditional and digital communication instruments and extends the communication environment from enterprise-consumer interaction to multi-stakeholder interaction throughout the agri-food value chain.

The proposed closed management cycle ensures continuous movement from environmental diagnostics and information collection through analytics, strategy, communication impact and omnichannel interaction to feedback, effectiveness assessment and corrective action. The results of communication activities thereby become a source of information for subsequent managerial decisions.

The integral effectiveness indicator combines communication, digital, relationship, reputation and economic dimensions, allowing marketing communications to be assessed as a multidimensional management process rather than solely as an advertising or sales-support activity.

The principal theoretical contribution is the development of the author's 2006 conceptual approach under contemporary conditions of digital transformation. Its fundamental principle of continuous monitoring and management has been preserved, while its mechanisms have been expanded through digital analytics, omnichannel interaction, continuous feedback and adaptive decision-making.

The proposed model provides a methodological basis for designing marketing communication management systems in agro-industrial enterprises. Further research should focus on empirical validation, determination of context-specific effectiveness weights, development of industry-specific communication KPIs and assessment of the economic effects of adaptive marketing communications.

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