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IMPROVING THE METHODOLOGY OF ARTIFICIAL INTELLIGENCE-BASED MARKETING DECISION-MAKING IN CONSTRUCTION MATERIALS MANUFACTURING ENTERPRISES

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Abstract. This article investigates the issues of improving the methodology for artificial intelligence-based marketing decision-making in construction materials manufacturing enterprises. The role of artificial intelligence, Big Data, Customer Relationship Management (CRM), and marketing analytics technologies in marketing management is analyzed, and the possibilities of enhancing the scientific validity of marketing decisions through their integrated application are evaluated. As a result of the study, a methodological approach is proposed that contributes to improving marketing activities based on the principles of data-driven management, accurately forecasting market demand, ensuring the efficient use of resources, and strengthening the competitiveness of enterprises.

Keywords: construction materials industry, artificial intelligence, marketing management, marketing decision-making, Big Data, Customer Relationship Management (CRM), marketing analytics, digital transformation, competitiveness, methodology.

Аннотация. В данной статье исследуются вопросы совершенствования методологии принятия маркетинговых решений на основе искусственного интеллекта на предприятиях по производству строительных материалов. Проанализирована роль технологий искусственного интеллекта, Big Data, Customer Relationship Management (CRM) и маркетинговой аналитики в системе маркетингового управления, а также оценены возможности повышения научной обоснованности маркетинговых решений на основе их комплексного применения. По результатам исследования предложен методологический подход, способствующий совершенствованию маркетинговой деятельности на принципах управления, основанного на данных (data-driven management), более точному прогнозированию рыночного спроса, обеспечению эффективного использования ресурсов и повышению конкурентоспособности предприятий.

Ключевые слова: промышленность строительных материалов, искусственный интеллект, маркетинговое управление, принятие маркетинговых решений, Big Data, Customer Relationship Management (CRM), маркетинговая аналитика, цифровая трансформация, конкурентоспособность, методология.

INTRODUCTION

The construction materials industry is one of the strategic sectors contributing to the sustainable development of the national economy. The continuous growth of construction activities, the expansion of infrastructure projects, and increasing investment activity have made the effective management of enterprises in this sector an important priority. The market success of construction materials manufacturers depends not only on production capacity and product quality but also on their ability to accurately assess market demand, respond to changing customer needs, and make scientifically grounded marketing decisions [2; 10].

The construction materials market is characterized by a wide variety of products, significant regional differences in demand, fluctuations in raw material prices, and an increasingly competitive business environment. Under such conditions, traditional approaches to marketing management are no longer sufficient to fully exploit

market opportunities. Developing marketing decisions based on timely, accurate, and reliable information has become one of the key prerequisites for enhancing enterprise competitiveness, expanding market share, and effectively implementing long-term development strategies [4; 11].

The widespread adoption of digital technologies in production and management processes has created new approaches to organizing marketing activities. Artificial intelligence (AI), Big Data, business analytics, machine learning algorithms, and Customer Relationship Management (CRM) systems have significantly expanded the capabilities for processing marketing information, identifying market trends, forecasting demand, and developing strategic decisions [1; 3]. By integrating and analyzing large volumes of data collected from multiple sources within a unified analytical environment, these technologies improve the accuracy, responsiveness, and overall effectiveness of marketing management [5; 15].

The specific characteristics of marketing activities in construction materials manufacturing enterprises further emphasize the necessity of applying these technologies. The predominantly business-to-business (B2B) nature of the industry, customers' reliance on technical specifications in purchasing decisions, the broad product assortment, and the importance of logistics require comprehensive multifactor analysis in marketing decision-making [7]. Artificial intelligence technologies enable the integrated evaluation of these interrelated factors, facilitate the identification of promising market segments, improve demand forecasting, and support the efficient allocation of marketing resources [6; 9]. Consequently, marketing management evolves into a data-driven system capable of rapidly adapting to market changes while supporting long-term strategic development.

Existing scientific literature extensively discusses individual applications of artificial intelligence in marketing, including demand forecasting, market segmentation, pricing strategies, and customer relationship management [3; 5; 16]. However, the comprehensive organization of marketing management in construction materials manufacturing enterprises through artificial intelligence, as well as the methodological integration of Big Data, CRM, marketing analytics, and decision support systems into a unified framework, has not yet been sufficiently systematized from a scientific perspective [14; 18]. This research gap highlights the need to improve the methodology of marketing decision-making by providing a scientifically grounded framework for its components and their interrelationships.

The scientific and practical significance of this study lies in the fact that an artificial intelligence-based marketing management system enables enterprises to utilize market information more effectively, reduce marketing risks, allocate resources more efficiently, and develop management decisions that better reflect customer needs. Such an approach not only enhances the effectiveness of marketing activities but also strengthens the investment attractiveness, export potential, and long-term competitiveness of construction materials manufacturing enterprises by providing a robust methodological foundation for strategic marketing management [10; 18; 20].

Accordingly, the objective of this study is to develop the scientific and methodological foundations for improving artificial intelligence-based marketing decision-making in construction materials manufacturing enterprises, evaluate the potential for the integrated application of digital technologies in marketing management, and substantiate practical recommendations aimed at improving the quality of marketing decisions and enhancing overall management effectiveness.

LITERATURE REVIEW

The rapid diffusion of artificial intelligence (AI) technologies across various sectors of the economy has fundamentally transformed the nature of marketing management and marketing decision-making processes. Contemporary research increasingly associates the effectiveness of marketing activities with data-driven management systems, recognizing the application of artificial intelligence, Big Data, machine learning, and business analytics as strategic priorities in marketing decision-making [1; 2]. This paradigm has reshaped marketing management from a conventional market research function into a comprehensive strategic management mechanism that supports sustainable enterprise development.

Early studies primarily examined the application of artificial intelligence in marketing for analyzing consumer behavior, forecasting demand, and optimizing advertising activities. More recent research, however, demonstrates a substantial expansion of AI capabilities across various marketing functions [3; 5]. Artificial intelligence algorithms are now widely employed in pricing strategy development, product portfolio optimization, market segmentation, personalized marketing communications, and the evaluation of marketing investment performance [4; 11]. Consequently, marketing decision-making has shifted from experience-based and intuitive approaches toward analytical, evidence-based models supported by predictive insights and large-scale data analysis [5].

The effectiveness of this transformation largely depends on the quality and availability of marketing information. Therefore, Big Data technologies are widely recognized as one of the most important information sources supporting artificial intelligence applications in marketing [3; 8]. By processing large volumes of

structured and unstructured data collected from multiple sources, organizations are able to generate more accurate insights into market conditions, customer preferences, competitors' activities, and demand dynamics [8]. Researchers emphasize that the integration of Big Data with artificial intelligence significantly improves forecasting accuracy, reduces market uncertainty, and enhances the efficiency of resource allocation within marketing management [1; 15].

Customer Relationship Management (CRM) systems have likewise become increasingly important in contemporary marketing management. Modern CRM platforms integrated with artificial intelligence algorithms enable the continuous analysis of customers' purchasing behavior, preferences, and expectations [6]. Through machine learning techniques, organizations can predict future customer needs, develop personalized marketing offers, and design strategies aimed at strengthening customer loyalty [9; 16]. As a result, marketing management is evolving from a sales-oriented function toward a customer value creation system focused on establishing long-term relationships with clients [13].

The application of artificial intelligence technologies is particularly significant for construction materials manufacturing enterprises. The technical complexity of construction materials, the predominance of business-to-business (B2B) transactions, the long-term nature of purchasing decisions, and considerable regional differences in market demand require highly sophisticated analytical approaches to marketing management [7]. Accordingly, recent studies identify artificial intelligence as an effective tool for improving market segmentation, demand forecasting, adaptive pricing strategies, and product portfolio optimization within this industry [5; 14].

In recent years, Marketing Decision Support Systems (MDSS) have also developed rapidly. These intelligent systems integrate artificial intelligence, Big Data, business analytics, and predictive models into a unified information platform, thereby improving the scientific validity and effectiveness of marketing decision-making processes [18]. Such platforms enable enterprises to evaluate multiple strategic scenarios simultaneously, identify market risks in advance, and determine the most appropriate marketing strategies [19]. Consequently, marketing management is increasingly characterized by responsiveness, adaptability, and evidence-based decision-making supported by advanced analytical technologies [20].

International experience demonstrates that enterprises successfully implementing artificial intelligence in marketing achieve significant improvements in market share, customer loyalty, marketing return on investment, and the quality of strategic decision-making [5; 10; 18]. In particular, integrating production and marketing processes within a unified information system shortens response times to changing market conditions, improves resource utilization, and facilitates the continuous enhancement of marketing performance [11; 17].

Nevertheless, although existing studies have extensively explored individual applications of artificial intelligence in marketing, a comprehensive methodological framework specifically designed for marketing management in construction materials manufacturing enterprises remains insufficiently developed. In particular, the integration of Big Data, CRM systems, Marketing Decision Support Systems, and artificial intelligence algorithms into a unified marketing decision-making framework, together with the evaluation of their interrelationships and combined impact on managerial performance, requires further scientific investigation [14; 19; 20]. This research gap provides the methodological foundation for the present study and justifies the development of a conceptual model of artificial intelligence-based marketing decision-making, as well as the assessment of its practical effectiveness in the subsequent sections.

RESEARCH METHODOLOGY

This study employed a comprehensive approach to investigating the improvement of the methodology for artificial intelligence-based marketing decision-making in construction materials manufacturing enterprises. The theoretical foundation of the research was based on international studies published between 2020 and 2025 concerning artificial intelligence, Big Data, Customer Relationship Management (CRM) systems, marketing analytics, and marketing decision support systems [1–20].

The research applied a combination of systems analysis, comparative analysis, content analysis, scientific generalization, and logical analysis. Initially, the functional capabilities of artificial intelligence technologies in the marketing decision-making process were examined, with particular emphasis on their role in market segmentation, demand forecasting, pricing strategy development, and customer relationship management based on relevant scientific literature [2; 5; 11]. Subsequently, a comparative analysis was conducted to evaluate the integration of Big Data and CRM systems with artificial intelligence algorithms, focusing on their impact on the quality of marketing information processing, the accuracy of managerial decisions, and the overall effectiveness of marketing activities [3; 6; 15].

The methodological framework considered the marketing decision-making process as a sequence of interconnected stages, including data collection, data analysis, forecasting, strategic evaluation, and managerial decision development. Based on the research findings, the integration of artificial intelligence, Big

Data, CRM systems, and marketing analytics within a unified management platform was identified as a priority methodological approach for enhancing the scientific validity of marketing decisions, reducing marketing risks, and strengthening the competitiveness of construction materials manufacturing enterprises [14; 18; 20].

ANALYSIS AND RESULTS

The effectiveness of marketing activities in construction materials manufacturing enterprises increasingly depends on the quality of information resources and the timeliness of managerial decision-making. Rapid changes in the market environment, the diversification of customer needs, and intensifying competition require enterprises to make marketing decisions based on accurate, reliable, and up-to-date information [2; 10]. From this perspective, the adoption of artificial intelligence technologies in marketing management has become not only a means of automating existing processes but also a critical factor in improving the quality of strategic decision-making [1; 5].

The analysis conducted in this study indicates that traditional marketing management is largely based on expert judgment, statistical reports, and historical performance data. Although such an approach provides valuable managerial insights, it has limited capacity to identify rapid changes in market conditions in a timely manner and may increase marketing-related risks due to delayed responses to emerging market trends [4]. In contrast, artificial intelligence technologies enable the real-time processing of large volumes of data, comprehensive analysis of customer behavior, and accurate forecasting of market trends, thereby providing a scientifically grounded basis for marketing decision-making [3; 11] (Table 1).

Table 1
Comparative Characteristics of Traditional and Artificial Intelligence-Based Marketing Decision-Making Systems¹

Indicator	Traditional Management	Artificial Intelligence-Based Management
Data collection	Periodic	Real-time
Data analysis	Manual	Automated
Demand forecasting	Limited	Highly accurate
Market segmentation	Generalized	Individualized
Decision-making	Based on managers' experience	Based on algorithm-driven recommendations
Marketing risk	High	Relatively low
Strategic adaptability	Low	High

The superiority of artificial intelligence in marketing decision-making is primarily reflected in its ability to process large volumes of data rapidly and generate highly accurate analytical results. Machine learning algorithms enable the comprehensive evaluation of customers' purchasing behavior, demand dynamics, and competitors' activities, thereby facilitating the adaptation of marketing strategies to changing market conditions [6; 15]. Furthermore, these algorithms automatically identify market segments, detect high-potential customer groups, and support the efficient allocation of marketing resources, contributing to more effective and data-driven marketing management [8].

To evaluate the effectiveness of artificial intelligence in marketing management, a comparative analysis of findings reported in international scientific studies was conducted. The analysis indicates that artificial intelligence-based marketing management systems substantially accelerate the marketing decision-making process, improve forecasting accuracy, and enhance the efficiency of marketing expenditures [1; 5; 18].

The results presented in Table 1 clearly demonstrate the advantages of artificial intelligence technologies in improving marketing management performance. In particular, the ability to process information in real time enables enterprises to promptly identify changes in market conditions and adapt their marketing strategies accordingly [2; 8]. This allows organizations to reduce marketing-related risks, respond more effectively to customer needs, and strengthen their competitive advantage in increasingly dynamic markets [10; 15].

The effectiveness of artificial intelligence-based marketing management largely depends on the extent to which Big Data technologies are utilized. The large volumes of data generated throughout marketing activities are processed using artificial intelligence algorithms to identify customer behavior patterns, product demand trends, and regional market dynamics [3; 8]. Consequently, the scientific validity of marketing planning is enhanced, market opportunities can be assessed more accurately, and the efficiency of investment resource utilization is significantly improved [15] (Table 2).

¹ Source: Compiled by the author based on international research studies.

Table 2

Functions of Artificial Intelligence Technologies in the Marketing Decision-Making Process²

AI Technology	Application in Marketing	Benefits for the Enterprise
Machine Learning	Demand forecasting	Optimizes production planning
Big Data Analytics	Market analysis	Improves decision-making accuracy
CRM Intelligence	Customer segmentation	Increases customer loyalty
Predictive Analytics	Sales forecasting	Reduces marketing risk
Recommendation Systems	Product recommendations	Increases sales volume
Decision Support Systems	Strategic decision-making	Enhances management effectiveness

The findings presented in Table 2 demonstrate that artificial intelligence technologies are being progressively integrated into every stage of the marketing process. In particular, Machine Learning and Predictive Analytics algorithms enhance the accuracy of demand forecasting, thereby improving the alignment between production planning and marketing strategies [5; 11]. CRM Intelligence technologies facilitate the development of long-term customer relationships and support the design of personalized marketing strategies tailored to individual customer preferences [6; 16]. Furthermore, Decision Support System platforms enable marketing managers to evaluate multiple development scenarios and select the most appropriate strategic alternatives based on analytical evidence [18; 20].

The integration of Customer Relationship Management (CRM) systems with artificial intelligence has also produced significant improvements in marketing management. CRM platforms consolidate both historical and real-time customer information into a unified database, while artificial intelligence algorithms analyze these data to predict customer loyalty, future purchasing needs, and buying intentions [6; 16]. This enables enterprises to develop personalized marketing strategies, optimize advertising expenditures, and establish long-term relationships with customers, ultimately improving overall marketing performance [9].

The above analysis highlights the individual functional capabilities of artificial intelligence in marketing management. However, existing studies have not sufficiently systematized the sequential and integrated application of these technologies within the overall marketing decision-making process. Therefore, based on the findings of this research, a five-stage methodological model of artificial intelligence-based marketing decision-making has been developed specifically for construction materials manufacturing enterprises (Figure 1).

Figure 1. Five-Stage Methodological Model for AI-Based Marketing Decision-Making in Construction Materials Manufacturing Enterprises

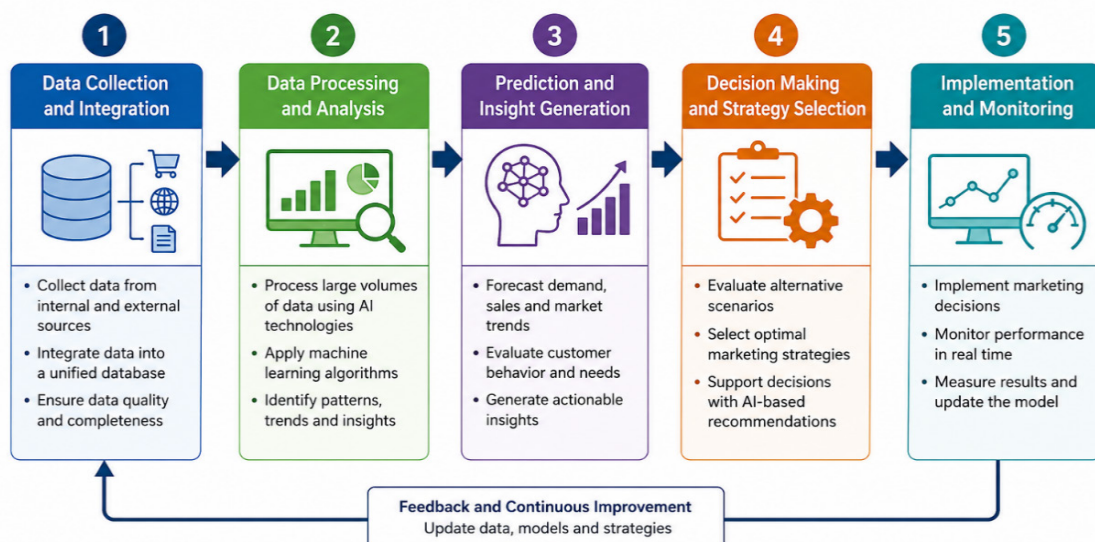


Figure 1. Five-Stage Methodological Model of Artificial Intelligence-Based Marketing Decision-Making in Construction Materials Manufacturing Enterprises³

² author's development

³ author's development

The proposed five-stage methodological model not only provides a systematic framework for organizing the marketing decision-making process but also enables the evaluation of the practical benefits achieved through the application of artificial intelligence technologies. For this purpose, the expected economic and managerial outcomes associated with the implementation of intelligent marketing management were analyzed.

A distinctive characteristic of marketing activities in construction materials manufacturing enterprises is that purchasing decisions are generally based on technical specifications, pricing, logistics capabilities, and the potential for long-term business cooperation [7]. Therefore, the application of artificial intelligence technologies contributes not only to the analysis of customer behavior but also to product portfolio optimization, regional market assessment, demand forecasting, and the development of effective sales strategies [12; 14].

An analysis of international experience indicates that enterprises implementing artificial intelligence in marketing management have achieved consistent improvements in marketing return on investment, market share, and customer loyalty [5; 18]. Moreover, the use of intelligent marketing decision support platforms enhances the quality of strategic planning, shortens the time required for managerial decision-making, and improves the overall effectiveness of marketing activities [19; 20].

The research findings demonstrate that integrating artificial intelligence, Big Data, Customer Relationship Management (CRM) systems, and marketing analytics within a unified management platform elevates the quality of marketing decision-making to a new level in construction materials manufacturing enterprises. Such an approach enables enterprises to respond rapidly to changing market conditions, utilize marketing resources more efficiently, and establish sustainable long-term competitive advantages [14; 18; 20].

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study demonstrate that the effectiveness of marketing decision-making in construction materials manufacturing enterprises is directly influenced by the level of digital technology adoption. The literature review and scientific synthesis confirmed that artificial intelligence technologies significantly enhance the capabilities of marketing management by improving market analysis, demand forecasting, customer behavior assessment, and the efficient allocation of marketing resources [1; 5; 10].

The analysis indicates that, compared with traditional marketing management, artificial intelligence-based approaches substantially improve the speed and accuracy of marketing information processing, enable enterprises to respond more rapidly to market changes, and support more scientifically grounded strategic decision-making [3; 11]. In particular, the integration of Big Data technologies and Customer Relationship Management (CRM) systems with artificial intelligence algorithms plays a significant role in improving market segmentation, demand forecasting, and customer relationship management processes [6; 15; 16].

The study further established that the marketing decision-making process should be viewed as a sequence of interconnected stages, including data collection, data analysis, forecasting, and strategic evaluation. The proposed conceptual model integrates artificial intelligence technologies with marketing analytics, thereby strengthening the scientific basis of managerial decisions, reducing marketing risks, and improving the efficiency of resource utilization [14; 18; 20].

Based on the research findings, it is recommended that construction materials manufacturing enterprises integrate artificial intelligence technologies with CRM and Big Data platforms as part of their marketing digitalization initiatives. Furthermore, enterprises should adopt intelligent marketing decision support systems and expand the application of machine learning algorithms for demand forecasting and market segmentation [5; 11; 18]. In addition, the use of real-time analytical indicators for evaluating marketing performance is recommended to further improve the quality and effectiveness of managerial decision-making [3; 19].

Overall, improving the methodology of artificial intelligence-based marketing decision-making represents a key factor in enhancing the adaptability of construction materials manufacturing enterprises to dynamic market conditions, increasing the effectiveness of marketing activities, and establishing sustainable long-term competitive advantages. Moreover, this approach contributes not only to the advancement of modern marketing management methodology but also provides a scientific foundation for developing practical management mechanisms that support the strategic development of enterprises [10; 18; 20].

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