

Optimization of strategic management of marketing and logistics of companies as part of the implementation of artificial intelligence

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<https://doi.org/10.22306/al.v11i4.565>

Received: 05 Apr. 2024; Revised: 26 July 2024; Accepted: 11 Sep. 2024

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Abstract: The goal of the study is determining the key aspects of optimizing the strategic management of marketing and logistics of modern companies as part of the realization of artificial intelligence technologies. It has been determined that scaling a business and ensuring its profitability is possible by optimizing business processes and management strategies using the implementation of artificial intelligence technologies. The key aspects of automation of marketing and logistics management strategies of companies and their optimization based on the application of artificial intelligence technologies are substantiated. The main trends in the development of artificial intelligence technologies in the global economy are conceptualized. The evolution of artificial intelligence technologies in the world and its impact on the activities of companies is structured with an argument for the main directions and tools. It has been proven that the application of artificial intelligence into the marketing and logistics strategies of companies determines their transformational development and maximum optimization. To determine the key aspects of optimizing the strategic management of marketing and logistics of companies under the influence of artificial intelligence, multifactor correlation and regression analysis tools were used. The correlation between key indicators of marketing (sales volumes) and logistics (logistics efficiency index), their close relationship and an assessment of the impact of artificial intelligence technologies on the transformation of management strategies of modern companies has been determined. Theoretical and scientific-practical recommendations have been formed that are complete and reliable and can be applied in practice when optimizing the marketing and logistics management strategy companies.

1 Introduction

The evolution of the foundation and managing the business of companies in the conditions of transparency of global markets is due to the need to increase efficiency and profitability through the introduction of innovative artificial intelligence technologies. The growing share of innovative and information and telecommunication technologies in all spheres of the world economy creates a dependence of business segments on the intensity and speed of their evolution. Innovative technology stacks contribute to increased optimization and maximum automation of business processes of companies that are

characterized by the use of artificial intelligence tools. Digital evolution increases the role of artificial intelligence technologies in organizing the activities of companies and their management, which makes them a conceptual factor of modification. Considering their implementation through the prism of strategic management of marketing and logistics, it should be noted that both marketing and logistics have undergone strong transformations in their conceptual components of management concepts. Which are determined by the development of digital channels of communication and interaction with consumers, promotion and service, optimization of monitoring processes and

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transport management, machine learning, growth forecasting, transport routing and others, which confirms the relevance of this area and requires study that is more detailed. It is important to state that artificial intelligence today is an integral tool that has widespread and everyday use in the life of every person and business segments.

Artificial intelligence technologies are characterized by the ability to recognize speech and mastery of machine vision, which allows one to determine the basic parameters of a person (age, gender, emotionality and the value of a particular product or service). The capabilities of artificial intelligence technologies are expanding and improving every day, which confirms the relevance of this issue and the need for a detailed study and identification of key aspects of optimizing the strategic management of marketing and logistics of companies in contemporary circumstances. For constructive formation of the main aspects of strategic management of marketing and logistics of companies within the framework of the use of artificial intelligence technologies, it is necessary to evaluate the modification of business processes of companies from the point of view of justifying the evolutionary specifics of these technologies and their subsequent reflection in marketing and logistics tools. The interpretation of the features of strategic management of marketing and logistics and their modification based on the implementation of artificial intelligence technologies is relevant, in demand and requires detailed study to justify their practical implementation and further evolution.

1.1 Evolution of the theory of artificial intelligence and modification of marketing and logistics strategy management

The efficiency of the functioning of modern business is a priority and necessary through the prism of strategic goals and objectives, the implementation of which is possible only with the help of maximum optimization and automation in the presence of artificial intelligence. The use of artificial intelligence technologies is because companies can achieve strategic business goals only through the prism of technological solutions that significantly simplify the management and decision-making process. Modern management solutions are mainly aimed at optimizing the activities of companies and developing technological solutions based on the use of artificial intelligence, which, first, significantly simplify strategic management and determine the efficiency and profitability of companies. The study of the evolution of artificial intelligence technologies and its impact on the functioning of a business, including its marketing and logistics activities, is in demand, which is confirmed by the variety of approaches and scientific hypotheses in this direction; the key ones should be argued.

A review of the theoretical background for the use of artificial intelligence technologies based on the integration of industry information is presented by Zhang, C. [1]. These approaches define the areas of application of

artificial intelligence as the main effective mechanism that will contribute to the modification of the global economy. Attention is focused on the intensity of the processes of applying artificial intelligence technologies, but the conceptual trends in the development of artificial intelligence and its impact on the marketing and logistics of companies, which needs to be improved and studied in more detail, have not been studied. Bharadiya, J. [2], presents the argumentation of the premises of a comparative study of business analytics and artificial intelligence and their application in the analysis of large volumes of data. Business analytics a significant role in the management decision-making process and, for its reliability and accuracy, uses artificial intelligence technologies, which ensures the rapid collection and analysis of large volumes of data. Large volumes of data are typical for all areas of the company's activities, these prerequisites can serve as the basis for decision-making, the creation of a business intelligence system, but the essence and tendency in the evolution of the company is marketing, and logistics under the influence of artificial intelligence technologies have not yet been revealed. It was revealed that this approach requires improvement and further study.

A constructive approach to considering the use of artificial intelligence in business is presented by Feuerriegel, S. [3], which focuses on the obstacles to the implementation of these technologies and substantiates the need to delegate the management decision-making process to artificial intelligence technologies. Maximum automation of routine processes of companies is provided by artificial intelligence technologies and ensures their efficiency. The proposed aspects of delegation of the decision-making process are relevant in modern realities and will save time and resources of companies, but do not reveal its impact on the strategic management of marketing and logistics of companies, which requires the development of this approach through further research. Particular attention should be paid to the systematic literature review on the use of artificial intelligence tools in marketing and logistics, which is presented in the scientific article by Chintalapati, S. [4]. Digitalization has been stated, which is caused by the growing demand for the use of artificial intelligence technologies, which are a decisive mechanism for the prospects of business evolution. The main scientific works in the field of application of artificial intelligence technologies in marketing and logistics are substantiated, which can serve as a theoretical basis for studying this issue, but the transformation of these areas under the influence of artificial intelligence technologies is not disclosed, which determines the relevance and need for further study.

Features of using artificial intelligence technologies for B2B marketing and focusing on the problems and opportunities of their implementation are disclosed in the article by Dwivedi, Y. [5]. Aspects of stimulating innovation and using supply chain networks based on

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artificial intelligence are substantiated, which significantly improves the quality of service and builds relationships with B2B clients. This approach reveals the main specific elements that allow you to improve your business through automation. It should be noted that the use of artificial intelligence technologies in the B2B business segment is disclosed, but the essence of the modification of marketing and logistics under their influence is not disclosed, which requires research.

Focusing on tendency in the introduction of electronic marketing in contemporary circs is revealed in the scientific research of Thakur, J., and others [6]. Consolidated the main aspects of the implementation of innovations and artificial intelligence technologies in marketing, which reveal the main aspects of implementation in marketing activities and can be used as practical recommendations. However, this approach does not reveal the main aspects related to the strategic management of marketing and logistics of modern companies, which requires detailed study and research.

The study of the features of the use of artificial intelligence in logistics systems and digital marketing strategies of companies is disclosed in the scientific approach of Ponomarenko, I. [7]. This sight is aimed at determining the impact on companies of the simultaneous use of logistics and digital marketing based on artificial intelligence when promoting and selling products in domestic and foreign markets. The proposed methodology used in this study includes statistical analysis of the dynamics of the logistics market and the artificial intelligence market, as well as specialized software for digital marketing. However, this approach does not cover the key aspects of strategic management of marketing and logistics of companies under the influence of artificial intelligence, which requires improvement and further study. Noteworthy is the study of Al-Ababneh, H. and others [8], which examines conceptual approaches to the digitalization of marketing and logistics of companies under the influence of innovation. This approach argues for the conceptual role of technology in the marketing and logistics strategy of modern companies, which is relevant and necessary when building a long-term development strategy. It is worth noting that this glance is aimed more at studying innovations and technologies in the context of digitalization of the marketing and logistics system, but does not determine the features of strategic management under the influence of artificial intelligence, which requires further study.

It is important to focus on studying the promising features of marketing development based on innovative technologies, which are presented by Adeola, O. and others [9]. This approach argues that the future evolution of companies' marketing and logistics is possible only through the introduction of artificial intelligence, virtual reality, demand forecasting, machine learning and neuromarketing technologies that contribute to the achievement of companies' strategic business goals. Based

on this, it should be noted that this approach is relevant and can be applied in practice when forming a company's strategic plan.

However, it does not reveal the specifics of modification of marketing and logistics under the influence of artificial intelligence technologies, which requires further study. The use of artificial intelligence in today's realities is relevant and in demand, which is confirmed by many studies in this direction. Noting the theoretical aspects discussed, it should be noted that artificial intelligence and the technologies arising from it are maximally are scalable in the global economy, generating massive processes of modifications and changes that need to be identified and applied in strategic planning. Since the existence of business segments is impossible without marketing and logistics, it is therefore necessary to identify trends in marketing changes under the influence of artificial intelligence.

1.2 The evolution of artificial intelligence technologies and application features

The evolution of artificial intelligence plays a conceptual role in the global economy and is scaling into more and more new industries and areas of activity of companies, while creating innovative advantages that are generated by technology development trends in the field of artificial intelligence. Artificial intelligence is an innovative technology for creating programmed intelligent mechanisms and applications for a deeper understanding of human intelligence, which is not limited to biologically plausible methods. Based on this, it should be stated that the evolution of artificial intelligence and its key technologies contributes to maximum automation and optimization of business processes in various sectors of the global economy to achieve maximum results of strategic management. The evolution of artificial intelligence began as a result of decades of research and many scientific developments. It is important to note that from the first attempts to simulate human thinking on mechanical devices to modern achievements in the field of deep neural networks of artificial intelligence, a difficult path has been passed. Today, artificial intelligence technologies have learned to solve many complex problems, study and research, analyze huge amounts of information, recognize speech, temperature, sounds and create art.

The conceptual basis for the implementation and motivation for the development of artificial intelligence technologies is the availability, openness, reliability and sufficiency of information infrastructure, the quality of communication and Wi-Fi coverage, which will significantly increase the efficiency of the modification process of both marketing and logistics of companies. The use of artificial intelligence technologies requires huge amounts of data, which are filtered using system creation algorithms. It is important to note that implementation occurs because of models and machine learning, which are combined and reflected in artificial intelligence

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technologies and its tools, programs that influence individual segments or the activities of companies as a whole [10]. To establish the demand for artificial intelligence technologies in modern business segments of

the global economy, one should consider the conceptual directions of the evolution of artificial intelligence technologies in the world, which are presented in Table 1.

Table 1 Conceptual directions for the evolution of artificial intelligence technologies in the world

DIRECTIONS OF EVOLUTION	ARTIFICIAL INTELLIGENCE TECHNOLOGIES
HYPER-AUTOMATION OF COMPANY BUSINESS PROCESSES	Hyper-Automation is the use of innovative artificial intelligence technologies to automate company tasks. This direction is characterized by the following artificial intelligence technologies: Robotic Process Automation; Machine Learning; Automation of cognitive processes; Intelligent Business Process Management Software that optimizes operations and increases profitability.
CYBERSECURITY	Artificial intelligence technologies provide an evolution in approaches to organizing cybersecurity based on automation and risk-freeness through cloud-based data storage solutions and increasing the productivity of data volume technologies.
TECHNOLOGIES OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN IOT	Implementation of these technologies in the Internet of Things, which is aimed at automating the processes of recognizing sounds, temperature, movement, various changes from human health indicators to speech recognition and data management in order to maximize the automation.
ANALYTICAL FORECASTING AND DATA ANALYSIS	The use of mechanisms for forecasting and studying behavior in markets, database systems, which are based on artificial intelligence technologies.
AUGMENTED INTELLIGENCE	Technologies that combine automation and manual labor to provide companies with cognitive productivity. Collection, analysis, study, consolidation and management of data, which allows you to form the most reliable picture of the situation in a particular area.
TRANSPORT ROUTING AND INVENTORY MANAGEMENT	Artificial intelligence algorithms can optimize delivery chains, taking into account many factors affecting the restrictions on the movement of the supply chain. Artificial intelligence can analyze inventory and production data to optimize inventory levels and avoid overstocking or understocking.
FRAUD DETECTION	Machine learning algorithms can analyze transaction data and identify signs of fraud or security breaches in logistics operations.
DELIVERY TIME FORECASTING	Artificial intelligence can analyze data on transport routes and road conditions to accurately predict delivery times.

The presented directions for the introduction of artificial intelligence technologies can be applied in any industry and company activity. The emphasized features of the evolution of artificial intelligence technologies with the argumentation of the main directions of introduction of artificial intelligence technologies should highlight the features of their pressure on the strategic management of marketing and logistics of companies.

2 Methodology

Peer review process

Scaling innovation and keeping up with the times in business, taking into account ensuring a competitive position in the global market, is incomparable without the use of artificial intelligence technologies. Artificial intelligence has penetrated into all areas, developing all sectors of the global economy, including marketing and logistics. To substantiate the optimization of strategic management of marketing and logistics under the influence of artificial intelligence technologies, the study was based on the analytical collection and business analysis of data on the dynamics of indicators of the evolution of artificial intelligence in the business structure of companies: the use of artificial intelligence technologies in organizing a business, %; Average share of artificial intelligence

technology capabilities used by businesses, %; Level of investment in artificial intelligence technologies, %; Share of artificial intelligence technologies in service maintenance, %; Share of artificial intelligence technologies in marketing, %; Logistics efficiency index for high-income countries (analysis was carried out on the logistics efficiency index of the UAE (United Arab Emirates)), Share of artificial intelligence technologies in production, %; Share of artificial intelligence technologies in strategic management, %.

The rationale for the modification and tactics of the influence of artificial intelligence on the strategic management of marketing and logistics of the current business is based on the use of tools of correlation and regression analysis and assessment of the influence of indicators of the evolution of artificial intelligence technologies in the business of companies on the efficiency indicators of marketing and logistics: Sales volume through digital marketing, trillion dollars. USA and Logistics Performance Index (LPI). To clarify the processes of modification of strategic management of marketing and logistics under the influence of artificial intelligence technologies, the use of multifactor correlation-regression analysis with a linear type of regression is justified. The following linear regression (1)

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models were formed as the basis for a multifactor correlation and regression analysis of marketing modification under the pressure of artificial intelligence technologies:

$$Y = f(x, b) + \varepsilon \quad (1)$$

where, b - are the main attributes of the regression model; ε - random error of the regression model; is called linear regression if the regression function $f(x, b)$ has the following form (2):

$$f(x, b) = b_0 + b_1x_1 + b_2x_2 + \dots + b_kx_k \quad (2)$$

where, b_j - main attributes of the regression model for modifying strategic management of marketing and logistics under the pressure of artificial intelligence technologies; x_j - regressors (artificial intelligence technologies) pressure the strategic management of marketing and logistics and their performance indicators.

The main attributes of the linear regression model justify the speed of optimization of strategic management of marketing and logistics, namely the performance indicators: Sales volume through digital marketing, trillions of dollars. USA and Logistics Performance Index (LPI), taking into account other factors of artificial intelligence technologies (3):

$$b_j = \frac{df}{dx_i} = const \quad (3)$$

Basic parameters b_0 in which there are no factors influencing performance indicators is a constant. In essence, this is the value of the optimization function for strategic management of marketing and logistics with a zero value of all artificial intelligence technologies. To interpret the results by default, the constant is the base parameter with "artificial intelligence technologies" equal to 1. However, if you resort the factor signs and parameters of the original regression model taking this into account (leaving the designation of the total number of factors influencing artificial intelligence technologies - k), then the linear a regression function without a constant should be expressed (4):

$$f(x, b) = b_0 + b_1x_1 + b_2x_2 + \dots + b_kx_k = \sum_{j=1}^k b_j x_j = x^t b \quad (4)$$

where, $x^t = (x_1, x_2, \dots, x_k)$ - vector of model regressors, $b = (b_1, b_2, \dots, b_k)^t$ vector of model regressors (column with indicators of artificial intelligence technologies).

A linear model can be either with or without a constant. Then in this representation the first factor is either equal to one or is an ordinary factor, respectively. Having stated the above, it should be noted that to determine the optimization of strategic management of marketing and logistics under

the pressure of artificial intelligence technologies, exactly the same tools were chosen to substantiate the close interdependence and influence of the factor characteristics of the regression model. Establishing the relationship between effective marketing and logistics performance and artificial intelligence technologies.

3 Result and discussion

The evolution of management and increasing requirements for the functioning of business constructively determine improvement based on innovative technologies. Competition and the need to scale a business and expand its boundaries require companies to use artificial intelligence technologies that will ensure increased profitability, optimize business processes and increase market presence. It should be noted that artificial intelligence in the contemporary world is a set of technologies, algorithms and control systems that allow computers to perform complex business tasks, usually associated with the mental activity of people and mainly having their application for automating routine tasks, decision making, building processes and maximum optimization of business processes. The use of neural networks implemented on artificial intelligence is based on the use of algorithms and models adapted to decision-making based on the company's accumulated experience. Artificial intelligence technologies are opening up many benefits and opportunities for businesses, causing changes in the strategic management of marketing and logistics under their influence [12].

It is important to note that the optimization of strategic management of marketing and logistics is characterized by the fact that artificial intelligence technologies significantly improve the process of interaction with consumers, optimize promotion, advertising, analysis and study of competitors, while maximizing profitability, improve transport management processes, predicting demand and managing the supply chain.

To argue for the features of the organization and optimization of strategic management of marketing and logistics within the framework of the implementation of artificial intelligence technologies, the relationship between logistics and marketing should be considered. Based on this, it should be noted that marketing is a management system that allows you to adapt production to market requirements in order to ensure profitable sales of goods. Marketing was in demand due to the difficulties that arose with the sale of goods historically in an earlier period than logistics. In the middle of the 20th century [13]. The orientation of production towards the production of goods needed on the market and the use of marketing methods for studying demand and influencing demand turned out to be a decisive factor in increasing competitiveness. The task of creating systems that ensure end-to-end management of material flows was not relevant then, firstly, due to the lack of technical capabilities for building such systems in the economy, and secondly, due to the fact that through the use

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of marketing techniques that were new for that time it was possible to dramatically go ahead. In modern conditions, the strategic management of a company cannot be based only on marketing. The demand identified by marketing must be met in a timely manner through fast and accurate delivery and logistics. Historically, having entered the economic arena in a later period, logistics complements and develops marketing, linking the consumer, transport and supplier into a mobile, technical, technological and economically planned system. Marketing monitors and determines the demand that has arisen, answers the questions: what product is needed, where, when, in what quantity and of what quality. Logistics ensures the physical movement of the in-demand commodity mass to the consumer. Logistics integration allows you to deliver the required product to the right place at the right time at minimal cost. Marketing poses the task of a systematic approach to the organization of product distribution; with

the effective organization of product distribution, each of the stages of this process must be planned as an integral part of a well-balanced and logically constructed overall system. However, methods of technical and technological integration of all participants in the product distribution process are the main subject of study not of marketing, but of logistics. Marketing is focused on studying the market, advertising and their psychological impact on the buyer. Logistics is focused, first of all, on the creation of technically and technologically related systems for the delivery of materials along commodity distribution chains, as well as systems for monitoring their passage. Arguing the above, it is important to note that effective strategic management of current companies is only possible with integrated management of marketing and logistics as a single system, which should be based on the introduction of artificial intelligence technologies [14].

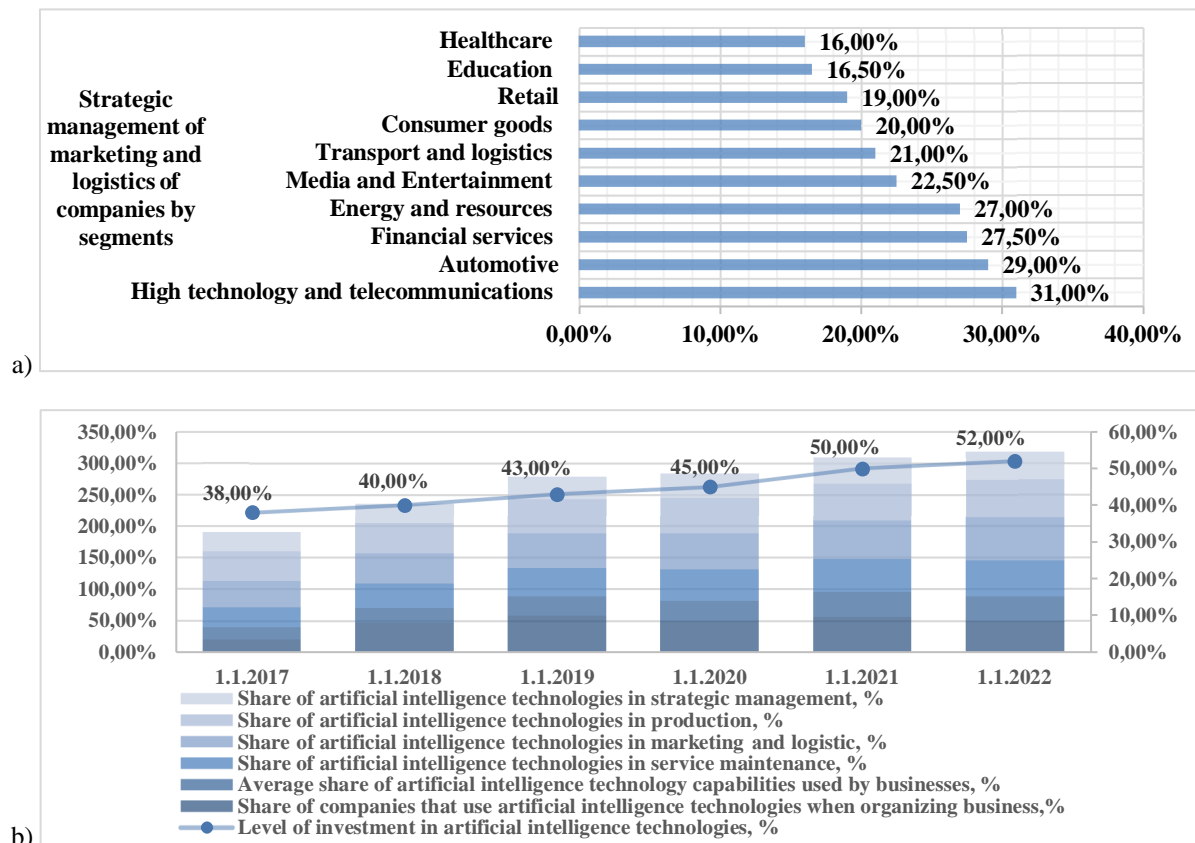


Figure 1 Artificial intelligence in the world, %: a) - the share of artificial intelligence in the strategic management of marketing and logistics of companies by segment as of 01.01.2023 in %; b) the evolution of artificial intelligence and strategic management of marketing and logistics

The intensive use of artificial intelligence technologies in almost all sectors of the global economy has not spared marketing and logistics. The use of such technologies often causes serious changes and optimization in the functioning of a particular industry; marketing and logistics are no exception. Based on this, it should be stated that the optimization of strategic management of marketing and

logistics is mainly caused by neural networks based on artificial intelligence technologies and is aimed at optimizing marketing business processes through maximum automation. The effectiveness of artificial technologies is growing every day, which confirms their relevance and demand in business, regardless of industry and segment. It is necessary to consider the share of

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artificial intelligence in the strategic management of marketing and logistics of companies by segment as of 01.01.2023 in %, as well as the dynamics of factor indicators of the use of artificial intelligence technologies, which will be assessed by their impact on the optimization of strategic management of marketing and logistics of companies (Figure 1).

Arguing what is presented in Figure 1, it is important to argue that strategic management of marketing and logistics is ahead of many industries in its development and the number of innovative tools used based on artificial intelligence technologies. Business processes of marketing and logistics that are subject to optimization based on artificial intelligence technologies are listed in the Table 2.

Table 2 Business processes of marketing and logistics that are subject to optimization based on artificial intelligence technologies

BUSINESS PROCESSES	DEFINITION MARKETING AND LOGISTICS OPTIMIZATION AND UNIQUENESS
PREPARING THE TEXT	Robotization of the process of writing or editing text, which is aimed at identifying errors, structure and essence, depending on the expectations and business goals.
RELEASE OF CONTENT	Using artificial intelligence technologies, image creation, background editing, contrast elements and quality improvement are ensured without manual manipulation.
CONTENT VISUALIZATION	The use of automated video release with the necessary material and prepared content.
ANALYTICAL COMPONENT OF MARKETING	Carrying out analytical work on data collection, consolidation, analysis and assessment of the target audience and the formation of personal proposals.
IMPROVEMENT OF COMMUNICATIONS	Creation of robotic assistants, chat bots, which provide efficiency in customer service and enormous savings in resources by automating service and sales.
ADVERTISING OPTIMIZATION	Collection of analytical data, consolidation and analysis of key segments of the target audience based on artificial intelligence with personal advertising programs.
SEARCH OPTIMIZATION	Automation of search algorithms based on query processing and their maximum personalization based on the expectations and preferences of the audience.
USER EXPERIENCE	Consolidation of data and study of analytics of user behavior patterns in order to improve interaction.
PERSONIFICATION	The use of technologies for studying preferences and needs in consumer behavior models in order to offer an individual approach to service and provision of services.
ROUTE OPTIMIZATION	Optimize the analysis of large amounts of data on traffic, weather conditions and other external factors to create the most efficient delivery routes. This reduces travel time and fuel costs.
WAREHOUSE AUTOMATION	Works and automated systems controlled by artificial intelligence can perform loading, unloading, sorting and packaging of goods. This improves order processing speed and reduces errors.
INVENTORY MANAGEMENT	Artificial intelligence systems can predict product demand by analyzing past sales data, market trends, and other factors. This allows companies to optimally manage inventory, reducing storage costs and the risk of stock-outs.

The use of this type of technology allows for the maximum modification of classical approaches to marketing and logistics into a more innovative digital form, which has a number of advantages and brings companies tremendous success by optimizing business processes, automation and increasing profitability. Artificial intelligence technologies lead to optimization of marketing and its components in terms of automation and optimization of routine processes [15]. Determining factor indicators for optimizing strategic management of marketing and logistics is impossible without identifying the connection and influence between effective indicators of marketing, logistics and indicators of the use of artificial intelligence technologies based on the method of statistical groupings [16]. For this purpose, indicators of the introduction of artificial technologies and their impact on the strategic management of marketing and logistics for the period from 01.01.2012 to 01.01.2022 were calculated and collected over time.

The presented direction for optimizing strategic management of marketing and logistics under the impact of artificial intelligence technologies is characterized by

the fact that modern processes are fundamentally different from classical ones, which is due to the use of neural networks and maximum automation of business processes to achieve the strategic business goals of companies. When discussing the directions of strategic management of marketing and logistics under the impact of artificial intelligence technologies, it is advisable to conduct a correlation and regression analysis of their influence and assess the close relationship in optimization processes. To substantiate the dependence of strategic management of marketing and logistics and their optimization under the impact of artificial intelligence technologies, the method of correlation and regression analysis based on a linear trend was used.

Where, Y_1 - Sales volume through digital marketing, trillion dollars. USA; Y_2 - Logistics Performance Index (LPI). Digital Marketing Sales, Trillions of dollars. USA. - are characterized by the fact that they determine the level of effectiveness of marketing development through the implementation of translation technologies such as artificial intelligence. The introduction of artificial intelligence technologies determines the optimization of

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marketing processes, increasing their efficiency and profitability.

The basis for assessing the impact of artificial intelligence technologies on the optimization of strategic

management of marketing and logistics based on the methods of correlation and regression analysis are given in Table 3.

Table 3 Key performance indicators of marketing and logistics and optimization of their strategic management under the influence of artificial intelligence technologies for correlation and regression analysis

YEARS (STAGES OF MARKETING AND LOGISTIC OPTIMIZATION)	MARKETING / LOGISTIC PERFORMANCE INDICATORS		INDICATORS OF APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES						
	Y ₁	Y ₂	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇
01.01.2017	3307.00	3.40	20.0%	19.0%	38.0%	32.0%	42.0%	46.0%	31.0%
01.01.2018	3368.00	3.72	47.0%	23.0%	40.0%	39.0%	47.0%	48.0%	32.0%
01.01.2019	3351.00	3.94	58.0%	30.0%	43.0%	45.0%	55.0%	55.0%	36.0%
01.01.2020	4213.00	4.00	50.0%	31.0%	45.0%	49.5%	58.0%	56.0%	39.0%
01.01.2021	4921.00	4.10	56.0%	39.0%	50.0%	52.0%	61.0%	59.0%	41.0%
01.01.2022	5545.00	4.21	50.0%	38.0%	52.0%	57.0%	68.0%	61.0%	43.0%

The Logistics Performance Index (LPI) is a ranking index for benchmarking the performance of logistics systems around the world. compiled by the World Bank based on a worldwide survey of logistics operators that measures performance across a country's entire logistics supply chain. This index characterizes the weighted average assessment of the country according to six key parameters: the efficiency of the customs inspection process; quality of trade and transport infrastructure; ease of organizing supplies at competitive prices; competence and quality of logistics services; ability to track shipments and ensure timely delivery to destination within planned or expected delivery times [17]. This index allows you to directly determine the introduction of artificial intelligence technologies in various areas of logistics. which is determined by the level of optimization and efficiency of business processes. Based on what has been presented. these key indicators were selected to determine the main directions for optimizing strategic management of marketing and logistics under the impact of artificial intelligence.

It is important to state that by considering the main tendency in the introduction of artificial intelligence

technologies in the strategic management of marketing and logistics of modern companies. the authors present the structural dynamics of the logistics efficiency index for 25 developed countries with high incomes. In the context of each group of structural indicators. the following are presented: customs clearance. which shows the degree of automation and optimality of business processes for processing documents by border control agencies. including customs; the quality of logistics infrastructure. which is characterized by the quality of trade and transport infrastructure of the analyzed countries. which depend on technology; the simplicity and cost of organizing supplies. the introduction of technologies and the level of routine of these processes; the quality of service provision and the ability to track and control cargo and timely delivery. which determines the level of automation and introduction of artificial intelligence technologies [18]. Structural dynamics of the logistics efficiency index for countries with developed economies and high income levels by category: customs clearance; quality of logistics infrastructure; the quality of service provision and the ability to track and control cargo and timely delivery are presented in Figure 2.

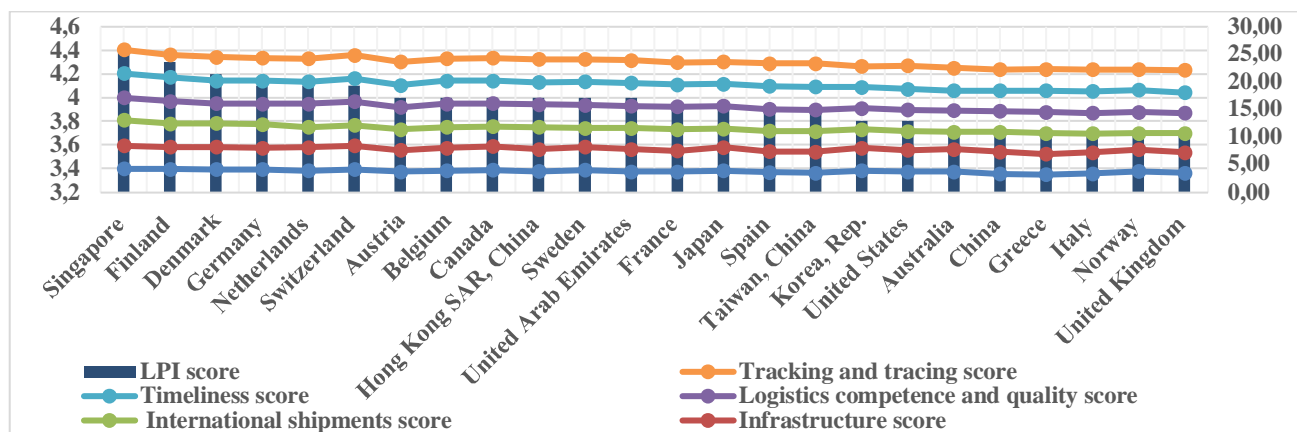


Figure 2 Structural dynamics of the logistics efficiency index for countries with developed economies and high-income levels by category as of 01.01.2023 [17]

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From what is presented. it should be noted that all countries are almost in the same range. and the efficiency of logistics depends on the dynamics of its structural indicators. which are presented. However. this logistics performance index fully reveals all aspects of strategic management of marketing and logistics of companies as a whole. which requires an assessment and identification of key aspects for their optimization.

The closeness of the relationship and impact on the presented conceptual indicators of marketing and logistics will be determined by the basic areas of introduction of artificial intelligence technologies in the strategic management of modern companies. namely: X₁- Share of companies that use artificial intelligence technologies when organizing business %; X₂ - Average share of artificial intelligence technology capabilities used by businesses %; X₃ - Level of investment in artificial intelligence technologies %; X₄ - Share of artificial intelligence technologies in service maintenance %; X₅ -

Share of artificial intelligence technologies in marketing and logistic %; X₆ - Share of artificial intelligence technologies in production %; X₇ - Share of artificial intelligence technologies in strategic management %.

Conducting correlation and regression analysis on the presented factor indicators. which have a close relationship with strategic management. marketing and logistics of modern companies. to ensure the identification of key areas of optimization and indicators that have a significant impact on key business processes. Based on the presented basic data. a correlation-regression analysis was carried out based on trend analysis. which will allow us to determine the impact of factor indicators on the use of artificial intelligence technologies and their impact on the modification of marketing based on correlation matrices. Correlation matrix of the impact of artificial intelligence technologies on marketing modification (resultative indicator - Sales volume through digital marketing, trillion US dollars) Table 4.

Table 4 Correlation matrix of the impact of artificial intelligence technologies on the strategic management of marketing and logistics of companies (resulting indicator – Sales volume through digital marketing tools, trillion US dollars)

	Y ₁	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆
Y ₁	1						
X ₁	0.974022	1					
X ₂	0.9625	0.96381	1				
X ₃	0.958046	0.970364	0.993479	1			
X ₄	0.98014	0.962456	0.981149	0.986388	1		
X ₅	0.968405	0.980309	0.980754	0.984226	0.984398	1	
X ₆	0.872829	0.956764	0.884635	0.89657	0.860794	0.926518	1

This matrix made it possible to highlight indicators of the introduction of artificial intelligence technologies in the strategic management of companies in terms of marketing business processes. Based on the results of this correlation. the most influential aspects of the introduction of artificial intelligence technologies will be argued in order to consider them in the future when optimizing the business

processes of companies. Correlation matrix of the impact of artificial intelligence technologies on the strategic management of marketing and logistics of companies (the resulting indicator is the Logistics Efficiency Index (for the analysis, the dynamics of the LPI for the United Arab Emirates was selected) Table 5.

Table 5 Correlation matrix of the impact of artificial intelligence technologies on the strategic management of marketing and logistics of companies (the resulting indicator is the Logistics Efficiency Index (for the analysis, the dynamics of the LPI for the United Arab Emirates)

	Y ₂	X ₁	X ₃	X ₄	X ₅
Y ₂	1				
X ₁	0.7396334	1			
X ₃	0.73994308	0.962499	1		
X ₄	0.695969	0.958045	0.970364	1	
X ₅	0.7262631	0.980140	0.962456	0.98119	1

As presented. the LPI is an interactive benchmarking tool designed to help countries identify the challenges and opportunities they face in their trade logistics activities and what they can do to improve their performance. It is important to note that the LPI includes quantitative data on the performance of key supply chain components in countries. Thus. the LPI consists of both qualitative and quantitative indicators and helps create logistics profiles for these countries. It measures performance along a

country's logistics supply chain and offers two different perspectives: international and domestic [19].

The most significant indicators (more than 0.55) of the evolution of artificial intelligence and its application in the strategic management of marketing and logistics to optimize key business processes were selected. The correlation between indicators of the modification of artificial intelligence technologies confirmed the hypothesis about their impact and connection with the

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transformation and optimization of strategic management processes of marketing and logistics of modern companies. Interpretation of the results of correlation and regression analysis of optimization of strategic management

of marketing and logistics of companies as part of the introduction of artificial intelligence technologies is presented in Table 6.

Table 6 Interpretation of the results of correlation and regression analysis of optimization of strategic management of marketing and logistics of companies within the framework of the introduction of artificial intelligence technologies

INDICATORS OF APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES	PERFORMANCE INDICATORS OF STRATEGIC MANAGEMENT OF MARKETING AND LOGISTICS		THE CLOSENESS OF THE RELATIONSHIP AND ASSESSMENT OF THE IMPACT ON THE OPTIMIZATION OF STRATEGIC MANAGEMENT OF MARKETING AND LOGISTICS OF COMPANIES	
	Y ₁	Y ₂		
X ₁	Strong connection and influence	Strong connection and influence	Artificial intelligence directly contributes to the optimization of business processes for managing the marketing and logistics of companies. The implementation of technologies simplifies processes. increasing their efficiency and rational use of resources.	
X ₂		Low connection and influence	Optimization of business processes for strategic management of marketing and logistics based on the implementation of artificial intelligence technologies has a close connection and dependency. An increase in the share of technologies and their implementation in the marketing and logistics of companies directly leads to an increase in efficiency. throughput in servicing. delivery and provision of services.	
X ₃		Strong connection and influence	Strong connection and influence	Growing investments in artificial intelligence technologies directly affect the strategic management of marketing and logistics of companies. This is due to the increase in automation of routine business processes. improvement in quality. service and speed of service provision. delivery and order tracking.
X ₄				
X ₅				
X ₆				
X ₇	Low connection and influence	Low connection and influence	Artificial intelligence in production and strategic management of marketing and logistics has its impact on processes and their optimization. but has a close relationship that depends on the type of activity and business segment. Artificial intelligence is not intensively used in all industries. which is explained by the specificity and complexity and versatility of the process that is subject to optimization.	
MULTIPLE CORRELATION COEFFICIENT	0.987	0.863	X	

Interpretation of the results of correlation-regression analysis of optimization of strategic management of marketing and logistics of a company under the influence of the introduction of artificial intelligence technologies allows us to confirm the hypothesis put forward. It should be noted that the proposed hypothesis for assessing the impact of artificial intelligence technology implementation indicators on the strategic management of marketing and logistics provided confirmation of the advanced theoretical assumptions on the impact. closeness of communication and their significance. It is important to note that based on the obtained multiple correlation coefficients of interdependence and close influence of artificial intelligence technologies on the optimization of strategic management of marketing and logistics confirm the accuracy and reliability of the results obtained [20,21]. The proposed approach will allow us to argue for the need and determine tendency in the introduction of artificial intelligence technologies in the strategic management of marketing and logistics of companies. in contrast to existing ones. it determines the main directions for optimizing the business processes of marketing and

logistics. and identifies the key tools that ensure their transformation from the classical concept to the digital one. The interpreted results can be applied in practice by highlighting the factors impact business strategy. followed by their analysis and emphasis when forming a marketing and logistics strategy and planning the optimization of companies' business processes.

The relevance of using artificial intelligence technologies in all sectors of the world economy is justified by the conceptual need to search for new and improve existing management methods. A hypothesis has been put forward to assess the impact of artificial intelligence technologies on the optimization of strategic management of marketing and logistics based on indicators of the use of these technologies in the world and their interpretation in the economic development of countries. The proposed methodology for correlative-regression analysis of assessing the relationship. impact and main factors of optimizing the strategic management of marketing and logistics. Within the framework of the implementation of artificial intelligence technologies is in demand and applicable taking into account the purpose of the study. but

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can be supplemented and improved depending on the focus of the problem and the tasks set. The justification of factor indicators for the modification of artificial intelligence technologies is conceptual and based on data from the World Bank and analytical reports in the field of organizing and managing the effectiveness of marketing and logistics of companies in the world. but is not an exhaustive list. which can be supplemented or shortened as part of further research using tools correlation and regression analysis or other methods and tools for conducting economic and statistical analysis and modeling. The results obtained provided confirmation of the put forward theoretical premises and hypotheses with justification for the type of relationship. closeness and interdependence. as well as the characteristics of the influence on the optimization of strategic management of marketing and logistics of companies within the framework of the introduction of artificial intelligence technologies. The developed approaches are in demand in modern conditions of global market volatility and the need for constant optimization of business processes and maximum scaling with minimal costs in order to maximize profitability at a normalized level of risks.

4 Conclusions

The main results of the study are characterized by the fact that the need to improve and optimize modern mechanisms for strategic management of marketing and logistics of companies is stated. which substantiates the demand for artificial intelligence and its spread to all spheres of human life. A critical analysis and study of scientific approaches and research in the field of marketing and logistics made it possible to verify that the evolution and application of artificial intelligence. as well as the optimization of marketing and logistics management processes require improvement and more detailed study to determine key aspects and algorithms. A classification of the main directions for the revolutionary development of artificial intelligence technologies in the world has been developed. focusing on the technologies themselves and the key industries where they have their practical application.

The evolution of artificial intelligence technologies and its introduction in the industry and segment of the global economy are revealed. It is substantiated that in most cases. the introduction of artificial intelligence technologies is focused and aimed at strategic management of company processes. including marketing and logistics. It is argued that the introduction of artificial intelligence technologies has a positive impact on the business processes of marketing and logistics and leads to their maximum automation of routine work and optimization. In order to evaluate the evolution of artificial intelligence and its impact on the strategic management of marketing and logistics of companies and more aspects of their optimization to justify the close relationship and impact of

artificial intelligence. tools of correlation and regression analysis were used.

These tools are relevant and in demand in contemporary circs. which are characterized by their versatility and the possibility of application regardless of the field of scientific research. The construction of regression models and their dependence on factor indicators ensures the creation of mathematical models depending on the indicators. their close impact and significance. Key indicators of strategic management of marketing and logistics have been determined (sales volumes using digital marketing and logistics efficiency index). Data on the implementation of artificial intelligence technologies in the world in the context of industries and tools are formulated as factor indicators. Interpretation of the main results of correlation and regression analysis provided evidence that the introduction of artificial intelligence technologies in marketing and logistics processes and their strategic management have a direct impact and contribute to constant transformations and optimizations in order to minimize costs. improve the quality of service and the speed of service and logistics. The developed methodology can be used in practice when planning stages of optimization of strategic management of marketing and logistics of companies as part of the introduction of artificial intelligence technologies.

The formed theoretical aspects of the introduction of artificial intelligence can serve as the basis for studying the evolution of their development. The introduction of these technologies and the argumentation of key indicators can be taken as basic indicators for prospective assessment of their impact on the strategic management of companies. regardless of the type and specificity of activity. The results obtained are a completed study. which is confirmed by the accuracy and reliability of the results obtained. which can be used in practice.

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Review process

Single-blind peer review process.