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## **APPLICATION OF ARTIFICIAL INTELLIGENCE IN RETAIL**

*In the context of the contemporary Industry 4.0 concept, artificial intelligence (AI) has become an integral component of human life's success, the impact of which is increasingly difficult to overestimate today. With the advent of AI, the everyday life of individuals has noticeably transformed. Neural networks are capable of working in an algorithmic way, adapt, learn, and even generate new inventions within a short span of time. Since the concept of AI appeared, fervent debates have revolved around its advantages and opportunities for modern society, ethical frameworks of application, risks, and the negative impact of AI on various professional spheres. However, the revolutionary changes brought about by AI, enabling individuals to delegate routine tasks and freeing up time for creative endeavors, remain indisputable. Despite the high significance of previously conducted research, the state and potential opportunities of industrial application of AI remain insufficiently explored. The purpose*

## **ВИКОРИСТАННЯ ШТУЧНОГО ІНТЕЛЕКТУ В РИТЕЙЛІ**

*У контексті сучасної концепції Industry 4.0 штучний інтелект (ШІ) перетворився на невід'ємну складову успішності людського життя, вплив якого сьогодні важко переоцінити. З появою ШІ помітно змінилося повсякденне життя людини. Нейромережі здатні працювати алгоритмізованим чином, адаптуватися, навчатися та навіть генерувати нові винаходи за короткий проміжок часу. Відколи з'явилося поняття ШІ, навколо нього точаться палкі дискусії щодо переваг і можливостей, які він відкриває для сучасного суспільства, етичних рамок використання, ризиків та негативного впливу на різні професійні сфери. Водночас незаперечними є революційні зміни, що відкриває перед людством використання ШІ, якому людина може делегувати рутинну роботу, звільняючи час для творчої діяльності. Попри високу значущість проведених раніше досліджень, залишаються недостатньо вивченими стан та потенційні можливості галузевого засто-*



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of the study is to determine the current trends in the development of artificial intelligence, to assess the actual state of use and to justify recommendations for the future use of AI systems in the retail sector. It has been determined that the introduction of AI technologies is a modern global trend and one of Ukraine's priorities. It has been proven that the complex realities of domestic retail development unveil opportunities for digital transformation and the intensification of AI implementation. The current state of AI development has been examined: the leading countries in artificial intelligence implementation have been identified, and the retail sector has been ranked fourth among industries with high potential for the application of advanced technologies. To gain an understanding of AI development in retail, a survey was conducted, the results of which delineated business processes where AI technologies are actually applied and specified the goals of their application. The priority operational processes of retail enterprises for the implementation of advanced technologies have been identified and ranked by the significance of AI systems, which are most relevant to modern retail. A list of AI systems has been sorted according to their purpose and functional capabilities in retail.

*Keywords:* artificial intelligence (AI), information, digital transformation, retail, trading enterprise.

JEL Classification: C45, F19, L81.

## Introduction

Research conducted by the media company Forbes indicates that the volumes of creation and consumption of informational data in 2020 compared to 2010 have increased by as much as 5000%. According to the research firm Grand View Research, in 2020, the size of the global artificial intelligence (AI) market amounted to USD 62 billion, and it is projected to grow annually by 40.2% during the period 2021–2028 (Chia-Hui Lu, 2021). Under such circumstances, the implementation of cutting-edge technologies is a mandatory requirement for the swift and efficient processing of the colossal volume of complex information circulating in the business environment today.

A study commissioned by Grammarly and conducted by Forrester Consulting in May 2023 showed that by 2025, as many as 97% of organizations plan to implement generative AI (Grammarly, 2023). Such extensive adoption of modern technologies has fundamentally changed and will continue to influence the everyday and professional lives of individuals.

The era of digital technologies has fundamentally reshaped the landscape of the business environment. Today, it is insufficient for enterprises to merely achieve success and efficiency in the market; it is imperative

сування ШІ. Метою дослідження є визначення сучасних тенденцій розвитку штучного інтелекту, оцінювання фактичного стану використання та обґрунтування рекомендацій щодо перспективного застосування систем ШІ у сфері ритейлу. Встановлено, що впровадження технологій ШІ є сучасною світовою тенденцією та одним з пріоритетів України. Доведено, що складні реалії розвитку вітчизняного ритейлу розкривають можливості для цифрової трансформації та активізації впровадження ШІ. Досліджено сучасний стан розвитку ШІ: виявлено країни-лідери його впровадження та визначено 4-те місце сфери торгівлі серед галузей з високим потенціалом застосування новітніх технологій. Для формування уявлення про стан розвитку ШІ в ритейлі проведено опитування, за результатами якого окреслено бізнес-процеси, в яких фактично застосовуються технології ШІ, та конкретизовано цілі їх застосування. Ідентифіковано пріоритетні робочі процеси підприємств роздрібною торгівлі для впровадження новітніх технологій та ранжировано за значущістю системи ШІ, які найбільш актуальні для сучасного ритейлу. Перелік систем ШІ впорядковано за їх призначенням та функціональними можливостями у ритейлі.

*Ключові слова:* штучний інтелект (ШІ), інформація, цифрова трансформація, ритейл, підприємство торгівлі.

to establish themselves as technologically advanced organizations capable of challenging other economic agents through balanced digital investments, astute innovation policies, and a steadfast commitment to the testing and implementation of state-of-the-art technologies.

The results of the research conducted by the international network of companies PwC have enabled an assessment of the current state of implementation and the pace of global development of digital technologies. The contribution of AI systems to the global GDP is estimated at USD 15.7 trillion, surpassing the combined volume of industrial production of India and China. According to forecasts, this indicator is projected to increase by 14% by 2030 (Raiffeisen Bank, 2020).

Figure 1 presents the indicators of the level of AI implementation in some countries in percentage terms. AI implementation exhibits a promising long-term trend: only every fifth company currently does not plan to utilize AI. Leading the research race are China, Singapore, and India. Regarding the practical application of AI, the top three in this ranking are Canada, the United Kingdom, and South Korea. Ukraine is not represented in the ranking of leading countries in AI utilization primarily due to complex military realities that significantly hinder its economic development.

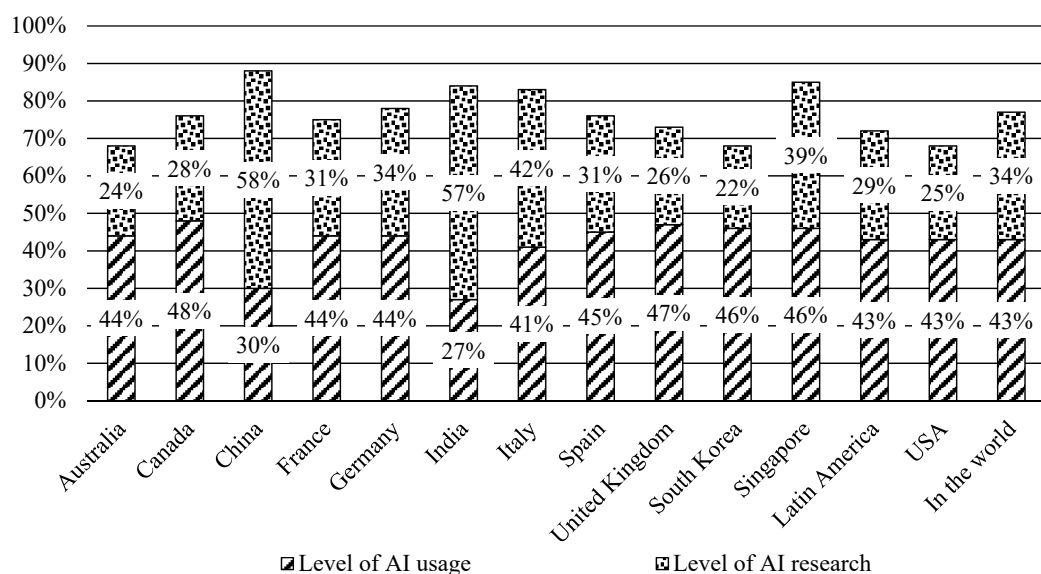


Figure 1. Indicators of application and investigation of artificial intelligence (statistics for Ukraine are not available)

Source: developed by the authors based on (IBM, 2022).

At present, the effectiveness of AI is beyond doubt. Transitioning from personnel-oriented processes to technologically oriented ones incurs minimal additional costs for enterprises and can swiftly reinvigorate operations without an increase in expenditures. Furthermore, equipment and machinery tailored to accommodate new technologies will continually undergo refinement. In this scenario, the prime candidates for automation are the business processes traditionally outsourced (Raye, 2018).

The Ministry of Digital Transformation developed the Concept of Artificial Intelligence Development in Ukraine in 2020. It declares the relevance of implementing information technologies, with an emphasis on the application of AI technologies, as part of the country's prospective development strategy. Within this Concept, AI is considered as an organized set of information technologies, through which complex tasks can be accomplished using a system of scientific research methods and information processing algorithms, obtained or independently created during work, as well as creating and utilizing proprietary knowledge bases, decision-making models, information processing algorithms, and determining ways to achieve set tasks (Order of the Cabinet of Ministers of Ukraine No 1556-p., 2020, December 2). The authors fully endorse this viewpoint and will utilize it in this study.

It is noteworthy that the outlined problem has long attracted the attention of foreign and domestic scholars. It may seem surprising, but the term AI emerged a century ago when the father of modern computer science, Alan Turing, first introduced this concept, understanding it as a highly complex computational "thinking" machine equipped with a scanner capable of managing vast amounts of memory. The theoretical foundations for the application of AI were largely laid down by a whole constellation of brilliant scientists in the past century, including Ch. Babbage, N. Wiener, A. Turing, V. Glushkov, and others.

At the beginning of the 21st century, Ukrainian scientists such as Hlybovets & Oletsky (2002) and Shvyrvkov (2006) were among the first to investigate AI-related issues. A collective monograph written by a group of Ukrainian scientists is a fundamental modern work that examines the prerequisites and scientific foundations for creating a Strategy for the Development of Artificial Intelligence in Ukraine, as well as the means and ways of its effective implementation (Shevchenko et al., 2023). The role of AI in organizational management, criteria for its effectiveness, and prospects for further development were addressed in an article by Nesterak & Malinovska (2020). G. Mashlii, O. Mosiy and M. Pelcher conducted research on the peculiarities of management during the AI development period in Ukraine and beyond, highlighting the relevance of considering the risks of AI development and presenting the results of a study on the readiness to implement cutting-edge technologies in domestic enterprises with specific proposals for AI development (Mashlii et al., 2019). The article by V. Kuzyomko and V. Burangulova reflects on the history of AI development and analyzes the experience of implementing AI technologies by leading global companies in various sectors of the economy (Kuzyomko & Burangulova, 2021). In the article by O. Pizhuk, the essence of AI as an economic category is defined, and the role of AI as a key driver of digital transformation of the economy is argued (Pizhuk, 2019). G. Piatnytska described startups using AI technologies that open up market opportunities for improving the management system of trade enterprises (Piatnytska, 2022). In the series of articles, a computational core model of decision support system utilizing artificial intelligence in the process of continuous mutual

investment in technologies for Smart City (SmSy) is described. This model facilitates the interaction of all business processes to activate and implement digital transformation in smart city commerce enterprises. Additionally, a decision support system model based on artificial intelligence for mutual investment in SmSy technology is discussed. This model enables potential investors to familiarize themselves with future logistical requirements and reduce discrepancies in assessing profitability forecasting data of investments in SmSy (Lakhno et al., 2020; Lakhno et al., 2022).

Today, the scope of AI application is very broad, thus, it is of interest to study the industry-specific features of digital investment data utilization. Among the wide range of industries, the retail sector has been selected, which acts as an intermediary between producers and end consumers, and also serves as a relay for the voice of the latter to the production sector. This is one of the few sectors that has demonstrated its flexibility to innovation, especially under critical and extreme conditions in which Ukrainian businesses are currently developing. In particular, the following questions remain insufficiently studied:

- What are the potential applications of AI in different sectors of the economy, including retail?
- What roles are assigned to AI tools in retail?
- Which business processes at retailers are actually covered by AI technologies and in which functional areas is their implementation recommended?
- What does the rating and system of AI technologies recommended for implementation in the retail sector look like?

The article hypothesises that AI algorithms will be predominantly used to automate workflows in the retail sector and improve consumer experience. Hypothetically, AI in retail enterprises covers such business processes as information collection and analytical processing, customer research, chatbots for communication with consumers and e-commerce. At the same time, the study of potential opportunities for using AI in retail requires special attention. It is also of interest to systematise AI systems in terms of their applied value for retail.

Thus, the purpose of the study is to determine the current trends in the development of artificial intelligence, to assess the actual state of use and to justify recommendations for the future use of artificial intelligence systems in the retail sector.

During the research, scientific-empirical methods were employed to collect data on the actual usage of AI in various retail business processes. This involved surveys of retailers and observation of AI system implementations in retail enterprises. Expert evaluations and forecasting methods were also utilized to determine future trends, potential development directions, obstacles, and opportunities for AI adoption in retail. Key success factors and challenges of applying cutting-edge technologies in this industry were identified.

Given the active development of advanced technologies in Ukraine and the current opportunities for business process restarting, an online survey was conducted regarding AI application in retail (in the form of an online survey based on a questionnaire designed by the authors using the Google Forms application) with a convenient sample of 100 employees in the retail trade of various formats, geographical locations, and retail sectors (Food Market, electronics stores, fashion retail, DIY format, drugstores, furniture stores, military stores, hardware stores, marketplaces, etc.). The questionnaire included closed and semi-closed questions and employed multiple-choice answers. The survey was conducted in January–February 2024. Encompassing a broad spectrum of stores increased the objectivity and reliability of the conclusions drawn. The contingent of respondents (age 20+ years) included management personnel at the top, middle and lower levels of enterprise management and operational personnel who are involved to one degree or another in the process of selling goods and serving consumers (in general, the respondents were Store Directors, Store Administrators, Category and Trade Managers, Merchandisers, Sales Managers, Customer Service Managers, Product Supply Specialists, QA-Testers, HR-Managers, Sales Consultants, etc.). The analysis confirmed that the majority of respondents were women (66%). The surveyed respondents are mostly young – from 20 to 30 years old (84%) with a majority of work experience in retail up to 3 years (more than half of the respondents). The study included an assessment of support for the idea of using AI in retail; determining the role of AI tools in the industry; identification of AI systems that are relevant for use in the retail sector. The task of identifying business processes in which AI technologies are actually used and in which experts recommend their use was also set.

### **1. Modern roles of AI tools in retail**

Currently, progressive intellectual innovations come to the aid of managers, capable not only of simplifying their current activities but also of introducing a significant portion of insights and originality into the process of managerial decision-making. Among such innovative practices, AI occupies a special place. In the sphere of commerce, business processes are aimed at enhancing the customer orientation of enterprises by creating a responsive system for monitoring consumer demands and needs, establishing personalized communications with buyers, and providing multichannel high-quality retail services to various target audiences of consumers. All these tasks under modern conditions can only be mediated and effectively executed with the assistance of information and digital technologies.

It must be acknowledged that the war has made adjustments to all spheres of activity and life for Ukrainians, and naturally, it has left its mark on the sphere of commerce. At the same time, the complex wartime conditions in which the Ukrainian retail sector has recently been developing lay opportunities for reinvigorating retail enterprises through the modernization of outdated technologies and supply chains, optimization of inventory

management systems, and reconsideration of pricing principles. Currently, the Ukrainian retail sector is facing unprecedented temporary difficulties due to Russian armed aggression. In such conditions, the adoption of advanced technologies and awareness of new consumer trends are steps toward the future of the retail sector during wartime and subsequently in the post-war reality (Biliavska & Mykytenko, 2023).

The results of the study showed unanimous support for the use of AI in retail. In this regard, the following roles are attributed to artificial intelligence (*Figure 2*).

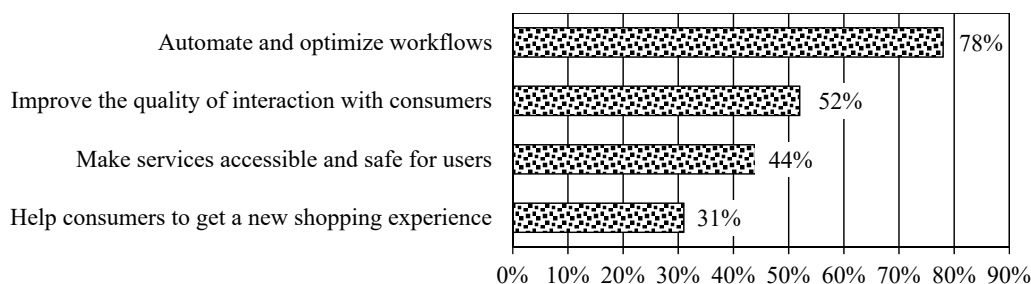


Figure 2. The role of artificial intelligence tools in retail

Source: developed by the authors by survey results.

As evident from *Figure 2*, the majority of respondents perceive AI as an opportunity to automate and optimize work processes, with over half convinced that AI tools enhance the quality of interaction with consumers. Furthermore, almost half of employees believe that artificial intelligence increases the availability and security of retail services for customers, and one in three respondents noted the ability of artificial intelligence to help consumers gain new shopping experiences. This underscores the high relevance of AI technologies in reshaping business processes through automation, enhancing customer orientation, and streamlining the process of decision-making.

## 2. Comparison of the actual and recommended state of implementation of AI systems

An interesting phase of the research involved determining the existing state of digital transformation in retail enterprises. Therefore, the actual application status of AI in the business processes of contemporary retail enterprises is depicted in *Figure 3*.

Therefore, leading positions in the utilization of AI in retail are occupied by information gathering and processing business processes, which become particularly relevant with the implementation of advanced automated analytics. As the volumes of information in trade pertaining to customers, competitors, product markets, manufacturers, and suppliers grow exponentially, AI is capable of conducting analysis and generating reports, analytical forms, allowing more time to be dedicated to strategic decision-making and focusing on product promotion and sales profitability enhancement. Chatbots for consumer communication hold the second

position in AI implementation. The third place in actual AI usage is occupied by consumer research processes and intelligent video analytics, which enable the evaluation of numerous factors for identifying patterns and models of consumer behavior, identifying trends in its changes, understanding the specifics of consumer behavior in the retail space, and forecasting consumer priorities and preferences for the future.

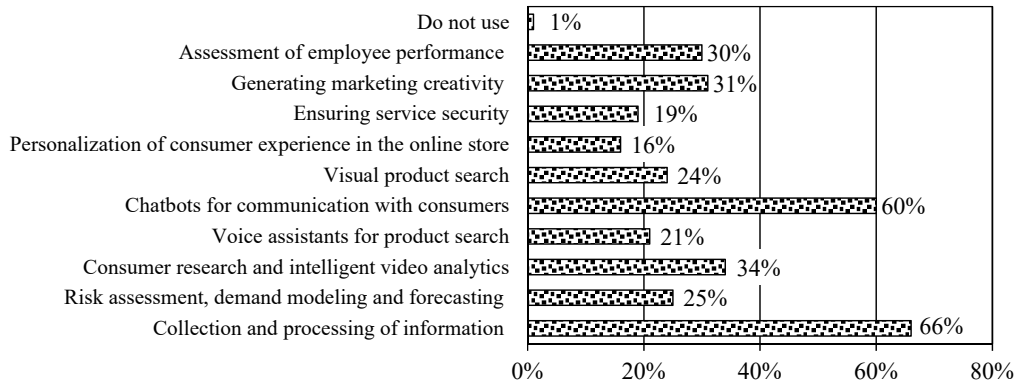


Figure 3. Business processes in which retailers use artificial intelligence

Source: developed by the authors based on survey results.

An important area of AI application in retail is the evaluation processes of employee performance, as well as business processes requiring non-standard creative approaches. Currently, a significant portion of tasks of the marketing and advertising departments, as well as the PR department, can be accomplished by neural networks, including the generation of digital marketing solutions, enhancement of marketing activities, creation of vivid content, generation of marketing creatives, development of contextual advertising, and more. Interestingly, there are almost no companies that still do not use AI. This confirms the prevailing trend of modern retail towards progressive advanced technologies.

At the same time, surveyed experts emphasize a range of priority functional areas for AI implementation in retail (Figure 4).

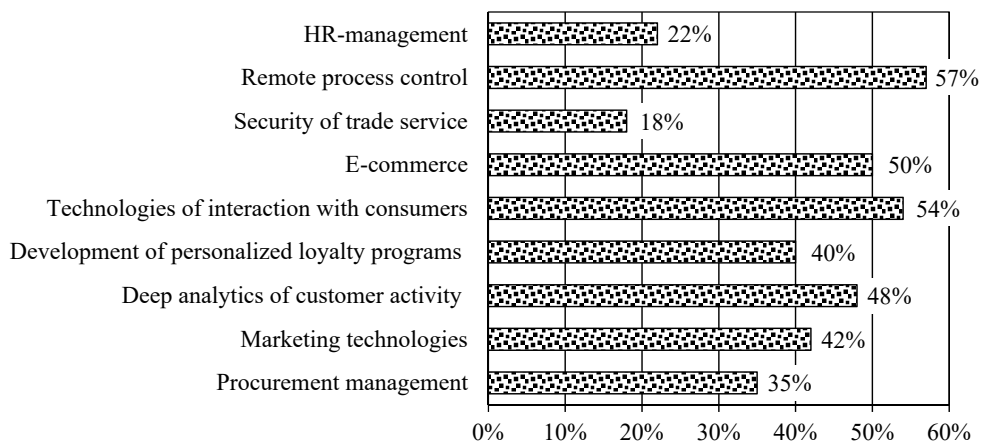


Figure 4. Prioritizing retail processes for the application of artificial intelligence

Source: developed by the authors based on survey results.



The TOP-5 processes in which AI can be applied in retail are as follows: remote process management, customer interaction technologies, e-commerce, in-depth analysis of customer activity, and marketing technologies. AI should be an integral part of operations; however, in some processes, it cannot replace human intervention but is intended to facilitate business processes to some extent, for example, in the development of personalized consumer loyalty programs and in procurement management processes. Overall, neural networks enable increased accuracy in demand forecasting, ensuring adequate shelf assortment in retail stores, and optimizing logistical processes. AI algorithms can process vast amounts of data, analyze sales history, market trends, and conduct factor analysis, allowing for precise forecasts of future consumer demand, thereby increasing the relevance of product assortment to consumer requests and expectations.

### 3. Rating and list of AI technologies recommended for implementation in retail in the context of potential trade opportunities

The study also aimed to understand respondents' perceptions of the ranking of AI application in retail enterprises. Based on the conducted survey, it was possible to identify and rank the most relevant AI systems for retail today (*Figure 5*).

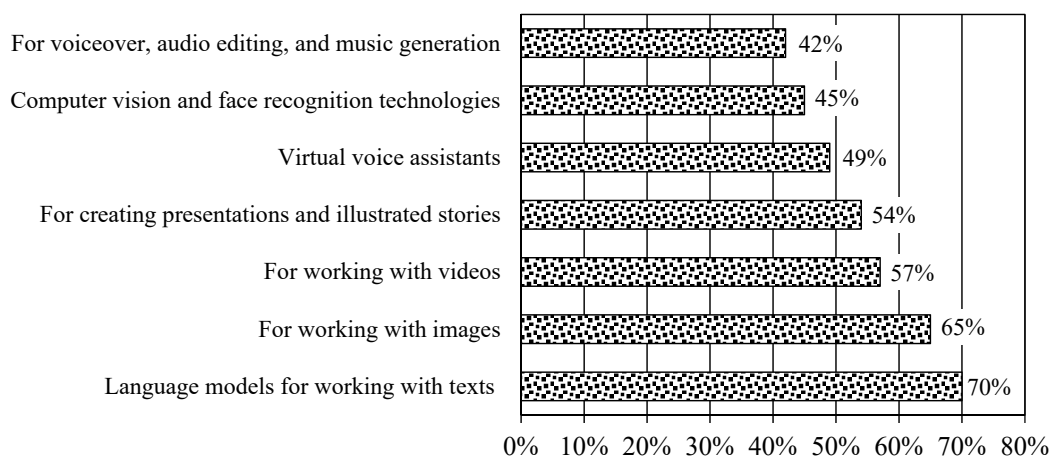


Figure 5. Artificial intelligence systems recommended for use in retail

Source: developed by the authors based on survey results.

The hypothesis regarding hidden potential opportunities in trade is supported by the modeled indicator of growth in gross value added (GVA) resulting from the integration of AI into economic processes (*Figure 6*). The economic impact of AI technology implementation primarily manifests in profit growth, driven by increased productivity stemming from the automation of core business processes.

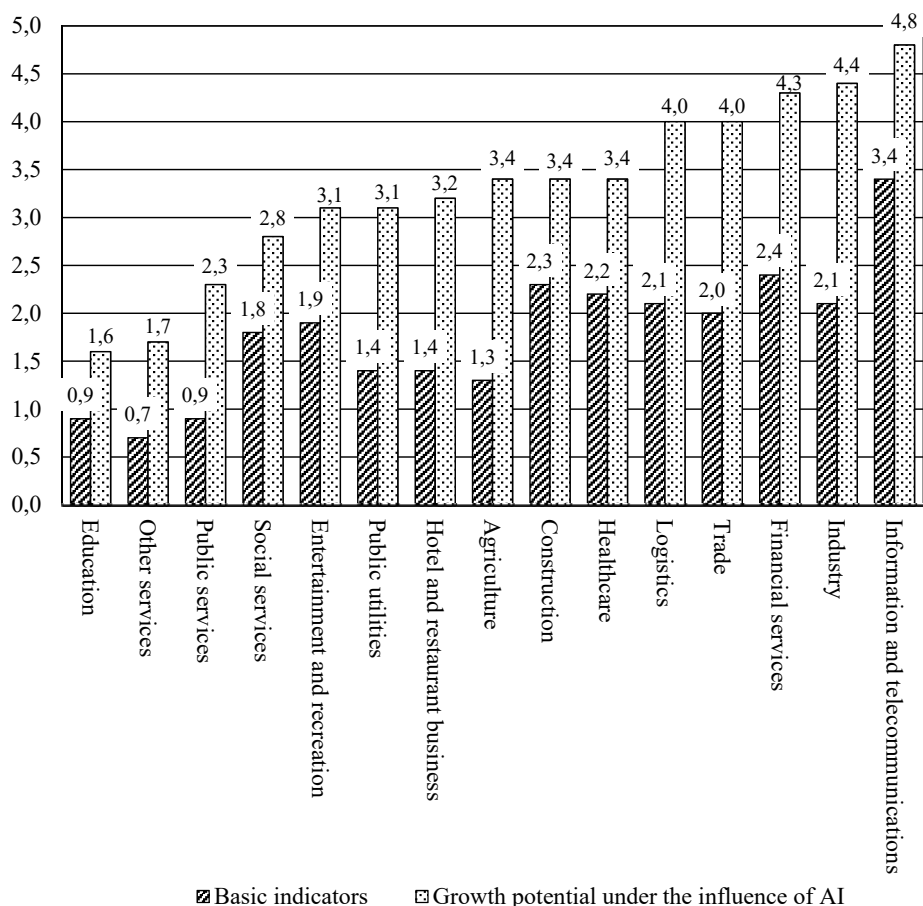


Figure 6. Estimated annual growth rates of gross value added (GVA) with the integration of AI into the economic processes of various industries as of 2035

Source: developed by the authors based on (Pizhuk, 2019).

As observed, the retail sector provides fertile ground for the implementation of technological innovations such as AI, further substantiating the relevance of allocating such AI systems whose defined functional capabilities can harmoniously substitute and compensate for labor costs in retail.

Thus, the identified trends compel retail enterprises to create necessary conditions for the widespread implementation and practical utilization of AI. In accordance with our inquiry, we have formulated and systematized a list of AI systems based on their relevance and purpose in retail (Table 1; 2).

Table 1

Recommended first-order AI technologies for retail

AI Systems	Developer	Functional Capabilities	Potential Application Area in Retail
<i>Language Models for Text Processing</i>			
ChatGPT (Generative Pre-trained Transformer)	OpenAI	A tool that uses artificial intelligence, similar to a chatbot that generates text, can communicate in different languages. Develops program code in JavaScript, Java, C#, C++, Go, Python, Ruby	Creating new content for the website, product descriptions for the online store, and enriching the landing page with engaging content

End of the table 1

AI Systems	Developer	Functional Capabilities	Potential Application Area in Retail
Grammarly	Grammarly Inc.	Generative artificial intelligence capable of generating contextually relevant drafts, ideas, plans, and answers on demand. Enables summarizing emails and promptly responding to them using context-dependent prompts	Generating marketing ideas, processing electronic correspondence
SmartWriter	Products Pty Ltd	An AI-powered tool for organizing English-language business correspondence. Creates emails that have a high conversion rate and generates automated email responses to inquiries. Automates 98% of the sales funnel	Generating compelling content on social media, editing blogs, and copywriting
Texts	Automattic Inc.	An online platform based on AI that combines correspondence from popular messengers into one account and encrypts data. All chats are searched for relevant information	Managing communications in social media
Penelope	Penelope ALPHA	A generator and editor of articles and papers that can write the text of a paper based on the title of the article alone	Copywriting, speechwriting, rewriting, SEO copywriting
Notion AI	Notion Labs Inc.	The array of artificial intelligence features available in the Notion program, utilized for text generation and note-taking purposes. It encompasses numerous organizational tools such as task management, to-do lists, project tracking, bookmark creation, and others	Generating job instructions, report summaries, agendas, press release notices, social media updates, blog posts, etc.
<i>Systems for working with images</i>			
Midjourney	Midjourney	A neural network on the Discord platform that converts a text description written by a person into an image. The text should be simple and not require the same accuracy as the images	Use of generated images in social networks, blogs, and media
Stable Diffusion	Stability AI	A tool for generating images based on AI and a deep learning model for transforming text into images, which utilizes diffusion processes to convert descriptions and images into exquisite works of art. Designed for rapidly creating and modifying beautiful photos, allowing for the creation of stunning art content within minutes	The system is beneficial for copywriters, marketing and PR specialists, team leaders, designers, and developer engineers
Visual ChatGPT	Microsoft Research	A chatbot that integrates two key components: OpenAI ChatGPT and 22 distinct visual models (VFM). This is an open tool that enables image generation and manipulation in response to inquiries directly within the ChatGPT conversation	Generating ideas and implementing them in blogs, social media, and within the advertising and marketing department's activities
<i>Video processing systems</i>			
Maverick AI	Maverick	A service for personalizing video clips using neural networks. Primarily designed for online store owners, it also enables the automatic generation of numerous personalized communications to customers from a single recording	Personalization of consumer interaction through video messaging and branded video pages
InVideo	Filmr	Video editing service, marketing videos in accordance with the text script	Diversification of marketing activities
Pictory	Creators' Group	The platform transforms content from social media (i.e., converts scripts, articles, and posts from social networks) into videos. It cuts long segments of content and automatically adds subtitles to each video	Enrichment of marketing activities and content on social media platforms

Source: developed by the authors based on (Gaivoronska, 2022; Printing house, 2023; Yivzhenko, 2023; Zhornak, 2022; Self-education, 2023; Stark, 2023; Happy Monday, 2023; Hillel, 2023; ITC, 2022; ITProger, 2023; Vector, 2023).

The first category encompasses AI technologies aimed at generating new compelling content on the retail company's website, enhancing e-commerce, including adding "highlight" features to the landing page and SEO optimization, comprehensive management of social media pages and blogs, creating personalized customer loyalty programs, establishing effective customer interactions, refining electronic communications, and providing comprehensive support for the marketing and advertising department. The primary goal of these technologies is to increase website traffic and attract new visitors, optimize the conversion rate (CRO), improve the shopping experience, boost repeat purchases, enhance the level of communication personalization with customers, refine product and service promotion strategies, and enrich marketing activities in retail enterprises.

Table 2

## Recommended second-order AI technologies for retail

AI Systems	Developer	Functional Capabilities	Potential Application Area in Retail
<i>Systems for creating presentations and illustrated narratives</i>			
Piggy	Piggy	An application for mobile devices that allows users to create presentations and social media posts manually or automatically	Generating marketing ideas, creating content on social media platforms
<i>Virtual voice assistants</i>			
Siri	Apple	Virtual cloud assistant for devices on iOS, MacOS, iPadOS, watchOS, tvOS, and audioOS platforms. Control is performed through voice commands, gestures, as well as regular button presses. This assistant is based on natural language processing technology, enabling the system to process queries and respond to them, provide recommendations, and manage the operation of integrated digital devices with Ukrainian language support. Features include reminders, weather forecasts, stock updates, message transmission, email, calendar, contacts, notes, clock, and web browsing capabilities	Ordering a taxi, transferring money from card to card (with Apple Pay connection), making calls, sending SMS, posting photos on social media, searching for information on Wikipedia and in the browser, etc.
Google Assistant	Google	A virtual assistant based on the Google Now personal search service, utilizing cognitive computing, machine learning, and voice recognition technologies. The assistant is available on virtually any device running Android version 5.0 and above, supporting 40 languages. Currently, this program is accessible on smartphones and tablets with the Android OS, as well as on Google Home smart speakers for managing smart offices, the Google Allo messenger app, and Android Wear smart-watches. Additionally, the AI assistant is compatible with a range of other devices, including smart TVs, smart displays, automotive systems	Gadget management. Retrieving data from online calendars, internet information: from route planning to controlling alarms, timers, and reminders. Administration of meetings, events
<i>Computer vision and facial recognition technologies</i>			
Face ID	Apple	3D face scanning system, a biometric application enabling person identification through analysis of texture-based facial models. Person geometry recognition is employed for biometric attendance tracking: contactless monitoring automates attendance control, organizes actual schedules, provides real-time information, relieving managers from routine tasks	Customer visit analytics, tracking top-selling items and shopping lists, constructing consumer profiles. Personalizing the customer experience and enhancing consumer loyalty. Detecting shoplifters, assisting the HR department

End of the table 2

AI Systems	Developer	Functional Capabilities	Potential Application Area in Retail
Attention Insight	Attention insight uab	An analytical platform based on artificial intelligence utilizing predictive heat maps of attention to detect potential productivity issues at the stage of designing business processes. The platform operates on a deep learning algorithm trained on approximately 70.000 sets of eye-tracking research images. This AI technology enables the generation of eye-tracking heat maps with an accuracy of 90–96%, even without human involvement	Optimization of design and marketing strategies. Attracting consumer attention through advertising campaigns, landing pages, and traffic redirection
GV-Smart Retail	GeoVision	An automated system, based on AI advancements, integrating facial recognition analytics, video analysis, and Big Data. These tools facilitate workforce management, alerting for empty shelves, long queues at cash registers, notifying about incorrect prices or suspicious transactions. The system ensures high-level security, provides anti-theft measures, visitor counting, integration with cash registers, monitoring of suspicious activities, and more	Optimization of workflow processes, planning advertising policies based on demographic client data, thereby increasing sales volume and profit
<i>Systems for text-to-speech, audio editing, and music generation</i>			
Open Voice OS	MycroftAI	An open source platform for developing a voice interface for a smart home using a neural network	Creating non-textual musical content on social media, reminders

Source: developed by the authors based on (Amos, 2023; Andreev, 2023; Happy Monday, 2023; Harrigan, 2023; Inweb, 2020; Printing house, 2023).

Second category of AI systems is aimed at optimizing business processes in retail, collecting and processing vast amounts of complex information, remote process management, automation of business tasks, conducting in-depth analysis of purchasing activity, data visualization, consumer demand forecasting, ensuring the security of retail services, and providing technical support for personnel management to increase productivity and operational efficiency, ensure the availability and safety of retail services, activate and stimulate consumer demand, increase the average transaction amount, increase sales volume and profitability, as well as assist consumers in gaining new shopping experiences.

### Conclusions

Thus, the field of digital technologies, which until recently seemed like science fiction, has now become our everyday reality. The rapid development of AI continuously offers the world even more powerful inventions like the ambitious Gemini project or a new version of Siri with natural language communication and enhanced personalization, which aims to surpass existing AI technologies.

Traditionally, Ukraine is famous for its intellectual potential, which provides a favorable environment for the implementation of innovative technologies like AI, enabling the transformation and automation of outdated operational processes, thereby significantly increasing labor productivity and protecting staff from errors. It was found that there are considerable reserves for the prospective use of AI systems in the retail sector.

The results of our research confirmed our hypothesis and showed that AI tools in retail are mainly used to automate and optimise workflows, improve the quality of customer interaction, improve the accessibility and security of retail services for consumers, and help consumers gain a new shopping experience.

It is established that, in fact, AI at trade enterprises covers such business processes as information collection and processing, chatbots for communication with consumers, consumer research and intelligent video analytics, and employee performance evaluation. It was also found that AI capabilities are well integrated into marketing processes that require creative and innovative approaches. However, the study also demonstrated the necessity and feasibility of implementing and developing AI in the direction of remote process management, interaction between retail enterprises and consumers, e-commerce promotion, generation of analytical information regarding consumer purchasing activity, and during the implementation of marketing technologies.

Considering the relevance for retail, we have systematized AI systems for their future implementation in modern retail enterprises: language models for text processing, image processing technologies, video processing technologies, presentation and illustrated story creation, virtual voice assistants, computer vision and facial recognition technologies, text-to-speech systems, audio editing, and music generation. All AI systems are evaluated in terms of possible areas of their practical application in retail.

Today, in the multichannel retail sector, one cannot ignore the achievements of scientific and technological progress and the opportunity to work ahead of consumers' expectations and demands, which highlights the digital transformation, implementation of complex automated analytics, and generative AI. However, there is another side to the coin. Everything must be in a smart balance, so in the process of implementing digital know-how, it is impractical to become so engrossed in them as to ignore the opportunities of human intellectual potential in the context of increasing the efficiency of managerial decisions and optimizing modern business processes.

It should be noted that the field of AI development is very dynamic and dependent on the application area, so the prospects for further research are related to the study of the implementation status and recommendations for AI usage in enterprises of various economic sectors.

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