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TOOLS OF INFLUENCING CUSTOMER BEHAVIOR IN THE CONDITIONS OF THE FOURTH WAVE OF THE SCIENTIFIC AND TECHNOLOGICAL REVOLUTION

The modern stage of economic development is characterized by the rapid spread of digital technologies, artificial intelligence, robotics, big data analytics, cloud computing, and the Internet of Things. These technological transformations are commonly associated with the Fourth Industrial Revolution, which significantly changes the mechanisms of interaction between businesses and customers. Under such conditions, enterprises receive fundamentally new opportunities to influence customer behavior through digital channels, personalized communications, and intelligent decision-making systems.

Customer behavior has always been one of the central objects of marketing research because understanding customer needs and preferences allows companies to create competitive advantages and achieve sustainable market positions. However, the Fourth Industrial Revolution has transformed not only the tools used by marketers but also the very nature of customer decision-making. Digital technologies have increased the volume of available information, accelerated communication processes, and expanded opportunities for personalized interactions between businesses and customers.

One of the most influential tools affecting customer behavior is artificial intelligence (AI). AI technologies enable companies to analyze large volumes of customer data, identify behavioral patterns, predict future purchasing decisions, and automate marketing communications. Modern recommendation systems used by e-commerce platforms are based on machine learning algorithms that analyze previous purchases, browsing history, and customer preferences. As a result, customers receive personalized product recommendations that significantly increase the probability of purchase.

Another important tool is big data analytics. The collection and processing of large datasets allow organizations to gain a deeper understanding of customer behavior in both online and offline environments. Companies can identify customer preferences, analyze purchasing patterns, evaluate customer satisfaction, and forecast future demand. The use of big data contributes to more effective segmentation of target audiences and improves the efficiency of marketing campaigns. According to modern marketing concepts, data-driven decision-making becomes one of the key factors of business competitiveness in the digital economy [1].

The development of digital marketing technologies has also increased the importance of personalized communications. Personalization involves adapting marketing messages, advertisements, offers, and recommendations to the specific characteristics of individual customers. Personalized marketing contributes to stronger customer engagement, higher conversion rates, and increased loyalty. Through the use of AI algorithms and predictive analytics, companies can create unique customer experiences and build long-term relationships with customers [2].

Artificial intelligence has become one of the most powerful instruments influencing customer behavior during the Fourth Industrial Revolution. Unlike traditional marketing approaches, which primarily relied on demographic characteristics and broad market segmentation, AI enables companies to understand customers at the individual level and predict their future actions with unprecedented accuracy. The integration of machine learning algorithms, natural language processing, computer vision, and predictive analytics into business processes has transformed the mechanisms through which organizations interact with customers.

One of the key advantages of AI is its ability to process large volumes of customer data generated in digital environments. Online searches, website visits, purchases, social media interactions, and mobile activity create digital traces that reveal behavioral patterns. AI systems analyze these data to build customer profiles and predict preferences, purchase intentions, and future needs, enabling companies to shift from mass marketing to personalized interactions.

A significant mechanism of AI influence is predictive personalization. Algorithms analyze customer behavior and generate recommendations tailored to individual interests and needs. Recommendation systems used by e-commerce, streaming platforms, and social media strongly influence decision-making by displaying the most relevant products or services. This reduces information overload, simplifies purchasing, and increases the perceived value of recommended options.

Artificial intelligence plays a critical role in dynamic content personalization. Websites, mobile applications, and digital advertising platforms automatically adapt content based on customer characteristics and real-time behavior. Users receive personalized offers, promotional messages, pricing, and interfaces according to their browsing history, purchasing behavior, location, and demographic profile. Such personalization increases user engagement and improves marketing effectiveness.

Another important area is the use of AI in digital advertising. Unlike traditional campaigns targeting broad audiences, AI-powered systems optimize advertising at the individual level. Algorithms analyze user interests, online activity, purchase history, and responses to ads to determine the optimal timing, platform, message, and format. This significantly increases advertising effectiveness and improves conversion rates.

AI-powered chatbots and virtual assistants have become important tools for influencing customer behavior. Unlike traditional support systems, conversational AI enables personalized interactions, answers questions, provides recommendations, and supports purchasing decisions. Available 24/7, these systems can serve thousands of customers simultaneously while collecting data on preferences, increasing customer engagement and trust.

An increasingly important aspect of AI influence is sentiment analysis. Natural language processing enables organizations to analyze customer opinions from reviews, social media, comments, and online discussions. By identifying attitudes toward products and brands, companies can quickly adjust marketing strategies and respond to customer concerns. Sentiment analysis also helps detect emerging trends and anticipate changes in customer expectations earlier than traditional market research.

Artificial intelligence is closely connected with behavioral economics and neuromarketing. Advanced algorithms identify psychological triggers that influence decision-making. AI can determine which messages evoke stronger emotional responses, which visual elements attract attention, and which offers encourage purchases. Combining behavioral data with psychological insights enables companies to create persuasive marketing campaigns that influence customer choices at both rational and emotional levels.

The emergence of generative artificial intelligence has expanded opportunities for influencing customer behavior. Generative AI creates personalized advertising texts, product descriptions, images, videos, and communication scenarios for specific audience segments. This enables organizations to scale personalized marketing while maintaining relevance and engagement. As a result, customers increasingly interact with content tailored to their preferences and expectations.

An important trend of the Fourth Industrial Revolution is the integration of behavioral economics into marketing. Companies use cognitive biases and psychological triggers to encourage customer actions through tools such as scarcity effects, urgency messages, social proof, personalization, and gamification. These approaches increase customer engagement and more effectively influence purchasing decisions [3].

The development of mobile technologies has expanded opportunities to influence customer behavior. The widespread use of smartphones allows marketers to engage customers throughout the entire customer journey, from information search to post-purchase support.

In conclusion, the Fourth Industrial Revolution is transforming the tools used to influence customer behavior. Artificial intelligence, big data, personalized marketing, social media, behavioral economics, and mobile technologies provide businesses with new opportunities to understand and shape customer decisions. Their effective use improves customer experience, enhances competitiveness, and supports sustainable economic development, while requiring ethical responsibility and respect for customer rights.

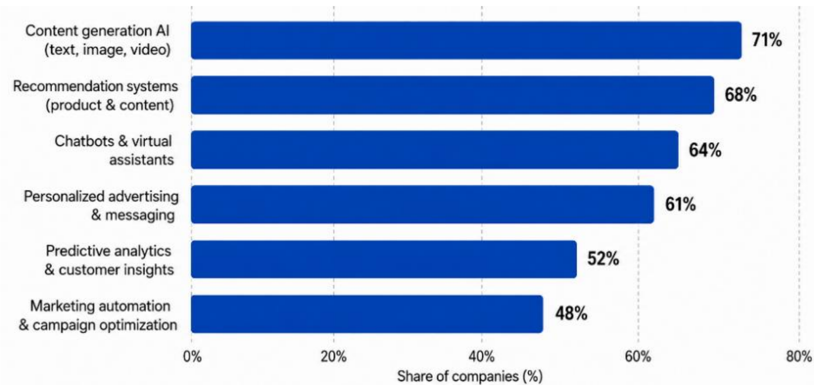

Figure 1. Evolution of AI Usage as a Tool for Influencing Customer Behavior (2020–2026)

Source: compiled by the author based on McKinsey, Deloitte [8], Salesforce [9], Gartner [11], Statista [12], and conceptual approaches to digital marketing and customer behavior presented in [13]

	2022	2023	2024	2025	2026
AI Recommendation Systems (Amazon, Netflix, TikTok)	Deep learning for more accurate and context-aware recommendations	Cross-platform personalization and intention forecasting	Hyper-personalization based on behavior, context, and intent	Emotion-aware recommendations and situational adaptation	Autonomous recommendation systems fully adapted to real-time context
Generative Content (ChatGPT, Gemini)	Mass use of AI for copywriting and visual content creation	Personalized content for individual users and segments	Multimodal generative content (text, image, video, audio)	Automated content creation based on behavior and intent	AI agents generate content autonomously for specific marketing objectives
AI Chatbots (Customer Service, Sales Bots)	NLP-powered bots for understanding customer intent	Context-aware dialogues and personalized offers	Proactive engagement based on user behavior	AI agents negotiate, up-sell and support sales closure	Autonomous AI consultants with emotional intelligence
Predictive Analytics (Forecasting & Insights)	Prediction of purchase behavior and product affinity	Prediction of intent and campaign performance optimization	Real-time predictive analytics for scenario modeling	AI models detect micro-signals in behavior	Autonomous forecasting and decision support in marketing
Personalized Advertising (AdTech, Programmatic)	Budget optimization with machine learning	Creative personalization for different segments	AI-optimized channels, bids and creatives (based on LTV)	Hyper-personalized ads with emotion and context awareness	Autonomous ad systems adapting in real time to user emotions and business goals
Dynamic Pricing (Price Optimization)	Machine learning for real-time price optimization	Personalized pricing for customer segments	Context-aware pricing based on behavior and market conditions	Individualized pricing for each user	Autonomous dynamic pricing to maximize profit and loyalty
AI Search & Voice Assistants (Search AI, Voice Assistants)	Understanding context and user intent	Personalized search results and recommendations	Multimodal search (text, voice, image)	AI assistants for purchases and decision making	Proactive AI assistants anticipating user needs
Impact Level on Consumer Behavior	High	Very High	Critically High	Extreme	Autonomous Impact in Real Time

Figure 2. Evolution of AI Usage as a Tool for Influencing Customer Behavior (2022–2026)

Source: author's development based on systematization of scientific literature and analytical reports [10; 11; 13–16]

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