

## **ARTIFICIAL INTELLIGENCE IN RETAIL: CONSUMER ATTITUDES TOWARD VOICE COMMERCE**

**Septemvrina Kostova**

University of National and  
World Economy

ORCID 0009-0002-5312-1255

**Goran Angelov**

University of National and  
World Economy

ORCID 0009-0000-0862-8685

Как да се цитира тази статия / How to cite this article:

Kostova, S., Angelov, G. (2026). Artificial Intelligence in Retail: Consumer Attitudes toward Voice Commerce. *Economic Thought Journal*, 71 (3), 468–492.

<https://doi.org/10.56497/etj2671306>

To link to this article / Връзка към статията:

<https://ethj.iki.bas.bg/etj/article/view/1311>



Published online / Публикувана онлайн: 10 October 2026



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# ARTIFICIAL INTELLIGENCE IN RETAIL: CONSUMER ATTITUDES TOWARD VOICE COMMERCE

**Septemvrina Kostova**

University of National  
and World Economy

ORCID 0009-0002-5312-1255

**Goran Angelov**

University of National  
and World Economy

ORCID 0009-0000-0862-8685

*Abstract:* The global volume of e-commerce has been steadily increasing, prompting retailers to adopt online sales channels alongside traditional physical stores. A similar trend is observed in the adoption of artificial intelligence in retail, where AI is becoming a key prerequisite for market competitiveness. E-commerce encompasses multiple dimensions, and the present study focuses on one increasingly relevant area: voice commerce. The paper aims to examine the use of artificial intelligence in voice commerce through an online consumer survey and in-depth interviews with industry practitioners. The findings provide insights into consumer attitudes, perceived benefits, barriers to adoption, and the practical implications of AI-based voice commerce for improving customer experience and enhancing market competitiveness.

*Keywords:* artificial intelligence; voice commerce; e-commerce; consumer behaviour; retailing

*JEL codes:* L81; M31; O33

*DOI:* <https://doi.org/10.56497/etj2671306>

*Received:* 2 July 2026

*Revised:* 25 August 2026

*Accepted:* 18 September 2026

## Introduction

Artificial intelligence (AI) has become an important operational tool that helps retailers manage costs, better align their offerings with consumer needs, and create more personalized customer experiences. However, the implementation of AI in retail cannot be compared to a software package that can simply be purchased, installed, and immediately put into operation. To generate meaningful benefits, AI systems in retail require access to well-structured, relevant, and high-quality data.

One of the key factors in developing effective AI-driven solutions is the creation and management of reliable databases. This process relies heavily on the expertise of data

analysts and AI specialists who have the knowledge required to develop, train, and optimize algorithms that support business objectives. By transforming large volumes of data into actionable insights, these experts enable retailers to improve decision-making, enhance customer engagement, and strengthen their competitive position in the market.

The aim of the present study is to analyse the potential for implementing AI-based voice commerce at eMAG and its impact on consumer behaviour, customer satisfaction, and the efficiency of the online shopping process. More specifically, the study examines the level of adoption, effectiveness, and consumer perception of voice commerce through AI technologies, such as virtual assistants and chatbots with voice interfaces, as well as its influence on consumer behaviour. The empirical object of the study comprises users of the eMAG platform.

Subject of the study:

The use of voice-based AI interfaces in online purchasing, with a focus on consumer behaviour, attitudes, and interaction.

Initial empirical gap:

Research on AI and voice commerce is mainly conducted at a conceptual or technological level, while fewer studies examine actual consumer behaviour, trust, perceived usefulness, and barriers to implementation in a specific online retail market. This article addresses this gap by providing empirical evidence from Bulgarian consumers and industry practitioners.

### ***Research Questions***

The study addresses the following research questions:

1. How do consumers perceive voice commerce on the eMAG platform, and to what extent do they use voice assistants and voice-based AI interfaces for online shopping?
2. To what extent does voice commerce improve the online shopping experience by facilitating product search, navigation, product selection, and purchase completion, including the time required to complete a purchase?
3. What factors influence consumer trust in voice-based AI technologies, and what are the main barriers to their adoption, particularly regarding security, personal data protection, and the limitations of voice technologies?
4. What are the main differences between traditional e-commerce and voice commerce from the consumer's perspective, and how may the implementation of AI-based voice interfaces influence customer experience, purchase completion, and conversion rates?

### ***Research Hypotheses:***

H1: The use of a voice assistant has a positive effect on customer satisfaction.

H2: AI-based product recommendations increase the average order value.

H3: Low trust in data security limits consumers' willingness to use voice commerce.

H4: Previous experience with voice assistants positively influences consumers' intention to use voice commerce.

In terms of retail operations, AI can help reduce costs and improve operational efficiency. For example, by providing intelligent customer service through chatbots and by personalizing the shopping experience with more accurate product and inventory-related recommendations based on customer preferences, AI can contribute to lower labour costs. It can also increase brand relevance by predicting consumer purchasing trends based on shopping patterns, customer interactions, and social media activity.

### **Advantages of Artificial Intelligence in Retail**

Retail businesses with appropriate leadership and a data-driven mindset can benefit significantly from the implementation of AI. However, they must first establish a culture of decision-making based on reliable data and AI-generated insights. In today's competitive environment, retail leaders need to carefully assess the practical impact that AI-based solutions may have on their business processes. In addition to reducing costs, AI in retail can provide valuable customer insights, improve customer engagement, and support sales growth. As a result, AI is increasingly regarded as one of the key technologies shaping the future development and competitiveness of the retail sector.

As companies achieve cross-functional maturity in the use of AI, they can apply this technology to gain a deeper understanding of consumer preferences and behaviour across multiple channels. AI is capable of analysing large and seemingly unrelated datasets more quickly and comprehensively than traditional analytical tools, as it can identify patterns, correlations, and trends that may not be immediately visible through conventional methods.

Product recommendations provide multiple benefits for e-commerce retailers, including a higher number of returning customers, improved customer retention and sales, a more personalized shopping experience for online shoppers, and the opportunity to implement personalized email marketing campaigns.

## **Methodological Rationale for the Five-Step Framework for AI Implementation in Retail**

The framework is conceptually consistent with established approaches to enterprise AI, data analytics, and iterative development, including the business-oriented perspective of Davenport and Ronanki (2018), the strategic role of AI and data described by Iansiti and Lakhani (2020), the data-analytic thinking proposed by Provost and Fawcett (2013), and the iterative logic of the CRISP-DM methodology (Chapman et al., 2000). Accordingly, the framework is presented as a proposed methodological systematization adapted to the specific characteristics of retail businesses, rather than as a universally established model attributed to a single author. The five-step framework presented in this study is an author-developed adaptation of established approaches to problem-driven innovation, data-centric analytics, and iterative implementation, tailored to the context of retail businesses.

The proposed framework follows the logic of *problem-driven and data-driven innovation*. Its central premise is that AI adoption should not begin with the selection of a particular technology but with the identification of a specific business problem whose solution may generate measurable value for the enterprise. This approach is consistent with contemporary perspectives on enterprise AI, which emphasize the importance of understanding the business context, identifying relevant use cases, and assessing the data available to support AI applications (Davenport & Ronanki, 2018; Iansiti & Lakhani, 2020).

This study proposes a five-step framework for introducing AI into retail businesses and transforming it into a source of competitive advantage. The framework consists of: (1) identifying the problem areas of the retail business; (2) determining the data required to address the selected problem; (3) establishing data collection and analysis practices; (4) developing a prototype for collecting and applying data to improve the selected business process; and (5) implementing the prototype in practice.

The first step, *identifying the problem areas of the retail business*, establishes the business rationale for AI adoption. It directs managerial attention towards processes where AI may improve operational efficiency, decision-making, customer experience, forecasting, inventory management, or other dimensions of business performance. This problem-oriented starting point helps prevent technology-driven implementation in which AI is introduced without a clearly defined organizational need.

The second and third steps reflect the *data-centric logic of AI implementation*. Identifying the data required to solve a business problem and establishing appropriate

practices for data collection, integration, processing, and analysis are essential because the effectiveness of AI applications depends substantially on the availability, quality, accessibility, and relevance of data. In retail, such data may include information on sales, inventory, prices, promotions, customer behaviour, supply chains, and store operations. The framework therefore treats data not merely as a technical input but as a strategic resource supporting the creation of business value (Provost & Fawcett, 2013; Iansiti & Lakhani, 2020).

The fourth step, *developing a prototype*, introduces an iterative and experimental dimension into the implementation process. The prototype is intended to assess whether the required data can be collected and processed successfully, whether the proposed AI application is technically feasible, and whether it can contribute to improving the selected business process. This stage makes it possible to test the expected value of the solution before committing to a broader implementation. In this respect, the framework is conceptually consistent with iterative approaches to data analytics and experimental innovation, including the logic of business understanding, modelling, evaluation, and deployment found in the CRISP-DM methodology (Chapman et al., 2000).

The fifth step, *implementing the prototype in practice*, represents the transition from an experimental solution to operational use. It involves integrating the AI application into the relevant business process, establishing performance indicators, and monitoring its effects on efficiency, costs, service quality, decision-making, or other relevant organizational outcomes. Implementation should therefore be understood not as the final technological act but as a process requiring managerial coordination, organizational adaptation, and continuous evaluation.

## **Artificial Intelligence as a Tool in Management Decisions**

Artificial intelligence is increasingly used as a tool to support management decisions in retail and e-commerce. AI-based solutions enable retailers to analyse large volumes of customer, product, sales, and operational data in order to improve decision-making, optimize business processes, and enhance customer experience. When considering the adoption of such technologies, retailers should evaluate not only their potential benefits but also the organizational, technological, and data-related requirements for their effective implementation.

New AI tools are helping to create more competitive opportunities for retailers by improving search, personalization, merchandising, and product discovery. One example

is Fast Simon, which offers AI-based shopping optimization solutions and provides software development tools that can be integrated into e-commerce user interfaces. Such solutions allow retailers to improve product search, filtering, A/B testing, personalized recommendations, and visual discovery.

Another AI-powered platform for online retailers is Vizia, which focuses on the use of visual data to support conversion optimization. Vizia's AI platform helps e-commerce retailers evaluate how consumers perceive product images and visual content. This enables retailers to optimize their visual presentation and identify which product images are more likely to motivate target consumers to make online purchases.

Fast Simon's software development kit requires limited code integration and allows retailers to connect its platform with different e-commerce user interfaces. Combined with a self-managed dashboard, such AI-based solutions provide retailers with greater control over key retail functions, including merchandising, search, A/B testing, collection filters, personalization, visual discovery, and product recommendations.

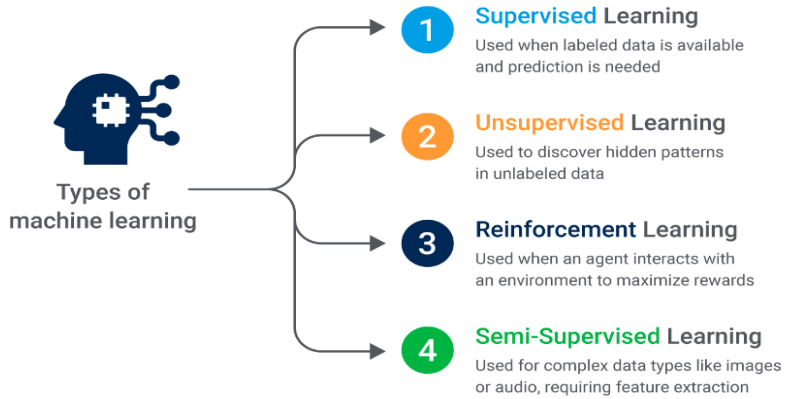
AI helps democratize access to advanced retail technologies by enabling a broader range of retailers to compete more effectively. Most retailers, including many large brands, do not have the extensive engineering resources available to companies such as Amazon. AI-based e-commerce tools and intelligent digital assistants, such as Google Duplex, are developing capabilities that support automated and voice-enabled shopping processes, including:

- creating shopping lists based on the shopper's natural voice commands;
- automated product search;
- placing online orders on behalf of the customer.

Among the main applications of AI in e-commerce, some are particularly effective in supporting both physical and online retail objectives. Artificial intelligence is a key driver of transformation in the retail sector and an important source of competitive advantage. This transformation is based on several technological developments, including machine learning (ML), natural language processing (NLP), computer vision, and predictive analytics.

- *Machine learning (ML)*, as a branch of artificial intelligence, focuses on the development of algorithms that learn from collected data, identify patterns, make predictions, and support decision-making. These models are not programmed only through explicit rules; instead, they improve their performance by learning from data. One of the key advantages of ML is its ability to process large and complex datasets that would otherwise require extensive manual analysis.

What are types of machine learning?



Source: Akamai (n.d.).

Figure 1. Types of machine learning

- *Natural language processing (NLP)* is a key AI technology underlying many everyday digital services, including virtual assistants such as Siri and Alexa, machine translation systems, and increasingly accurate text prediction tools. NLP enables machines to process, interpret, and generate human language, thereby facilitating more natural interaction between users and digital systems.

In e-commerce, NLP can be applied to product recommendations, customer service chatbots, voice-based search, and sentiment analysis of customer reviews. By analysing user preferences, browsing history, and textual feedback, NLP helps retailers better understand customer needs and improve the personalization of the online shopping experience (International Organization for Standardization, n.d.).

- *Computer vision* is a subfield of AI that enables machines to analyse and interpret visual data, such as images and videos. It uses machine learning techniques to extract relevant insights from visual information. Computer vision can be understood as the interaction of three main processes that work together and inform one another: recognition, reconstruction, and reorganization (IBM, n.d.).

- *Predictive analytics* is widely used in marketing, as it enables retailers to forecast customer behaviour, preferences, and needs. More specifically, it refers to a statistical and data-driven approach that supports customer retention strategies, improves loyalty management, and helps reduce customer churn (Talend, n.d.).

These technologies increasingly aim to support hyper-personalization, real-time

insights, and continuous improvement of the customer experience. Another competitive advantage they provide is demand forecasting, which helps retailers balance overstocks and stock shortages. Kumar et al. (2023) identify several AI tools used in e-commerce, including:

- customer segmentation;
- product analysis;
- intelligent pricing;
- customer lifetime value prediction;
- personalized product recommendations;
- competitive price monitoring.

According to Satija and Singla (2025), several additional AI applications can be identified in e-commerce. These include fraud detection and cybersecurity, where AI is used to detect anomalies in payments, accounts, and transactions and to enhance overall security. AI also contributes to supply chain efficiency by improving logistics, delivery processes, and operational performance.

Predictive and extrapolative analytics support better decision-making, planning, and management, while inventory management automation enables retailers to optimize stock levels and reduce manual intervention in inventory-related processes. Computer vision and image recognition are also relevant in e-commerce, particularly for visual search, product recognition, and image-based product discovery.

In addition, speech recognition supports voice interfaces, digital assistants, and voice-driven customer interactions. Biometrics may be applied to identification, trust-building, and security-related processes, while text analysis and natural language processing (NLP) support the interpretation of customer requests, content analysis, and feedback evaluation.

According to Nguyen (2026), artificial intelligence has a multidimensional impact on customer experience and customer satisfaction. First, AI enables 24/7 customer support through chatbots and virtual assistants. Second, the study highlights the need to balance technological efficiency with human interaction. Third, AI improves the customer experience at specific touchpoints, which can significantly increase customer satisfaction.

AI also plays a key role in big data management. Hasan and Rabby (2026) argue that big data and artificial intelligence create both opportunities and challenges for business growth in e-business. Through intelligent algorithms, large datasets can be transformed into real-time solutions that support decision-making. E-commerce platforms generate and process substantial volumes of data, which can be used to optimize operational efficiency and improve customer experience.

AI-enabled e-commerce tools and intelligent digital assistants, such as Google Duplex, are developing capabilities like creating shopping lists based on the shopper's natural voice and placing online orders on behalf of customers. Among the main applications of AI in e-commerce, some are particularly effective in supporting both in-store and online sales objectives. From this perspective, there are four major applications of AI in e-commerce for Chatbots and other virtual assistants. E-commerce merchants are increasingly turning to chatbots, or digital assistants, to offer 24/7 support to their online shoppers. Built with artificial intelligence technologies, chatbots are becoming increasingly intuitive and enable a better customer experience.

### ***AI Personalization in E-Commerce***

Ranked among the most effective modes, personalization is the foundation of AI in e-commerce marketing. Based on the specific data collected from each online user, AI and machine learning in e-commerce infer important user insights from the generated customer data. For example, the AI-enabled tool Boomtrain can analyse customer data from multiple touchpoints (including mobile apps, email campaigns, and websites) to see how they interact online. This data allows e-commerce merchants to make relevant product recommendations and provide a consistent user experience across devices.

### **Voice Commerce and its Implications for Online Commerce**

In their article, P. Prasanthi, D. Paul Dhinakaran, S. Neelima, M. Rajalakshmi, S. Natarajan, and R. Kumar describe voice commerce not as something new but rather an upgrade of e-commerce in human-computer interaction. According to the authors, this type of commerce is used more for repeat purchases (reordering) than as a channel for discovering new products. As weaknesses, they point out the lack of visual feedback, difficulties with complex categories, problems with context in long sessions, and the complexity of integration with the existing e-commerce infrastructure.

There are a number of factors that motivate and demotivate users to shop with their voice. A study of 400 people (Mittal & Manocha, 2023) highlights that usefulness, ease of use, and social influence are among the factors that have a positive impact on app usage. Among the factors that have a negative impact are fears of their personal data being leaked. Entertainment is the only factor that users indicated as insignificant.

Voice commerce is designed to be and is easy to implement. From a user perspective, all you need is your voice. Then you need the technology to make it happen. There are four requirements that are essential for its proper implementation.

1. A device that has a voice assistant: this can be a smartphone or similar voice-activated device (such as Amazon Echo or Google Home).
2. A command to wake up the device, such as "Hey Siri".

3. Use of a trigger word (usually a verb or action). For example, in "Siri, order product XYZ," the keyword would be "order".

4. The device should recognize the voice and avoid placing a command following what is assumed to be an "unknown" voice.

### ***Benefits of Voice Commerce***

Voice-powered devices are used for a variety of purposes, such as listening to music, checking the weather, searching for information online, and performing everyday activities such as ordering food and shopping online. Since commerce is such a massive opportunity for voice technology, many companies have already taken advantage of voice commerce to improve their customers' online experience. The main benefits are convenience, availability at any time of day, speed of purchase, and personalization of shopping experiences.

### ***Challenges of Voice Commerce***

Despite its potential, voice commerce faces several important challenges. One of the main limitations is related to speech recognition. Human voices differ in terms of accent, intonation, pronunciation, and speech patterns, which may make it difficult for voice-based systems to interpret commands accurately. In addition, language barriers and the complexity of natural conversation remain significant obstacles to the wider adoption of voice assistants. Improving the accuracy and naturalness of voice interactions is therefore essential for increasing consumer trust and encouraging broader use of voice commerce.

Another important challenge is the knowledge gap among consumers. Many users are not fully aware of the capabilities of voice assistants, how they can be used in online shopping, or what potential risks may be involved. This lack of knowledge can reduce adoption, especially when combined with concerns about privacy, data protection, and the accuracy of voice-based transactions.

### ***Future Development of Voice Commerce***

Voice commerce has significant potential for both B2C and B2B e-commerce once the main barriers to adoption are addressed. In B2C markets, voice technologies can simplify product search, support repeat purchases, and reduce the time required to complete routine transactions. In B2B contexts, voice commerce may also support operational processes in warehouses, offices, and procurement activities while helping companies differentiate themselves through more innovative digital services.

For B2B companies, voice commerce may be particularly useful in improving internal processes such as inventory checks, order placement, supply coordination, and warehouse communication. Companies that adopt such technologies early may be able to provide

their business customers with faster, simpler, and more efficient online purchasing experiences.

Voice commerce provides an alternative to traditional keyboard- and mouse-based online shopping. It enables consumers to search for products, add items to a cart, reorder previously purchased products, and complete transactions through voice commands. In this context, virtual assistants such as Amazon Alexa and Google Assistant play an important role in enabling voice-based interactions between consumers and online retail platforms. The main consumer benefits of voice shopping include hands-free interaction, convenience, the ability to shop while performing other activities, and faster access to information and results.

### ***Implementation of Voice Shopping***

To use voice commerce tools, consumers typically need a mobile device, a smart speaker, or another voice-enabled device paired with a virtual assistant. Popular examples include Amazon Echo, powered by Alexa, and Google Home, powered by Google Assistant. These assistants are used for various purposes, including searching for information, controlling smart home devices, ordering food, and supporting online shopping.

In the case of Amazon, for example, consumers can use an Alexa-enabled device to search for, order, and purchase products through voice commands. After the trigger word activates the device, the user can request a product by voice. The system may then use previous purchase history to suggest relevant products. If no similar previous purchase exists, the assistant may recommend alternative products based on available platform data. The user is then asked to confirm the purchase before the order is placed.

### ***Voice Assistants as a New Customer Touchpoint***

Voice assistants represent an important category of AI-enabled conversational agents. They interpret voice commands and the context of user requests in order to perform functional or informational tasks. Their operation is based on a combination of technologies, including automatic speech recognition (ASR), text-to-speech synthesis (TTS), natural language understanding (NLU), and machine learning.

This category of technologies includes smart speakers, AI assistants, digital personal assistants, voice-controlled assistants, and conversational agents. These devices are increasingly used as digital touchpoints between consumers and brands. Initially, their most common functions included playing music, controlling smart devices, providing weather information, answering general knowledge questions, and setting alarms. However, advances in artificial intelligence and machine learning have expanded their business applications, including customer service, product search, personalized recommendations, and voice-enabled purchasing.

Today, digital assistants are increasingly viewed as a new point of interaction between consumers and brands. In online retail, they may support more natural, convenient, and personalized forms of communication, while also creating new opportunities for customer engagement and commercial interaction.

For the empirical part of the study, the following methodological framework was applied.

#### *Stages of the Study*

1. Selection of an online store and definition of the relevant functionality;
2. Data collection through an online survey;
3. Conducting semi-structured interviews;
4. Analysis and interpretation of the collected data;
5. Formulation of conclusions and recommendations.

#### *Methodological Design*

The study applies a mixed-methods approach, combining a quantitative online survey with qualitative semi-structured interviews. The primary data sources include survey responses, interviews, and observations, while the secondary sources include scientific publications, reports, and market analyses.

The quantitative component is based on a survey conducted among more than 100 users familiar with online shopping and the eMAG platform. The sample is non-random and consists of respondents who voluntarily participated in the study. The main selection criteria include digital literacy and frequency of online shopping.

The survey was distributed online and focused on several key indicators:

- perceived ease of use;
- trust in AI;
- customer satisfaction;
- intention to reuse voice commerce solutions.

#### *Indicators and Variables*

The independent variables include education, digital literacy, and previous experience with voice technologies. The dependent variables include frequency of voice commerce use, level of trust, satisfaction, purchase intention, and average order value.

The qualitative component consists of in-depth semi-structured interviews with five participants from practice. These interviews were used to obtain expert insights into the practical application of AI and voice technologies in online retail.

Where possible, behavioural analysis may include indicators such as clicks, time spent on the website, and cart abandonment rate. In addition, data from an online store

may be analysed before and after the implementation of a voice-based function, using key metrics such as conversion rate, average order value, purchase completion time, and bounce rate.

The collected data may be processed using statistical software such as SPSS, R, or Python.

### *Limitations of the Study*

The study has several limitations. First, the sample size is limited and the sample is not statistically representative of the target population. Second, voice commerce is still a relatively new technology for many users, which may have influenced their responses. Third, there are difficulties in simulating a fully realistic online shopping environment. Additional limitations include restricted access to real user data, possible subjectivity in the responses, and the rapid development of AI technologies.

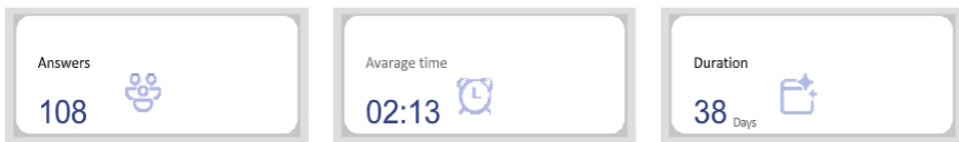
### *Expected Results*

The study is expected to identify key factors influencing the adoption of voice commerce, assess the role of AI in personalization, and provide recommendations for businesses and developers. It may also indicate the potential for implementing voice commerce in eMAG, suggest improvements in UX, and outline practical guidelines for the application of voice interfaces in online retail. These guidelines may include improving the UX/UI of voice interfaces, developing AI strategies for e-commerce, and optimizing marketing campaigns.

The results may be useful for online retailers seeking to improve customer experience, developers of AI-based solutions, and marketing specialists.

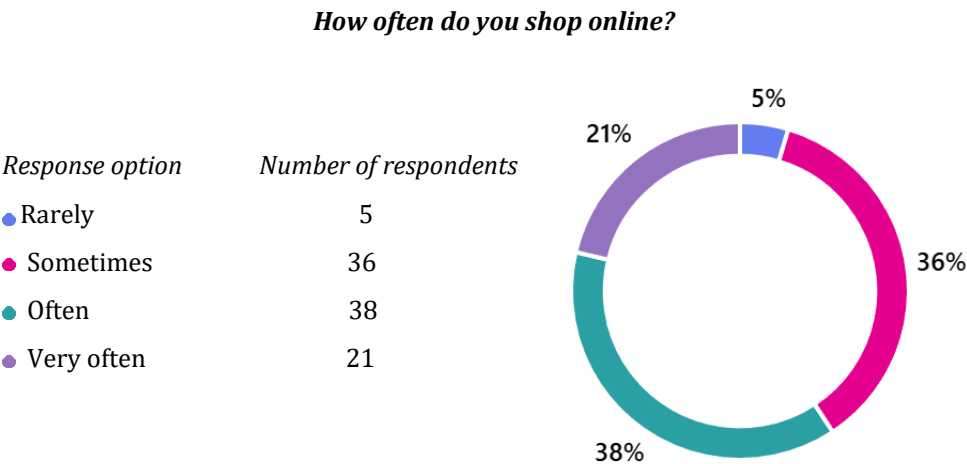
The survey questionnaire is presented in Appendix 1.

The survey was conducted among 108 respondents. The sample is non-random and not statistically representative of the overall population of eMAG users or online shoppers in Bulgaria. The respondents include students and lecturers from the University of National and World Economy, as well as employees from small and medium-sized enterprises.



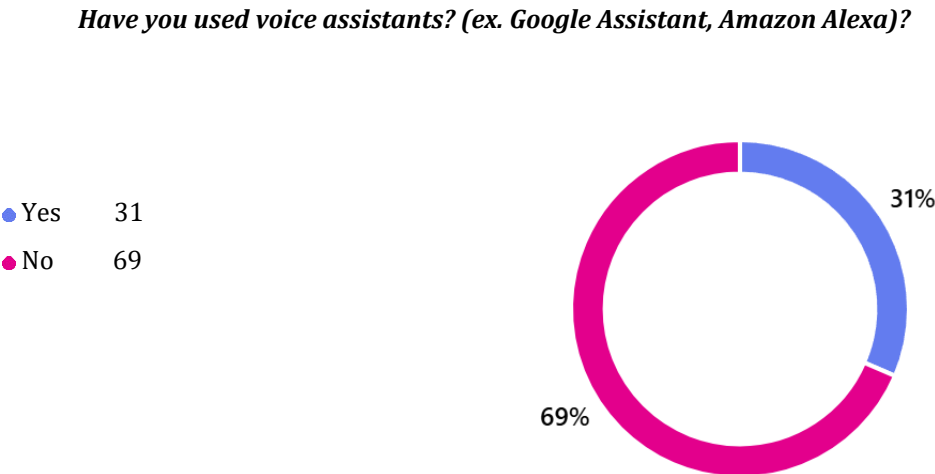
*Source:* Authors' calculations.

Figure 2. Number of answers, average time, and duration



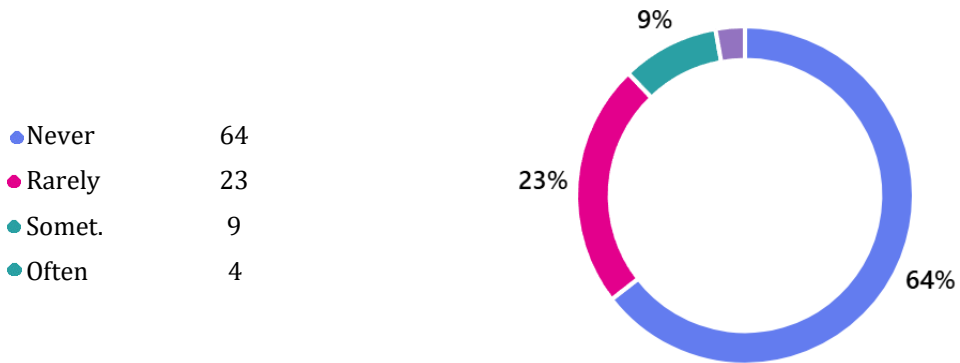
Source: Authors' calculations.

Figure 3. Frequency of online shopping among respondents



Source: Authors' calculations.

Figure 4. Respondents' experience with voice assistants

**How often do you use them?**

Source: Authors' calculations.

Figure 5. Frequency of using voice assistants

*Based on the survey results, the following conclusions can be drawn:*

1. Almost all respondents shop online.
2. Voice commerce is not yet widely used. Although there is some interest in this technology, relatively few respondents have practical experience with it.
3. The main concerns are related to lack of trust and uncertainty about the accuracy of voice command execution.
4. Respondents also expressed concerns about the protection of their personal data. These concerns are partly justified, given the growing number of cybersecurity incidents and the increasing sensitivity of consumers to data privacy issues.
5. Convenience is perceived as one of the main benefits of voice commerce, particularly in terms of time savings and faster product search.
6. A key limitation is the social context of use. Potential users believe that speaking aloud is not always convenient, especially when they are in public places.

Overall, the survey results suggest that consumers are cautious about voice commerce but do not reject it entirely. This indicates potential for future development, provided that data security, trust, and the accuracy of voice-based interactions are improved.

The second part of the empirical study was based on semi-structured interviews. The interview questions are presented in Appendix 2. Five practitioners with experience in online sales were interviewed. Their responses are summarized below.

### *1. Changes in Online Consumer Behaviour*

Online consumer behaviour has changed significantly. Today, users tend to lose interest much faster. If a product, message, or interface does not attract their attention within the first few seconds, they are likely to move on.

This change is largely influenced by social media. Constant scrolling has created a habit of rapid information processing. Users increasingly scan content rather than read it in depth. As a result, they expect online content to be clear, concise, and immediately understandable.

This behavioural shift is particularly visible in e-commerce. Customer experience, or CX, is becoming increasingly important. Despite the current limitations of artificial intelligence, companies are increasingly using AI assistants to facilitate user interaction and speed up the purchasing process.

Although AI still has limitations, its role in customer service and online sales continues to grow. Consumers increasingly expect speed, convenience, and clarity. If these expectations are not met, they are likely to leave the platform and continue searching elsewhere.

### *2. The Role of Data in Online Commerce*

Data are the foundation of any effective online commerce system. Without data, a business may continue to operate, but it becomes much more difficult to optimize processes, forecast demand, and manage operations effectively.

Particularly important are data related to customer behaviour, such as which products customers view, how long they spend on a product page, when they hesitate, when they make a purchase, when they abandon the shopping cart, and what feedback they provide afterwards.

This type of analytics is already essential, as it can be used to build machine learning models capable of predicting customer behaviour. For businesses, this is highly valuable because it enables more accurate planning of deliveries, product availability, promotions, and personalized offers.

The example of a physical store is illustrative. If a customer passes by a section or shelf and does not find the product they are looking for, the store may lose that customer at that moment. In a traditional system, stock shortages are often identified reactively, only after an employee checks the shelf or warehouse. However, if data are collected and analysed in real time, retailers can identify when a product is running out, how customers move through the store, and where the customer experience is disrupted.

The same logic applies to online retail. Data show not only what customers purchased but also what they considered purchasing. This is where significant value emerges: in

understanding customer intent, hesitation, and behaviour before the actual purchase.

For this reason, the role of data will become increasingly important. Based on data-driven insights, retail processes can be optimized, customer experience can be improved, and personalization can become more accurate.

Yes, we use such solutions both internally and in projects for our clients.

### *3. Use of AI-Based Solutions in Practice*

The interviewed practitioners indicated that AI-based solutions are already being used both internally and in client projects. One respondent noted that their organization works with Google Enterprise AI infrastructure at a corporate level and has access to various models, studios, and tools for building custom AI agents. These agents can be designed to automate specific tasks according to the needs of individual team members or departments.

The respondent also explained that the organization had previously developed its own AI-based solution, which was later offered to clients after its practical value had been recognized. Today, this solution is part of the company's broader portfolio of digital and AI-based services.

The practitioners also indicated that AI and automation are applied in a wide range of processes, including internal organization, data analysis, prototype development, client solutions, communication automation, calls, account management, and strategic activities. These technologies are used on a daily basis. In addition, regular sessions are held to review new updates, models, capabilities, and practical applications. This allows organizations to test new solutions quickly and adapt them to specific client cases.

A particularly important aspect is the practical orientation of AI implementation. When working with clients, companies often prepare prototypes in order to demonstrate how a particular solution would function in a specific business context. This is important because many clients do not expect only a general idea but also a practical demonstration, clear value, and a better understanding of the expected results.

### *4. Concerns Related to Data Security and Infrastructure*

The interviews show that concerns about AI implementation vary across clients. Some clients simply state that they want their data to remain under their control, although they do not always understand the technical implications of this requirement. Others have a deeper understanding of the issue, and their concerns about data protection and infrastructure are well justified.

A major problem is that, alongside the rapid growth of interest in AI, many companies have started developing assistants and automation tools without paying sufficient attention to infrastructure, security, or data management. There are numerous solutions on the

market, but not all of them are based on reliable platforms or transparent terms of use. In practice, many users and companies do not carefully examine the detailed terms and conditions of these tools.

For this reason, security should be treated as a fundamental layer in AI-based solutions from the very beginning. The first consideration is infrastructure, which should be scalable, flexible, and adaptable to different levels of use. The second mandatory layer is data security.

Some organizations work with solutions located within European territory, including data centres in Frankfurt, and are thus aligned with European regulatory requirements. However, having a physical location in Europe is not sufficient on its own. It is also important to consider how access rights are structured, where information is actually stored, who controls it, and how it is encrypted.

The concept of the European sovereign cloud is also becoming increasingly relevant. Although many providers use this term, it is necessary to examine carefully what it actually means in practice. The fact that data are physically stored in Europe does not always guarantee their full control or independence. Therefore, sensitive AI solutions should include additional mechanisms for encryption, access restriction, and data governance.

#### *5. Risks Related to the Use of AI Platforms*

One of the main risks identified in the interviews is the uncontrolled uploading of customer information to various AI platforms. This risk is particularly relevant for smaller companies, which often use free or insufficiently transparent tools without knowing where the data are stored, whether they are retained, whether they are used for model training, and who has access to them.

For this reason, security should not be treated as an additional feature but as a precondition for AI implementation. AI can create significant value only when it is built on appropriate infrastructure, a clear data policy, access control, and effective information protection. In this sense, security should precede functionality.

#### *6. Future Development of AI in Bulgarian Online Retail*

According to the interviewed practitioners, the development of AI in Bulgaria is likely to progress more slowly than in more technologically advanced markets. A realistic time horizon for broader adoption may be five to seven years rather than three to five years.

Companies of different sizes, ranging from large retailers to smaller fashion brands, boutiques, and online stores, are already beginning to automate processes. However, this automation often starts internally rather than directly from the customer-facing side. The

first areas of implementation usually include warehouses, deliveries, inventory management, internal organization, and order processing. Only after these internal processes are optimized does automation gradually extend to customer-facing activities.

The interviewed practitioners emphasized that many businesses still value human contact. For them, it remains important that customers have the opportunity to communicate with a real person, especially when the purchase involves consultation, product-specific questions, or more complex decision-making. Nevertheless, the overall direction is clear: operational processes in online retail are expected to become increasingly automated.

In the coming years, AI is likely to be associated with specialized agents capable of performing specific autonomous tasks. These tasks may include order processing, customer service, product recommendations, planning, calls, sales support, data analysis, and inventory control.

People are not expected to disappear from these processes, but their role is likely to change. Human employees will increasingly monitor, verify, manage, and control the activities performed by automated systems. At the operational level, however, many routine activities may gradually be transferred to AI-based agents.

Concerns that AI may replace jobs are already partly visible in practice. However, this process is not simply the result of technology replacing people; it also comes from people voluntarily delegating routine tasks to algorithms and digital assistants. Instead of manually taking notes, searching for information, or managing every operational step, employees increasingly use AI systems to accelerate these activities.

Therefore, the key issue is not whether AI will enter online retail but who will be able to work effectively with it. Employees who develop the ability to use AI tools properly are likely to increase their value to organizations, while those who refuse to adapt may face greater pressure.

In online commerce, AI solutions are expected to develop on several levels. The first level is customer support, including chat and voice assistants for standard customer inquiries. The second level is sales support, where AI assistants may process inquiries, qualify leads, and support outbound communication. The third level is internal optimization, including warehouse management, deliveries, inventory availability, planning, and data analysis.

The most significant change is that AI will no longer be perceived as a separate tool but as a normal part of the infrastructure of online commerce. Retailers that implement AI solutions in a secure, strategic, and well-managed manner are likely to gain a substantial competitive advantage.

### ***Future Research Directions***

Future research may further enrich the literature on AI and voice commerce by examining the influence of demographic and socio-economic factors on consumer attitudes. In particular, subsequent studies may analyse the role of age, gender, education, digital literacy, and previous experience with voice technologies in shaping attitudes toward voice commerce and AI-based shopping solutions.

### **Conclusion**

Bulgarian retailers should increasingly adopt artificial intelligence (AI) in order to respond more effectively to changing market conditions and growing competition in online and omnichannel retail. Rapid developments in AI and machine learning create opportunities for improving business operations, customer service, personalization, demand forecasting, and the overall customer experience. The findings of the study indicate that voice commerce is still not widely used among the surveyed respondents, although there is potential for future development. Most respondents already shop online, but their experience with voice assistants remains limited. The main barriers identified in the survey are related to trust, data security, the accuracy of voice command execution, and the convenience of using voice technologies in different social contexts. At the same time, respondents recognize potential benefits such as faster product search, time savings, and greater convenience. The interviews with practitioners confirm that AI is increasingly becoming part of the infrastructure of online commerce. According to the interviewed experts, companies are beginning to apply AI not only in customer-facing activities, such as chatbots, voice assistants, and personalized recommendations, but also in internal processes, including inventory management, delivery planning, order processing, and data analysis. This suggests that the adoption of AI in retail is likely to develop gradually, starting with internal operational optimization and later expanding toward direct customer interaction. A key conclusion of the study is that the successful implementation of AI-based voice commerce depends on more than technological availability: it also depends on consumer trust, data protection, usability, and the ability of retailers to integrate such solutions into existing business processes. For Bulgarian retailers, AI-based tools may provide competitive advantages by supporting personalization, improving customer engagement, reducing operational inefficiencies, and enabling more data-driven decision-making. However, the implementation of AI should be approached strategically. Retailers need reliable data, appropriate infrastructure, clear data governance policies, and sufficient organizational capacity. Larger companies may develop their own AI models and platforms, while small and medium-sized retailers may benefit from ready-made AI solutions adapted to their specific business needs. Overall, the study shows that AI and voice commerce have

significant potential in Bulgarian online retail, but their wider adoption will depend on the ability of businesses to build trust, ensure security, and demonstrate clear value for consumers. Future investments in AI should therefore focus on improving customer experience, transparency, and long-term competitiveness beyond automation and efficiency.

### Credit Authorship Contribution Statement

**Septemvrina Kostova:** Conceptualization; Methodology; Supervision; Validation; Writing – review and editing.

**Goran Angelov:** Investigation; Data curation; Formal analysis; Visualization; Project administration; Writing – original draft; Writing – review and editing.

### Conflicts of Interest

The authors have no conflicts of interest to declare.

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**Septemvrina Kostova**, PhD, is a Professor at the University of National and World Economy. ORCID 0009-0002-5312-1255, costovs@yahoo.com

**Goran Angelov**, PhD, is a Chief Assistant Professor at the Department of Economics of Trade, University of National and World Economy. ORCID 0009-0000-0862-8685, gangelov@unwe.bg

How to cite this article:

Kostova, S., Angelov, G. (2026). Artificial Intelligence in Retail: Consumer Attitudes toward Voice Commerce. *Economic Thought Journal*, 71 (3), 468–492.  
<https://doi.org/10.56497/etj2671306>

## Appendix 1. Survey Questionnaire

### Part I: Demographic Information

1. **Age:**
  - ☐ Under 18
  - ☐ 18–25
  - ☐ 26–35
  - ☐ 36–50
  - ☐ Over 50
2. **Gender:**
  - ☐ Male
  - ☐ Female
  - ☐ Other
3. **How often do you shop on eMAG?**
  - ☐ Rarely
  - ☐ Sometimes
  - ☐ Often
  - ☐ Very often

### Part II: Experience with Technology

4. **Have you ever used voice assistants, such as Google Assistant or Amazon Alexa?**
  - ☐ Yes
  - ☐ No
5. **How often do you use voice assistants?**
  - ☐ Never
  - ☐ Rarely
  - ☐ Sometimes
  - ☐ Often

### Part III: Attitudes toward Voice Commerce

Please rate the following statements on a scale from 1 to 5, where 1 means “strongly disagree” and 5 means “strongly agree”.

6. I would use a voice assistant to search for products on eMAG.
7. Voice shopping would make the purchasing process easier.

8. I trust AI when shopping online.
9. I am concerned about the security of my personal data.
10. I prefer voice search to traditional search.

#### **Part IV: User Experience**

11. A voice interface would save time.
12. A voice interface would make it easier to choose between products.
13. A voice interface would improve my overall shopping experience.

#### **Part V: Behavioural Intentions**

14. I would use such a feature in the future.
15. I would recommend voice shopping to others.

#### **Part VI: Open Question**

16. What are your main concerns or expectations regarding voice shopping?
- 

## **Appendix 2. Interview Questionnaire**

1. **How has online consumer behaviour changed in recent years?**
2. **What role does data play in the management of online commerce?**  
For example, data collected from browsing behaviour, product views, abandoned carts, purchase history, customer feedback, and website interactions.
3. **Do you use AI-based or automated solutions? If so, in which business processes are they applied?**
4. **What concerns do consumers and businesses have regarding AI, security, and personal data protection?**
5. **How can trust in AI-based voice technologies be built?**
6. **How do you see the future of AI in online commerce in Bulgaria over the next 3–5 years?**