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A Study of the Impact of Artificial Intelligence on Consumer Decision Making

Shmatko Aleksey Dmitrievich[1], Volkova Anastasia Anatolyevna[2], Rasulov Zainodin Nurmagomedovich[3], Remshev Evgeny Yuryevich[4], Olekhver Aleksey Ivanovich[5]

Abstract

The article considers not only the obvious benefits of using AI, but also potential risks associated with changing consumer behavior. The study introduces the User Engagement Index (UEI), which allows measuring and comparing user activity and interaction with marketplaces, considering the influence of AI. The proposed methodology can become the basis for further research in the field of human-artificial intelligence interaction in the digital environment. The UEI formula allows for a comprehensive assessment of user engagement, considering several key factors that influence user behavior on the site.

Keywords: *Consumer, Decisions, AI, Digital Platform, User Engagement Index.*

Introduction

Artificial intelligence is becoming an integral part of modern technologies and business processes. The impact of AI on consumer decision-making, especially in the context of e-commerce, is one of the most relevant research topics. In the context of rapidly developing digital technologies, this not only simplifies the process of user interaction with Internet platforms, but also actively forms consumer behavior patterns, influencing their choices and preferences. In this article, we will look at how artificial intelligence is used to analyze and predict user behavior, as well as to optimize interaction with them.

The integration of AI into consumer decision-making is not always explicit. To understand this phenomenon, it is important to delve deeper into theory and focus on some aspects of human decision-making.

Theoretical aspects of the decision-making process. The foundations of decision theory were laid in the middle of the 20th century. Scientist Herbert Simon (Herbert A. Simon; 1957) He proposed the concept of limited rationality, in which he argued that people, when making decisions, are limited in their information processing capabilities, time and resources. This leads to the fact that solutions are often not optimal. His work served as the basis for further research in the field of cognitive biases and systematic errors in decision-making. Also in 1957, Leon Festinger He substantiated the theory of cognitive dissonance, which explains why people tend to justify their decisions in order to avoid internal conflict between actions and beliefs. Over time, research in the field of decision-making has revealed many factors that can lead to mistakes. In 1974, scientists Amos Tversky and Daniel Kahneman They presented the concept of cognitive distortions, according to which systematic deviations from rational judgment arise from the use of simplified rules or heuristics in decision-making: accessibility heuristics and representation heuristics. Availability heuristic is a condition in which people estimate the probability of an event based on how easy it is to recall examples of that event. Accessibility heuristics can lead to significant errors in

[1] Doctor of Economics, Professor, Head of the Department of Organization Management, Baltic state technical university «VOENMEH» named after D.F. Ustinov, Saint-Petersburg, Russia.
[2] Candidate of Economics, Associate Professor of the Department of Organization Management, Baltic state technical university «VOENMEH» named after D.F. Ustinov, Saint-Petersburg, Russia.
[3] Candidate of Technical Sciences, Associate Professor of the Department of High-Energy Devices of Automatic Systems, Baltic state technical university «VOENMEH» named after D.F. Ustinov, Saint-Petersburg, Russia
[4] Candidate of Technical Sciences, Associate Professor, Associate Professor of the Department of High-Energy Devices of Automatic Systems, Baltic state technical university «VOENMEH» named after D.F. Ustinov, Saint-Petersburg, Russia.

[5] Candidate of Technical Sciences, Associate Professor of the Department of High-Energy Devices of Automatic Systems, Baltic state technical university «VOENMEH» named after D.F. Ustinov, Saint-Petersburg, Russia, e-mail: leshicher@mail.ru (Corresponding author)

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judgment, as readily available information is not always representative. For example, people may mistakenly assess risk based on vivid and emotional events that come to mind faster than more frequent but less noticeable ones. Representation heuristic is a cognitive distortion in which people judge the probability of an event based on stereotypes. For example, if someone looks or behaves typical of a certain group, then people may overestimate the likelihood that they belong to that group, even if it is statistically unlikely. Tversky and Kahneman's research has shown that people often rely on heuristics that make decision-making easier, but at the same time lead to systematic mistakes. In 1989, Gary Klein The concept of natural Decision Making (NDM) has been proposed. She focuses on using intuition and experience to make quick decisions, which can be more effective than trying to follow complex algorithms. In 2004, the American psychologist Barry Schwartz He described the phenomenon in which an abundance of options leads to difficulties in decision-making and, ultimately, to a decrease in satisfaction with the choice. Schwartz argues that the more options a person has, the more difficult it is for them to make a decision, as they experience more doubt and fear about potentially making the wrong choice. Also in his work "The Paradox of Choice", the author considers two types of rationalization in relation to decision-making: prospective and retrospective rationalization: Prospective rationalization is a process in which a person justifies his choice by finding arguments in favor of a certain option before a decision is made. This helps to reduce the stress of making a decision, especially in conditions of an abundance of choice. Retrospective rationalization occurs after the choice is made. This process helps to minimize cognitive dissonance and maintain the feeling that the choice was the right one. In 2011, researchers Jonathan Levav and Shai Danzinger It was found that people who are forced to make many decisions in a row are less likely to make optimal decisions due to fatigue.

Summarizing the main theoretical provisions, the following factors can be identified that negatively affect the "right" choice when making a decision:

too little or too much information to study (a person may make the wrong decision without having enough information, or, conversely, due to an overabundance of information, which leads to "overload" and makes it difficult choice);

accepting opinions as facts (cognitive distortions can force a person to search for and interpret information in such a way that it corresponds to his already existing beliefs);

decision-making fatigue (poor physical condition of a person affects the quality of decisions; fatigue leads to a tendency to choose a simpler and safer option, but not necessarily the most successful one);

inability to consider previous mistakes (a person may have overestimated confidence in the accuracy of their knowledge and overestimate the ability to control events, which leads to systematic errors).

The advent of artificial intelligence has radically changed the approach to decision-making, especially in the online environment. In the 2020s, researchers began to actively study how generative artificial intelligence affects a person in a situation of choice. In particular, how interaction with AI can change a person's perception of their role in the decision-making process and how AI can improve or worsen the quality of these decisions. In addition to the obvious advantages of AI, which help to cope with the main negative factors, attention is also paid to real and potential risks for humans, such as weakening critical thinking, unwillingness to make decisions on their own, unconditional trust in AI without considering their own experience and intuition, dependence on technology.

The impact of AI on the decision-making process of consumers in e-commerce is also receiving great attention in the scientific and educational system. The scientists of the BSTU "VOENMEH" D.F. Ustinov named after D.F. Ustinov have created and introduced into the educational process materials of online educational platforms, within which the following aspects are considered:

- online educational platform "Assessment of investment decisions" examines the definition and function of investments, the main financial indicators used to evaluate investment projects and how to calculate them: NPV, PI, IRR;

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online training platform "Strategic planning of marketing activities" studies the issues of strategic marketing activities; methods of collecting information for the analysis of internal and external factors; methods of analyzing information in making managerial decisions, building economic, financial, organizational and managerial models; assessing competitiveness;

online learning platform "Fundamentals of business strategy in the digital environment" studies the impact of OT development on the modern world; information on the use of IT; strategies in the digital environment; IT management in the organization;

Digital Business online learning platform , It includes such issues as: the basic concepts of modern digital business, the state of digital business in Russia and abroad, the organization, management and control of the activities of a digital enterprise, business promotion on the Internet and evaluation of the effectiveness of digital business.

AI and e-commerce. The development of AI has also led to fundamental changes in user interaction with online platforms. It is becoming increasingly difficult to resist AI at the time of purchase, as it is integrated into the user experience on such a large scale that its interference becomes invisible. Let's consider the impact of AI on the customer's decision-making process in stages:

- Awareness of the need. At this stage, customers traditionally begin to understand that they need a product or service. In an online environment, these needs can be imposed or confused with desires, as AI analyzes user behavior, in particular search history and viewed goods or services in order to predict and offer an interesting product. And optimizes advertisements by showing them to users who are most likely to be interested in the proposed product.

- Search for information. When a consumer explores product information, AI plays an important role in providing this information through the algorithms of search and recommendation systems, where AI improves the relevance of search queries by providing more accurate results based on search history and user preferences, as well as provides personalized recommendations tailored to user preferences.

- Evaluation of alternatives. At this stage, consumers compare different options. And analyzes user reviews and can offer them in a convenient format, helping customers make a more informed decision. AI also actively uses the principles of social proof, showing how other users react to certain goods or services. For example, through the options "n number of users are currently viewing this product" or "n people have already bought this product". Also, for example, when buying clothes, virtual fitting rooms help you choose the appropriate options. When buying cosmetics, AI facial analysis services allow users to "try on" makeup virtually.

- Making a purchase decision. At the decision-making stage, it helps to speed up the process through forecasting demand and offering personalized discounts or promotions that allow you to stimulate purchase. Such an instant reaction to user behavior makes resistance much more difficult, as the offers seem particularly profitable or timely. . AI also helps automate the purchase process by simplifying the checkout process and offering pre-filled forms and the most convenient payment method, which reduces the number of last-minute cancellations.

- Reaction after purchase. After purchase, the AI continues to interact with the user through chatbots and other systems, providing round-the-clock support, answering customer questions and solving problems. The system also offers optimal recommendations for repeat purchases. Retargeting helps to bring back users who have already visited the site but have not made a

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purchase. In addition, it is common for a person to justify their decisions retrospectively, even if an impulsive unnecessary purchase took place under the influence of AI, so as not to feel cheated.

The impact of AI in e-commerce is often not to ensure that the consumer understands their needs and makes the best choice, but to ensure that they want to buy here and now. This helps to strengthen the emotional component of decision-making and suppresses logical thinking and analytics, as they require more effort and are more energy-consuming.

Thus, the impact of AI can be viewed through the following aspects:

Consumer price sensitivity: dynamic pricing and personalized discounts change consumers' perception of value;

Returns of goods: AI helps to reduce the number of returns of goods by improving the accuracy of recommendations, which allows consumers to evaluate goods more accurately before buying;

Impulsive purchases: AI can increase the impulsiveness of purchases by offering personalized recommendations and instant offers that encourage unplanned spending;

Repeat and cross-purchase: AI systems increase the likelihood of repeat purchases, as well as offer additional or alternative products that match the interests of buyers;

emotions: AI is able to analyze not only the rational, but also the emotional aspects of decision-making. It can use data about the user's mood or emotional state to offer products or services that match their current mood.

Users of marketplaces. The introduction of AI has become widespread in online commerce. Already at the information retrieval stage, it plays a key role in attracting traffic to websites, providing more accurate targeting, personalization and optimization of advertising campaigns. One of the first organizations to actively implement artificial intelligence to personalize the user experience was the American company Amazon, having developed its own algorithms. Research shows that up to 35% of Amazon sales are generated precisely through personalized recommendations. Using data on customers' individual preferences and purchases, browsing history, and products that are linked and regularly bought together, Amazon can create a personalized list of products that customers really want to buy. It's not just about offering products that customers might like; it's about understanding their preferences, shopping patterns, and behaviors to create a personalized shopping experience. And in 2024, Amazon occupies a leading position in the global e-commerce market, and the market share in the United States is 37.6% . The company actively cooperates with other online stores, providing them with access to its AI technologies and advising on their integration. The U.S. marketplace and online commerce market is one of the most developed in the world. It is characterized by high competition, innovations in technology and a wide range of offers for consumers. If we consider the largest companies in the field of e-commerce, we can note certain trends and patterns associated with attracting users to websites (Table 1). Marketplaces attract a large number of visitors, which makes their traffic more representative for analysis. This allows you to better understand the general trends and behavior of online shoppers.

Table 1. Statistics On Visits to US Marketplaces For June 2024

Marketplace	Number of site visits, billion	Direct traffic	Organic brand traffic
Amazon.com	2.659	58,36%	16,69%
Ebay.com	610.7	57,46%	20,03%

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Temu.com[6]	0.5552	51,61%	5,26%
Walmart.com	0.441	49,29%	23,49%
Etsy.com	0.393	48,04%	19,05%

In order to identify the impact of AI on users, consider site metrics such as organic and direct traffic. Organic traffic is a search in which a user enters a query into a search engine and goes to a site from a list of results. Organic traffic can be branded or non-branded. Brand search means that the user enters queries with the name of the marketplace into the search bar, and non–brand search means when the user enters a query into the search bar, for example, "best smartphones" or "buy a phone" and goes to the site without knowing its name in advance. If the share of organic search is high, then users are more focused on buying, since the search initiative comes from them. Direct traffic means that the user goes to the site without the mediation of search engines, that is, enters the exact URL of the site or the brand name directly into the address bar of the browser. Direct traffic indicates strong user loyalty and brand awareness.

The evidence that people make purchases under the influence of marketing efforts and AI is the combination of organic brand and direct traffic in the American market, which ranges from 56 to 77% depending on the company (Figure 1).

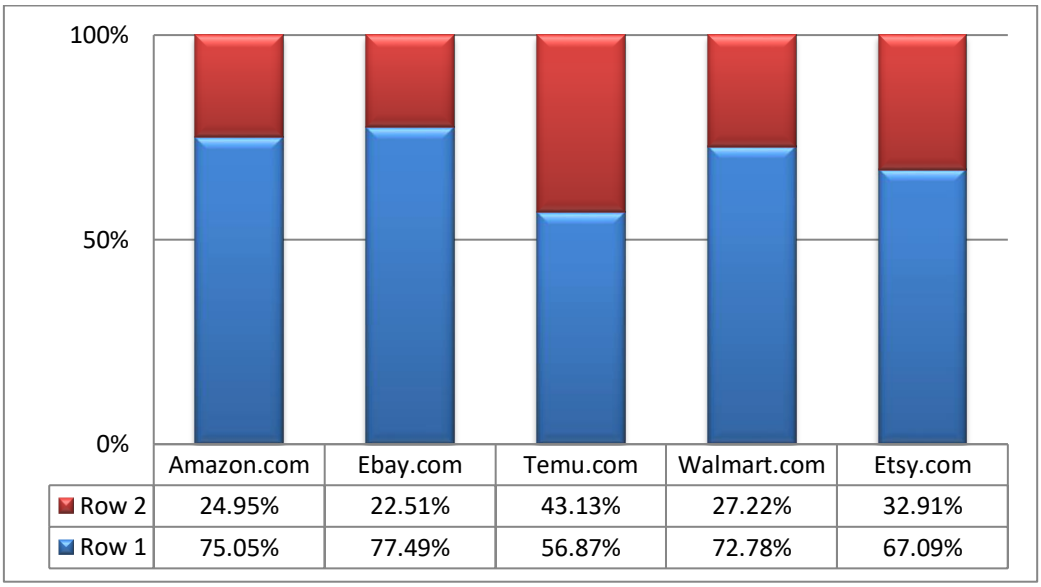

Figure 1. Statistics Of Direct, Organic Brand Traffic Relative to Total Traffic,

Usa, June 2024.

This indicates that a significant portion of users (the rest of the users) come to the site through other channels, and not during an active product search. Such site visitors are influenced by marketing efforts and recommendation systems that attract their attention and encourage them to visit.

The Russian market is more isolated than the US market. The audience of marketplaces in the Russian Federation consists of more than 90% of Russian users, while American marketplaces attract a large percentage of the audience from other countries. Let's take the main marketplaces of the Russian Federation for comparison (Figure 2).

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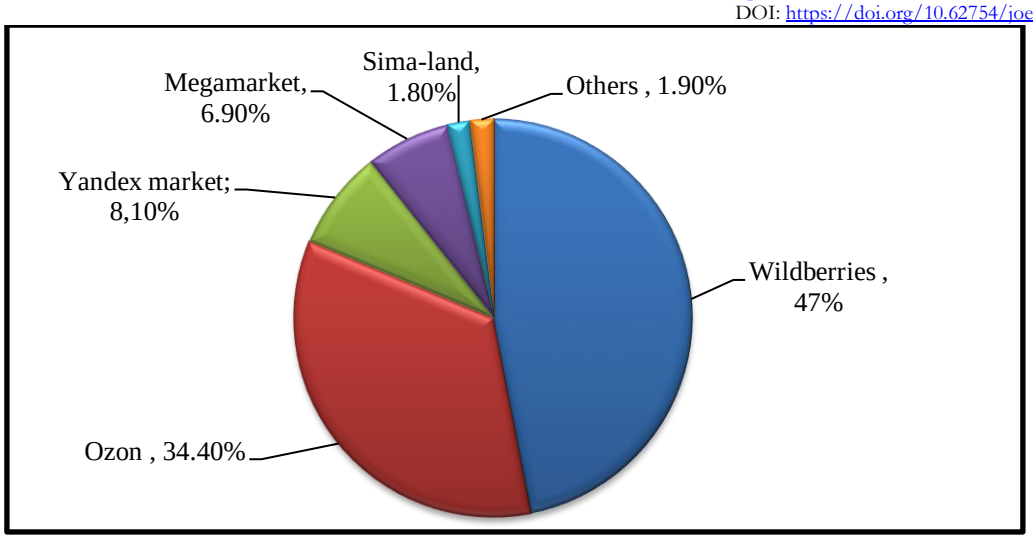

Figure 2. Market Shares of Marketplaces in Russia, 2024

It is noteworthy that the market shares of Ozon and Wildberries account for more than 80%, which indicates the strong position and influence of these companies in Russian e-commerce.

If we consider similar traffic parameters of Russian marketplaces, it is noted that the number of visitors who get to sites through direct or organic branded traffic ranges from 40% to 77% (Table 2).

Table 2. Statistics On Visits to Russian Marketplaces Sites for June 2024.

Marketplace	Number of site visits, mln.	Direct search	Organic crazy search (from total traffic)
Ozon.ru	393.3	46,53%	22,03%
Wilberries.ru	314.9	55,09%	22,26%
Market.yandex.ru	140.7	38,97%	1,56%
Megamarket.ru	46,01	37,78%	10,28%
Sima-land.ru	6,51	40,43%	7,83%

That is, a significant part of users also come to the site not as a result of a targeted search, but thanks to marketing efforts and the use of artificial intelligence. It is clearly highlighted that Ozon and Wildberries companies have greater recognition and customer loyalty, since users visit their sites much more often directly, compared with competitors (Figure 3).

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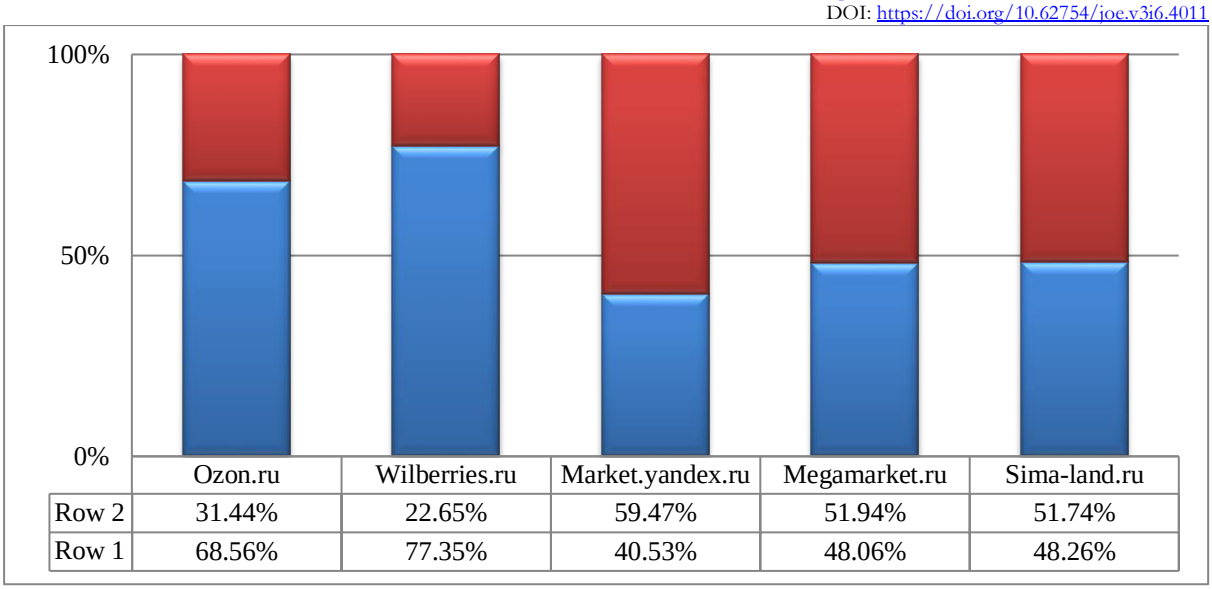

	Ozon.ru	Wilberries.ru	Market.yandex.ru	Megamarket.ru	Sima-land.ru
Row 2	31.44%	22.65%	59.47%	51.94%	51.74%
Row 1	68.56%	77.35%	40.53%	48.06%	48.26%

Figure 3. Statistics Of Direct, Organic Brand Traffic in Relation to Total Traffic, Russian Federation, June 2024.

User engagement index. To study consumer behavior and decision-making in an online environment, the authors propose a developed formula based on the main indicators of company websites: the User Engagement Index (UEI). This index helps to measure how actively users interact with the site. The formula of the User engagement Index (UEI):

$$UEI = \frac{(\text{Average site visit time}) * (\text{ Number of pages viewed per session})}{(\text{Bounce rate}) * (100 - \text{ Organic Search})}$$

Components Of the Formula

Average site visit time indicates the average amount of time that users spend on the site per visit. This metric is important for evaluating the quality of content and user interaction, especially in combination with other metrics, since if the site is difficult to navigate or users cannot quickly find the information they need, then the time of visiting the site will indicate not the involvement of the buyer, but the technical problems of the site.

The number of pages viewed per session The number of pages per visit helps to assess the depth of user interaction with the site.

The bounce rate reflects the percentage of visitors who viewed only one page of the site for a certain period of time, and then left the site. This metric shows how much the site holds the attention of visitors. A high bounce rate may indicate low satisfaction or irrelevant content.

100 - Organic search reflects the proportion of users who came to the site not through organic search. Users who come directly or through branded queries are often more involved.

Justification of the Formula Selection

A combination of time and behavioral indicators: UEI considers both the time on the site and the number of pages viewed, which allows you to evaluate both activity and the depth of interaction.

Using bounce rate as a reverse indicator: Bounce rate is used to correct UI, as it reduces the index value with low user engagement.

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Accounting for traffic sources: The inclusion of an organic search component helps to account for differences in the types of users who come to the site.

AI has a significant impact on the user engagement index. The more effectively technologies are used to improve the user experience, personalize content and automate interactions, the higher the UEI indicator will be, reflecting the active and deep interaction of users with the site.

A high UEI indicates a high user engagement, which may indicate good content quality and site usability. A low UEI indicates low engagement, which may require an improvement in the user experience or the content of the site.

Practical application. UEFI can be used to compare different online platforms or to track the dynamics of user engagement on the same site over time. Let's calculate the index for US marketplaces (Table 3).

Table 3. Website Traffic Data, June 2024

Marketplace	Number of site visits	Organic Search	Bounce rate	Average site visit time	Number of pages viewed per session
Amazon	2.659 bil	23,84%	33.83%	0:06:05	8,53
Ebay	610.7 mln	27,44%	37,26%	0:06:41	7,05
Temu.com	555.2 mln	7,74%	42,66%	0:05:11	6,57
Walmart	441.0 mln	32,18%	51,61%	0:04:21	4,39
Etsy	393.0 mln	29,77%	41,14%	0:05:20	6,10

The results were as follows:

- Amazon — 1.21 (the highest UEI)
- Ebay — 1.05
- Etsy — 0.68
- Temu.com — 0.52
- Walmart — 0.33

Amazon shows the highest user engagement index among the presented marketplaces. This may be due to a well-optimized user experience, despite the high bounce rate. Ebay also has a fairly high UEI, which indicates high user engagement. Although the bounce rate of the site is higher than that of Amazon, the average time on the site and the number of pages viewed maintain a good level of engagement. Etsy has an average UEFI value due to high bounce rates and relatively short average time on the site, which reduces the overall engagement index. Walmart and Target have the lowest UEI values, which may indicate a lack of user engagement.

In the current economic conditions, the index should be considered separately in the markets of countries, since the socio-economic situation in the country plays an important role. When analyzing the metrics of Russian companies' websites (Table 4), the following results were found:

- Wilberries — 4.78 (the highest UEI)
- Ozon — 3.35
- Yandex Market — 2.62
- Sima-land — 2.15
- Megamarket — 0.32

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Wildberries demonstrates the highest UEI among the presented marketplaces, which indicates a high level of user engagement. Also, the level of competition in Russia is very different from the United States. The company managed to take a stable position thanks to a wide product range and adaptation to the needs of users. This may explain the high engagement index, as users often return to the platform and actively interact with it. Ozon and Yandex Market also have high UEI values, which indicates good user engagement and efficient operation of the platforms. Megamarket and Sima-land may consider optimizing their strategies to increase user engagement and reduce the bounce rate using AI.

Table 4. Website Traffic Data, June 2024

Marketplace	Number of site visits, mln	Organic Search	Bounce rate	Average site visit time	Number of pages viewed per session
Ozon	393.3	40,79%	27.66%	0:08:18	11,01
Wilberries	314.9	35,33%	27.82%	0:10:59	13,04
Yandex market	140.7	52,01%	25,12%	0:05:53	8,96
Megamarket	46,01	46,74%	55,72%	0:04:07	3,79
Sima-land	6,51	48,92%	36,63%	0:07:39	8,75

Conclusions

The scientific novelty of the work lies in a comprehensive analysis of the impact of AI on the decision-making process of consumers in e-commerce. The article examines not only the obvious advantages of using AI, but also the potential risks associated with changing consumer behavior. The study introduces the User Engagement Index (UEI), which allows you to measure and compare user activity and interaction with marketplaces, taking into account the impact of AI. The proposed methodology can become the basis for further research in the field of human-artificial intelligence interaction in the digital environment. The UEFI formula allows you to comprehensively assess user engagement, taking into account several key factors that affect user behavior on the site. It can be adapted to specific needs, which makes it useful for a wide range of tasks in web analytics and marketing.

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Based on the data https://inclient.ru/marketplaces-stats/

The majority of users are from the USA (28%)

Row 1 is the sum of direct and organic brand traffic relative to the total volume of the company's traffic, row 2 is the rest of the company's traffic

Based on the data https://inclient.ru/marketplaces-stats/

The information is accumulated from the website Similarweb.com

Row 1 is the sum of direct and organic brand traffic relative to the total volume of the company's traffic, row 2 is the rest of the company's traffic.