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Consumer Trust in AI Algorithms Used in E-Commerce: A Case Study of College Students at a Romanian Public University

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Abstract: The aim of this cross-sectional study was to investigate the factors associated with trust in AI algorithms used in the e-commerce industry in Romania. The motivation for conducting this analysis arose from the observation of a research gap in the Romanian context regarding this specific topic. The researchers utilized a non-probability convenience sample of 486 college students enrolled at a public university in Romania, who participated in a web-based survey focusing on their attitudes towards AI in e-commerce. The findings obtained from an ordinal logistic model indicated that trust in AI is significantly influenced by factors such as transparency, familiarity with other AI technologies, perceived usefulness of AI recommenders, and the students' field of study. To ensure widespread acceptance and adoption by consumers, it is crucial for e-commerce companies to prioritize building trust in these new technologies. This study makes significant contributions to our understanding of how young consumers in Romania perceive and evaluate AI algorithms utilized in the e-commerce sector. The findings provide valuable guidance for e-commerce practitioners in Romania seeking to effectively leverage AI technologies while building trust among their target audience.

Keywords: ecommerce; trust in AI; AI algorithms; transparency; perceived usefulness of AI; familiarity with AI; Romania

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1. Introduction

Romania has emerged as a prominent player in the Central and Eastern European region's digital economy, as evidenced by its thriving e-commerce market. The COVID-19 pandemic served as a catalyst for accelerated growth across the global e-commerce industry, including Romania. With increased online ordering by consumers, Romanian enterprises experienced a surge in web sales, peaking during the first year of the pandemic. For example, the revenue of the e-commerce market in Romania grew from EUR 3.6 billion in 2018 to EUR 6.2 billion in 2021 [1]. Additionally, there was a notable increase in the proportion of businesses conducting sales through online channels, with sectors like restaurants focusing on online platforms and delivery services. As of 2023, Romania boasts 9.7 million e-commerce users, reflecting a user penetration rate of 48% [1].

On a global scale, retail e-commerce sales reached approximately USD 5.2 trillion in 2022, with a projected growth of 56% over the next few years, amounting to around USD 8.1 trillion by 2026 [1]. Kumar and Trakru [2] highlighted the significant influence of artificial intelligence (AI) and machine learning on this explosive growth. As Romanian e-commerce businesses increasingly implement AI technologies such as chatbots, recommenders, and virtual sales assistants, it becomes crucial to understand the level of consumer trust in AI algorithms within the country. Ultimately, the continued growth of e-commerce relies on consumers' confidence in AI.

E-commerce AI refers to the utilization of AI techniques, systems, tools, or algorithms to support online buying and selling activities. AI algorithms can analyze customer purchasing behavior data and offer personalized product recommendations, thereby increasing sales and customer satisfaction. Furthermore, AI can automate inventory management processes by leveraging sales and trend data to predict future demand and optimize inventory levels, reducing costs associated with overstocking or stockouts. AI is not only employed by businesses but also utilized by customers during the purchasing process. For example, customers can use AI-based virtual assistants to search for products, compare prices, and receive personalized recommendations based on their purchasing behavior, interests, and preferences.

According to Kumar and Trakru [2], AI has numerous applications in e-commerce, such as visual and voice search, AI assistants, and chatbots for customer inquiries and recommendations, as well as smart logistics for efficient delivery management and warehouse operations. Chatbots have evolved from providing standardized replies to engaging in online conversations with website visitors, seamlessly transitioning to live human agents when necessary. AI also plays a crucial role in Customer Relationship Management (CRM), utilizing extensive customer data to analyze behavior patterns, purchase trends, and influencing factors. This enables accurate predictions, increased company profits, and successful achievement of sales goals. AI further enhances the customer experience through improved product content management, leading to greater customer satisfaction and profitability. Automation is another area where AI significantly contributes by understanding customer needs and enabling global collaboration to boost sales. AI's ability to analyze customer data aids in sales forecasting, process automation, redundancy resolution, and personalized marketing solutions.

By leveraging AI to gain accurate insights into customer expectations and needs, marketing strategies in e-commerce can be significantly improved. Soni [3] emphasized that AI enhances customer satisfaction by facilitating real-time human interaction through various applications such as messengers, chatbots, and voice chats. Furthermore, AI enables the design of smart services that employ technology to understand customer inquiries and provide appropriate personalized suggestions.

While studies on trust in e-commerce AI exist in developed countries, little is known about the extent of trust in these applications among Romanian consumers, particularly college students. Therefore, this study aims to identify factors associated with trust in AI algorithms based on a sample of 486 students enrolled in 2022 at Ovidius University in Constanta. The study specifically aims to achieve the following objectives:

a. Understand the socio-demographic factors influencing trust in e-commerce AI algorithms.
b. Evaluate the relationship between familiarity and expertise with other AI technologies and trust in e-commerce AI algorithms.
c. Examine the connection between transparency and trust in e-commerce AI algorithms.
d. Assess the impact of the belief that AI can influence purchasing decisions on trust in e-commerce AI algorithms.

2. Background Literature and Research Hypotheses

This section provides an overview of the recent literature on trust in AI applications, highlighting its significance and key factors associated with high levels of trust. These factors include transparency, familiarity with AI technologies, perceived understanding of AI algorithms, perceived usefulness of recommenders, belief in AI's influence on buying behaviors, and socio-demographic characteristics.

2.1. Trust in AI

Despite the numerous advantages of AI technology in online shopping, previous studies have indicated that not all customers are receptive to interacting with AI robots or accepting the services provided by these devices [4,5]. This skepticism is often fueled by media reports highlighting AI failures. Trust plays a pivotal role in the adoption and usage

of AI in e-commerce. Given the inherent uncertainty associated with the development and deployment of AI in online shopping, caution, skepticism, and distrust can arise. Overcoming this uncertainty is vital as it establishes the necessary foundation of trust for embracing AI technologies. Research has consistently highlighted the mediating role of trust in the interaction between humans and technology [6–9]. Trust is a critical precursor to risk-taking behaviors [10] and can mitigate perceived uncertainty. Consequently, customers who trust the interaction with AI virtual assistants are more likely to select products or services provided by these robots, fostering the establishment of long-term relationships with businesses that employ AI. This, in turn, leads to higher customer retention rates [11,12].

2.2. Transparency

Gürses et al. [13] discovered that transparency in data collection and algorithmic decision-making processes has a positive impact on trust. Consumers highly value clear information and a comprehensive understanding of how AI algorithms operate. Similarly, Acquisti et al. [14] demonstrated that individuals who have access to transparent information and control over their personal data are more likely to trust AI algorithms and view them as helpful tools. In a related study, Mohd Rahim et al. [15] highlighted that perceived trust in the adoption of chatbots by higher education institutions is influenced by factors such as interactivity, design, and ethics. Research has also indicated that users who are familiar with AI expect transparency and explanations regarding AI algorithms and decision-making processes [16]. Transparency and disclosure of tracking practices play a critical role in shaping consumer awareness and trust. Studies have consistently shown that consumers highly value transparency in terms of data collection and algorithmic decision-making processes [13]. When consumers are provided with clear information and control over their personal data, they are more inclined to trust algorithms and perceive them as useful tools [14]. The level of awareness that consumers possess regarding algorithms significantly influences their trust in algorithmic processes and impacts how they evaluate privacy concerns and self-disclosures [17].

Hypothesis 1. *Consumers who receive transparent information from e-commerce sites regarding their interaction with AI algorithms are more likely to develop trust in these algorithms.*

2.3. Familiarity and Perceived Understanding

Recent research has established a strong association between familiarity with AI technologies and trust in e-commerce AI systems. Belanche et al. [18] found that users with a higher level of familiarity with robots perceive AI used in fintech as more useful and hold more positive attitudes towards it. Similarly, Horrowitz et al. [19] demonstrated that individuals with familiarity with AI and related technologies are more likely to support autonomous applications compared to those with limited understanding of the technology. These findings indicate that familiarity with AI engenders confidence and comprehension, which in turn contributes to higher levels of trust in the technology.

When consumers can understand the rationale behind AI algorithm recommendations or actions, it enhances their trust in the algorithm. However, research suggests that many consumers have limited knowledge about how algorithms track their online behavior and personalize their experiences [20]. Conversely, younger and more digitally literate consumers tend to be more aware of algorithmic tracking and its implications, while older consumers may exhibit lower levels of awareness and understanding [21,22]. These findings emphasize the importance of increasing consumer knowledge and awareness about AI algorithms and their impact on personal data to foster trust and informed decision-making.

Hypothesis 2. *Consumers who have prior familiarity with AI technologies such as voice/facial recognition, translation services, chatbots, and virtual sales consultants are more likely to trust e-commerce AI algorithms.*

Hypothesis 3. *Consumers who possess knowledge about the interaction between AI algorithms and their personal data will exhibit higher levels of trust in e-commerce AI algorithms.*

2.4. Socio-Demographic Factors

Socio-demographic factors, including age, education level, and technology adoption, have been identified as influential factors shaping consumer beliefs. Li et al. [23] discovered that consumer acceptance of artificial intelligence customer service decreases with age. Younger consumers, who are more exposed to modern technology, are generally more willing to embrace artificial intelligence customer service through chatbots. In contrast, older consumers tend to be less accepting of this emerging technology. Younger consumers also exhibit greater openness to using AI-based recommendation algorithms, recognizing the benefits of personalized recommendations and the ease of searching and comparing prices facilitated by these tools. Having grown up alongside technological advancements, young consumers are more enthusiastic about technology and eager to experiment with new tools and tasks. It is important to note that the use of AI in the purchasing process is not limited to young people. Consumers of all ages can benefit from personalized recommendations and the automation of shopping processes provided by AI. However, certain AI-based products and services may require specific skills that older individuals may not possess, creating barriers to their adoption.

Furthermore, studies have highlighted differences in tolerance for hidden AI customer service based on education levels. Consumers with low education levels exhibit low tolerance for hidden AI customer service, while those with high education levels demonstrate low tolerance for camouflage AI customer service [23]. However, there is a scarcity of research exploring how trust in AI varies across different college majors. Further research is needed to investigate how trust in AI algorithms varies among students based on their field of study. Understanding these potential variations can provide valuable insights into the impact of academic disciplines on trust in AI and inform strategies for enhancing trust among different student populations.

Hypothesis 4. *Younger consumers will demonstrate a higher level of trust in e-commerce AI algorithms compared to older consumers.*

2.5. Perceived Usefulness of Recommenders

Research suggests that consumers generally perceive AI algorithmic product identification as effective. They believe that AI algorithms can efficiently and accurately match their preferences and needs with relevant products [24]. In general, consumers appreciate the ability of AI algorithms to analyze vast amounts of data and provide personalized product recommendations that align with their preferences and interests. Likewise, Kian et al. [25] found that consumers' perceived usefulness of AI has an impact on consumer purchase intention on social media websites and Noreen et al. [26] showed that awareness, attitude, subjective norms, perceived usefulness, and knowledge of artificial intelligence technology had a significant and positive relationship with the intention to adopt AI in the banking sector

Wu et al. [24] established that consumers' previous experiences and interactions with AI algorithms can shape their beliefs. Positive experiences, where AI algorithms have successfully recommended relevant products and enhanced the overall shopping experience, can reinforce the belief in their strong influence. Additionally, Li et al. [27] showed that when consumers perceive that AI algorithms accurately understand and anticipate their preferences, they are more inclined to trust AI.

Furthermore, studies have found that consumers perceive AI algorithms as effective in reducing information overload and simplifying the product search process [28]. The algorithms are seen as capable of filtering out irrelevant options and presenting a curated selection of products that are more likely to meet consumers' expectations. However, there are also considerations regarding the limitations of AI algorithmic product identification.

Some consumers express concerns about algorithmic biases and the potential lack of transparency in how AI algorithms make recommendations [29]. They worry that the algorithms may not fully understand their unique preferences or may prioritize certain products or brands based on hidden criteria.

Research consistently indicates that consumers generally perceive AI algorithmic product identification as effective. They believe that AI algorithms have the capability to efficiently and accurately match their preferences and needs with relevant products [24]. Consumers appreciate the ability of AI algorithms to analyze vast amounts of data and provide personalized product recommendations that align with their preferences and interests. This perception of usefulness is also reflected in the impact of AI on consumer purchase intention on social media websites [25] and the banking sector [26].

Consumers' previous experiences and interactions with AI algorithms play a significant role in shaping their beliefs. Positive experiences, where AI algorithms have successfully recommended relevant products and enhanced the overall shopping experience, reinforce the belief in their strong influence [24]. Additionally, when consumers perceive that AI algorithms accurately understand and anticipate their preferences, they are more inclined to trust AI [27]. Moreover, studies have highlighted the effectiveness of AI algorithms in reducing information overload and simplifying the product search process [28]. These algorithms are viewed as capable of filtering out irrelevant options and presenting a curated selection of products that are more likely to meet consumers' expectations.

However, considerations regarding the limitations of AI algorithmic product identification also exist. Some consumers express concerns about algorithmic biases and the potential lack of transparency in how AI algorithms make recommendations [29]. They worry that the algorithms may not fully understand their unique preferences or may prioritize certain products or brands based on hidden criteria. Understanding these consumer perceptions and concerns is crucial for businesses and developers of AI algorithms. By addressing issues of transparency, mitigating algorithmic biases, and emphasizing personalized experiences, businesses can build consumer trust and enhance the effectiveness of AI algorithmic product identification.

Recent extensions of fuzzy sets, such as Linear Diophantine Fuzzy Sets (LDFS), hold the potential to bring significant improvements to AI algorithms. Fuzzy sets provide a mathematical framework for representing and reasoning with uncertainty and imprecision, allowing for more flexible and nuanced modeling compared to traditional crisp sets [30–33]. LDFS builds upon this foundation and introduces new capabilities that can enhance AI algorithms in several ways: (1) enhanced representation of uncertainty, (2) improved decision-making and reasoning, (3) enhanced pattern recognition and classification, and (4) adaptability to real-world scenarios. By incorporating these advancements, AI algorithms, including those used in e-commerce, can become more robust, flexible, and effective in addressing real-world problems.

Hypothesis 5. *Consumers who perceive AI as beneficial in assisting them in finding desired products will exhibit higher levels of trust in e-commerce AI algorithms.*

2.6. Belief That AI Influences Purchasing Behaviors

Numerous studies have investigated consumers' perceptions of AI's influence on their decision-making, preferences, and reliance on AI algorithms during the purchasing process. The findings reveal diverse perspectives among consumers.

Some consumers perceive AI algorithms as influential factors in their purchasing decisions, attributing significant weight to the recommendations provided by these algorithms [34]. They believe that AI algorithms possess a deep understanding of their preferences, surpassing their own self-awareness, and can effectively recommend products that align with their needs and desires. These consumers place considerable trust in AI algorithms to guide their choices.

Conversely, other consumers believe that their purchasing habits are less reliant on the presence of AI algorithms. They acknowledge that AI recommendations can play a role in their decision-making process, but they ultimately prioritize personal preferences, past experiences, and other sources of information [35]. These consumers perceive themselves as active decision-makers who take multiple factors into account when making a purchase. They may exhibit a lower level of trust or reliance on AI algorithms in their purchasing process.

These contrasting perceptions underscore the importance of understanding individual differences in consumer attitudes towards AI algorithms. Businesses and developers should recognize that while some consumers place substantial trust in AI recommendations, others may maintain a more cautious and independent approach to decision-making. Personalization and customization of AI recommendations, along with transparent communication about the algorithm's role, can help build trust and cater to the varying preferences of consumers.

Hypothesis 6. *Consumers who perceive that AI has the potential to influence their purchasing decisions will demonstrate lower levels of trust in e-commerce AI algorithms.*

In conclusion, the literature underscores the importance of consumer awareness regarding how algorithms interact with their profiles on e-commerce websites. It emphasizes the need for transparency, disclosure, and education to empower consumers and foster trust in algorithmic processes.

3. Materials and Methods

3.1. The Research Setting

Ovidius University has a rich history, being the successor of the first higher education institution in Constanța, originally founded in 1966 as the Pedagogical Institute of Constanța. Since then, it has transformed into a multidisciplinary university offering undergraduate, master's, and doctoral programs, all accredited by national and international bodies. The university boasts modern educational facilities, equipped with the necessary resources for teaching and learning, with a total instructional space of over 24,000 square meters. In 2005–2006, Ovidius University aligned with the Bologna Process, joining the European Higher Education Area and providing recognized diplomas both within and outside the European Union. Upon graduation, students receive bilingual diplomas issued in Romanian and English.

Ovidius University attracts more than 15,000 students, who are guided by a dedicated team of 650 teaching and research staff, supported by over 300 employees and administrators. The university offers a wide range of programs across various disciplines, including medicine, engineering, humanities, exact sciences, natural sciences, economics, law, arts, and theology. It consists of 16 faculties, covering different areas of study such as arts, civil engineering, law and administrative sciences, physical education and sports, pharmacy, mechanical engineering and maritime engineering, history and political sciences, letters, medicine, dentistry, mathematics and computer science, psychology, applied sciences and engineering, economics, natural sciences and agricultural sciences, and theology. In addition to undergraduate and graduate programs, Ovidius University also provides pedagogical training courses, professional development courses for certified teachers, and residency programs in medicine. The university supports a total of 487 students enrolled in doctoral programs and 870 medical residents.

For the purpose of this study, the population of interest consisted of undergraduate students attending full-time education at Ovidius University. A nonprobability convenience sample of 486 students was selected, resulting in a response rate of 33%. The sample excluded students enrolled in distance learning, master's, and doctoral programs. Table 1 presents the demographic profile of the study participants, with *n* and % representing the number and percentage of students in each category. The majority of respondents were

female (68.1%), with ages ranging from 18 to 25 years (76.3%). More than one-third of participants were economics majors.

Table 1. Demographic profile of survey respondents.

	n	**%**
Field of Study		
Law	20	4.1
Economics	167	34.4
Informatics	66	13.6
Engineering	61	12.6
Medicine	98	20.2
Humanities	74	15.2
Total	486	100
Gender		
F	331	68.1
M	155	31.9
Total	486	100
Age Group		
18–25	371	76.3
25–35	43	8.8
35–45	57	11.7
45 or older	15	3.1
Total	486	100

3.2. Data Collection Procedure

The current study examines the following factors related to trust in e-commerce AI algorithms:

(1) Familiarity and perceived understanding;
(2) Extent to which customers understand that AI algorithms interact with (or track) personal data;
(3) Past experience in using AI technologies such as voice/facial recognition or translators;
(4) Past experience in interacting with virtual sale consultants;
(5) Demographic characteristics of consumers.

The researchers administered a survey with the approval of the Rector of Ovidius University, and the participants were recruited during face-to-face classes. The survey was developed by the researchers based on the review of literature. The students received the survey link via email, which was developed in Google Forms. The first page of the survey served as a consent form, where the authors informed the students about the purpose of the study, assuring them that all survey responses would remain anonymous and that the results would be reported in an aggregated form. Additionally, the participants were informed that their participation in the study was voluntary and that they could withdraw at any time without facing any repercussions. Data collection took place between 20 April 2022 and 30 April 2022.

3.3. Data Analysis

The collected survey data were analyzed using SPSS 28 (IBM Corp., Armonk, NY, USA) with the primary objective of examining the factors associated with trust in using AI algorithms in e-commerce. The data analysis involved two main phases. In the first phase (bivariate analysis), Pearson Chi-Square statistics were employed to explore significant differences between two response groups: students reporting high trust in e-commerce AI and students reporting low trust. Cross-tabulations were conducted to examine the usage of digital devices based on gender, age, and field of study. In the second phase (multivariate analysis), an ordinal logistic regression model was constructed to determine the predictive factors of young consumers' trust in e-commerce algorithms. The independent variables included in the model were based on the results obtained from the Pearson

Chi-Square statistics The ordinal logistic regression model aimed to identify which of these factors significantly influenced the level of trust in e-commerce algorithms among young consumers.

4. Results

4.1. Bivariate Analysis

To analyze trust levels among students, the trust variable was recoded into a binary variable, categorizing Low Trust as responses 1 (no trust), 2 (very little trust), and 3 (little trust), while High Trust included responses 4 (high trust) and 5 (very high trust) on a Likert scale. Pearson's Chi-Square statistics were employed to examine significant differences in trust levels across various subgroups of students. These differences were explored in relation to demographic characteristics (such as education, gender, and age) and variables related to the use of AI algorithms in e-commerce.

The latter group of variables included:

(1) Number of days spent shopping online per month;
(2) Amount spent on purchases per month;
(3) Level of knowledge regarding how algorithms on visited websites interact with consumer profiles;
(4) Extent of belief that algorithms facilitate product identification;
(5) Frequency of interaction with algorithms simulating a human sales consultant (virtual sales assistant);
(6) Extent of belief that AI algorithms influence buying decisions.

The results of the bivariate analysis can be found in Appendix A. The table presents the total number of students (n) in each category, the Chi-Square statistic (Chi-Square), and the significance level (p) for the Chi-Square statistic. Additionally, Cramer's V, a measure of association, was used to quantify the strength and significance of relationships between categorical variables. Cramer's V ranges from 0 to 1, where 0 indicates no association and 1 represents a perfect association between variables.

Socio-Demographic Factors: The analysis revealed that trust in AI does not exhibit significant variations based on students' gender or age. However, there is an association between the field of study and trust in AI, with students in informatics and law majors displaying higher levels of trust compared to other majors.

Familiarity and Expertise: Students who exhibit higher levels of trust in AI algorithms tend to possess significantly greater knowledge about how these algorithms interact with their consumer profile. Additionally, a strong correlation was observed between high levels of trust and previous experience with other AI technologies, such as voice recognition assistance (e.g., Siri), facial recognition (e.g., smartphone software), or translation services (e.g., Google Translate). However, trust in AI was not found to be related to the number of days students engage in online shopping or the amount of money spent on online purchases.

Perceived Usefulness of Recommenders: Students who believe that interacting with AI algorithms on e-commerce sites aids them in identifying desired products were significantly more likely to report high levels of trust in AI.

Transparency: Students who received information from visited e-commerce sites indicating their interaction with an AI algorithm tended to exhibit higher levels of trust in AI, in contrast to those who were not informed about such interactions. Students who did not receive transparency messages displayed lower levels of trust in AI.

These findings provide insights into the factors influencing trust in AI among students, highlighting the importance of familiarity with AI technologies, perceived usefulness of AI recommenders, and the impact of transparency messages from e-commerce sites.

4.2. Multivariate Analysis

In the second stage of the analysis, an ordinal logistic regression was conducted to examine the relationship between trust in e-commerce AI algorithms and the following variables:

(1) The level of knowledge regarding how algorithms on visited websites interact with consumer profile (Knowledge_of_Interaction);
(2) The extent to which interaction with algorithms aids in identifying desired products (Product_Identification);
(3) The frequency of interaction in the past month with a virtual sales consultant (Virtual_Sales_Consultant);
(4) Whether or not the consumer was informed by the e-commerce site that they will interact with an AI algorithm (Informed_By_Site);
(5) Past use of other AI technologies such as facial/voice recognition software or Google Translate (Used_AI_Software);
(6) Extent to which consumers believe AI algorithms influence their purchasing decisions (Influence_Belief).

These independent variables were selected to be included in the logistic model because their association with trust in AI algorithms was found to be significant in bivariate analysis. The goal of this analysis was to determine the unique contribution of each factor to predicting consumer trust in e-commerce AI algorithms. Specifically, the analysis had the following objectives:

a. Understand which socio-demographic factors affect trust in e-commerce AI algorithms;
b. Evaluate the relationship between familiarity and expertise with other AI technologies and trust in e-commerce AI algorithms;
c. Examine the link between transparency and trust in e-commerce AI algorithms;
d. Evaluate the extent in which the belief that AI can affect purchasing decisions affects e-commerce AI algorithms.

The general formula for the ordinal logistic model is as follows:

$$\ln\left(\frac{\text{prob(event)}}{1-prob(event)}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_K X_K \quad (1)$$

where event is the dependent variable, β_0 is the intercept, X_1 to X_K are the independent variables, and β_1 to β_K are the indepndent variables included in the model.

To evaluate the model, Cox Square, Snell R Square, and Nagelkerke R Square were utilized. These statistics, which are equivalent to R Square in linear regression, measure the proportion of variation in the dependent variable explained by the independent variables in the model. The selected variables account for 23% (Cox and Snell R Square) and up to 25% (Nagelkerke R Square) of the variation in consumers' levels of trust in AI algorithms. Table 2 presents the results of the ordinal logistic regression, which predicts higher levels of trust in AI.

Table 2. Ordinal logistic regression results for factors predicting trust in e-commerce AI algorithms.

Variables	Categories	B	Wald	*p*	Exp(B)
Used_AI_Software	No	−0.76	5.98	0.015	0.47
Informed_by_Site	No	−0.56	5.83	0.016	0.57
Product_Identification	1	−2.30	7.59	0.006	0.10
	2	−3.40	23.19	<0.001	0.03
	3	−1.88	9.12	0.003	0.15
	4	−1.28	4.40	0.036	0.28
Field_of_Study	Law	1.63	7.94	0.005	5.12
	Economics	0.60	3.28	0.07	1.82
	Informatics	1.53	11.71	<0.001	4.64
	Engineering	0.92	5.13	0.024	2.50
	Medicine	1.07	7.61	0.006	2.91

Reference levels: Trust_AI (5) Product_Identification (5), Informed_by_Site (Yes), Field_of_Study (Humanities and Social Sciences).

The findings indicate that several factors positively influence the likelihood of college students trusting e-commerce AI algorithms. These factors include the extent to which students agree that AI aids in finding the products they need, being informed by the e-commerce site about interacting with AI algorithms, prior usage of other AI technologies such as facial/voice recognition software or AI translators, and the student's field of study.

Students who were not informed by the e-commerce site about interacting with AI algorithms are 43% less likely to trust AI-driven purchasing compared to those who were informed. Similarly, students who have not adopted other AI technologies (facial/voice recognition or AI translators) are 53% less likely to trust AI compared to those who have used such software. Additionally, students who perceive that AI algorithms help them very little (1) in locating desired products are 90% less likely to trust AI than those who believe AI is of great help (5) in this aspect.

Furthermore, trust in AI exhibits significant variations based on the student's field of study. Humanities and social sciences students display the lowest levels of trust, while law and informatics students are five times more likely to trust AI algorithms compared to humanities and social sciences students. Medical students are three times more likely than the latter group to trust AI-driven e-commerce, and engineering and economics students are approximately two times more likely than humanities and social sciences students to trust AI. These findings align with expectations, as informatics students, who possess knowledge about how AI works and tend to be early adopters of new technologies like voice/facial recognition applications, exhibit the highest levels of trust. Both variables have been found to be significantly related to trust.

The Parameter Estimates table (Table 2) presents the coefficients, the Wald test, and associated *p*-values for the coefficients. Exp(B) represents the results as proportional odds ratios (the exponentiated coefficient). The reference levels provided at the bottom of the table indicate the baseline categories for each factor. For instance, the reference level for *Product_Identification* is 5.00, which means the analysis compares the other levels of trust (1.00, 2.00, 3.00, and 4.00) to this baseline level.

5. Discussion

Transparency. The findings of this study support Hypothesis 1, which states that consumers who receive transparent information from e-commerce sites regarding their interaction with AI algorithms are more likely to develop trust in these algorithms. When consumers are informed by the e-commerce site that they will be interacting with AI algorithms, their trust in the algorithms increases. This has important implications for businesses operating in the e-commerce industry. By providing transparent information about the role of AI and its benefits, companies can enhance consumer confidence in AI algorithms and promote their effective utilization. However, it is crucial for companies to strike a balance by acknowledging the limitations associated with the use of AI.

The results highlight the significance of transparency in fostering consumer trust in AI algorithms, which is consistent with previous research findings. Gürses et al. [13] demonstrated that transparency in data collection and algorithmic decision-making processes positively influence trust. Consumers value clear information and understanding of how AI algorithms operate. Similarly, Acquisti et al. [14] found that individuals are more likely to trust AI algorithms and perceive them as helpful tools when they have access to transparent information and control over their personal data. The present findings are also in line with the results of Zhao et al. [36], who observed that the subjective transparency of AI decision-making improves people's subjective feelings. When AI provides more information and enhances transparency, people are more likely to receive useful information from it.

To foster consumer awareness and understanding, it is important to implement improved education and communication strategies. Smith et al. [20] emphasized the significance of educating consumers about algorithmic interactions and their implications. Likewise, Gürses et al. [13] highlighted the importance of user-friendly interfaces that

facilitate consumer control and provide transparent information. When consumers are provided with clear information and have control over their personal data, they are more likely to trust algorithms and perceive them as helpful tools [14].

In order to establish trust in AI applications, it is essential to understand their programming and the specific functions they perform under different conditions. Transparency plays a crucial role, and AI should be capable of explaining and justifying its behaviors and decisions. One of the challenges in machine learning and deep learning is the presence of a "black box" in the ML and decision-making processes. When the explainability of an AI application is poor or absent, it can affect trust in the system.

Perceived Usefulness of Product Recommenders. This study also confirmed that when consumers believe that AI algorithms help them locate the desired products, they exhibit higher levels of trust in e-commerce AI algorithms. Thus, we accept Hypothesis 5, which states that consumers who perceive AI as beneficial in assisting them in finding desired products will have higher levels of trust in e-commerce AI algorithms. These findings are consistent with the research conducted by Wu et al. [24], who demonstrated that consumers' previous experiences and interactions with AI algorithms can shape their beliefs. Positive experiences, where AI algorithms successfully recommend relevant products and enhance the overall shopping experience, reinforce the belief in their influential role [24]. Additionally, Li et al. [27] found that consumers are more inclined to trust AI algorithms when they perceive that the algorithms accurately understand and anticipate their preferences.

It is worth noting that some concerns were raised in the open-ended responses provided by the study participants regarding the potential manipulation of consumers' buying behavior through the use of AI in e-commerce. For instance, participants expressed apprehension about AI-based recommendation algorithms that utilize data on customer buying behavior. These algorithms can create positive reinforcement in customers' minds by offering personalized recommendations, which may lead to impulsive or unwarranted purchases.

Furthermore, some students expressed the belief that neuroscience is employed in advertising to manipulate customers' emotions and desires, prompting them to purchase unnecessary or unsuitable products. Therefore, it is crucial for companies to adhere to rules and ethical principles in the use of AI and neuroscience, respect buyers' rights, and ensure transparency in the collection and utilization of customer data. All buyers should be informed about how their data are used and have the option to object to data collection. Additionally, control and regulatory mechanisms should be in place to prevent unethical use of AI in e-commerce.

Familiarity and Expertise. This study has revealed that consumers who have prior familiarity with AI technologies such as voice or facial recognition, AI translators, chatbots, and virtual sales consultants are more likely to develop trust in e-commerce AI algorithms. Therefore, we confirm Hypothesis 2, which posits that consumers who are familiar with AI technologies are more inclined to trust e-commerce AI algorithms. These findings align with the research conducted by Horrowitz et al. [19], who demonstrated that individuals with familiarity with AI and similar technologies are more likely to support autonomous applications compared to those with limited understanding of the technology.

Field of Study. After controlling for confounding variables, the field of study among students was found to have a significant impact on trust in e-commerce AI algorithms. The results of the ordinal regression model indicate that students majoring in law and informatics are five times more likely to report higher levels of trust compared to students majoring in social sciences and humanities. However, due to the limited availability of research on similar patterns across different studies, it is difficult to determine if these differences by major have been consistently observed.

Furthermore, it is important to note that not all research hypotheses were supported by the findings of the ordinal logistic model. Specifically, the following three hypotheses were rejected:

Hypothesis 3. *Consumers who possess knowledge about the interaction between AI algorithms and their personal data will exhibit higher levels of trust in e-commerce AI algorithms.*

Hypothesis 4. *Younger consumers will demonstrate a higher level of trust in e-commerce AI algorithms compared to older consumers.*

Hypothesis 6. *Consumers who perceive that AI has the potential to influence their purchasing decisions will demonstrate lower levels of trust in e-commerce AI algorithms.*

6. Limitations

There are several limitations associated with the research design utilized in this study. Firstly, the relatively low response rate may have influenced the representativeness of the sample, thus limiting the generalizability of the findings to other college students in Romania. Additionally, as the study was conducted at a single university, caution should be exercised when applying the results to a broader population.

Secondly, the study lacks a comprehensive understanding of trust in AI algorithms, as it primarily relied on survey responses. To gain a more nuanced perspective, future research could consider incorporating qualitative methods such as semi-structured interviews or focus groups with the students. These methods would allow for in-depth exploration of the factors influencing trust and provide richer insights into participants' experiences and perceptions.

Thirdly, the study did not examine the impact of social factors on trust in e-commerce AI algorithms. Recommendations and opinions from friends, family, and online communities can significantly influence individuals' trust in AI. Positive reviews, testimonials, and endorsements from trusted sources can enhance users' confidence in the reliability and effectiveness of AI algorithms. Future research could explore the role of social factors in shaping trust perceptions to provide a more comprehensive understanding of the phenomenon. Overall, while this study contributes valuable insights into trust in e-commerce AI algorithms, these limitations highlight the need for further research to address the gaps and provide a more comprehensive understanding of the factors influencing trust in AI in the context of e-commerce in Romania.

7. Conclusions

This cross-sectional study aimed to investigate trust in e-commerce AI algorithms among college students at a public university in Romania. The findings from the ordinal regression analysis revealed several factors that are associated with trust, including transparency, perceived usefulness of product recommenders, familiarity and expertise with other AI applications such as face and voice recognition, and the field of study of the students.

These findings have important implications for e-commerce businesses. Companies can utilize these results to enhance the transparency of their AI algorithm interaction messages, providing clear and informative communication to consumers. Additionally, improving the technology and effectiveness of product recommenders can further contribute to building trust, as consumers perceive them as valuable tools.

This study adds to the existing body of research on trust in AI by providing evidence from Romania, which aligns with findings from studies conducted in other countries that highlight the significance of transparency. The results underscore the need for businesses to prioritize transparency and improve the functionality of AI systems to foster trust among consumers.

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Appendix A

Table A1. Chi-Square results for students' trust in e-commerce AI algorithms.

	Low Trust in E-Commerce Algorithms	**High Trust in E-Commerce Algorithms**	***n***	***Chi-Square***	***p***	***Cramer's V***
Field of Study				11.24	<0.05	0.15
Law	40.0%	60.0%	20			
Economics	63.5%	36.5%	167			
Informatics	48.5%	51.5%	66			
Engineering	62.3%	37.7%	61			
Medicine	65.3%	24.7%	98			
Humanities	68.9%	31.1%	74			
Gender				0.45	0.501	0.30
Female	62.5%	37.5%	331			
Male	59.4.%	40.6%	155			
Age Group				5.27	0.153	0.10
18–25	59.3%	40.7%	371			
25–35	76.7%	23.3%	43			
35–45	64.9%	35.1%	57			
Older than 45	60.0%	40.0%	15			
How many days per month do you shop online?				3.33	0.504	0.08
Never	67.5%	32.5%	40			
1–3 days	63.4%	46.6%	257			
4–7 days	54.5%	45.5%	77			
8–10 days	53.6%	46.4%	28			
11 or more days	61.9%	38.1%	84			
How much do you spend monthly on online shopping?				1.91	0.753	0.06
Under 100 lei	66.3%	33.7%	92			
100–200 lei	61.6%	38.4%	164			
201–500 lei	60.9.%	39.1%	161			
500–1000 lei	57.9%	41.1%	57			
More than 1000 lei	50.0%	50.0%	12			
Knowledge of the ways in which AI algorithms on the e-commerce sites you visit interact with your consumer profile:				6.91	<0.01	0.12
Low	65.5%	34.5%	328			
High	53.2%	46.8%	158			

Table A1. *Cont.*

	Low Trust in E-Commerce Algorithms	**High Trust in E-Commerce Algorithms**	***n***	***Chi-Square***	***p***	***Cramer's V***
Belief that your interaction with AI algorithms on e-commerce sites helps you identify the desired products:				26.25	<0.001	0.23
Low	46.0%	54.0%	286			
High	23.1%	76.9%	200			
Frequency of interaction in the last month with an AI algorithm that simulates a sales consultant (via chat or phone)?				2.67	0.102	0.07
Low	62.5%	37.5%	451			
High	48.6%	51.4%	35			
Belief that AI algorithms affect buying decisions:				6.91	<0.01	0.12
Low	65.5%	34.5%	328			
High	53.2%	46.8%	158			
Have you been informed by the visited e-commerce sites that you will interact with an algorithm?				8.00	<0.01	0.16
Yes	51.7%	48.3%	145			
No	67.5%	32.5%	166			
During the last month, have you used technologies such as voice recognition assistance (i.e., Siri), facial recognition (i.e., to access your smartphone), or translation services (i.e., Google Translate)?				11.74	0.001	0.16
Yes	57.9%	42.1%	394			
No	77.2%	22.8%	92			

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