

The Impact of Artificial Intelligence (AI) on the Sharing Economy: Automation and Optimization

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Abstract. *The adoption of artificial intelligence and the development of the collaborative economy represent two major directions of digital economic transformation in the European Union. This study examines the implementation of these technologies across EU countries, with a particular focus on Romania, analyzing their implications for economic competitiveness and workforce digitalization. Existing research highlights that digitally advanced countries tend to integrate artificial intelligence and collaborative platforms more rapidly. However, notable East-West EU disparities remain. To identify the key factors influencing variations in AI adoption across the EU and to assess how the collaborative economy affects digital integration in different national economies, a comparative analysis was conducted on statistical data regarding AI usage in enterprises, workforce digitalization and the evolution of online purchases on collaborative economy platforms between 2021 and 2024. The findings highlight a significant increase in AI adoption in the EU, from 8,03% in 2023 to 13, 48% in 2024, indicating an overall upward trend, although at uneven rates across countries. Notably, the comparative analysis of sharing economies in Eastern and Western Europe remains limited, representing a relevant research gap for understanding regional differences in the integration of these technologies. The conclusions emphasize the need for increased investment in digital infrastructure and technological education to reduce disparities and accelerate digital transition across the European Union.*

Keywords: sharing economy, artificial intelligence, circular economy, collaborative economy, sharing economy platforms, AI automation, technological adoption.

Introduction

Given the context of the global economic transformation of the last decades, artificial intelligence and the sharing economy have become two key phenomena shaping the future of markets and economic interactions, redefining business models and contributing to the global economic paradigm shift. On the one hand, artificial intelligence plays a crucial role in process automation, data-driven decision-making and resource optimization. On the other hand, the sharing economy is redefining traditional patterns of consumption and production through digital platforms, facilitating access to goods and services without the need to own them. The intersection of these concepts is generating significant changes in various economic sectors, with implications for the efficiency, competitiveness and regulation of markets.

The sharing economy has been made possible by the accelerated technological progress and digitization of recent decades. This has radically changed the way people conduct their economic

activities, breaking down the traditional barriers between supply and demand. Platforms such as Uber, Airbnb, Bolt are using AI algorithms to improve resource allocation, consumer experience, real-time price adaptation, and increase user safety and satisfaction (Zervas et al., 2017). At the same time, through chatbots, predictive analytics, customer service automation, AI is helping to streamline companies' internal processes.

The digital revolution has also transformed the labor market, raising both opportunities and challenges. On the one hand, AI is creating new jobs in areas such as data analytics, algorithm development and cybersecurity. On the other, the automation of processes is reducing the workforce in some sectors, raising concerns about the future of employees in traditional fields.

Thus, the integration of advanced technologies into business models has become a widely used practice due to the opportunities created, but of course, the challenges related to ethical, regulatory and social impacts on the punch market must also be taken into account (Floridi et al., 2018).

This work is relevant for business, given the need to understand the long-term impact of AI on the sharing economy. As AI becomes increasingly developed, the ability of platforms to operate efficiently and offer personalized services grows exponentially, transforming both consumer behavior and business strategies.

The European Union is succeeding in providing a regulatory framework that seeks to balance technological innovation with consumer and workforce protection. However, there are economic disparities between Eastern and Western countries in the adoption of artificial intelligence that may affect the cohesion of the European single market. Therefore, studying these phenomena is essential for the formulation of effective policies to integrate AI into the digital economy.

This paper aims to investigate how artificial intelligence influences the sharing economy, considering automation and resource optimization processes. Thus, the research is based on the following question:

- How does AI-driven automation impact the scalability of sharing economy platforms in EU countries?

This paper makes a significant contribution to the literature by analyzing in detail the interaction between AI and the sharing economy, highlighting the economic, social and technological implications of these transformations. The study will provide insights into how digital platforms are optimizing their operation through AI, as well as the challenges this transition poses for the labor market and international regulation.

In addition to this question, the research explores variations in AI adoption across Europe, the influence of the collaborative economy on digitalization, and the ethical and regulatory challenges associated with AI integration in this sector. The study examines these aspects through a literature review, a description of the research methodology—including a comparative analysis of AI adoption in European Union companies and the application of statistical significance tests (t-tests for AI adoption differences)—followed by the presentation of results and their implications for the labor market and public policies. Finally, the paper synthesizes the main findings and proposes recommendations for policymakers and economic actors interested in transitioning toward an efficient and sustainable digital economy.

Literature review

In order to understand the relationship between the collaborative economy and artificial intelligence, it is essential to consider the factors contributing to the growth of the sharing economy and how these factors align with the principles of technological development, in particular the

evolution of artificial intelligence. In this relationship, emerging technologies facilitate both the expansion of collaborative markets and their efficiency.

Husnita et. al. (2023) believes that one of the most important factors contributing to the growth of the AI-enabled sharing economy is the increased accessibility to the internet and mobile devices, as well as the development of web and mobile applications that have enabled users to interact quickly and efficiently on sharing platforms. AI is playing an important role in optimizing the user experience and scaling these platforms to handle an increasing number of users and transactions. In a complementary perspective, Zervas et al. (2017) analyzed the impact of Airbnb on traditional hotel markets, highlighting the role of the collaborative economy in redistributing demand and redefining consumption patterns. Linking these findings, it can be observed that the increased accessibility of digital platforms, facilitated by AI, amplifies the economic and social impact of sharing services, contributing to the transformation of traditional sectors.

More recent studies in the field (Blahušáková, 2023) emphasize that the automation of certain processes makes sharing economies more efficient and less dependent on human interaction. Thus, AI through machine learning technologies, i.e. machine learning optimizes processes in the shared economy, such as transaction validation, user review management or the pricing process. For example, platforms can use AI to predict supply and demand, adapting quickly to market changes. The current research (Felicetti et al., 2024) analyzes current trends in the application of AI to increase efficiency and reduce operational costs in sharing economy platforms. This confirms previous observations that emerging technologies are transforming business models and creating new opportunities for companies and users to grow.

Strowel & Vergote (2018) argue that sharing economy platforms facilitating the exchange of goods and services, such as Airbnb or Uber, are powered by advanced technologies that enable efficient data management, user behavior analysis and personalized service delivery, thus with AI it is much easier to understand user behavior and continuously improve the consumer experience and optimize processes.

Another major concern relevant in the literature (European Parliamentary Research Service, 2019) for users of the collaborative economy is data protection and privacy. In this context, increasing trust in these platforms becomes a crucial factor. Technological developments in AI are being used to create more secure authentication and data protection systems (e.g. biometrics, advanced encryption), which reduce fraud risks and improve the security of sharing platforms. In this context, (European Commission, 2024) European data protection regulations are fundamental to guarantee the protection of users' rights in collaborative economy platforms integrating AI. At the same time, the ethical challenges related to AI require particular attention to the transparency of algorithmic decisions, but the EU is engaging bilaterally and multilaterally to promote trusted, human-centered and ethical AI.

The adoption of AI in the collaborative economy brings both benefits and challenges. On the one hand, the use of intelligent data analytics and machine learning helps maximize competitive advantages for digital platforms. On the other hand, studies indicate that firms face the need for significant upfront investments, data privacy concerns, and the need to upskill the workforce (Pfister & Lehmann, 2023). These issues need to be addressed strategically to ensure a sustainable deployment of new technologies.

Studies in the literature show that artificial intelligence can help sharing economy platforms by increasing trust, asset matching, and understanding participants' preferences and attitudes. In this regard, Kong et. al. (2020) emphasizes through trust and reputation theory that user feedback, ratings and identity validation play a key role in building trust in the sharing economy. The theory

states that supporting trust mechanisms is crucial for reducing uncertainty associated with transaction planning (Burinskienė et. al., 2024). However, Gerwe (2024) argues that the sharing economy still has some limitations, focusing on issues such as regulation and legal compliance. The author suggests that many sharing platforms operate in legal gray areas, which may lead to conflicts with existing regulations. He also explains that the excessive use of these platforms and the impact of artificial intelligence can have negative environmental consequences, contrary to sustainability goals.

The relationship between the collaborative economy and artificial intelligence is symbiotic, and technological development plays a fundamental role in optimizing and expanding it. Artificial intelligence contributes to streamlining processes, personalizing user experiences and increasing trust in sharing platforms, facilitating a better integration of the sharing economy into everyday life.

Methodology

The main purpose of this study is to analyze the evolution of online procurement on collaborative economy platforms at the level of the European Union countries. The research method used is quantitative research, on data collection and analysis for the period 2021-2024, and for a clearer picture, the use of artificial intelligence in companies in the European Union will be analyzed, and the use of computers and the internet by the employees of these companies will be analyzed. Finally, the evolution of online purchases on collaborative economy platforms at the level of the European Union will be analyzed and the percentage average of the European Union with Romania will be compared.

For data collection, official sources and statistical reports were used, being accurate and reliable from the official Eurostat website, namely:

- Artificial intelligence by size class of enterprise - This data product is extracted from the following source datasets isoc_eb_ai (All activities, except: agriculture, forestry and fishing, and mining and quarrying, without financial sector);
- Use of computers and the internet by employees by size class of enterprise - This data product is extracted from the following source datasets isoc_ci_cm_ps (All activities, except: agriculture, forestry and fishing, and mining and quarrying, without financial sector);
- Internet purchases - collaborative economy - This data product is extracted from the following source datasets isoc_ec_ce_i (Online purchases from private persons: any physical goods, 3 months).

These datasets were chosen due to their comprehensive coverage of key aspects related to artificial intelligence, internet and computer use, as well as online purchases on collaborative economy platforms in the EU. Alternative datasets were considered, but narrower application areas (agriculture, forestry and fishing, and mining and quarrying, financial sector) were excluded due to limitations.

For the data analysis, Microsoft Excel, a basic tool in quantitative analysis, was used. Graphs and charts were produced to analyze trends and make statistical comparisons. The graphical analysis was complemented by visual observations of the variations in the data, allowing a clearer picture of their evolution, both at national and European level.

In addition, the analysis assumes that the data provided by the official Eurostat website are consistent and accurate across countries, although there may be variations in reporting standards. Official sources guarantee the safety and objectivity of the information presented.

Furthermore, an independent t-test was conducted to assess differences in AI adoption rates across different countries.

Results and discussions

The data analyzed from 2023 on the use of artificial intelligence (AI) in enterprises in the European Union reflects a significant diversification in the implementations of such technologies. The percentage varies considerably, there are differences not only in the level of technological development but also in the degree of integration of these new technologies by the population, respectively the workforce.

The highest percentages of AI implementation in businesses are found in countries such as Denmark (15.17%), Finland (15.1%) and Luxembourg (14.45%). They have a solid and well-developed digital infrastructure, favorable government policies and innovations oriented towards digitalization and automation. In addition, these percentages reflect significant investments in research and development, as well as a high degree of digital skills among the workforce.

At the opposite end of the scale, countries such as Romania (1.51%), Bulgaria (3.62%) and Poland (3.67%) have the lowest percentages of AI use in enterprises. These values are well below those of the rest of the European Union countries in terms of AI adoption in the business environment. The main reasons for those low values include a less developed digital infrastructure and limited investment in technology. The private sector is also not as innovation-driven, and human capital needs specialized education in AI and the use of technologies.

Germany (11.55%), Slovenia (11.37%) and Austria (10.79%) have higher AI adoption rates than Eastern European countries, but remain significantly behind from the levels reached by the Nordic countries. In these countries, there are still challenges in adopting AI on a large scale, and investment in this area needs to be stimulated.

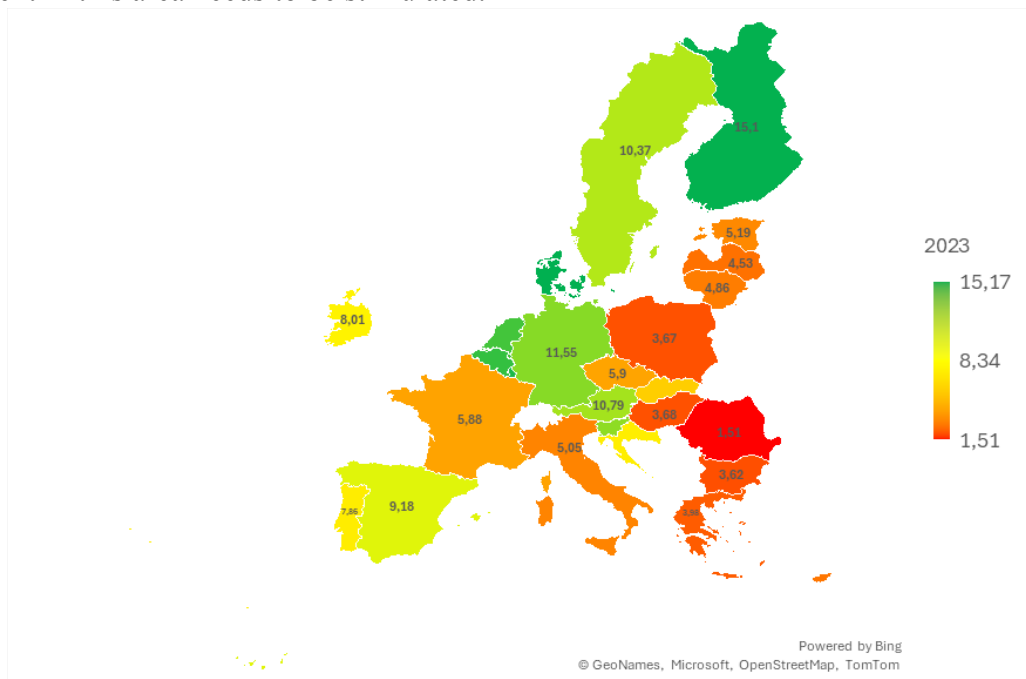


Figure 1. Use of artificial intelligence in enterprise, European Union, 2023, Percentage of enterprises

Source: Own processing of data from Eurostat database, isoc_eb_ai.

The variability in the adoption of artificial intelligence in enterprises has significant implications for the economy, with countries that fail to keep up with the adoption of technologies risking falling behind in global competitiveness. Training the population and stimulating investment in technology are crucial.

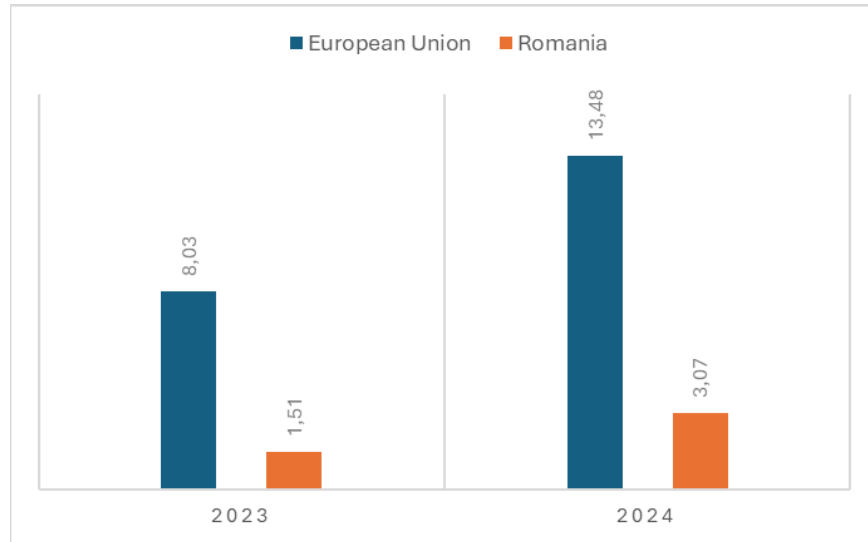


Figure 2. Use of artificial intelligence in enterprise European Union vs. Romania, 2023-2024, Percentage of enterprises

Source: Own processing of data from Eurostat database, isoc_eb_ai.

Between 2023 and 2024, there has been a trend of expansion in the use of artificial intelligence in enterprises, both in the European Union and in Romania, but with a significant difference between the two. The European Union average increased from 8.03% in 2023 to 13.48% in 2024, which highlights an increasing interest among European enterprises in integrating digital technologies within the broader context of digital globalization.

In parallel, Romania has recorded a lower growth, from 1.51% in 2023 to 3.07% in 2024, representing a major difference compared to the European average. Although an obvious growth is observed, the pace is slow and the digital competition is increasingly fierce. Romania must accelerate the implementation of digital infrastructures and increase investments in the technology sector to keep pace with national economies.

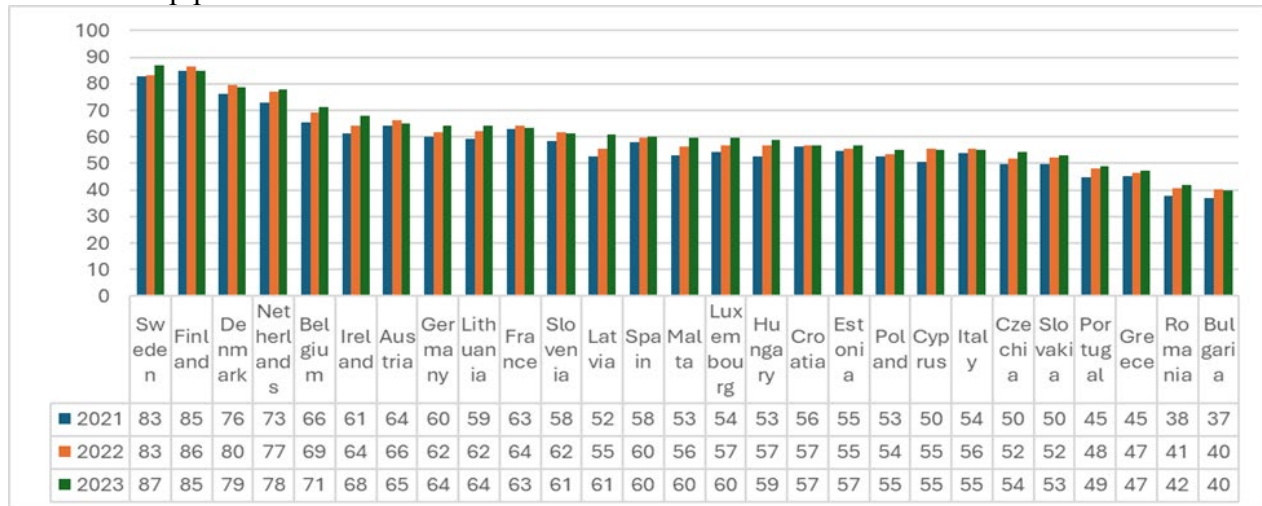


Figure 3. Use of computers and the internet by employees, European Union, 2021-2023, Percentage of total employment

Source: Own processing of data from Eurostat database, isoc_eb_ai.

The data analyzed in Figure 3 represents the use of computers and the internet by employees in enterprises across European countries during the period 2021-2023. This statistic is relevant to assess the level of digitalization of the workforce and the degree of adaptability of employees to new technologies emerging in the current economic context.

The Nordic countries, Sweden, Finland, Denmark, have the highest percentages of computer and internet use among employees, being over 80% in the analyzed period. This indicates a widespread use of technologies and digitalization in the workplace, a trend supported not only by national digitalization policies but also by a high-quality education system, which ensures that the workforce is very well adapted to digital advancements.

The Netherlands and Belgium, for example, are countries that are experiencing continuous growth in the use of digital technologies, as a consequence of the globalized and interconnected economy, in which digitalization is essential for business success. On the other hand, Romania and Bulgaria are at the lower end of the ranking, with low percentages of use of digital technologies among employees. Although Romania has a significant IT workforce, challenges in digital infrastructure persist. While the percentage of employees using digital technologies is increasing slightly, it remains significantly lower than that of countries in Western and Northern Europe.

The use of computers and the Internet among employees in enterprises represents a general trend of workforce adaptation to the demands of the modern economic market, which emphasizes digital skills. This has significant economic implications, as it can stimulate productivity growth and improve access to new employment opportunities, thus supporting the transition to dynamic and digital economies. The significant differences between countries highlight the need for economic, but especially educational, policies that promote and stimulate the development of digital skills across all economic sectors.

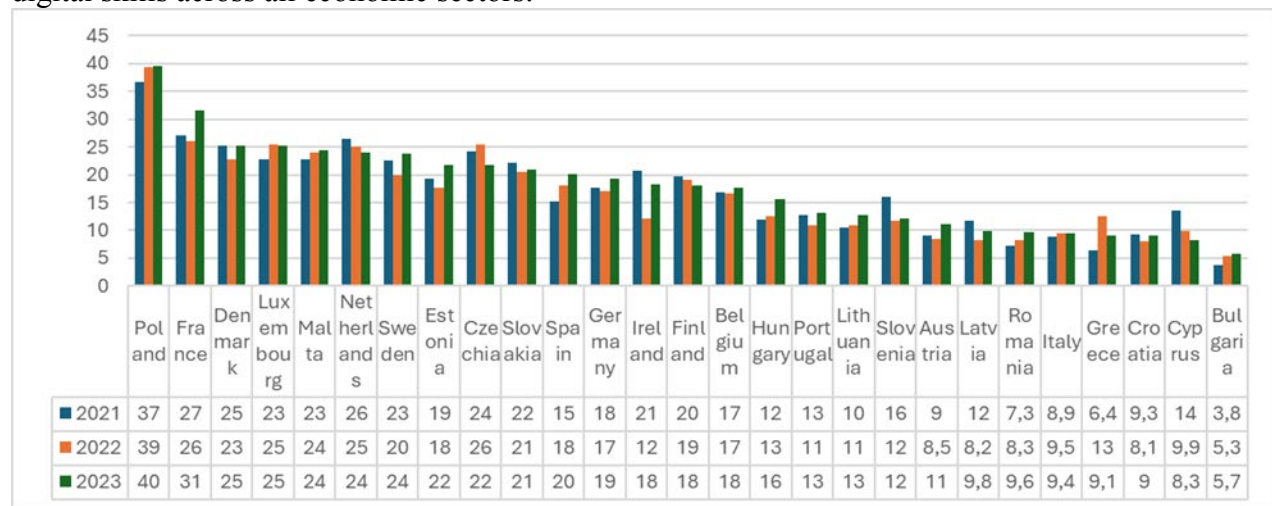


Figure 4. Internet purchases - collaborative economy, European Union, 2021-2023, Percentage of individuals

Source: Own processing of data from Eurostat database, isoc_eb_ai.

According to Figure 4, the evolution of online purchases through collaborative economy platforms from 2021 to 2023 varies significantly, suggesting notable differences in the impact of this economy on national markets.

In general, the analyzed data show an increasing trend in most Central and Eastern European countries, which demonstrates the adaptability of consumers to the digital technologies

within collaborative economy models (Bolt, Uber, Airbnb), especially among the younger generation.

At the top of the ranking is Poland, which has a constant expansion in online purchases of collaborative economy services, from 36.65% in 2021 to 39.57% in 2023, which demonstrates an accelerated process of digitalization, as well as its assimilation by the population.

In France, for example, the collaborative economy market has been volatile, starting at 26.97% in 2021, then declining in 2022 (25.99%), before making a spectacular comeback in 2023 to 31.47%. This subsequent increase is due to the population's trust in collaborative economy platforms, but also to the economic and socio-political factors of better regulation of them.

Countries such as Denmark, Luxembourg and Malta have shown constant values during the analyzed period, indicating stability in consumer behavior. Trust in digitalization and collaborative economy platforms remains high. These countries have mature economies that have reached a level of equilibrium, with small but constant increases.

Regarding smaller countries in Eastern Europe, such as Romania or Bulgaria, there is a small growth trend in the use of collaborative economy platforms. For example, saw an increase from 7.28% in 2021 to 9.64% in 2023. This gradual expansion reflects investment in digital infrastructure and improved digital education among the young population.

Ireland has experienced a dramatic decline in online purchases within the collaborative economy, from 20.77% in 2021 to 12.13% in 2022, with a subsequent rebound of 18.36% in 2023, demonstrating changes in the economic behavior of Irish consumers.

Overall, this analyzed data set suggests that countries in the European Union have significant diversity in the pace at which the collaborative economy is developing, influenced by factors such as the level of digitalization and digital education of the population, but also by the country's technological infrastructure.

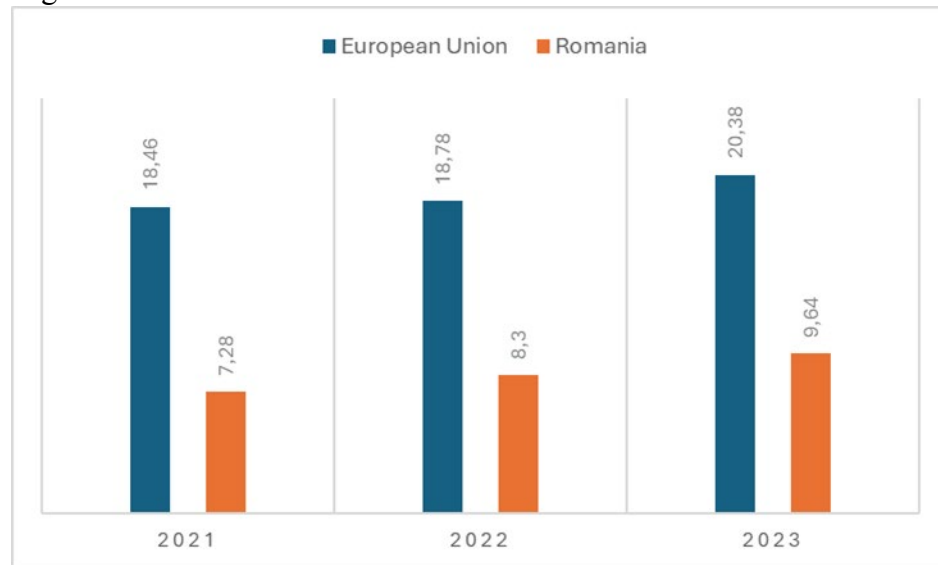


Figure 5. Internet purchases - collaborative economy, European Union vs. Romania, 2021-2023, Percentage of individuals

Source: Own processing of data from Eurostat database, isoc_eb_ai.

The data analyzed in Chart 5 reflects the evolution of online purchases through collaborative economy platforms by comparing the European Union average with Romania, during the period 2021-2023. In the EU, the percentage of people using collaborative economy platforms

has increased steadily, from 18.46% in 2021 to 20.38% in 2023. This expansion suggests the growing scale of the digital economy, supported by technological infrastructure, as well as the population's adaptation to new service and consumption models within a regulatory environment favorable to European policies.

Romania also recorded an increase during the analyzed period, from 7.28% in 2021 to 9.64% in 2023, but these values remain significantly below the European Union average. This expansion is due to the improvement of internet access in rural areas, but also to the development of the population's trust in online collaborative economy platforms. The data analyzed is post-COVID-19 period, following a time when most consumers were in quarantine and relied on collaborative economy services to meet their needs.

Table 1. Artificial intelligence by size class of enterprise (T-test)

Country	2021	2023	2024	T-statistic	P-value
Belgium	10,32	13,81	24,71	-1,9420	0,3027
Bulgaria	3,29	3,62	6,47	-1,2619	0,4266
Czechia	4,46	5,9	11,26	-1,7347	0,3329
Denmark	23,89	15,17	27,58	-0,1746	0,8899
Germany	10,56	11,55	19,75	-1,2746	0,4235
Estonia	2,77	5,19	13,89	-1,7707	0,3273
Ireland	7,88	8,01	14,9	-1,0385	0,4880
Greece	2,61	3,98	9,81	-1,6143	0,3531
Spain	7,67	9,18	11,31	-5,8710	0,1074
France	6,67	5,88	9,91	-0,6722	0,6232
Croatia	8,74	7,89	11,76	-0,6398	0,6376
Italy	6,17	5,05	8,2	-0,4754	0,7175
Cyprus	2,59	4,67	7,9	-4,6174	0,1358
Latvia	3,72	4,53	8,83	-1,4642	0,3815
Lithuania	4,45	4,86	8,76	-1,2350	0,4333
Luxembourg	13	14,45	23,73	-1,3704	0,4013
Hungary	2,98	3,68	7,41	-1,4620	0,3819
Malta	10,16	13,17	17,3	-6,3750	0,0991
Netherlands	13,1	13,37	23,06	-1,0573	0,4823
Austria	8,83	10,79	20,27	-1,5213	0,3702
Poland	2,86	3,67	5,9	-2,1408	0,2782
Portugal	7,2	7,86	8,63	-13,0000	0,0489
Romania	1,38	1,51	3,07	-1,1818	0,4471
Slovenia	11,73	11,37	20,89	-0,9271	0,5241
Slovakia	5,19	7,04	10,78	-2,9577	0,2076
Finland	15,79	15,1	24,37	-0,8614	0,5473
Sweden	9,92	10,37	25,09	-1,0631	0,4805

Source: Own processing of data from Eurostat database, isoc_eb_ai.

The analysis of AI adoption in the European Union was based on data from Eurostat, comparing values from 2021, 2023, and 2024. To assess the statistical significance of AI adoption differences between these periods, the paired t-test was applied for each country.

The results indicate that, in most of the analyzed countries, the differences between 2021 and 2024 are not statistically significant ($p > 0.05$), suggesting that the observed variations may be due to natural fluctuations rather than a clear trend of accelerated growth. The only exception is Portugal, where $p = 0.0489$, indicating a real increase in AI adoption during this period, confirming that the digitalization and AI integration process has been more pronounced in this country.

Regarding Romania, the results show a modest increase in AI adoption (from 1.38% in 2021 to 3.07% in 2024), but without strong statistical significance ($p = 0.4471$). This outcome aligns with Kong et al. (2014)'s trust theory, which explains the slow adoption of new technologies in emerging economies through a low level of trust in digital platforms and automation. One of the key barriers identified for Romania is the low level of digital literacy, which limits both companies' interest in adopting AI and the workforce's ability to use these technologies effectively.

A limitation of this analysis is the absence of data for 2022, which reduces the granularity of observations and makes it difficult to capture intermediate trends in AI adoption rates. Additionally, although the t-test provides a measure of statistical significance, it does not fully capture the contextual factors influencing AI adoption, such as investments in digital infrastructure, government policies, or sector-specific characteristics of each economy.

In conclusion, while the analysis indicates a general trend of increasing AI adoption in the EU, this growth is neither uniform nor statistically significant in most countries. The disparities between Western and Eastern European states persist, influenced by structural factors such as digital education, the level of economic digitalization, and trust in new technologies. These findings highlight the need for public policies focused on improving digital skills and stimulating investment in emerging technologies to reduce regional gaps in the digital transformation of the European economy.

Conclusion

This study has examined the impact of artificial intelligence (AI) in the context of the sharing economy, with a particular focus on Romania and the diversity of AI adoption across different EU countries. A key contribution of this research is its perspective centered on Romania, highlighting the country's challenges in integrating AI within the collaborative economy, especially in relation to digital literacy levels and trust in automated platforms.

Regarding our research question, the use of artificial intelligence contributes significantly to increase the efficiency of sharing economy platforms by optimizing the connection processes between users and service providers, personalizing services and improving user experience. AI also makes it easier to manage resources and improve operational efficiency, reducing costs and the time it takes to complete certain transactions. However, the extent of these benefits varies across the EU, with Eastern European countries lagging due to lower levels of digital infrastructure investment and slower adoption of automation technologies.

With respect to the automation of traditional workplaces in sectors impacted by the collaborative economy, the study indicates that transportation, delivery, and service industries are particularly affected. While AI and automation technologies create new job opportunities in emerging fields, they also contribute to the decline of traditional jobs, necessitating workforce adaptation through upskilling and continuous training. A critical area for future research would be

the impact of AI on sharing platforms in rural areas, where digital infrastructure is often weaker, and automation may face additional barriers.

The main ethical and regulatory challenges related to the integration of AI in the sharing economy are related to the protection of personal data, the transparency of algorithms and the fairness of access to digital platforms. Existing regulations are not always sufficiently clear or adaptable to the rapid pace of technological innovation, which can create risks of abuse and inequality. There are also questions about the accountability of platforms to users, particularly where automated AI decisions can negatively affect the user experience. A key policy recommendation to address these issues would be the implementation of EU-funded subsidies for AI training programs, particularly targeting Eastern European countries where skill gaps hinder AI adoption.

The significance of this research lies in its exploration of AI's transformative role in the sharing economy and its potential to create more efficient and sustainable digital ecosystems. However, limitations include the availability of data, as the absence of 2022 figures reduces the ability to track year-on-year trends with greater accuracy. Additionally, the complexity of factors influencing AI adoption suggests that future studies should incorporate case studies from different EU regions, providing a more granular analysis of how AI influences various sectors. Further research should also examine the role of public policy and regulation in shaping AI integration, considering each country's distinct socio-economic and legislative context.

In conclusion, AI integration within the sharing economy represents a crucial step toward a digitized and automated future, but its success depends on clear regulations, workforce reskilling, and equitable access to AI-driven opportunities. By addressing the existing digital divide and fostering targeted policy interventions, the EU can ensure a balanced and sustainable transition to an AI-powered collaborative economy.

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