

Comparative Analysis of AI Use in a Business Sphere in EU countries

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Abstract: In recent years, artificial intelligence has become one of the most important factors affecting the functioning of businesses. Its impact is noticeable from production and logistics to marketing and customer support. For companies, this means not only the need to adapt to new trends, but also the need to effectively evaluate the benefits and risks that the implementation of AI brings. The aim of the paper is to assess the current state of AI implementation in the business sector in EU countries with the emphasis on Slovakia and propose measures for its improvement. Through comparative analysis, we found out that Slovak companies use artificial intelligence less than their competitors in Western Europe. Only 29% of Slovak companies achieve a high level of integration and innovation. This is the fifth lowest share in the EU. It can be positively assessed that in certain areas our country is already above the EU average, as well as in purposes for which AI is used. These findings reveal several challenges, but also opportunities. Slovakia has the potential to become an active player in the field of artificial intelligence, especially if access to technologies is improved, the digital readiness of small and medium-sized enterprises is increased, and cooperation between business, academia, and the state is deepened.

Key Words: Artificial intelligence, Digital Intensity Index, Cloud computing services

1. INTRODUCTION

The term artificial intelligence (AI) is used in many contexts today. Nevertheless, it remains somewhat abstract and variously defined. In this paper, we understand AI as a system that exhibits signs of intelligent behavior – in particular learning, planning, natural language processing and decision-making – and is capable of independently performing tasks that traditionally require human intellect. In this regard, it is also important to distinguish between general and narrow AI. While narrow AI is here and now – practical, applied and functional, general AI remains a vision of the future that is technologically, ethically and socially open. The subject of our work is the application of narrow AI, as such systems find increasingly wider application in the business sphere.

Removčíková (2023) illustrates how versatile the use of AI can be in real business conditions. It is not only about robotization or physical machines, but especially about intelligent software solutions that save time, costs and increase the accuracy or quality of work. AI can be applied in the following areas:

- Quality control in production: AI can analyze camera images and detect even the smallest defects in materials (metal, plastic, etc.), thus replacing random inspection by the human eye. This reduces the error rate and at the same time relieves employees from physically demanding work (Balcioglu et al., 2024).
- Welding and technical inspection: In the mechanical engineering industry, AI helps with scanning and evaluating the quality of welds using special X-rays. The result is

more accurate diagnostics and the possibility of creating new jobs in the field of evaluating specific defects (Goel et al., 2024).

- Customer solutions and sales: The use of augmented reality in combination with AI allows customers to visualize, for example, the color of the facade directly on their house or virtually place furniture in the apartment. This increases satisfaction and reduces the risk of making the wrong decision when purchasing (Removčíková, 2023). Soni et al. (2020) add that AI is able to predict future customer behavior, product demand or market developments based on historical data and trends. This makes it possible to optimize inventory, marketing campaigns and make more qualified decisions in the field of production planning or financial management.
- Employee education and training: In the field of healthcare or energy (e.g. nuclear power plants), AI is a part of interactive training in virtual reality. It allows for the simulation of critical situations and the safe acquisition of correct reactions (Bajwa et al., 2021).
- Purchasing and Supply Chain: AI can optimize purchasing processes – processing data on inventory, prices and strategies, forecasting demand, supplier reliability and generating orders. The role of workers remains supervision and strategic decision-making (Removčíková, 2023). Aziki and Fadili (2022) report that

especially during the COVID-19 pandemic, AI has helped companies survive a period of instability – for example, by monitoring disrupted supply chains, managing inventories or adapting product offerings in response to changing customer preferences.

- Digital twins: Creating a digital copy of a machine, system, patient, or even a student. In a business, it can help predict equipment failures, in healthcare, save doctors' time, and in education, adapt education to individual needs (Menzies et al., 2024).
- Management and decision-making support: AI tools can also serve as a “consultant” for top managers, for example in strategic decisions, analyzing company problems, or planning changes. It can simulate various scenarios and suggest solutions (Removčíková, 2023). Enholm et al. (2022) confirm in a literature review that the correct deployment of AI can bring a competitive advantage to companies. AI helps not only with operational decisions, but also with formulating long-term strategies, assessing risks, or identifying new business opportunities.

Based on reports by McKinsey & Company (2025) and Mayer et al. (2025), one of the most common areas where AI is applied is the automation of routine processes – for example, in administration, order processing, inventory management or in HR. McKinsey report also states that up to 40% of working hours on average could theoretically be replaced by technologies based on AI and automation. These solutions also contribute to reducing errors, faster task completion and more efficient use of employee capacities. Authors Palanivelu and Vasanthi (2020) also conclude that the most widespread use of AI in companies is the automation of administrative and production processes. Companies use AI to optimize workflow, shorten production times and reduce error rates in processes that were previously dependent on manual work. The use of AI also increases work efficiency and allows workers to be transferred to more valuable positions. AI also plays an important role in predictive analytics, where companies process vast amounts of data from various channels to predict demand developments, customer behavior, or market trends. Based on these predictions, they are able to make more informed decisions, adjust their offerings, or optimize production processes (Mayer et al., 2025). A

McKinsey report (2025) points out that organizations that have integrated predictive analytics into sales and marketing management have seen an average increase in sales of 3 to 5%. Another very widespread form of use is chatbots and conversational AI systems, which not only answer customer questions in real time, but often also perform more complex tasks such as handling complaints, updating data, or providing personalized recommendations (Horák and Turková, 2023). These systems are designed to continuously learn from interactions, which improves their performance over time (Bruno, 2024). AI also plays a role in decision-making processes. Thanks to its ability to analyze complex scenarios, compare alternatives, and propose optimal solutions, it serves as a support for management in both strategic and operational decision-making. Mayer et al. (2025) add that it is the ability to connect human intuition with data-based decision-making that paves the way for the so-called “superagency” – a model where AI enhances human decision-making capacity instead of replacing it. Perifanis and Kitsios (2023) describe the use of AI in marketing, especially in market segmentation, the creation of personalized content, and setting prices using algorithms that track customer behavior in real time. Thanks to this, companies can target campaigns more effectively and increase conversion rates.

From the perspective of organizational management and performance, the implementation of AI represents a fundamental change in the way businesses operate. AI is not a replacement for human power in a negative sense, but rather a complement to it, helping companies manage labor shortages, increase process accuracy, and innovate without the need for large-scale personnel cuts. An important lesson is that in many cases, the introduction of AI does not lead to layoffs, but rather the opposite – it allows for retraining and new use of human capacities.

Many studies submit that the introduction of AI can significantly increase the performance, flexibility and ability of businesses to adapt to changing market conditions (Marr et al., 2019 and Oyekunle et al., 2024). However, several risks that are inevitably associated with this technological shift cannot be ignored.

Benefits of implementing AI for business management and performance:

- Increased productivity and quality: Businesses that have successfully implemented AI have seen an increase in output of up to 20–30%, while reducing

error rates and quality fluctuations (Balcioglu et al., 2024).

- More effective decision-making: AI enables the analysis of large volumes of data in real time, supporting fast and data-based decisions (Enholm et al., 2022).
- Automating routine processes: Reduces administrative and manual workloads on employees and allows them to redirect their capacities to more strategic activities (Marr and Ward, 2019).
- Improving HR processes: In the area of recruitment, training and employee evaluation, AI helps optimize talent selection, customize training and identify potential (Goel et al., 2024).
- Transforming corporate strategy: AI supports innovative business models and agile management, thereby increasing competitiveness (Oyekunle and Boohene, 2024).

Risks of implementing AI in businesses:

- Unclear liability: If errors occur in AI-based decision-making, it is often not clear who bears legal and moral responsibility (Perifanis and Kitsios, 2023).
- Resistance to change: Insufficient training of employees and concerns about jobs can slow down or completely block the adoption of AI (Horák and Turková, 2023).
- Ethical and legal dilemmas: Performance monitoring, employee profiling or improper handling of personal data can cause reputational and legal problems (Aziki and Fadili, 2022). Companies that work with, use, exploit or sell AI systems are required to comply with several legislative obligations (Heger, 2025). In case of breach of obligations, companies face fines of up to 7% of global annual turnover or up to 35 million euros, depending on the nature of the breach. In the case of SMEs, neglect of legal obligations can be even liquidating.
- Technology dependency: Over-reliance on algorithms can weaken managers' ability to think critically and independently (Menzies et al., 2024).
- Implementation and integration costs: For small businesses, implementing AI can be technologically and financially challenging,

creating differences compared to large players (Balcioglu et al., 2024).

2. MATERIAL AND METHODS

For the comparative analysis, we used data about how AI technologies are used, which came from the online database of the European Union's Statistical Office, specifically from the Eurostat survey (Eurostat, 2025). This is an annual survey that looked at companies in EU member states, currently 27 countries. The survey covers different areas of using information and communication technologies, with a special focus on artificial intelligence, which is the main topic of this paper.

The data collected was analyzed in two ways based on the research questions:

1.

Companies in the EU that use at least one AI technology were compared with companies in Slovakia. This relates to RQ1. The comparison looked at how companies using AI in Slovakia compare to those in EU member states and the overall EU average. Only companies with at least 10 employees were included in this analysis.

2.

Companies were also grouped by their size, which relates to RQ2. Different factors can be used to classify companies by size, such as market share, organizational complexity, annual turnover, or the number of employees. In this study, companies were divided into three size categories based on the number of employees:

- Small companies (10 to 49 employees),
- Medium companies (50 to 249 employees),
- And large companies (at least 250 employees or more).

The two research questions were:

RQ1: What is the position of Slovakia in the use of AI by companies compared to other EU countries?

RQ2: Which types of companies, based on their size, use AI more?

3. RESULTS AND DISCUSSION

The European Union has two main goals for digital transformation by 2030: more than 90% of small and medium-sized businesses (SMEs) should reach a basic level of digital intensity, and 75% of EU companies should use cloud computing, big data analysis, or AI.

The Digital Intensity Index (DII) measures how much businesses use digital technologies, like AI or online sales.

The index gives a score from 0 to 12 based on how many digital technologies a business uses:

- 0-3: very low
- 4-6: low
- 7-9: high
- 10-12: very high

A score of 4 or higher means a business has a basic level of digital intensity.

This includes businesses with low, high, or very high digital intensity, but not those with very low.

In 2024, 74% of all EU businesses had at least a basic level of digital intensity.

For SMEs, this was 73%, which is about 20 percentage points below the EU 2030 target. Large businesses did much better, with 98% reaching a basic level. Large businesses were more likely to have very high (41%) or high (46%) digital intensity compared to SMEs, who had only 6% with very high and nearly 27% with high. Most SMEs had low (40%) or very low (27%) digital intensity.

The share of SMEs with a basic level of digital intensity ranged from 50% in Bulgaria and 53% in Greece to 90% in Denmark and 93% in Finland.

As figure 1 shows, only 29% of Slovak companies achieve a high level of integration and innovation. This is the fifth lowest share in the EU.

Cloud computing lets businesses use computing power from other companies through the internet, instead of creating their own computer systems. This is a big benefit because it saves money on building and keeping up hardware and software.

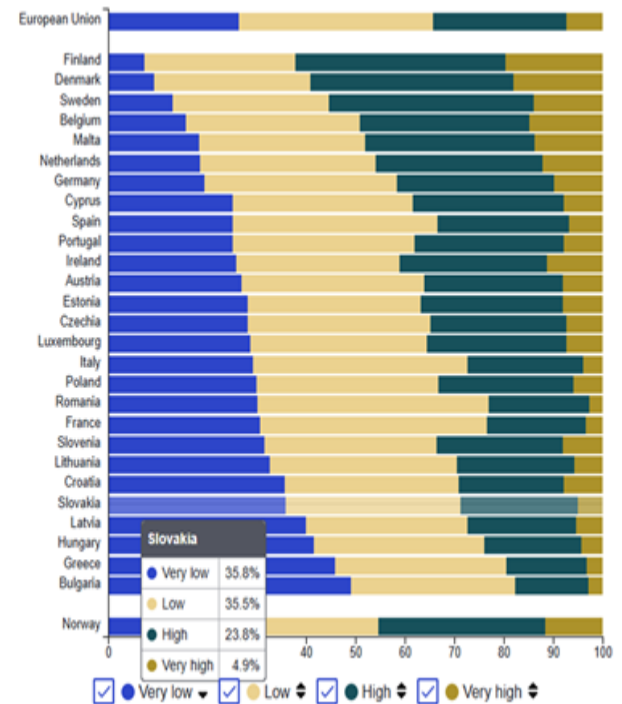
In 2023, 45% of businesses in the EU used cloud services. Larger companies were more likely to use the cloud, with 78% using it, compared to 44% of smaller businesses. Most companies that use the cloud use it for sending and receiving emails (83%), storing files (68%), and running office tools like word processors and spreadsheets (66%).

Businesses are using AI more and more to help with their work.

AI lets machines and systems learn and make decisions on their own to reach certain goals. In 2024, over 13% of EU businesses used AI, up from 8% in 2023. Like cloud computing, big companies used AI more often (41%) than small ones (13%).

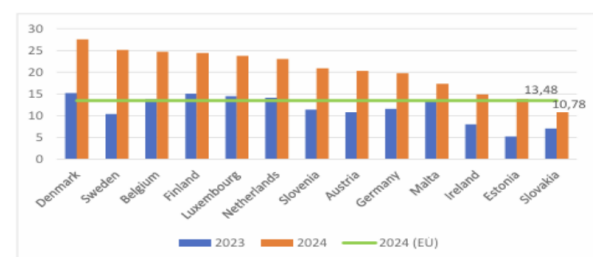
The most common use of AI was understanding written text (7% of EU businesses), then creating written or spoken language (5%), and converting spoken words into something a computer can understand (5%). Among EU countries, Denmark had the highest AI use at 28%, followed by Sweden and Belgium (both 25%). In contrast, Romania had the lowest AI use at 3%, and Poland and Bulgaria used AI at 6% each (Figure 2).

Figure 1: Digital intensity level in businesses, 2024 (as % of total businesses)



Source: own procession according to Eurostat

Figure 2: Businesses using artificial intelligence in selected EU countries (in %)



Source: own procession according to Eurostat

We processed in the table 1 which areas is artificial intelligence represented in and to what extent. The data are processed for 2024 and show the average value at the EU level, the value in the Slovak Republic and also identify the three top countries for individual areas.

Table 1 Overview of the areas which the companies use AI in (in %)

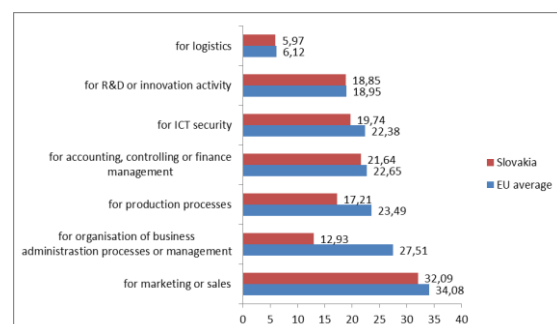
areas	EU	Top EU countries			SR
Water supply, sewerage, waste management and remediation activities	8,38	Denmark 20.48	Sweden 20.32	Austria 17.77	5.38
administrative and support services	14,33	Denmark 27.84	Luxembourg 25.64	Finland 24.78	18.37
Electricity, gas, steam and air conditioning supply	25,68	Denmark 48.36	The Netherlands 46.84	Sweden 40.71	13.07
Wholesale and retail trade, repair of motor vehicles and motorcycles	12,1	Denmark 27.34	Slovenia 23.46	The Netherlands 23.15	11.65
Transportation and storage	8,13	Belgium 23.03	Malta 20.63	Slovenia 18.97	8.22
Information and communication	48,72	Denmark 68.3	Sweden 67.56	Finland 66.43	29.19
Manufacturing	10,57	Luxembourg 27.13	Belgium 23.24	Austria 22.71	8.08
construction	6,09	Luxembourg 19.08	Sweden 13.15	Slovenia 11.94	6.31
Accommodation	6,09	Slovenia 16.85	Austria 15.87	Belgium 15.66	3.77
Real estate activities	15,45	Finland 32.85	Denmark 29.41	Sweden 28.97	3.68
Professional, scientific and technical activities	30,53	Sweden 53.71	Finland 48.46	Denmark 44.9	17.12

Source: own procession according to Eurostat

From the data, it is clear that Denmark and Sweden have the most companies using AI in specific areas. These countries frequently appear in the top three in the EU. When considering average EU values and other countries, including Slovakia, the best performance is seen in the area of information and communication. It is positive that in certain areas, Slovakia is already above the EU average—these are administrative and support services, construction, and transportation and warehousing (highlighted in grey).

In further analysis, we focused on the comparison between Slovakia and the EU average in terms of the purposes for which companies used artificial intelligence technologies in 2024 (figure 3).

Figure 3: Enterprises using AI technologies by type of purpose, EU, 2024 (% of enterprises using at least one AI technology)



Source: own procession according to Eurostat

The most common use of AI in Slovakia is in marketing or sales, where AI was used by 32.09% of companies. This value is only slightly lower than the EU average of 34.08%, which indicates that Slovak companies are well aware of the potential of artificial intelligence in the area of business and communication with customers.

On the contrary, the biggest difference compared to the EU is seen in the area of organization of business administrative processes and management. While the EU average here is 27.51%, in Slovakia this area is covered by only 12.93% of companies using AI. This may indicate that Slovak companies are not yet fully utilizing the possibilities of AI to streamline internal operations.

In production processes, AI was used by 17.21% of Slovak companies, while in the EU it was 23.49%. Similarly, in the area of ICT security and financial management, Slovakia is slightly below the European average. Interestingly, however, in the area of research and development (R&D) or innovation activity, Slovak companies are slightly above the EU average – 18.85% compared to 18.59%, which points to the potential of the domestic innovation environment.

It can therefore be pointed out that Slovak companies are competitive in some areas of AI use, but there is room for growth, especially in the areas of internal process management and industrial automation.

On the other hand, Slovak companies should approach AI not as a fashionable technology, but as a strategic tool that requires systematic preparation, quality data infrastructure and long-term vision. At the same time, it is important to remember that successful adoption of AI requires not only technological investments, but also a change in corporate culture, employee education and the ability to flexibly respond to market and regulatory developments.

In this regard, it is positive that the Slovak Republic, as a member state of the European Union, adopted the Digital Transformation Strategy for Slovakia 2030 in 2019. The strategy defines priorities for the transition to information technologies, with an emphasis on AI, 5G networks, processing of large data sets and super-powerful computers. At the same time, it sets out areas in which it is necessary to increase the efficiency of the implementation of digital transformation, such as the economy, education and research, public administration and territorial development (MIRRI, 2019). Specific steps to achieve the goals of the Digital Transformation Strategy of Slovakia 2030 are

defined in the Digital Transformation Action Plan 2023-2026, which focuses mainly on supporting the digitalization of enterprises, the development of digital infrastructure, artificial intelligence and building a digital ecosystem.

4. CONCLUSIONS

Artificial intelligence belongs to advanced digital technologies and finds its application in various fields. Integrating digital technologies into all areas of a business enables companies to improve their products and services, and to gain competitiveness.

The analyzed data clearly show that artificial intelligence is finding its place in corporate practice across the entire European Union. The share of companies deploying AI technologies grew year-on-year in all size categories - most in large companies, but a positive trend is also visible in small and medium-sized companies. From an EU perspective, countries such as Denmark, Sweden and Belgium are the leaders. Slovak companies use artificial intelligence less than their competitors in Western Europe. Only 29% of Slovak companies achieve a high level of integration and innovation. This is the fifth lowest share in the EU.

It can be positively assessed that in certain areas our country is already above the EU average - these are: Administrative and support services, Construction and Transport and warehousing.

It turns out that Slovak companies most often use AI in the area of marketing and sales, which also corresponds to the pan-European trend. In some areas, such as research and development, our companies are even slightly above the EU average. On the other hand, we lag behind, especially in the deployment of AI for internal processes, especially in administration and management, where the difference is significant.

These findings reveal several challenges, but also opportunities. Slovakia has the potential to become an active player in the field of artificial intelligence, especially if access to technologies is improved, the digital readiness of small and medium-sized enterprises is increased, and cooperation between business, academia, and the state is deepened.

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