IBIMA Publishing
Communications of International Proceedings
https://ibimapublishing.com/p-articles/46ISM/2025/4645725/
Vol. 2025 (29), Article ID 4645725

Artificial Intelligence Adoption by Enterprises: Quantitative Research from Poland*

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* Presented at the 46th IBIMA International Conference, 26-27 November 2025, Ronda, Spain

Abstract

Artificial intelligence (AI) technologies are increasingly developed and adopted in enterprises. This trend is also observed in Poland. However, current implementation of these technologies is impacted by the number of challenges and concerns. The article aims to investigate the opinions of practitioners on the AI adoption in enterprises in Poland. The questionnaire survey was used to conduct the quantitative research. Opinions of practitioners employed in enterprises in Poland were collected between February and July 2025. Research results analysis revealed that almost 50% of surveyed practitioners use AI in companies. The reasons for not using AI include lack of human resources or knowledge, high implementation costs and concerns on data protection. In turn, the most of surveyed practitioners pointed out that AI is implemented for process automation or decision-making support. Within the areas of activity in which AI technologies are applied in enterprises, respondents highlighted work organization and office tasks, marketing or sales support, and production or service delivery support. Respondents perceive saving time and costs, as well as error and risk reduction as the greatest benefits in implementing AI. The concerns on AI implementation largely refer to possibility of errors occurrence and dependence on technology. The majority of practitioners expressed optimistic viewpoint about rapid and moderate adoption of AI in enterprises over the next 10 years.

Keywords: Artificial intelligence (AI), modern technologies, enterprises, digital transformation, Poland.

Introduction

In recent years, artificial intelligence (AI) has emerged as a transformative force across industries, reshaping business models, operational processes, and strategic decision-making. AI is increasingly becoming a key element of digital transformation strategies, enabling process automation, big data analysis, service personalization and data-driven decision making. New technologies implementation is crucial in different economy sectors (Dyczkowska et al., 2023; Kostrzewski, 2024). Despite growing interest in this topic, relatively little is known about the actual level of implementation of this technology and the attitude of practitioners towards it.

As global enterprises increasingly integrate AI technologies to enhance efficiency, innovation, and competitiveness, Polish companies are also exploring its potential. However, the pace and scope of AI implementation in Poland remain uneven, influenced by factors such as organizational readiness, technological infrastructure, and socio-economic conditions.

Conducted analysis of available literature revealed that different AI technologies and solutions may be implemented in companies (Mazgajczyk et al., 2024; Pietrusewicz, 2019; Szajna et al., 2022). AI is increasingly

Cite this Article as: Ludmiła FILINA-DAWIDOWICZ, Agnieszka BARCZAK, Joanna SĘK, Piotr TROJANOWSKI, Anna WIKTOROWSKA-JASIK and Dorota CIESIELCZYK, Vol. 2025 (29) "Artificial Intelligence Adoption by Enterprises: Quantitative Research from Poland " Communications of International Proceedings, Vol. 2025 (29), Article ID 4645725, https://doi.org/10.5171/2025.4645725

recognized as a key driver of innovation and competitiveness in companies' operation (Golubiewska et al. 2024). In Poland, the adoption of AI differs depending on companies' size and industries (Filina-Dawidowicz, et al., 2025). Considering that the attitude to AI technologies is changing dynamically, understanding how Polish companies perceive and adopt AI is essential for shaping effective strategies for digital transformation.

This study aims to investigate the opinions of practitioners on the AI adoption in enterprises in Poland. By analyzing survey data collected from representatives of companies across various economic sectors, the research provides insights into how Polish businesses perceive and utilize AI technologies.

The main research question guiding this study is:

- What are the practitioners' opinions on the AI adoption in enterprises in Poland?

To address this question, the additional specific questions were formulated:

- What types of AI technologies are being implemented in companies and what areas of business activity do they support?
- What are the benefits and concerns associated with AI adoption in enterprises?
- How practitioners perceive the future development of AI technologies within enterprises they work?

By analyzing survey data collected between February and July 2025, it was possible to provide an overview of AI technologies adoption in Poland. The research findings contribute to a broader understanding of digital transformation in the Polish business landscape.

Literature Review

Over the years, the concept of artificial intelligence has evolved significantly. The first formal document containing the assumptions and objectives of AI was published in 1956 (McCarthy et al., 1956). The evolution of AI has been achieved through individual milestones (Padmaja et al., 2024) introducing various technical and technological solutions, including the implementation of neural network algorithms, machine learning capabilities, and other solutions (Morandín-Ahuerma, 2022). Digital technologies belonging to AI, implemented and developed in enterprises, include, among others, technologies (Kozłowska, 2024) that analyze text, convert spoken language into text, recognize objects, or enable the autonomous movement of technical objects.

Artificial intelligence technologies are consistently implemented in companies and are perceived as the most important innovations. Today, these technologies are becoming increasingly important in the functioning of companies, and their use is directly related to improving the precision and efficiency of processes and their automation (Golubiewska et al. 2024; Pinski et al., 2023). The choice of a specific technology depends on the industry in which the company operates, but the most commonly used artificial intelligence technologies include (Kozłowska, 2024):

- Technologies that analyze written language (text mining). These are language processing and transcription technologies (abbreviated as NLP). In these technologies, the appropriate software analyzes, interprets, and processes text in a specific language (Atabayeva, 2024). Text mining is a general term for data analysis methods that focus on text data. This gives businesses and other users broad access to applications and information from various sources (Dergaa et al., 2023). This is particularly important for businesses, as NLP makes it easier for them to track news and access reports in various applications, making it an important source of data (Dimlo et al., 2024). Text mining technology involves exploring text and extracting and organizing data, which is then subjected to final analysis. This brings many benefits to businesses, as data on business performance, employee engagement, and user interactions are monitored in real time, while areas for improvement are identified.

- Technologies that generate written or spoken language (natural language generation) are one of the most dynamically developing areas of artificial intelligence. In the subject literature, this technology is widely discussed in the fields of data science, computational linguistics, syntactic analysis, semantic analysis, speech recognition, and context understanding (Anggarini et al., 2025). This technology enables machines to understand, interpret, and generate human language in a way that allows it to be used. These include, among other things, applications that enable real-time language translation, including chatbots that support customer service (Singhb, 2024). Thanks to this technology, customer service is more efficient and customer expectations are met as natural-

sounding responses to their questions are created. The use of these technologies is already widespread, e.g., they are used in email filtering, voice assistants, AI agents, etc.

- Technologies that convert spoken language into a form recognizable by machines (speech recognition), known as STT (Speech-to-Text) and ASR (Automatic Speech Recognition). These technologies convert speech into written text, enabling machines to understand and respond to human speech. Specialized devices understand spoken language and are able to convert it into text or commands. This enables devices to execute commands that have been given verbally by a human (Anggarini et al., 2025). Speech recognition technologies have recently significantly changed the work of people in many industries, particularly in specific areas of activity, such as customer service, order placement and fulfillment, logistics, healthcare, etc.

- Technologies that recognize objects or people based on images (image recognition, image processing). This technology analyzes surrounding area (space, objects, images (photos, graphics), videos). Thanks to this, it can assign the same or similar objects to the appropriate group (Szeliga, 2019). This technology recognizes not only the object, but also its context. It draws conclusions after analyzing the data set, and takes action on that basis. Artificial intelligence image recognition technology enables, for example, automatic monitoring of public spaces, such as traffic, etc. (Karnik, 2024). Thanks to its capabilities, it is widely used in various fields: commerce, medicine, agriculture, art, digital marketing, forensics, etc. In addition, technologies that recognize objects or people based on images are used in search engines that use images instead of keywords (Dakshinamoorthy et al., 2025). They are also applied in spatial planning, mainly in systems for planning and locating infrastructure points. These solutions facilitate regulation of pedestrian traffic flows in cities and are used, for example, in parking lots (Bando, 2023).

- Machine learning is a technology that processes and analyzes data to find patterns and specific correlations in large data sets. It allows you to make accurate decisions and formulate forecasts based on the results of this data analysis. This technology enables the transformation of input data into information that can be used to automate processes and make highly accurate predictions. In addition, machine learning uses algorithms to create models and analyze data sets, enabling it to make accurate decisions without human intervention (Kozłowska, 2024). Machine learning concerns the development of software used mainly in innovative technologies and industry, as well as in medicine, e.g., for the analysis of medical data (Jindal, Kaur, 2024). Thanks to this technology, companies obtain information and have access to a large amount of data, which allows them to improve the quality of their products and services, predict customer behavior, reduce risk, and lower costs (Mira, 2024).

- Technologies that automate processes or support decision-making enable the automation of processes through the execution of repetitive tasks, mainly in the production and administrative processes. It is worth noting that technologies that automate processes or support decision-making are related, among other things, to robotization in production, mainly in serial, repetitive activities (e.g., assembly of components) (Morandín-Ahuerma, 2022). The widespread use of these technologies is associated with the expectation of reducing operating costs and the risk of errors. Automation also refers to the use of technology to streamline and manage the flow of information, making processes more predictable. Artificial intelligence is also used to automate business processes, as it allows for the effective distribution of tasks, information, and documents between different levels of the enterprise. The most commonly used process automation technologies include database management systems and technologies that enable rapid automation of routine tasks (RPA - Robotic Process Automation). Application integration tools are also widely used to connect different systems and applications for efficient data flow (Bielińska-Dusza, 2022). The use of these technologies is related to the fact that companies have a lot of data that requires rapid analysis. Artificial intelligence tools enable the collection of a large amount of information into a single database. Thanks to the use of AI technology, this information can be analyzed and, based on the results of the analysis, used to create, for example, a chatbot that will significantly reduce the number of manually handled requests.

- Technologies that enable machines or vehicles to move physically by making autonomous decisions based on observations of their surroundings. Artificial intelligence is fundamental to the development of autonomous vehicles. It enables machines or vehicles to move physically by making autonomous decisions based on observations of their surroundings. It provides vehicles not only with analysis of their surroundings, but also with decision-making capabilities regarding direction and driving optimization. Thanks to modern algorithms, vehicles can dynamically analyze road situations, which increases their safety and efficiency. AI technologies are used, for example, in autonomous means of transport (cars, drones, ships, and underwater robots, etc.). Their use is becoming increasingly widespread, e.g., drones are used to perform a variety of tasks: deliveries, mapping the environment, search and rescue missions, etc. Currently, every branch of transport is implementing AI solutions to automate vehicles, and in particular to make them autonomous. Autonomous vehicles are able to predict the

behavior of other road users, which minimizes the risk of collisions. In addition, these vehicles are equipped with systems that process vast amounts of data from sensors and cameras in real time, enabling them to respond quickly to changing road conditions. This allows them to adjust their speed and trajectory to the current situation, thereby reducing travel time and fuel consumption (San-Segundo et al., 2024).

When analyzing the state of advancement and further development of AI in Poland, it should be emphasized that the plans for the future are very ambitious. In the draft of the new Policy for the Development of Artificial Intelligence in Poland until 2030 (Ministry, 2025), it was assumed that Poland should be among the 10-20 most advanced countries in the world in AI rankings (including Stanford HAI, which is the most popular tool for assessing the dynamics of AI development - Stanford HAI Global AI Vibrancy Tool (Stanford, 2025). This draft is currently at the stage of analyzing submissions after public consultations, which ended on July 1, 2025, and will be further processed. This shows the course of action, as an analysis of research results (Al Naqbi et al., 2024; Mutascu 2021; Gao, Feng, 2023) on the effectiveness of AI solutions implemented in companies, it can be concluded that even a small amount of artificial intelligence can improve work performance. Moreover, in most cases, it also helps to reduce gaps in employee skills.

Use of artificial intelligence technologies in companies in Poland was analyzed by Filina-Dawidowicz et al. (2025). Mentioned study contains a comparative analysis of the use of these technologies by enterprises of different sizes based on data from the Central Statistical Office in Poland for the years 2023 and 2024. The relevance of this subject area indicates the need for further investigations. Therefore, it is reasonable to continue the research and investigate the opinions of representatives of enterprises located in Poland on the different issues related to AI adoption in subsequent years.

Methodology

To examine the adoption of artificial intelligence technologies among Polish enterprises a quantitative research approach using a diagnostic survey was applied. The research was conducted between February and July 2025, companies operating in various sectors and regions across Poland took part in the survey.

A structured questionnaire was developed. It included closed-ended questions. The questionnaire survey was divided into thematic blocks covering:

- company's description and respondent's profile – including location, business area, ownership status, sector, company's size, and respondent's role;
- thematic questions related to:
  - AI adoption in enterprises – including, i.e., current implementation, types of technologies used, areas of application, reasons for not to apply AI;
  - perceived benefits and concerns – including assessment of expectations and apprehensions related to AI;
  - future development – exploring anticipated developments in AI adoption over the next decade.

A questionnaire was spread online by placing it on the social media (e.g., Facebook) websites. A total of 118 valid responses were collected. The achieved data were analyzed and conclusions were drawn. The results provide an overview of the current adoption of AI technologies in Poland.

Results

Respondents answered the question about enterprise's location in Poland. It was revealed that the majority of practitioners' responses came from West Pomeranian Voivodeship (53 responses) and Greater Poland Voivodeship (36). There were a few responses from other voivodeships, including: Kuyavian-Pomeranian (5 responses), Silesian (4), Opole (3), Lodzkie (3), Lubusz (3), Pomeranian (3), Lower Silesian (2), Masovian (2), Subcarpathian (1), Świętokrzyskie (1), Lesser Poland (1), and Lublin (1).

The surveyed practitioners represented enterprises operating across various markets (Fig. 1). The largest group of respondents pointed to companies' activities on the international market (34 responses), followed by the national market (27 responses) and the local market (25 responses). A smaller number of interviewees indicated enterprises' operation on the global market (20 responses) and the regional market (12 responses).

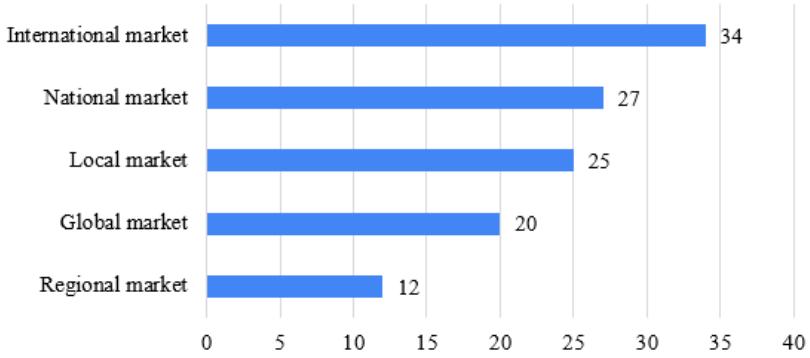

Fig. 1. Markets covered by enterprises' activities, number of responses (own elaboration)

Answering the question about business sector of enterprises' operation, respondents pointed out different sectors (Fig. 2). The majority of surveyed practitioners represented companies operating in service sector (76 responses), which included trade, transport, communication, municipal services, healthcare, education, tourism, and culture. 35 responses were received from representatives of the industrial sector, covering manufacturing and construction. The agricultural sector, which encompasses agriculture, forestry, fishing, hunting, and mining, was represented by 7 interviewees.

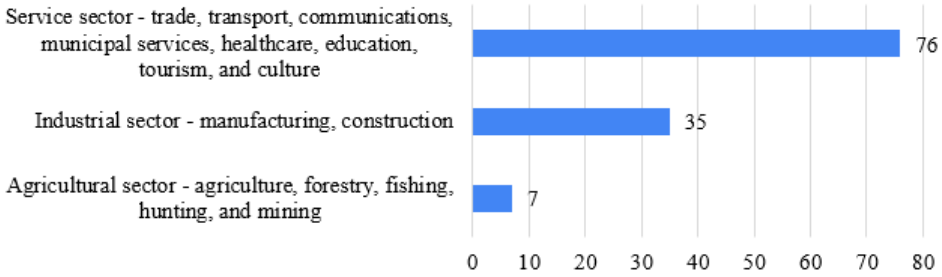

Fig. 2. Sector of enterprises' operation, number of responses (own elaboration)

While answering the next question, practitioners provided more detailed information about the type of activity carried out by companies where they work (Fig. 3). This was a multiple-choice question, allowing respondents to indicate more than one type of company's activity. Most respondents indicated that the company operates in the manufacturing sector (39 responses), followed by transport and storage activity (36). Other types of companies' activities included other services, agriculture, forestry and fishing, trade and vehicle/motorcycle repair, construction, and financial consulting and insurance. Single responses were received from practitioners working in companies dealing with public administration and defense, energy supply, mining and quarrying, arts, entertainment and recreation, and real estate.

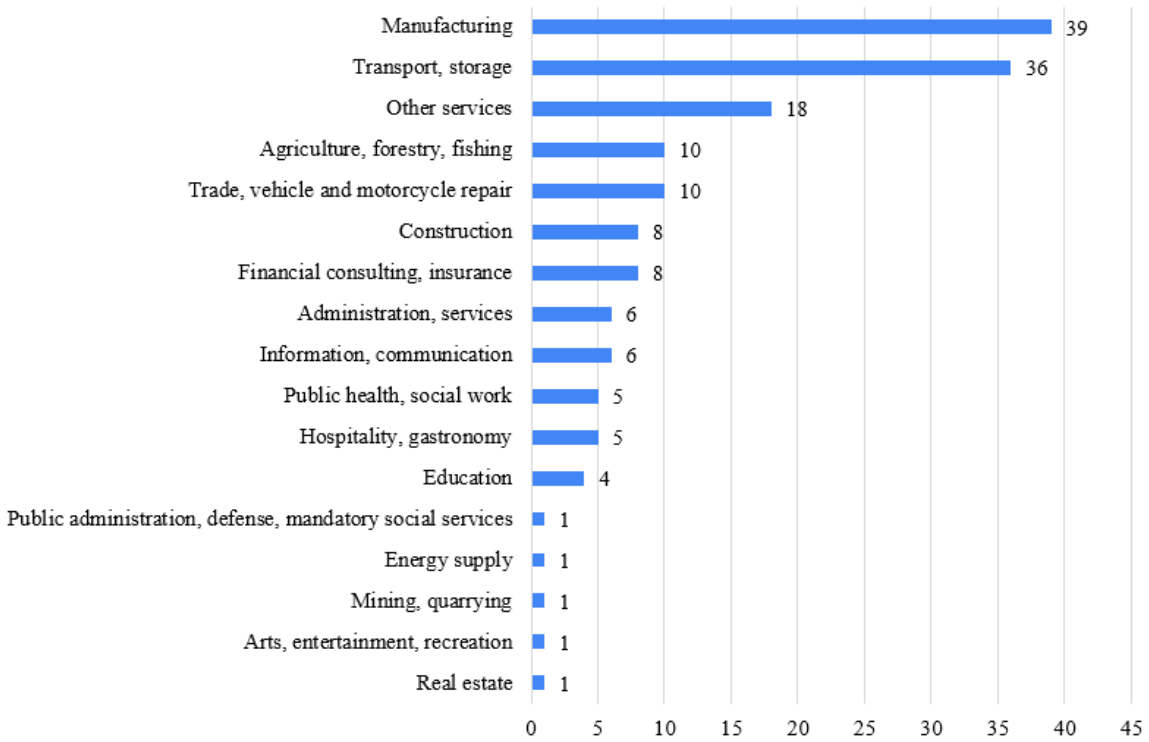

Fig. 3. Type of enterprises' activity, number of responses (own elaboration)

The surveyed respondents represented enterprises employing varying numbers of staff (Fig. 4). The largest group of practitioners represented companies with more than 250 employees (48 practitioners). Companies with fewer than 10 employees were represented by 29 respondents, while 27 practitioners mentioned their employment in enterprises hiring 10 to 49 people, followed by 14 representatives of companies with 50 to 249 employees.

The majority of survey participants identified their position within the enterprise as department employees (79 responses). 19 interviewees performed executive roles, such as company's director, president, or deputy director. Only a few respondents held specialized managerial positions, including head of sales/marketing department and head of IT department (with 4 responses for each group). 12 interviewee indicated other roles, such as forwarder or specialist.

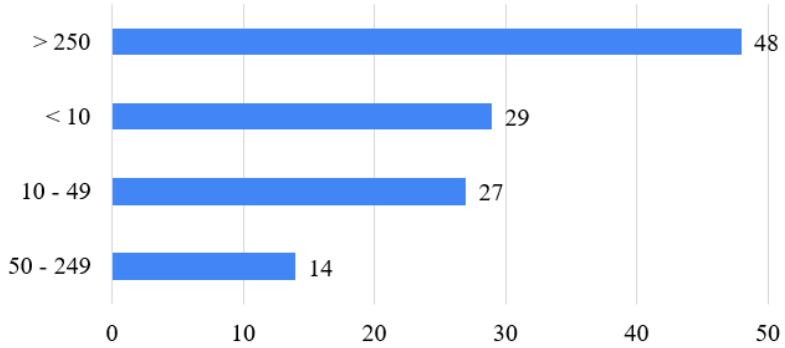

Fig. 4. Number of staff employed in enterprises, number of responses (own elaboration)

Within the group of thematic questions respondents were asked whether the enterprise they work implement AI technologies. 58 practitioners answered "Yes", indicating active use of AI solutions in company (49% of respondents). 49 interviewees responded "No" (approximately 42% of companies representatives), suggesting that AI has not yet been implemented in their organizations. Meanwhile, 11 respondents (9%) selected "Don't know" option, reflecting uncertainty or lack of awareness regarding AI usage within company they represent.

Respondents indicated whether their company is considering to implement AI technologies (Fig. 5). The majority of survey participants expressed a positive viewpoint, 30.5% of practitioners answered "Rather yes" and 29.7% selected "Definitely yes" option. A more cautious position was expressed by 19.5% of practitioners who selected

the answer “I do not know”, moreover, 16.9% of respondents answered “Rather no” and only 3.4% marked ‘”Definitely no”.

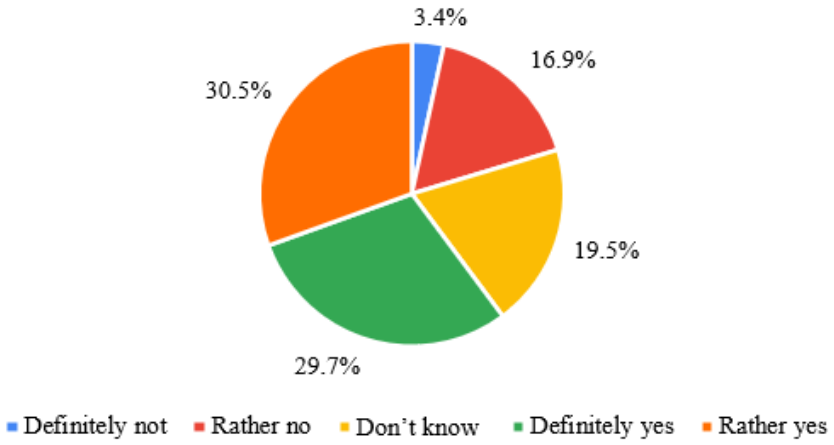

Fig. 5. Consideration of AI technology implementation, percentage of responses (own elaboration)

Surveyed practitioners also specified the types of artificial intelligence technologies adopted in enterprises they are employed (Fig. 6). This was a multiple-choice question. Results analysis revealed that process automation or decision-making support systems were adopted in analysed enterprises (selected by 46 respondents). Machine learning for data analysis was chosen by 28 respondents, followed by text mining (26), image/object/person recognition (22). The fewest number of responses concerned speech recognition (10 responses) and other technologies (3 responses). It should be noted that 46 respondents indicated that AI technologies are not used in companies they work.

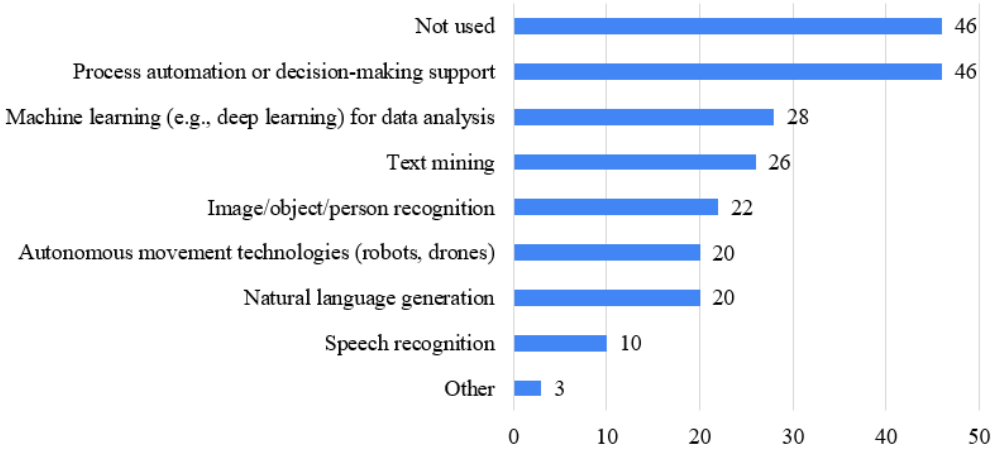

Fig. 6. Types of AI technologies adopted within the surveyed enterprises, number of responses (own elaboration)

Next question concerned the areas of activity in which enterprises apply artificial intelligence technologies (Fig. 7). The most frequently selected response was "Not used", selected by 45 companies’ representatives. However, the most common areas of AI technologies application included work organization and office tasks (mentioned by 40 practitioners), marketing or sales support (35), and production or service delivery support (32). The areas of AI technologies application with the smallest number of responses included: recruitment and human resources management (mentioned by 13 practitioners), ICT security (6), as well as other option (2). It should be highlighted that that a significant number of respondents do not currently apply AI technologies in enterprises they are employed.

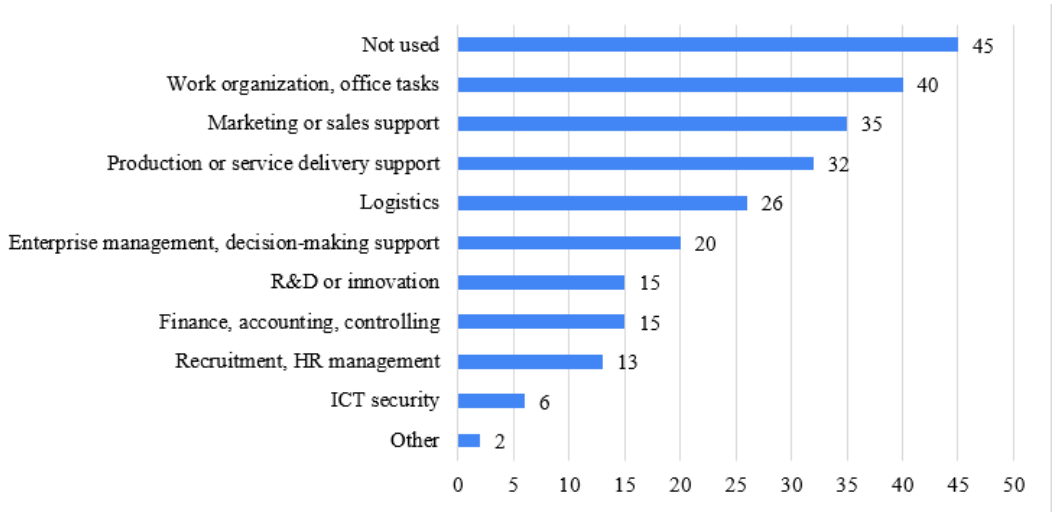

Fig. 7. Areas of activity in which artificial intelligence technologies are applied in enterprises, number of responses (own elaboration)

Respondents also pointed out the reasons why artificial intelligence technologies are not used in enterprises (Fig. 8). A lack of human resources or knowledge was the most frequently cited reason (selected by 39 respondents), followed by high implementation costs (32) and privacy or data protection concerns (29). Less frequently reported reasons covered: legal uncertainty (15 responses), data access issues or poor data quality (11), and ethical concerns (11).

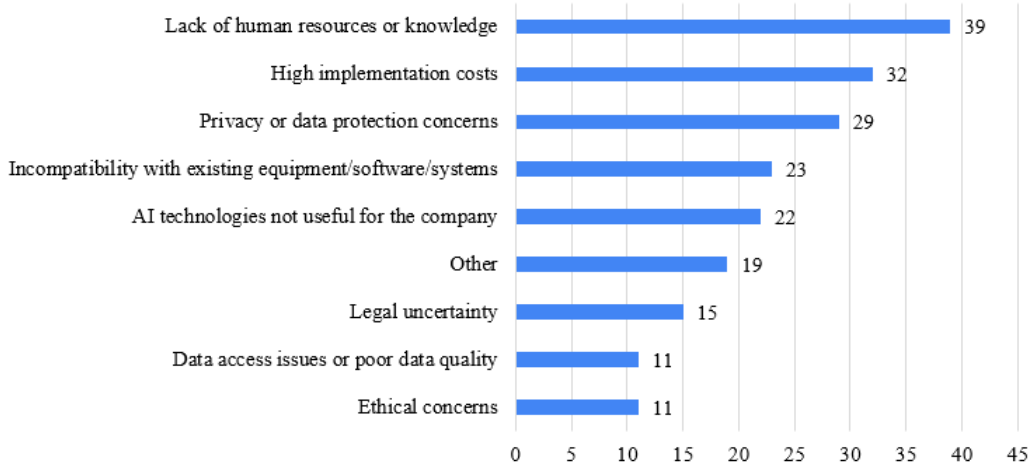

Fig. 8. Reasons for not using AI technologies, number of responses (own elaboration)

One of the key questions in the survey was dealing with the benefits of implementing artificial intelligence technologies (Fig. 9). Respondents were asked to evaluate each predefined benefit on a scale from 1 to 5, where 1 indicated the lowest level of significance and 5 – the highest level. The highest-rated benefits included: shorter task completion time (mean value 3.75), followed by error and risk reduction (3.57) and reduced operational costs (3.56). The lowest ratings were given by respondents to environmental protection (mean value 2.88), as well as the option "Others" (2.44).

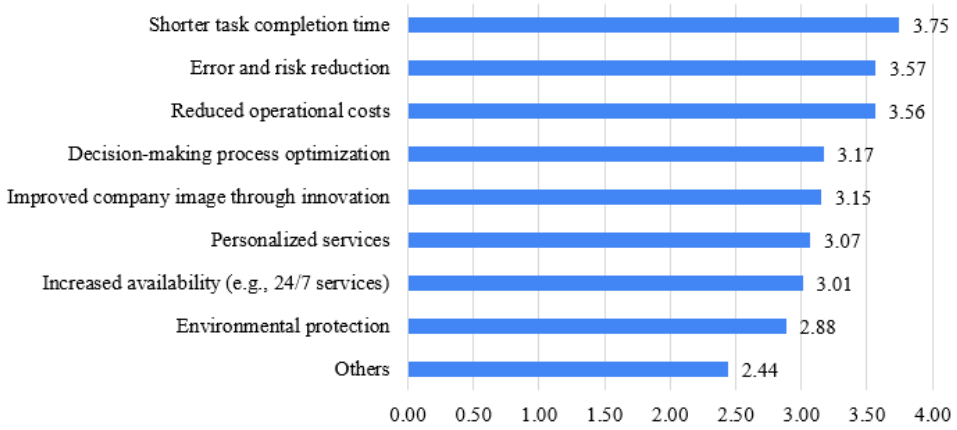

Fig. 9. Benefits of implementing artificial intelligence technologies, mean value (own elaboration)

Next question was related to the concerns associated with the implementation of artificial intelligence technologies (Fig. 10). Respondents also evaluated predefined concerns on a scale from 1 to 5, where 1 indicated the lowest level of significance and 5 – the highest level. According to respondents' viewpoint, possibility of errors and dependence on technology (mean value 3.41) is the most significant concern, indicating a strong awareness of the risks related to reliability and over-reliance on AI systems. Other high-rated concerns included the complexity of decision-making processes (mean value 3.25) and privacy and data security risks (3.24), that reflect apprehension about transparency and data protection. Low-rated concerns included: limited access to technologies (mean value 2.71), limited access to knowledge (2.69), and ethical dilemmas (2.67). The "Other" category received the lowest average rating (2.38). The achieved results reveal that while enterprises' representatives recognize the strategic potential of AI, they remain cautious due to technological, financial, organizational, and ethical challenges. Addressing these concerns will be essential for broader and more effective AI adoption.

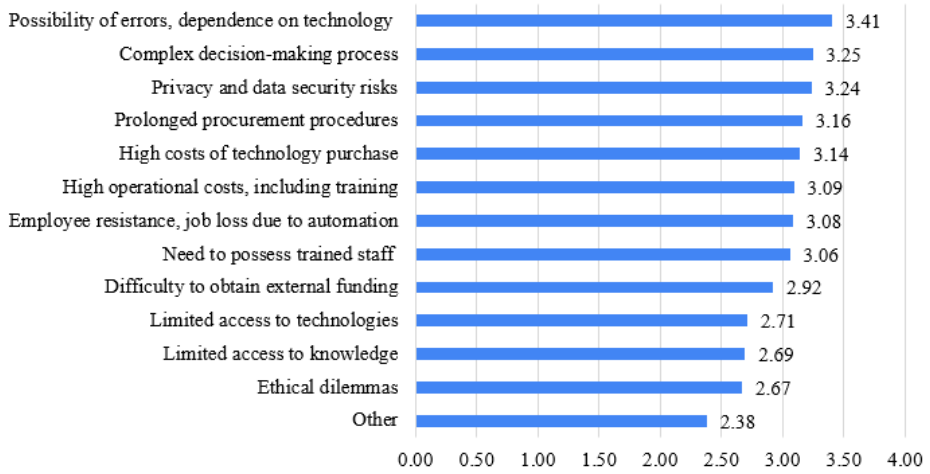

Fig. 10. Concerns related to the implementation of artificial intelligence technologies, mean value (own elaboration)

Respondents were also asked about their expectations regarding the adoption of artificial intelligence technologies over the next 10 years in enterprises they are employed. The majority of practitioners expressed optimistic viewpoint, 67 people expected rapid development of AI in companies, while 32 practitioners anticipated moderate progress. A small group of interviewees (15 respondents) stated that it is difficult to assess the prospects for the future, while only 4 people considered that there are no opportunities for artificial intelligence implementation in the companies where they work.

Conclusions

The aim of the article was to investigate the opinions of practitioners on the AI adoption in enterprises in Poland. To achieve this aim, the questionnaire survey was carried out among the representatives of companies operating

in Poland. The analysis of survey results provided an overview of the current state of artificial intelligence adoption among Polish enterprises.

Research results analysis revealed that while nearly half of the surveyed respondents (49%) indicated that AI technologies are already used in companies, a significant share of practitioners is still hesitating about its implementation. According to interviewees, AI is most commonly applied in areas such as work organization and office tasks improvement, support in marketing and sales, production and delivery services. The most frequently used technologies include process automation, decision-making support, machine learning, and text mining.

Respondents identified several essential benefits of AI implementation, particularly shorter task completion times, reduction of errors and costs. However, they also expressed concerns, especially regarding technological dependence and possibility of errors, data privacy, and security risks. These findings highlight both the advantages and apprehensions associated with AI adoption in business environments and underscore the need for strategic planning, investment in human capital, and expertise related to AI.

However, the adoption of AI in enterprises is hindered by challenges. The reasons of not using AI include above all insufficient human resources and knowledge, high implementation costs, and concerns related to data privacy and technological reliability. Despite these reasons and concerns, the respondents generally expressed the positive opinion on AI implementation in the enterprises over the next 10 years: 57% of respondents expect rapid development of AI in companies and 27% of interviewees believe in moderate progress.

The findings highlight the need for targeted support of companies' managers and operational staff in the form of training, infrastructure development, and regulatory clarity to facilitate broader and more effective AI integration. Therefore, it is reasonable to develop training programs for AI better adoption in companies.

The acquired results of quantitative research may be compared to outcomes of other study related to AI usage in Polish enterprises in 2023 and 2024 (Filina-Dawidowicz et al., 2025). A significantly higher share of people who declare that they use AI in their company in 2025, compared to results shown by Filina-Dawidowicz et al. (2025), should be noted. This may be impacted by observed trend in AI technologies development. Moreover, the presented results confirm the statement mentioned in previous study, namely, that in medium and large-sized enterprises, technologies that automate processes or support decision-making are used most frequently. This result also shows the area where AI technologies are adopted, and there may be further growth in demand for their development.

The research results are limited to the analysis of opinions of small, however, representative sample of respondents. This may be impacted by the fact that individuals are cautious about filling out questionnaires. However, those who are interested in AI could have been more motivated to participate in the study. The majority of responses originated from the West Pomeranian and Greater Poland voivodeships in Poland, a small share of responses was obtained from other regions. Moreover, respondents represented enterprises operating in different economy sectors that could impact the research results. Therefore, it would be reasonable to repeat the survey and investigate the opinions of practitioners employed in enterprises from different regions of Poland and abroad.

Authors' directions of future research will be focused on more detailed analysis of dependences between the values acquired in survey, exploring longitudinal changes in AI adoption and investigating sector-specific challenges in AI implementation in enterprises.

This research contributes to better understanding of AI transformation in Polish enterprises. The findings offer valuable insights for business leaders, policymakers, and researchers interested in fostering innovation and overcoming concerns to AI implementation.

Acknowlegements

The research was co-financed by the Interreg SouthBaltic programme within the AIKnowIT project No STHB.01.01-IP.01-0003/24.

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