

Opportunities for Application of Artificial Intelligence in Telecommunication Projects [†]

Gergana Dimcheva 

Department of Management in Communications, University of Telecommunications and Post,
1700 Sofia, Bulgaria; g.dimcheva@utp.bg

[†] Presented at the International Conference on Electronics, Engineering Physics and Earth Science (EEPES'24),
Kavala, Greece, 19–21 June 2024.

Abstract: Undoubtedly, artificial intelligence (AI) is entering at a very fast pace into all spheres of activity. More and more organizations are using artificial intelligence, which leads to the optimization of business processes, increased productivity, improved customer experience and more. The applications of AI are numerous. The use of artificial intelligence in project management represents an innovative approach that has the potential to transform traditional methods and lead to significant improvements in project efficiency and success. This paper examines some opportunities for applying AI in project management. Based on a literature review, the main benefits of using AI in project management as well as the challenges faced by project managers are highlighted. An empirical study was conducted among project managers and members of project teams in Bulgarian organizations in the telecommunications sector. Rapid technological development and growing user demands highlight the need to integrate artificial intelligence into telecommunications projects. This, in turn, enables telecommunications companies to manage large-scale and complex projects with greater efficiency, flexibility and innovation.

Keywords: artificial intelligence; project management; telecommunications



Citation: Dimcheva, G. Opportunities for Application of Artificial Intelligence in Telecommunication Projects. *Eng. Proc.* **2024**, *70*, 18. <https://doi.org/10.3390/engproc2024070018>

Academic Editor: Grigor Mihaylov

Published: 1 August 2024



Copyright: © 2024 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

In recent years, digitization has entered all spheres of activity. Undeniably, the telecommunications industry is at the forefront of technological innovation, which is constantly evolving to meet the growing demands of consumers. In the conditions of rapid digitization, telecommunications companies are forced to execute their projects efficiently, on time and within budget. Under the pressure of these dynamics, project management in telecommunications requires flexibility, efficiency and precision. One of the ways to deal with these challenges is the implementation of artificial intelligence (AI), which provides a number of opportunities such as improving the efficiency of project management, reducing risks and allocating resources.

The rapid development of AI has been driven by advancements in computing power, the availability of large datasets and significant progress in machine learning techniques. Machine learning, a subset of AI, involves training algorithms on data to enable them to make predictions or decisions without being explicitly programmed for each task. Within machine learning, deep learning uses neural networks with many layers to analyze complex patterns in data, allowing for more sophisticated and accurate models [1].

AI has a wide array of applications across various industries, including healthcare, finance, education and telecommunications. In healthcare, AI assists in diagnosing diseases, personalizing treatment plans and predicting patient outcomes by analyzing medical data. In finance, AI algorithms are employed for fraud detection, risk management and algorithmic trading, offering significant improvements in efficiency and accuracy. The potential for AI to transform industries is immense, but it also raises important ethical

and societal issues, such as its impact on employment, privacy concerns and the need for responsible AI development and regulation [2].

Modern organizations are constantly looking for new approaches to increase their competitiveness. In the conditions of rapid technological progress, some approaches seem to speak for themselves. It is no secret that for any changes in an organization, whether those relate to increasing competitiveness, improving business processes or offering new products/services, the project approach is used. In recent years, project management has also undergone development in various aspects.

As we enter the era of artificial intelligence, the interest in it from various sectors of the economy is growing, as well as the purposes for which it is used, for example, for the automation of various processes, the support of management decision-making, information processing and analysis, the optimization of administrative business processes, the optimization of logistics processes, human resources management, serving/communicating with customers and solving management problems. Project management is no exception. Companies in various industries are increasingly using artificial intelligence in their projects.

Some industries, such as information technology, finance, healthcare and manufacturing, are at the forefront of implementing AI in projects [3]. Although interest in artificial intelligence is growing, there is still little research in this direction that focuses on how AI is perceived and applied in project management. The purpose of this paper is to explore some possibilities of the application of AI in project management in Bulgarian organizations in the field of telecommunication services. A number of scientific studies prove that interest in using artificial intelligence in project management continues to grow, as it leads to automation of repetitive tasks, optimization of resource allocation and improvement of risk assessment, among other potential benefits [4–9].

2. Application of Artificial Intelligence

2.1. AI in Telecommunications

In the telecommunications industry, AI is playing a crucial role in enhancing network performance, customer service, and operational efficiency. AI-powered network optimization enables telecom companies to manage and predict network traffic, ensuring optimal performance and minimal downtime. Machine learning algorithms can analyze vast amounts of data from network sensors to detect anomalies, predict failures, and automate maintenance tasks, thereby enhancing network reliability and reducing operational costs.

Customer service in telecommunications has been significantly transformed by AI. Virtual assistants and chatbots, powered by natural language processing, provide instant support to customers by handling inquiries, troubleshooting issues, and guiding users through various processes. These AI-driven tools operate around the clock, offering a substantial improvement in customer experience and satisfaction by providing timely and accurate assistance. All this is achieved by applying the project approach. There is no way that project management will not be affected by artificial intelligence. Figure 1 show application of the AI in telecommunication.

2.2. AI in Project Management

In the specialized literature, several definitions of the term “Artificial Intelligence in Project Management” have been put forward.

- “Artificial intelligence in project management is the application of various techniques and methods based on computer algorithms that automate and optimize the processes of planning, execution and control of projects through data analysis and decision-making, capable of simulating human intellectual actions and provide analysis and forecasts for various aspects of project activities” [3].
- “Artificial Intelligence—this refers to the study of “intelligent agents”, autonomous non-human beings that can take in information from their environment and act on the environment in a way that allows them to succeed in their goals. Intelligent agents

must have mastered machine learning and predictive data analytics aspects to be able to do this. In the project context, some people speculate that an intelligent agent could enhance or change the roles and status of many project professionals” [3,10].

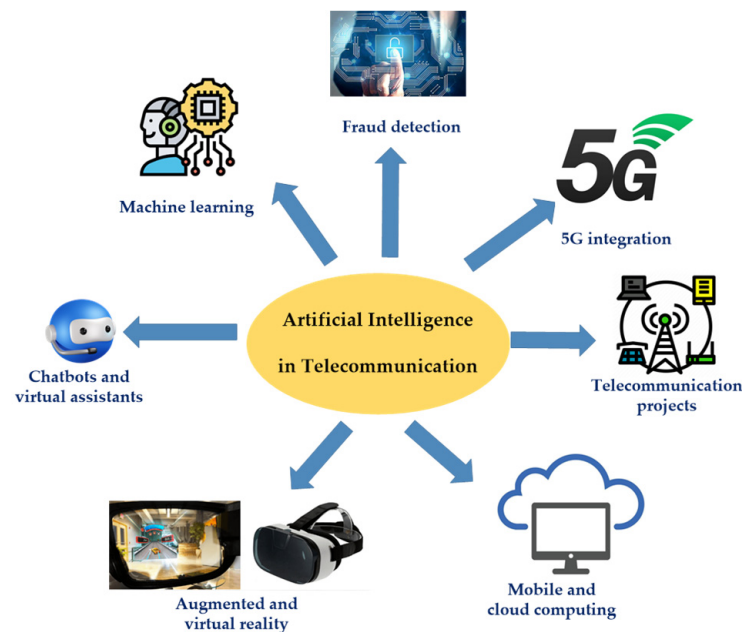


Figure 1. Artificial intelligence in telecommunication.

With its exceptional ability to process large volumes of data, predict outcomes and automate tasks, AI adoption is increasing at a tremendous speed in project management. By 2025, the artificial intelligence in project management market size is set to surpass USD 5.8 billion. It highlights the constant increase in demand for AI tools in project management, which in turn requires companies and professionals to increase their level of knowledge in this area. According to Gartner, 80% of project management tasks such as data collection, tracking and reporting are expected to be “taken over” by AI by 2030 [9]. This in turn will lead project managers to focus on the strategic goals related not only to projects but also to the development of the organization in general. In a survey of 200 senior executives, 46% said they are currently using AI for project management tasks, which has reduced project costs by up to 12% [3,11].

2.3. Possibilities for the Application of Artificial Intelligence in Project Management

Undeniably, the benefits of using AI in project management are many. A number of studies in science and practice have been carried out that highlight this. They can be divided into two main groups—opportunities for applying AI in the phases of the project and applying AI in separate areas of the project [4–11].

The main phases of implementing AI in projects are shown on Figure 2. The results of a survey of project participants indicate that they are most likely to use AI to monitor and control activities during the “Implementation and Execution” phase (65%), with 17% saying they are more likely to use it at the stage “Definition and planning” and 15% at the stage “Completion of the project” [3].

- **Initiation/definition:** Different AI applications in the initiation phase are used to identify projects, analyze project feasibility and define project objectives (strategic, tactical and operational).
- **Planning:** The use of AI in this phase of the project enables optimization of the project schedule, resource allocation, project cost planning, task prioritization and risk assessment.

- **Implementation:** AI applications support decision-making processes during project execution, resource management, including project human resources, resource demand forecasting and resource utilization optimization.
- **Closing:** The role of AI in this phase of the project is to evaluate the project, analyze the data needed to prepare a final project report and identify strengths and weaknesses of the project to benefit future projects.
- **Monitoring and control:** In this phase, AI allows real-time data analysis, project progress tracking and timely problem detection.

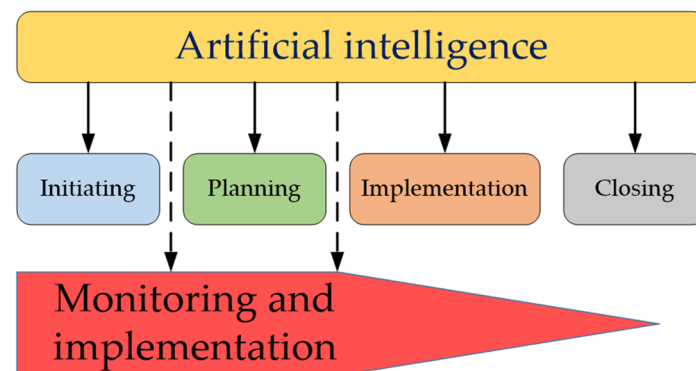


Figure 2. Artificial intelligence in project management phases.

Most of the research conducted is focused on the main directions in the management of projects in which artificial intelligence is used. Almost all authors are united around the fact that the potential of AI is most expressed in improving project work, automating routine tasks, optimizing resource allocation and supplementing decision-making processes. The possibilities of using artificial intelligence in project management can be summarized as follows [3–10,12,13].

- **Shared knowledge between stakeholders in the project** (within the project team and outside it)—One of the key factors for the correct execution of projects is shared knowledge in the project teams. This is especially important for complex projects. The complexity of a project varies during the individual phases of the project life cycle; it is not a static quantity. The use of different methods of sharing knowledge and experience between project participants can lead to an increase in the quality and efficiency of the project. Such methods include regular meetings and training, mentoring and coaching and creating a system for the processes and lessons learned within the project to be useful to the project participants. Sharing knowledge, documents, information and resources is one of the most important factors when applying artificial intelligence in project management.
- **Providing/receiving up-to-date/ongoing information**—Information related to project progress should be supplied between team members without the need for interaction with the project manager. To this end, the role of artificial intelligence is in the form of a communication hub where everyone on the project team receives up-to-date information related to the project instead of the project manager.
- **Improve communication**—Specific AI applications such as chatbots and virtual assistants can facilitate communication within project teams by providing real-time updates, answering queries and scheduling meetings. This improves collaboration and ensures that team members have access to the right information at the right time.
- **Analysis of large datasets**—AI can be useful in analyzing large datasets. The various tools and applications of AI can be used both to process large datasets and to support complex decision-making and problem-solving processes. This, in turn, leads to the simplification of some processes that, without AI, take more time and effort.

- **Prediction and derivation of trends**—Through the analysis of large datasets using artificial intelligence, both from past projects and from current ones, future project results are predicted. Also, by examining various factors and their influence, AI allows for the prediction of project timelines, costs and required resources. This helps project managers make informed decisions and effectively allocate resources, as well as anticipate potential challenges and opportunities.
- **Optimizing Resource Allocation**—AI applications can optimize resource allocation by matching project requirements with project team members' skills, expertise, experience and workload. This in turn leads to increased efficiency and productivity.
- **Risk Management**—AI enables the identification and mitigation of project management risks caused mostly by external factors (market conditions, regulatory changes, economic conditions, etc.). AI can recommend strategies to reduce and mitigate risks and avoid potential problems before they escalate. This proactive approach increases the sustainability of the project.
- **Quality Control**—AI can monitor project activities and deliverables to ensure compliance with quality standards and identify any deviations or defects early in the process. This helps maintain the overall quality of project deliverables and reduces the likelihood of rework or errors.

Integrating AI into project management processes can increase their efficiency. Therefore, it is critical for project managers and project teams to understand how to maximize the potential benefits offered by AI and overcome the difficulties of implementing it in project management. This, in turn, necessitates conducting various training in the field of AI.

In general, integrating AI into project management can improve project outcomes without the need to completely replace the human factor. However, some management decisions, conflict situations, analyses of problem cases or other tasks that necessitate creativity to perform require human judgment, which is essential for successful project management.

2.4. Some Challenges in Using Artificial Intelligence in Project Management

Despite the benefits of using AI in project management processes, project managers and project teams face the following challenges that need to be addressed [3,14]:

- Data privacy and security issues in AI-driven project management.
- Ethical considerations in decision-making and AI algorithms.
- Challenges related to workforce adaptation and potential job displacement.
- High short-term investment costs.
- High risk of long-term return on investment (ROI).
- Lack of trust in technology.
- Lack of experience with AI.
- Fear of AI's potential to replace jobs [15,16].

3. Methods

The dynamic development of technologies and the increase in the needs and expectations of users are only part of the challenges that telecommunication companies have to deal with. This encourages them to focus on implementing and offering new services, as well as improving existing ones, through their continuous adaptability to new technological opportunities.

People in these companies work in many different functional areas, in different organizational structures and in environments that range from very stable to, more often today, very uncertain. Some operators are small, while others are among the largest companies in the world [17,18]. In all telecommunications companies, people work on projects that are expected to deliver the desired results within set budgets and deadlines. Often these projects are complex and balance other requirements. In the rapidly evolving world of telecommunications, successful project management is the foundation that holds together the complex web of technologies, regulations and user requirements [19] that end users need for easy access and quick service.

Artificial intelligence is poised to transform telecommunications projects. From optimizing network performance to predicting and preventing potential problems, AI will play a critical role in increasing the efficiency and reliability of telecommunications infrastructure. AI-driven insights will enable project managers to make data-driven decisions, anticipate potential challenges and proactively address issues before they impact project timelines. This transformative AI integration will streamline project workflows and contribute to the overall success of telecom initiatives. Virtual assistants and automation powered by AI will become and are becoming an integral part of telecommunications project management [20,21].

The main objective of this publication is to establish to what extent and for what purposes artificial intelligence is used in the management of telecommunications projects. A survey method was used. A total of 27 project managers and members of project teams in the field of telecommunications services were studied. They are representatives of 4 organizations from the telecommunications sector in Bulgaria. Due to the small number of respondents, the survey was conducted on site. In this publication, only a part of the results of the conducted research is presented.

4. Results and Discussion

To the question “How familiar are you with the possibilities of using artificial intelligence in project management?”, with the possibility of answering on a 5-point Likert scale, a total of 73% gave a score of 4 and 5 (fully familiar). This question leads to a high percentage of 91% of the respondents using AI in the performance of their tasks in the projects in which they are involved.

Projects in the field of telecommunications are different in their nature, scope and content. Telecom companies use different project management methodologies/approaches. In a survey, it was found that the PMBOK-based methodology (43%) and Waterfall (18%) (i.e., traditional methodologies) occupy the largest share [21]. These methodologies retain the first two positions in the present study as well, which can be seen in Figure 3. This fact is not accidental because projects that are based on strict planning and sequences with a long life cycle prevail in the telecommunications industry. From such a point of view, it is understandable and normal that the use of AI approximates the preferred and applied project management methodologies.

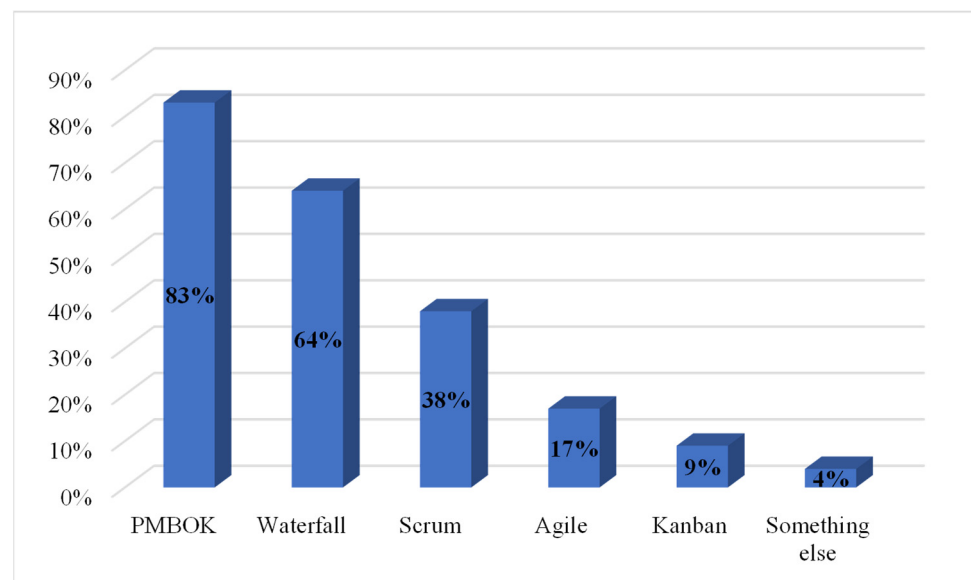


Figure 3. Answers to the question “In which of the following methodologies do you use/would you use AI? (More than one answer is possible)”.

Respondents to this question had the opportunity to indicate more than one possible answer, and the obtained percentages are based on the total number of answers indicated, not on the number of surveyed respondents. As can be seen from Figure 3, the largest percentage of respondents indicate that they use AI in a methodology based on PMBOK (83%) or Waterfall (64%) (i.e., traditional methodologies in project management). The use of AI in agile methodologies occupies 38% for Scrum, 17% for Agile and 9% for Kanban, respectively. In the answer “Other”, the respondents indicated the so-called “Hybrid approaches” to project management; in recent years, there has been a growing trend in their use by telecommunications companies.

One of the main features of a large part of telecommunication projects, which distinguishes them from those in other sectors of the economy, is the continuous participation of the client in the process of developing the product/service. Even the client is often part of the project team. This requires timely awareness, proactivity on the part of the project teams, sharing of up-to-date information with the client, etc. All this further emphasizes the need to apply various AI tools in telecommunication project management.

The purposes for which artificial intelligence can be used in the field of project management can be many. Both at the organization level and at the project level, AI can improve a wide range of activities, leading to increased productivity, better decision-making and more accurate forecasting of risks, resources and other areas of project management.

To the question “In which of the following areas in project management do you use/would you use AI?”, respondents had the opportunity to give more than one answer.

As can be seen from Figure 4, the first three places are occupied by the direction “Information processing / data management and analysis” (98%), “Planning, allocation and forecasting of resources” (87%) and “Data forecasting (timelines, budgets, results) / trends” (79%). This fact is not accidental. The participants of telecommunications projects are forced to react promptly and adequately not only to the rapid technological progress but also to the constant changes imposed by the customers’ requirements. Lastly, the respondents indicated “Problem solving” (36%) and “Supporting decision-making” (32%), which are directions related to the human factor.

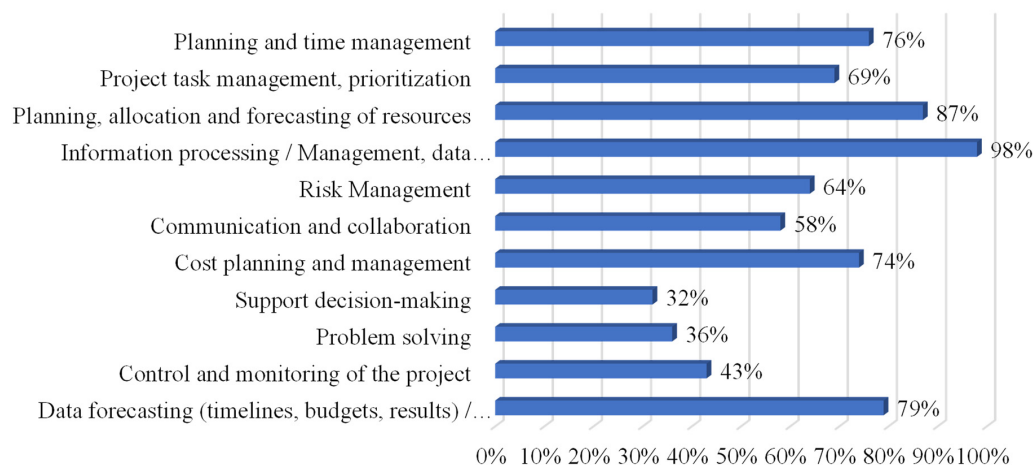


Figure 4. Answers to the question “In which of the following areas in project management do you use/would you use AI?”.

Obviously, the interest in integrating AI in telecommunications project management is also high, as the need for the necessary knowledge and skills is growing on the part of project managers, which is also evident in Figure 5.

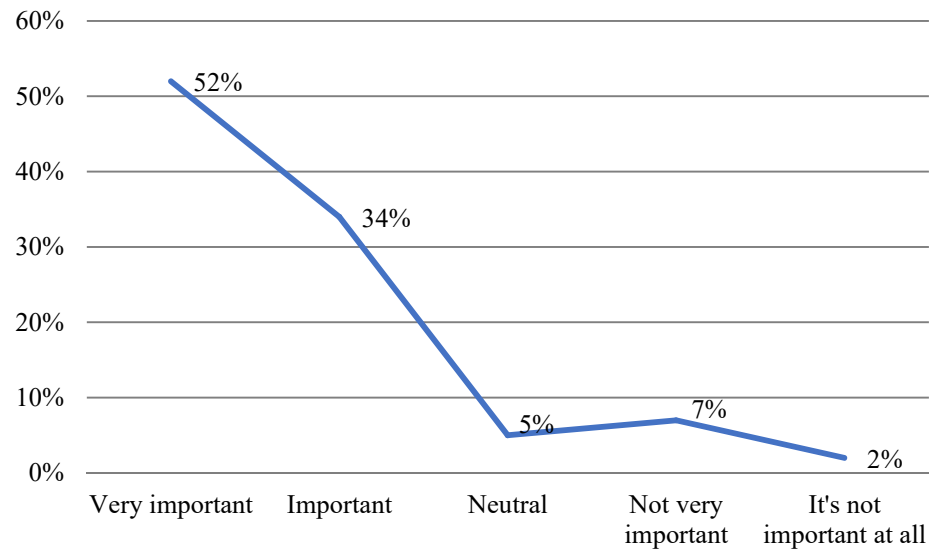


Figure 5. Answers to the question “How important is it for project managers to be knowledgeable about the capabilities of AI in project management?”.

From Figure 5, it is evident that a total of 86% of the respondents indicated that it is “Important” and “Very important” to be aware of AI’s capabilities.

Developing the necessary technical skills, fostering an understanding of the complexity of AI technologies and adapting to new workflows and project management processes are some of the challenges facing not only project managers but also the senior management of any organization. Organizations must invest time and money in continuous training and development programs for their employees. This is also confirmed by the results in Figure 6.

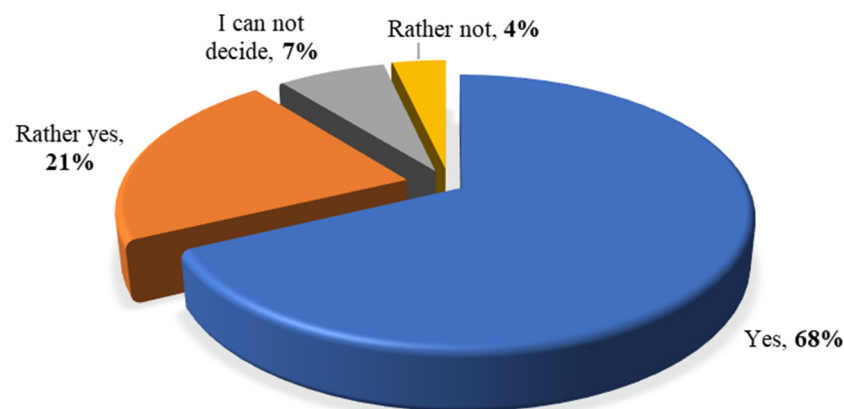


Figure 6. Answers to the question “Would you invest time and resources in improving your AI skills?”.

Obviously, the interest in integrating AI in the management of telecommunications projects is also high, as the need for the necessary knowledge and skills is growing on the part of project managers.

A total of 86% of respondents indicated that it is “Important” and “Very important” to be aware of AI’s capabilities.

5. Conclusions

Undoubtedly, the telecommunications industry will continue to be one of the first fields, in terms of speed, to experience technological development, and the integration of AI will offer a number of opportunities for the management of telecommunications projects. These are expressed in terms of streamlining processes; analysis of large datasets;

prediction of results; automation of periodically recurring tasks; search and processing of information in a short time; effective allocation of resources; risk assessment; reduction in human errors; increasing the efficiency of the subject; improving results and increasing the success rate of the project. All this allows project managers to focus on the execution of more complex tasks and manage large-scale and complex projects with greater efficiency, flexibility and innovation. Also, through AI, there are opportunities to offer personalized products, services and interactions, increasing customer satisfaction and loyalty. This in turn has forced organizations to invest in training programs for their workforce to effectively use AI tools, develop necessary technical skills and adapt to new workflows and processes. In future research, the author aims to explore the use of artificial intelligence and its impact on project success, including how intelligent algorithms can improve time and budget estimates, optimize resource allocation, minimize risks and increase project efficiency, communication and cooperation in teams.

Funding: This research was funded by supported from project No. 30-292/14 March 2024 under Research activity at the University of Telecommunications and Posts, Sofia, Bulgaria, with the aim of increasing the quality of education.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: The research was conducted with the consent of the telecommunications companies and based on the informed consent of the respondents.

Data Availability Statement: Data are available in this manuscript.

Acknowledgments: The author thanks the researched individuals and organizations for their assistance in conducting the research. The respondents gave their consent to participate in the study.

Conflicts of Interest: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

1. Markov, K. Artificial Intelligence in Higher Education—New Perspectives. In Proceedings of the Second National Conference Digital Transformation of Education—Problems and Solutions, Ruse, Bulgaria, 24–25 April 2024.
2. Ozkan-Ozay, M.; Akin, E.; Aslan, Ö.; Kosunalp, S.; Iliev, T.; Stoyanov, I.; Beloev, I. A Comprehensive Survey: Evaluating the Efficiency of Artificial Intelligence and Machine Learning Techniques on Cyber Security Solutions. *IEEE Access* **2024**, *12*, 12229–12256. [\[CrossRef\]](#)
3. Dacre, N.; Kockum, F. *Artificial Intelligence in Project Management, A Review of AI's Usefulness and Future Considerations for the Project Profession*; Association for Project Management: Princes Risborough, UK, 2022.
4. Barcaui, A.; Monat, A. Who is better in project planning? Generative artificial intelligence or project managers? *Proj. Leadersh. Soc.* **2023**, *4*, 100101. [\[CrossRef\]](#)
5. Taboada, I.; Daneshpajouh, A.; Toledo, N.; de Vass, T. Artificial Intelligence Enabled Project Management: A Systematic Literature Review. *Appl. Sci.* **2023**, *13*, 5014. [\[CrossRef\]](#)
6. Prifti, V. Optimizing project management using artificial intelligence. *Eur. J. Form. Sci. Eng.* **2022**, *5*, 29–37. [\[CrossRef\]](#)
7. Auth, G.; Johnk, J.; Wiecha, D.A. A conceptual framework for applying artificial intelligence in project management. In Proceedings of the 2021 IEEE 23rd Conference on Business Informatics (CBI), Bolzano, Italy, 1–3 September 2021; pp. 161–170. [\[CrossRef\]](#)
8. Kuster, L. The Current State and Trends of Artificial Intelligence in Project Management: A Bibliometric Analysis. Master Thesis, Escola de Administração de Empresas de São Paulo, São Paulo, Brazil, 2021.
9. Kotsev, E.; Stoycheva, B. Antecedents of individual innovativeness: Exploring gender, age and job nature. *AIP Conf. Proc.* **2024**, *3063*, 070008. [\[CrossRef\]](#)
10. Project Data Analytics: The State of the Art and Science. Available online: <https://www.apm.org.uk/resources/research/published-research/pda-pathfinder-report/> (accessed on 12 April 2024).
11. Essential AI in Project Management Statistics in 2023. Available online: <https://blog.srive.co/ai-in-project-management-statistics/> (accessed on 12 April 2024).
12. Bjorvatn, T.; Wald, A. Project complexity and team-level absorptive capacity as drivers of project management performance. *Int. J. Proj. Manag.* **2018**, *36*, 876–888. [\[CrossRef\]](#)
13. Thamhain, H. Managing risks in complex projects. *Proj. Manag. J.* **2013**, *44*, 20–35. [\[CrossRef\]](#)

14. Dimcheva, G.; Stoyanov, I. Challenges to the Application and Decision-Making using Artificial Intelligence (AI): Analysis of the Attitudes of Managers in Bulgarian Service Companies. In Proceedings of the 2023 4th International Conference on Communications, Information, Electronic and Energy Systems (CIEES), Plovdiv, Bulgaria, 23–25 November 2023; pp. 1–5. [\[CrossRef\]](#)
15. Pospieszny, P.; Czarnacka-Chrobot, B.; Kobylinski, A. An effective approach for software project effort and duration estimation with machine learning algorithms. *J. Syst. Softw.* **2018**, *137*, 184–196. [\[CrossRef\]](#)
16. Cubric, M. Drivers, barriers and social considerations for AI adoption in business and management: A tertiary study. *Technol. Soc.* **2020**, *62*, 101257. [\[CrossRef\]](#)
17. Introduction to Project Management in Telecommunications. Available online: <https://www.fishercom.xyz/project-management/introduction-to-project-management-in-telecommunications.html#download> (accessed on 15 April 2024).
18. Stoyanov, I. Opportunities and indicators for strategic development of leadership in mobile operators. *Int. J. Inf. Models Anal.* **2018**, *7*, 71–76.
19. Barberis, J.; Arner, D.W.; Buckley, R.P. *The RegTech Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries in Regulation*, 1st ed.; John Wiley & Sons: Hoboken, NJ, USA, 2019.
20. Ezeigweneme, C.; Umoh, A.; Ilojiannya, V.; Adegbite, A. Telecom project management: Lessons learned and best practices: A review from Africa to the USA. *World J. Adv. Res. Rev.* **2023**, *20*, 1713–1730. [\[CrossRef\]](#)
21. Dimcheva, G. *Project Management in the Field of Telecommunications Services*; University of Telecommunications and Post: Sofia, Bulgaria, 2022. (In Bulgarian)

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.