

7.3 Intelligent assistants as a tool for supporting managerial decision-making in projects

Introduction. Modern project management is characterized by rapid technological development, globalization, and increasing complexity. Organizations face increasingly high demands for adaptability, flexibility, and decision-making accuracy, mainly when resources are limited, and risks and uncertainties are high. At the same time, the use of innovative technologies, such as artificial intelligence (AI), machine learning, and automation, is becoming increasingly important to optimize the planning, execution, and control processes of projects (Hess & Kunz, 2024; Duică et al., 2024). The study by Müller et al. (2024) provides a comprehensive overview of the application of artificial intelligence in project management.

Intelligent assistants (IAs) based on AI technologies are a powerful tool for supporting managerial decisions in project management. Their functionality includes big data analysis, automation of routine tasks, risk forecasting, and scenario modelling. In addition, AI provides improved communication within teams, real-time monitoring of project progress, and personalized recommendations for managers (Hess & Kunz, 2024; Project Management Institute, 2024d). Generative artificial intelligence (GenAI) is coming to the fore, revolutionizing productivity and reshaping industries (Sira, 2023). This trend can significantly increase the efficiency of management processes, reduce the burden on humans in decision-making, and accelerate the achievement of project goals. In modern conditions, projects' complexity, interdisciplinary nature, and growing competition pose new challenges to managers. Project management requires rapid response to changes, considering a significant number of factors, and making informed decisions. (Ribeiro et al., 2020; Yevdokymova et al., 2024). In such circumstances, integrating intelligent assistants becomes both an innovation and a necessity. Technologies allow for overcoming the main barriers to decision-making associated with limited time, resources, and analytical capabilities. Therefore,

researching the role of IAs in supporting management decisions is highly relevant, as it contributes to developing new approaches to project management in the digital era.

7.3.1 Theoretical foundations of intelligent assistants

The modern development of digital technologies opens new opportunities for improving the efficiency of management processes. One of the most promising tools in this area is AIs, which, thanks to artificial intelligence technologies, can change approaches to data analysis, task automation, and decision-making. Integrating AIs into management activities contributes not only to the optimization of processes but also to the adaptation of organizations to the challenges that arise in the modern dynamic environment. As Felicetti et al. (2024) note, GenAI, characterized by the ability to learn, adapt, and generate content, transforms approaches to intellectual work, allowing the automation of complex creative tasks that previously required significant human intellectual effort and time." According to Dam et al. (2019), AI can significantly transform project management practices by automating repetitive tasks with high volume, providing project analytics for risk assessment and forecasting, providing practical recommendations, and even decision-making

IAs are software systems that use AI technologies to automate tasks and support decision-making. AIs act as means of interactive interaction with users. They can perform various functions, including data analysis, decision-making based on given algorithms, automation of routine tasks, and adaptation to changes in activities. The main functionalities of AIs are data processing and analysis, which allows them to work with large amounts of structured and unstructured information, identify patterns, and provide predictions or recommendations for decision-making. AIs also automate processes by performing routine tasks, such as scheduling meetings, sending messages, or creating reports, significantly saving time and reducing the likelihood of errors. Using machine learning algorithms, AIs can learn from experience and adapt to new conditions or tasks. In addition, AI provides forecasting and decision support by assessing the possible outcomes of different scenarios and helping users make informed decisions even in complex situations with high uncertainty.

Several main types of such systems can be distinguished depending on the functionality and how they interact with users. Each of them has its advantages and purposes, allowing AIs to solve specific tasks within project management (Hess & Kunz, 2024; Dacre & Kockum, 2022). Figure 1 shows a classification of the main types of intelligent assistants.

Voice Assistans •Use voice interaction •Organizing meetings, creating reminders, searching for information	Chatbots •Text-based assistants for interaction via messengers or web platforms •Resolving queries, providing consultations, automating standard tasks	Analytical systems •Advanced systems for data analysis •Analyzing large datasets, forecasting, identifying trends, providing recommendations	Experct Decision-Making Systems •Modeling and evaluating various development scenarios •Using accumulated knowledge base for well-grounded recommendations
Predictive Analytics Systems •Anticipating potential problems through forecasting •Optimizing resource utilization based on predictions •Reducing risks by early detection of possible obstacles •Adaptive planning based on analytical data	Intelligent Schedulers •Automating critical planning processes •Dynamic adaptation of plans to changing conditions •Optimal distribution of resources and workload •Accounting for multiple task dependencies	Collaboration Assistants •Ensuring effective team interaction •Coordinating work of distributed participants •Automating communication processes •Supporting synchronization of project work	Knowledge Management Systems •Preserving and systematizing project experience •Quick access to necessary information •Preventing repetition of past mistakes •Supporting team learning and development

Fig. 1. Types of intelligent assistants used in project management

Source: developed by the authors

Voice assistants are software systems that use voice interaction to perform tasks. They are typically used to organize meetings, create reminders, search for information, and perform other administrative functions. In project management, voice assistants can be integrated into corporate systems to facilitate management processes.

Chatbots are text-based assistants that can interact with users via instant messengers or web platforms. They can help resolve specific requests, provide advice, or automate standard tasks, such as answering employee or customer questions.

Chatbots are often used in project management to facilitate team communication and support project processes.

Analytical systems are more complex intelligent systems that analyse large amounts of data, such as financial information, task performance, or project timelines. They can provide forecasts, identify trends, and offer recommendations for process optimization. Such systems are often used to assess risks, select the most effective project management strategies, and support adopting complex management decisions.

Expert decision-making systems help project managers make complex strategic decisions based on deep data analysis. They use the accumulated knowledge base and artificial intelligence to model various scenarios and provide sound recommendations.

Predictive analytics systems are designed to anticipate potential problems by predicting future trends and risks in the project. They allow you to optimize the use of resources and minimize unexpected challenges.

Intelligent planners automate and optimize project planning processes, dynamically adapting schedules to changing conditions. Ensure the most effective allocation of resources and consider complex relationships between tasks.

Collaborative assistants ensure effective communication and coordination of distributed teams by automating interaction processes. Help synchronize the work of project participants regardless of their geolocation.

Knowledge management systems are responsible for storing, organizing, and quickly accessing project information and accumulated experience. They support corporate memory, prevent the repetition of mistakes, and contribute to continuous team learning.

The proposed types of intelligent assistants are used depending on the specifics of the tasks and needs of the organization, which allows for increased efficiency and reduces the time required to perform routine operations in the project management process. According to Davahli (2020), AI models can reduce uncertainties in project management through logical reasoning and probability calculation.

7.3.2 The role of intelligent assistants in supporting management decisions

The study of IAs in the context of artificial intelligence is becoming increasingly relevant in today's technological environment. According to McKinsey (2023), the implementation of IAs in business processes shows an annual growth of 35%, highlighting their growing role in digital transformation. Understanding the principles of operation and capabilities of AIs from an artificial intelligence perspective is crucial for their effective implementation and maximization of potential benefits across various application domains, from project management to supporting strategic decision-making.

The report "Artificial Intelligence and Project Management: A Global Chapter-Led Survey" reveals compelling statistics on the transformative potential of AI in the project management field (Project Management Institute Sweden, 2024). A striking 76% of professionals believe AI will substantially reshape project management practices within the next few years, assigning a rating of 7 or higher on a 10-point scale. This finding underscores the timeliness and significance of examining AI's impact on the profession.

Furthermore, key insights from the "First Movers' Advantage" report highlight that organizations actively supporting GenAI adoption have a higher proportion of "trailblazers" - early adopters and active users of GenAI (Project Management Institute, 2024a). These trailblazers consistently demonstrate enhanced productivity, creativity, problem-solving capabilities, and overall effectiveness compared to their peers. The correlation between organizational support, individual adoption, and improved performance outcomes emphasizes the importance of fostering an AI-enabled environment to drive project success. According to Taboada et al. (2023), modern manufacturing landscapes are increasingly characterized by the integration of sophisticated cognitive technologies that radically transform data processing and operational intelligence, enabling unprecedented levels of computational understanding.

Table 1 presents a comprehensive analysis of how AI assistants support decision-making processes in project management, based on Project Management Institute

research "Pushing the Limits: Transforming Project Management with GenAI Innovation" (Project Management Institute, 2024c). The data is organized into four main decision-making categories, showing both adoption rates (usage rate) and effectiveness (impact level) for specific tasks within each category.

Table 1.

Decision-making support in project management

decision category	specific tasks	usage rate	impact level
direct decision support	generating insights for decision-making	33%	43%
	research summarization for decisions	17%	25%
	data-driven improvement identification	24%	37%
analytical decision support	data trend identification	38%	53%
	predictive data analysis	33%	48%
	kpi monitoring and analysis	28%	48%
risk-based decisions	risk identification	26%	47%
	risk impact assessment	22%	30%
	mitigation strategy development	23%	34%
financial decisions	budget management	19%	42%
	budget risk assessment	18%	37%
	cost control and monitoring	19%	36%

Source: developed by the authors on the base of (Project Management Institute, 2024c)

Analytical decision support shows the highest overall impact and usage rates, with data trend identification achieving a 53% impact level and 38% usage rate. Direct decision support tasks demonstrate moderate adoption but significant impact, particularly in generating insights for decision-making (43% impact).

Risk-based decisions show balanced usage rates around 22-26%, with risk identification having the highest impact (47%). Financial decisions currently have the lowest usage rates (18-19%) but maintain substantial impact levels (36-42%), suggesting potential for increased adoption.

While AI assistants are well-established in analytical decision support, there remains significant potential for expanded implementation in financial and risk-based decision-making processes. The gap between usage rates and impact levels across all

categories suggests opportunities for increased AI adoption in project management decision-making.

The process of supporting managerial decisions through intelligent assistants represents a structured approach that includes several key stages (Figure 2).

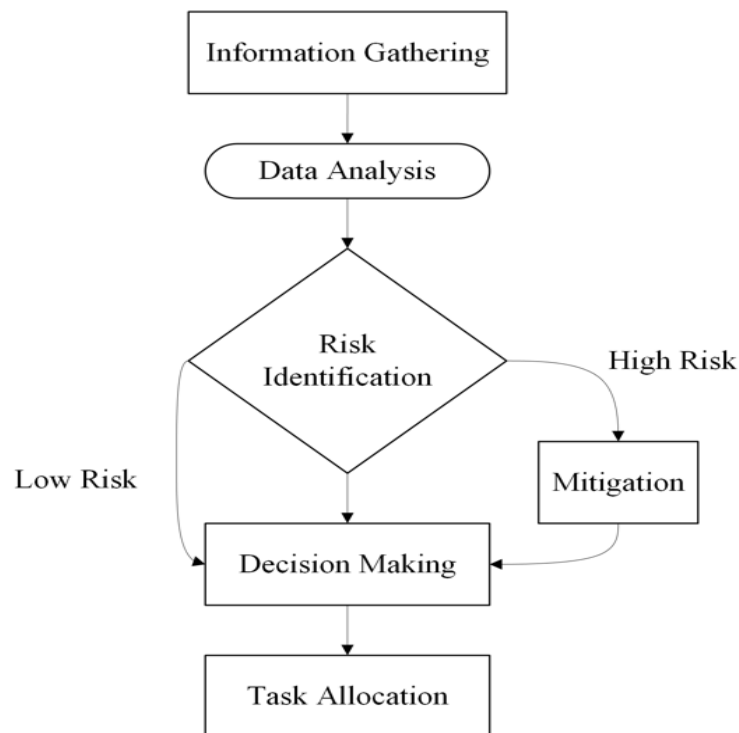


Figure 2. Flow decision support process flow in project management using intelligent assistants

Source: developed by the authors

The decision support process can be divided into three major phases: initial data processing (information gathering and analysis), risk evaluation (identification and mitigation), and execution (decision-making and task allocation). These phases form a framework for project management decision support.

The process begins with information gathering, where AIs automate the consolidation of data from various project sources. In the next stage of data analysis, IAs apply advanced algorithms to detect significant patterns in project data, generate analytical reports, and develop predictive models. This comprehensive analysis phase establishes the foundation for informed decision-making in subsequent stages.

During the risk identification stage, intelligent assistants perform thorough categorization of risks into high and low categories, evaluate the probability and potential impact of each risk, and develop mitigation strategies for high risks. For high-risk situations, IAs propose specific mitigation strategies, while low-risk factors proceed directly to the decision-making phase. This systematic approach to risk assessment ensures that project managers can focus their attention on the most critical issues.

In the final stages of the process, intelligent assistants support the formation of alternative decision options based on analysed data, assessment of potential consequences for each option, and optimal task allocation according to the decisions made. Throughout this phase, IAs provide data-driven insights that help project managers make more informed choices. The task allocation process is optimized to ensure efficient resource utilization and project delivery.

This structured approach to decision support significantly improves project management efficiency and minimizes potential risks. The integration of intelligent assistants at each stage of the process ensures consistent and data-driven decision-making, ultimately leading to better project outcomes.

7.3.3 The impact of intelligent assistants on project management effectiveness

Intelligent assistants are essential in modern project management and provide increased efficiency through process automation, data analysis, and decision support (Duică et al., 2024). Using these new work tools, which allow for increased task efficiency, challenges existing management methods and requires managers to update their skills to meet their mission. In addition to the technical skills essential to work with new technological tools, managers must demonstrate emotional intelligence and openness to fulfil their role (Duică et al., 2024; Project Management Institute, 2024b). Figure 3 shows how such systems affect project management processes, particularly accelerating decision-making, reducing risks, and optimizing resources.

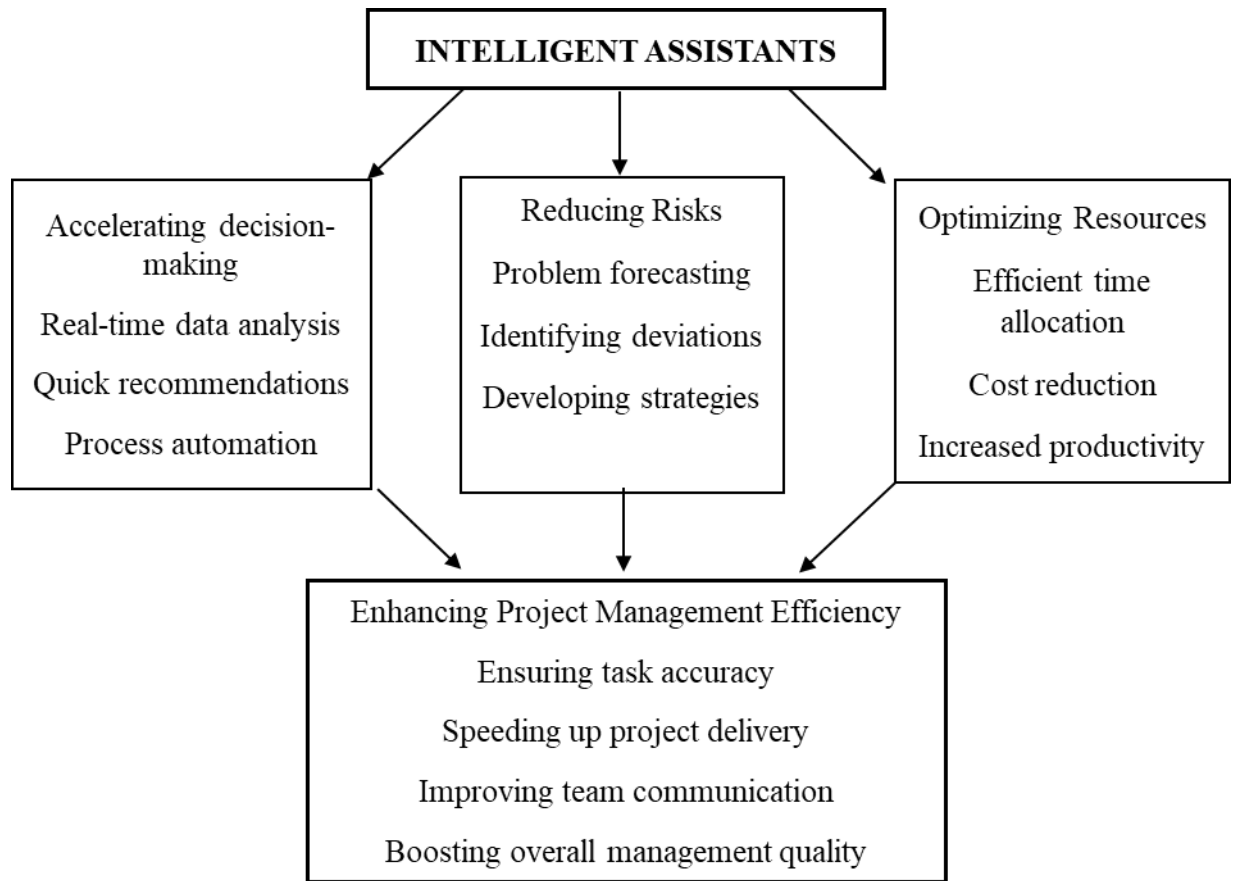


Fig. 3. Impact of Intelligent Assistants on Project Management Efficiency

Source: developed by the authors

AIs significantly impact project management efficiency, providing increased speed, accuracy, and quality of decision-making and contributing to risk reduction and resource optimization. One of the main positive aspects is the acceleration of the decision-making process. AI can analyse large amounts of data in real-time, providing project managers with important information and recommendations to quickly respond to changing conditions or unforeseen situations. This is especially important in a project environment, where each delayed step can lead to significant losses or missed opportunities.

Another vital aspect is risk reduction, as AI can identify potential problems and threats in the early stages of the project due to its ability to predict possible consequences and determine optimal strategies to prevent negative scenarios. As Sahadevan (2023) notes, AI can reduce uncertainty in project management by using logical reasoning and probability calculation. For example, analytical systems using

predictive algorithms can detect deviations from the plan in time, which reduces the likelihood of serious problems in the future.

In addition, AI helps optimize resources, including time, finances, and human resources. By automating routine tasks and accurate planning, they ensure a more efficient allocation of resources, considering the priority of tasks and available capabilities. This allows project managers to reduce costs, avoid duplication of efforts, and maintain focus on the most critical aspects of the project.

As a result, integrating intelligent assistants into the project management process can significantly increase work efficiency, reduce errors, speed up task completion, and improve the overall management environment. This creates added value for organizations that use these technologies and allows them to achieve better results in complex and dynamic projects.

Conclusions

AIs have become an integral part of modern project management due to the increase in the efficiency of management processes. Due to the ability to automate routine tasks, analyse large amounts of data, and support decision-making, such technologies open new opportunities for optimizing project management (Belkadi, et al., 2020). AIs allows managers to allocate resources more effectively, accelerate project implementation, and minimize risks.

One of the main advantages of intelligent assistants is their ability to accelerate the decision-making process. Thanks to real-time data analysis and the ability to provide quick recommendations, AI helps avoid delays and responds promptly to dynamic changes. This trend is significant in the complex project management environment, where even a slight delay can lead to severe losses or missed opportunities (Gil et al., 2021). Process automation provided by AI saves time and significantly reduces the level of errors associated with the human factor.

Another aspect is the ability of intelligent assistants to reduce risks. Using predictive algorithms and analytical tools, AI can identify potential problems at the initial stages of the project. This capability allows you to develop strategies to prevent negative scenarios and avoid severe disruptions. Such tools contribute to more accurate

planning, risk assessment, and the proposal of effective measures to minimize them. This aspect of AI is especially relevant in the context of increasing project complexity, interdisciplinary nature, and high competition.

No less critical is the impact of intelligent assistants on resource optimization. With accurate analysis and planning, AI allows more efficient use of resources, including time, finances, and human resources. Technologies help reduce costs, avoid duplication of efforts, and ensure concentration on the most priority tasks. This allows you to achieve greater productivity and increase the overall efficiency of project implementation.

However, introducing intelligent assistants into project management is accompanied by specific challenges. The main ones are the need to integrate technologies into existing business processes, train staff to work with new tools and maintain a balance between automation and human control. Despite this, the benefits of using AIs far outweigh the challenges, as they allow organizations to adapt to change more quickly and remain competitive. The prospects for developing intelligent assistants include further improvement, particularly expanding functionality, improving adaptability to rapidly changing conditions, and closer integration with project management systems. Combined with digital transformation strategies, AI creates the prerequisites for a new level of project management efficiency, allowing organizations to achieve better results in an increasingly complex and dynamic environment. The use of intelligent assistants is becoming not only an advantage but also a necessity for those managers who seek to maintain leadership positions in their industry (Duică et al., 2024; Project Management Institute, 2024b).