Ссылка для цитирования этой статьи:

Menshikova M., Bonacci I., Scrozza D. Project management and artificial intelligence: analyzing the project managers' perception // Human Progress. 2024. Том 10, Вып. 3. С. 7. URL: http://progress-human.com/images/2024/Tom10_3/Menshikova.pdf. DOI 10.34709/IM.1103.7. EDN TWEJHF.

УДК 331.1

PROJECT MANAGEMENT AND ARTIFICIAL INTELLIGENCE: ANALYZING THE PROJECT MANAGERS' PERCEPTION

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Abstract. Effective project management is a critical element to the success of any organization in the new framework of Project Economy, where projects have displaced operations as the economic engine of the actual reality (Rodriguez, 2021). In recent years, the project management has seen a notable transformation due to the integration of Artificial Intelligence (Taboada, I., et al., 2023). On the one hand, the impact of the innovation technologies is significant and redefines the project management landscape for efficiency, automation and success. On the other hand, the role,

  DOI 10.34709/IM.1103.7

competencies and activities carried out by project managers, always defined as key elements for the success of the project, are undergoing a notable transformation (Ribeiro et al., 2021). The objective of this paper is: 1) to analyze the impact of the introduction of artificial intelligence tools on project management at different stages of the project life cycle; 2) to explore how artificial intelligence is changing the role and skills of project managers. Based on the thematic analysis of interviews, the perceptions of project managers and their team members regarding the implementation of AI in project implementation were studied. Based on the results of the analysis, theoretical and practical implications for human resource management were presented and discussed.

Keywords: Project management; Artificial Intelligence; PM specialist's role transformation; skills development; PM specialist's competencies.

JEL code: M10; M12; M50.

Introduction

Effective project management is a critical element to the success of any organization in the new framework of Project Economy, where projects have displaced operations as the economic engine of the actual reality (Rodriguez, 2021). According to recent studies (Jugdev, K., et al., 2024; PMI 2021, Harvard Business Review, 2021), until 2027 the people involved in project management will reach around 88 million. Despite this, it is important to note that only 35% of projects undertaken worldwide are successful, which results in an enormous waste of money, time and opportunities (Rodriguez, 2021). Companies, regardless of the sector in which they operate, are increasingly entrusting projects with the responsibility for developing new products, services and strategic initiatives. In fact, according to a recent study of Silva et al. (2023) the value of project management brings to the organization's effectiveness through the alignment with strategy, contributing to its competitiveness and business success. Furthermore, the report of Project Management Institute (2021) state that the most important factors to achieve success in the project realization are organizational agility, together with the right choice of technologies to invest in and possession of human resources with relevant skills. In this context, the usage of innovative technologies and correct allocation of human resources take a key position in planning, execution and monitoring of the projects.

In recent years, the project management has seen a notable transformation due to the integration of Artificial Intelligence (AI) and combination of different project management approaches (traditional and agile ones) (Taboada, I., et al., 2023). On the one hand, the impact of the innovation technologies is significant and redefines the project management landscape for efficiency, automation and success. On the other hand, the role, competencies and activities carried

out by project managers, always defined as key elements for the success of the project, are undergoing a notable transformation (Ribeiro et al., 2021). In fact, the researchers claim that the digitalization of various processes causes disruptive effects for traditional project management and the role of the project manager. The new paradigm requires a more active role of the project manager, who should possess new technical, contextual, and behavioral skills (Peshkova, O., et al., 2023).

The objective of this paper is twofold. On the one hand, the paper aims to analyze the impact of the introduction of Artificial Intelligence tools to the project management at the different stages of the Project Life Cycle. On the other hand, the paper aims to investigate how the Artificial Intelligence changes the project managers' role and skills.

Initially the paper provides a literature review to better define the role (as a combination of activities, knowledge and skills) of Project Manager for an effective implementation of a project (Kirby, 2023; Hodgson & Paton, 2016; Thomas & Mengel, 2008). In the theoretical framework part, the paper is also focused on the analysis of the literature on the use of artificial intelligence for project management (Crawford et al., 2023; Song & Minku, 2023; Niederman, 2021; Auth et al. 2019; Wang, 2019). Furthermore, the gaps and critical issues in the introduction of this technology in project management were identified. The paper concludes with a multiple case study approach in order to analyze the perception of the project managers and their teams regarding the introduction of the IA in project implementation. Ultimately, theoretical and practical implications for human resource management were presented and discussed.

1. Theoretical Framework

The role of the project manager has been widely analyzed by several authors (Ghorbani, 2023; Rovenska, 2023). All the stages of the project realization (initiation, planning and implementation) require specialist not only with the adequate knowledge and technical skills to meet project deadlines, but also with temperament, passion and motivation for interacting with team members and project stakeholders (George, 2020).

In recent years, both the project management and the nature of projects themselves have changed significantly. The projects developed by companies (not only companies operating in the field of innovations and start-ups, but also traditional companies) are often based on innovative technology, as well as process management during the preparation and execution of a project is increasingly supported by ICT and artificial intelligence. The introduction of the technology in the project programming, execution and control makes the projects increasingly collaborative and flexible, capable of seizing opportunities and overcoming emerging obstacles (Fernandez & Fernandez, 2008).

According to Kerzner (2017), innovative technology-based projects are often considered the most difficult projects to manage, especially for entry-level project managers. The risk of these projects is greater and problem solving requires experimentation, interactive approaches and creativity. In particular, 'technological breakthroughs', and the impact of advances such as AI, will have a huge impact on the future of the workforce, including the role of the project manager.

In the last decade several scholars have focused on the study of AI through the systematic literature review in the field of the applications of AI techniques and their role for the implementation of innovative projects (Davahli, 2020; Taboada et al. 2023). Many studies analyze different AI methods to assist different project management processes (Crawford et al., 2023; Song & Minku, 2023; Niederman, 2021; Auth et al. 2019; Wang, 2019).

The most popular AI techniques assisted PM are support vector machine, neural networks, and genetic algorithms (Davahli, 2020), while the most popular PM processes, in which artificial intelligence is involved, are planning, measurement, and uncertainty performance domains where AI provides promising forecasting and decision-making capabilities (Taboada et al. 2023).

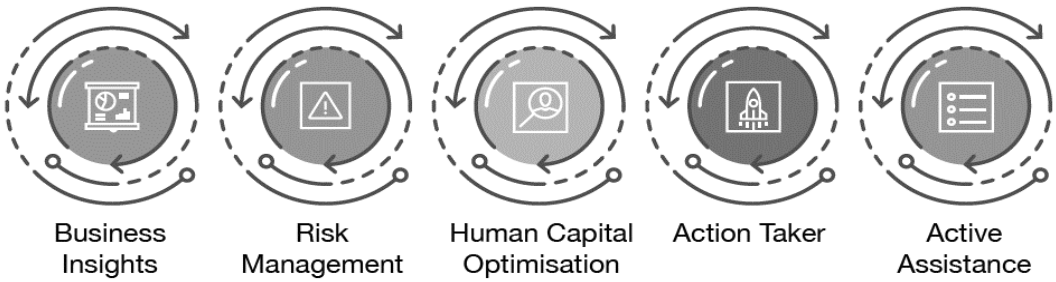
The enormous potential of artificial intelligence is greatly reflected in planning and measurement processes, including project time, effort prediction and cost estimation (Davahli, 2020). It is recognized by several authors (Bento et al., 2022) that the artificial intelligence tools are able to optimize and perform rule-based tasks at different stages of the project life management, both planning (scheduling, cost estimation or risk assessment) and execution (quality management, project cost management, risk management, resource management, project schedule and time management). According to a survey of Tsymbaliuk et al. (2022), the most significant positive consequences of using AI are the following: time saving, high speed of analysis of a large amount of data, reduction of the number of errors caused by the human factor, positive impact on efficiency. In fact, according to Fridgeirsson et al. (2021), the future of AI in PM is promising, especially in areas where data is useful (estimation and planning of schedules, adjusting forecasts and maintaining baseline). As for the areas least affected by AI are those where human leadership and communication skills are of greatest importance. A systematic literature review carried out by several authors (Davahli, 2020; Taboada et al., 2023) has highlighted that the papers studying the role of AI for team and stakeholder and team management in different moments of the project development (initiation, planning, execution and closure) are insufficient. According to Taboada et al. (2023), few existing studies in the field of stakeholder management describe like the AI techniques, among which there are Machine Learning (ML), Natural Language Processing (NLP), and Neural Networks (NN) are used to understand, classify, and analyze stakeholders (Taboada et al., 2023). However, at the moment there are no studies on the use of these techniques for

communication with the stakeholders and relationship management. According to Buah et al. (2020) the artificial intelligence-powered communication and engagement system can be an alternative to the conventional systems, but along with this, the authors believe that the main disadvantage of this approach is the missing of human interaction and emotionless. Furthermore, Tsymbaliuk et al. (2022) argue that the use of AI does not allow emotional intelligence to be taken into account when making decisions.

Another gap emerged in the studies is that relating to the analysis of the existing relationship between project managers and the introduction of the AI techniques in the project planning and execution. Some authors (Taboada et al., 2023) in a recent study argue that it would be interesting to study the project manager's opinion on the adoption of AI in PM in order to understand better the dynamics of coexistence of project management specialists with the new technologies that are increasingly used for the development of innovative projects by the companies in different sectors. According to the literature research carried out by the authors, although AI-based PM seems encouraging, its design, standardization and implementation in project-based companies is still a challenge. Therefore, it should be better studied for effective integration into the organizational environment and culture in order to ensure the acceptance of this innovative technology by managers and team managing projects, and consequently lead to an increase in the effectiveness of project management, thanks to the construction of a balance and a harmonious and supportive interaction, rather than competitiveness between human and artificial intelligence. In fact, among the negative consequences of the AI introduction in the organization processes there are the reduction of need for HR professional with a consequent increase of unemployment and the negative impact on the corporate culture (Tsymbaliuk et al., 2022).

AI-enabled project management tools give greater support and accuracy to the decision-making process and could be crucial in achieving successful project management across the following five key areas:

Fig. 1: AI and project management: key areas of transformation[1]



[1] PwC, 2019

In this case, it becomes interesting to understand how the use of AI techniques in the project development can impact both each of these five areas and the role of Project Manager in order to check whether this technology can put her/his career at risk or change her/his tasks and responsibilities during the Project Life Cycle.

The research hypothesis therefore concerns the idea that together with management processes, the activities carried out by project managers also change and their skills which must become increasingly developed in the digital field on the one hand, as well as the soft skills useful for approach tasks with a high creative and relational content that cannot currently be carried out by AI.

2. Methods and materials

In this phase the pilot phase of the research was carried out with the aim to explore the phenomenon and discover the problem areas to be further investigated in the subsequent phases of the broader study which aims to explore the integration of AI in the project management of Italian Higher Education Institutes (HEI), both digital (online and telematic universities) and standard (traditional universities). The comprehensive study will involve at least 10 institutions of each type to better understand not only the trends in AI use but also explore the differences and similarities between them.

The research method used in this project is a qualitative analysis. The data collected for the analysis is divided in secondary documents and reports and semi-structured interviews to ensure data triangulation and give greater depth to the study of the phenomenon from different perspectives. The research was conducted in 2 Higher Education Institutions (online universities) through online in-depth semi-structured interviews to explore individual experiences and perspectives on a set of specific issues, including the use of AI in project management (PM), its impact on project management activities, the effects on projecy managers and their teams, the need for skills updating, and the perceived costs and benefits. The process involved three main steps: recording the interviews, transcribing them, and performing thematic data analysis. The experiences of 2 senior project managers are analyzed and compared to better understand the perception of AI acceptance and usage in project management. Furthermore, the data will be integrated with the interviews carried out with their work teams (junior project managers).

This methodological approach is useful to conduct in-depth research in order to investigate the contemporary phenomenon such as the impact of AI on the key area of a project and the analysis of the project management specialists' perception regarding the transformation of their role, activities and skills.

Table 1. Description of the interviewees[2]

N’	Gender	Role
HEI 1		
1	F	Head of Project Management Area
2	F	Senior PM
3	F	Junior PM
4	M	HR Manager
HEI 2		
5	M	Head of Project Management Area
6	F	Senior PM
7	F	Junior PM
8	M	HR Manager

This allows us to observe the critical issues and opportunities that emerge from the fusion of AI tools with both the management of a project and the human resources skills in order to develop useful recommendations for HRM that can be applied in the phase of integrating human and artificial intelligence in the field of project management.

3. Results

The content of the interviews was transcribed and coded according to the five identified groups identified by PwC (2019). This process involved carefully analyzing the transcriptions to categorize the responses. Each response was reviewed to ensure accurate coding within the appropriate group. Significant quotes for each group are presented in Table 2, illustrating the key insights gathered from the interviews:

Table 2: Description of the main transformation in project management in the key areas[3]

Key areas of transformation	Quotes
Business Insights	«AI facilitates the analysis of emerging trends in the market and helps to discover technological innovations in the field» «AI can be useful s to identify new project areas, also due to the analysis of best practices» «It allows us to analyze historical project data to predict future outcomes and to have valuable foresight for project planning»
Risk Management	«It aids in the identification of potential risks such as scope creep, budget overruns, scheduling conflicts, and issues in managing partners…» «IA helps in mitigating the challenges before they escalate thanks to its analytical and predictive ability. In this case we try to remove from our business environment stakehoders those who we may consider toxic..»
HRM Optimization	«We use IA based technologies to optimize resource allocation by analyzing the skills, availability, and workload of team members» «What I treid to do is to enhance schedule due to the analysis of the dependencies in order to balance the workload and define the tasks distribution..».

[2] our elaboration
[3] our elaboration

Key areas of transformation	Quotes
Action Taker	«AI helps me to monitor key performance indicators (KPIs) such as task completion, objective achievements, and overall project progress. It informs me about deadlines, delays and critical points that need to be worked on…» «For me it is an essential assistant to analyzes expenditure patterns and forecasts future costs. It enhances the financial management of the project…»
Active Assistance	«It is very interesting to use AI for simulating different project scenarios in order to make decision further…» «I enjoy using AI-based tools to analyze communication flows with project partners. It analyzes stakeholder feedback and sentiment from various communication channels…»

In table 3 it is possible to see that based on the type of actor involved in project management the use of AI also changes, focusing on the most strategic tasks for senior project managers and the more operational tasks followed by younger collaborators. HRM specialists, on the other hand, use AI for project management mainly for the assignment of human resources to the project, their evaluation and development where necessary.

Table 3: Usage of IA by different specialists involved in managing a project[4]

N’	Business Insights	Risk managament	HRM optimization	Action Taker	Active Assistance
HEI 1					
Head of Project Management Area	+	+	+		
Senior PM		+		+	
Junior PM					+
HR Manager			+		
HEI 2					
Head of Project Management Area	+	+			
Senior PM	+		+	+	
Junior PM				+	+
HR Manager			+		

In addition to the use of AI tools in the different areas of project management, the interviews reveal how the skills and competences of the project management specialists need to be updated, developed and strengthened. To effectively utilize AI tools in project management for both operational and strategic purposes, project managers must develop and enhance a combination of hard and soft skills (Table 4). Key hard skills include a solid foundation in project management fundamentals, encompassing project planning, risk management, time management, and stakeholder engagement. Additionally, a deep understanding of AI technologies and data analytics is essential, particularly in areas such as machine learning, natural language processing, and data interpretation. Project managers need to be adaptable and committed to continuous learning, incorporating AI capabilities into long-term project strategies and objectives through strategic thinking.

[4] our elaboration

Soft skills are equally important. Project managers must possess learning agility, enabling them to quickly learn and apply new AI tools and methodologies in their projects. Problem-solving and critical thinking skills are essential for addressing complex issues and critically evaluating AI-generated insights and solutions. Collaboration and communication are critical, requiring the ability to work seamlessly with AI specialists, data scientists, and IT teams. Project managers must translate complex AI insights into actionable plans and effectively communicate these to stakeholders. Managing AI development teams and guiding them through transitions while minimizing resistance to AI implementation is another crucial competency. Leadership and management skills are necessary to lead teams through these changes and integrate AI into the project framework.

Table 4: Skills updating[5]

Skills	Typology	Description
Hard skills	Project Management Fundamentals	Enhancement of core competencies in project planning, risk management, time management, and stakeholder engagement
	AI Technologies & Data Analytics	Understanding machine learning, natural language processing, and data analytics Ability to interpret and analyze data generated by AI systems
Soft skills	Adaptability and Continuous Learning	Learning agility: ability to quickly learn and apply new AI tools and methodologies in the projects
	Strategic Thinking	Long-term planning incorporationg incorporate AI capabilities into the project strategies and objectives
	Collaboration and Communication	Ability to work with AI specialists, data scientists, and IT teams Skills to translate complex AI insights into actionable plans and communicate these to stakeholders
	Leadership and Management	Management of AI development teams Change management, guiding teams through transitions and minimizing resistance towards AI implementation
	Problem-Solving and Critical Thinking	Enhancement of problem-solving skills to address complex issues Critical evaluation of AI-generated insights and solutions

4. Discussion & Conclusion

The results point towards different effects of AI usage on both the five areas identified in the conceptual model. Moreover, we discover that the role and skills required by the people who will be able to interact with AI in the project implementation processes may vary based on their specialization and level of seniority. One key finding is the enhancement of decision-making through data-driven insights, which improves the accuracy of decisions and the effectiveness of project planning. This data-centric approach allows managers to make more informed choices based on comprehensive analysis. AI also contributes to increased efficiency by automating routine tasks, enabling team members to focus more on strategic activities that require human creativity and critical thinking. The findings of the study are in line with Peshkova et al. (2023) and show this shift

[5] our elaboration

in roles and responsibilities emphasizes the importance of strategic and creative activities while fostering the development of interpersonal relationships within the team. The interviews highlighted the role of AI in personalized learning and development. AI can provide specific training recommendations based on performance analysis, helping individuals improve their skills and grow professionally. This personalized approach ensures that employees receive relevant training that directly addresses their needs and areas for improvement. Furthermore, AI increases transparency within project management by offering clear visibility into project progress and performance for all stakeholders. This transparency ensures that everyone involved is aware of the project's status, which facilitates better communication and collaboration among team members and stakeholders. These insights underscore the significant impact of AI in enhancing decision-making, efficiency, role dynamics, personalized development, and transparency in project management. The perception of risk and opportunities created by the introduction of AI in project management appears to be similar between the senior manager and his/her work group. We further find that some skills to be developed by the project manager and his/her team are associated with the project area, number and types of stakeholders involved and the degree of innovativeness of the project to be developed. The results of the pilot phase highlighted how project management specialists perceive innovative AI-based technologies as a tool to support more effectively the project implementation, rationalizing and eliminating activities that can be automated, and thus freeing up the time necessary to carry out activities of creative, social and relational nature. In this way human intelligence integrates with artificial one, which provides greater availability of data necessary for the decision-making and evaluation of alternatives to manage projects and adapt them to ongoing changes required by different stakeholders and team members. In this way the project management could became much more agile, re-active and pro-active, leading to greater partner satisfaction and longer-lasting relationships. Despite previous research (Tsymbaliuk et al., 2022) the results of this study highlight how the introduction of Artificial Intelligence, according to the perception of the project managers interviewed, does not put the employment of Project Manager at risk and point out the importance of this specialized professional profile for effective project management and and building profitable and sustainable relationships with all project partners.

The limitations of this research concern the number of interviewees and case study analyzed. Furthermore, for the generalizability of the data it would be interesting to integrate the use of mixed methodology to discover the general trends in different types of HEIs, between different levels of specialists (junior and senior) in order to bring out any similarities or differences in the perception and acceptance of AI in project management activities. The next stages of the research will take into consideration the aforementioned limitations.

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УПРАВЛЕНИЕ ПРОЕКТАМИ И ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ: АНАЛИЗ ВОСПРИЯТИЯ МЕНЕДЖЕРОВ ПРОЕКТОВ

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Аннотация. Эффективное управление проектами является важнейшим элементом успеха любой организации в новой системе проектной экономики, где проекты вытеснили операции как экономический двигатель реальной реальности. В последние годы в управлении проектами произошли заметные изменения благодаря интеграции искусственного интеллекта (ИИ). С одной стороны, влияние инновационных технологий меняет процесс управления проектами в целях повышения эффективности, автоматизации и успеха, с другой стороны, роль, компетенции и деятельность менеджеров проектов, всегда определяемые как ключевые элементы успеха проекта, претерпевают заметную трансформацию. Цель данной статьи: 1) проанализировать влияние внедрения инструментов искусственного интеллекта на управление проектами на разных этапах жизненного цикла проекта; 2) исследовать, как искусственный интеллект меняет роль и навыки менеджеров проектов. На основании тематического анализа интервью была изучено восприятие менеджеров проектов и специалистов их рабочих групп относительно внедрения ИИ в реализацию проекта. По итогу анализа обсужден теоретический и практический вклад исследования, имеющий отношение к разработке мер по управлению человеческими ресурсами в новых условиях.

Ключевые слова: управление проектами; искусственный интеллект; трансформация роли менеджера проектов; развитие навыков; компетенций менеджера проектов.

JEL коды: M10; M12; M50.

  DOI 10.34709/IM.1103.7

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