

Artificial Intelligence and Project Management: Empirical Overview, State of the Art, and Guidelines for Future Research

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Abstract

Desk rejections of artificial intelligence (AI)–related submissions to the *Project Management Journal*[®] (PMJ) are high. This article provides an overview and state-of-the-art snapshot on academic and practitioner work to derive at potential future research topics and guidelines on the execution and reporting of AI-related studies in project management.

Keywords

artificial intelligence (AI), research questions, academic publishing, future research

Introduction

Project Management Journal[®] (PMJ) has been receiving manuscripts about artificial intelligence (AI) and projects at an increasing rate. Unfortunately, except for a few cases, most of these manuscripts are desk rejected by the editors or, less frequently, do not survive peer review. Müller and Locatelli (2023a) wrote about the importance of studying “contemporary phenomena”; indeed, AI is one of them, and there is vast scope to publish more about AI and projects. However, this research must be scientifically sound. We address this issue by discussing both academic and practitioner views and deriving suggestions for relevant and scientifically sound studies. We structure the thoughtlet by first scoping the state of the art of academic research on AI and projects; second, by providing empirical results from a survey on practical AI implementations in organizations; and third, by deriving some potential topics for future research and guidelines on the execution and reporting of related studies.

State of the Art of Academic Research

The early work of Alan Turing, who raised the question “Can machines think?” (Turing, 1950), is considered the departing point of the development of the modern concept of AI as intelligent machines that can replicate the reasoning processes performed by humans when they use available information to solve problems and make decisions. In the following decades—in parallel with the tremendous development of computers, robotics, and technology in general—the field of AI has evolved; though in certain periods, it has failed to meet the

high expectations of both scholars and practitioners (Buchanan, 2005; Haenlein & Kaplan, 2019). Moving into the 21st century, AI has dramatically progressed, not the least through the vast increase in computer power and currently offers a transformative effect on society (Gruetzemacher & Whittlestone, 2022; Sharma, 2023) and organizations (Agrawal et al., 2022; Arslan et al., 2022; Hendriksen, 2023; Jarrahi et al., 2023).

In order to understand the current and future potential impact of AI, professionals refer to the following three categories of AI capabilities (Hemachandran et al., 2023; Kaplan & Haenlein, 2019; Madakam et al., 2022): (1) Artificial Narrow Intelligence (ANI), also known as Weak AI, which is able to perform a specific task that it was trained to perform; (2) Artificial General Intelligence (AGI), also known as Strong AI, which will be able to perform new tasks in different contexts by independently learning from previous tasks; and (3) Artificial Superintelligence (ASI), which represents cognitive abilities, such as thinking, learning, communication, and decision-making, that surpass those of human beings. While most of today’s state-of-the-art AI systems apply ANI capabilities, and initial efforts have been made to develop AGI

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systems, Artificial Superintelligence is still a theoretical concept that may never be realized.

From a managerial perspective, the analytical functionalities of AI systems can be exploited either by reactive machine AI systems that can perform only the task they were designed for but cannot learn from previous experience, or by limited memory AI systems that can learn and improve performance to a certain extent based on their capacity to retain data from past experiences. However, future AI developments might also include social capabilities, when artificial social intelligence systems might use the Theory of Mind to understand and predict human thoughts, emotions, and behaviors in the relevant context (Cuzzolin et al., 2020; Williams et al., 2022).

From an empirical perspective, recent surveys among executives and professionals confirm the substantially increased use of AI in organizations (Chui et al., 2023; Greenstein & Rao, 2022; Lohr et al., 2023). From the academic perspective, although the contribution of academia to new AI solutions has decreased in recent years compared to developments in the industry (Maslej et al., 2023), there is a great interest among scholars in AI and its impact on management and managerial practices (Borges et al., 2021; Daugherty & Wilson, 2018; Davenport & Ronanki, 2018; Iansiti & Lakhani, 2020; Raisch & Krakowski, 2020; Ransbotham et al., 2017).

Studies on AI in project management have developed throughout the years—from specific applications of expert systems for decision-making (Currie & Drabble, 1992; Diekmann, 1992) to applications based on numerical data for processes (Cubric, 2020) such as effort estimation (Elish et al., 2013; Hosni et al., 2018; Song & Minku, 2023), cost management (Afzal et al., 2019; Cheng & Roy, 2011; Elmousalimi, 2020), and scheduling (Bahroun et al., 2023; Faghihi et al., 2014; Wang et al., 2012; Wauters & Vanhoucke, 2016). An additional avenue of research was conducted on using AI applications for risk management (Barta & Göröcsi, 2021; Costantino et al., 2015; Jin & Zhang, 2011), quality management (Nemati et al., 2002; Parra et al., 2015), and project selection (Costantino et al., 2015; Liu et al., 2019; Rad & Rowzan, 2018). Several scholars have examined how AI can support less quantitative-based processes such as procurement, supplier selection and contract negotiation (Attar et al., 2013; Chaphalkar et al., 2015; Kog & Yaman, 2016; Lewis et al., 2011), and knowledge management (Colomo-Palacios et al., 2014; Lin et al., 2015; Sacks et al., 2020).

Recent systematic literature reviews on AI in project management (Bento et al., 2022; Borges et al., 2021; Hashfi & Raharjo, 2023) provide an overview of previous publications with regard to AI techniques, project management domains, and industries. Additional studies surveyed the expectations of project management practitioners (Holzmann et al., 2022; Rodriguez & Vargas, 2023) on the impact of AI on the workplace. Overall, research indicates that AI might have a disruptive effect on the workplace; it is anticipated to impact the role of project managers as leaders, but at the same time it raises several concerns about job takeover and ethics.

With the significant advancement of AI in the last couple of years—when ChatGPT, Bard, and similar platforms become daily used tools—now is the time to investigate how AI can transform the management of projects and project studies.

Empirical Overview of AI in Projects and Organizations

Empirically, the integration of AI into project management is a transformative trend that is reshaping the industry. In the following section, we synthesize key findings from a comprehensive survey of 2,314 professionals across 129 countries, providing insights into the current state of AI adoption, AI's perceived impact on various project management areas, and the demographic distribution of AI knowledge and maturity levels within organizations (Nilsson, 2023).

The survey garnered a diverse set of responses, with the United States leading participation at 20%, followed by Italy (8%), Canada (7%), and India (7%). This global perspective ensures a broad understanding of AI's impact across economic and cultural contexts.

A substantial 76% of the participating professionals believe that AI will transform the management of projects. This consensus reflects a recognition of AI's potential to revolutionize the industry, necessitating a proactive approach to AI adoption and skill development.

The surveyed experts also indicated three primary areas through which AI impacts efficiency, accuracy, and decision-making within project management:

- Data collection and reporting,
- Performance monitoring, and
- Project time management and scheduling.

Despite AI's importance for organizational efficiency, 62% of the participants rated their companies at 4 or below (on a scale of 1 to 10) in providing AI training to their employees, which correlates with the finding that 65% of participants possess no or only a basic level of AI knowledge and experience. This gap highlights training (and research on training) as critical areas for development as organizations seek to harness the benefits of AI.

The survey results indicate that project managers show great interest in learning more about AI and recognize its significant impact on their future role. The same holds true for national governments, which identified and consider investment/funding in technology and innovation, education, and legislation to be critical for addressing future challenges such as the environment, aging population, and cybersecurity. Simultaneously, governments enact laws to safeguard citizens, regulate, and provide support to organizations by establishing clear guidelines that outline the rules they need to adhere to. Troubling, though, is that interest from the business sector appears low. This conclusion is based on the ratings given by respondents regarding

investment in AI training, recruitment of AI skills, and implementing AI technology.

Overall, the findings underscore the nascent stage of AI adoption in project management, with a significant proportion of organizations and professionals still in the early stages of AI maturity and expertise. The data suggest a critical need for enhanced AI training and education to prepare the workforce for the expected AI revolution in project management. The industry stands at the cusp of a paradigm shift, with AI poised to redefine traditional practices and create new benchmarks for efficiency, effectiveness, and strategic insight.

Guidelines for Future Research

The preceding sections provided an overview and established the relevance of research in AI and projects. Here, we explain why, despite the relevance of topics, many manuscripts are rejected. The most frequent reason is that most of these manuscripts are unscientific; such manuscripts fall into one or more of the following categories:

- **Speculative manuscripts.** Often written by “AI enthusiasts,” such manuscripts are rich in claims about the “amazing possibilities” of AI. They discuss, for example, how AI might replace project managers, improve time and cost-effectiveness, or benefit realizations. Unfortunately, such manuscripts do not bring any “hard evidence” to support such claims; they are epistemologically weak. Some of these manuscripts might include interviews with other “AI enthusiasts,” but again, their claims are typically not supported by facts and have all kinds of human biases that have already been vastly discussed in methodology books and papers.
- **Forecast manuscripts.** These manuscripts aim to forecast AI adoption in 5 to 10 years. Again, often written by “AI enthusiasts” and based on surveys or interviews, they try to predict the future, often in a very favorable way. Such manuscripts are often “authoritative manuscripts,” a few pages long and written by authors who believe they are “AI gurus.”
- **Atheoretical manuscripts.** Such manuscripts are survey-based and claim to “represent reality.” They provide data about, for example, the percentage of organizations using AI in country X or the tasks that AI supports in project-based organizations (e.g., scheduling). In these categories, papers also compare different AI models for project management tasks, for example, scheduling. The issue with such manuscripts (and many others studying other phenomena) is that they are theoretically weak. They neither build on existing theory nor develop or extend into new theory. Earlier editorials have already explained the importance of theory for PMJ submissions (e.g., Müller & Klein, 2018).
- **Not project management papers.** Such papers often systematically review AI, comparing the different models or

features. The link to project studies is minimal, often including no more than a few fictitious or untested examples.

All the above manuscripts might be suitable for practitioner journals, but not PMJ. Authors should also remember that it typically takes a year between submission and publication. So, for instance, well-executed surveys about “adoption of AI in country X” can be ideal for a practitioners’ journal but not for PMJ. Indeed, one year is a long time for a rapidly evolving phenomenon like AI, so the article might not be representative anymore when published. PMJ articles are intended to be read years after publication; therefore, PMJ is not keen on publishing articles on AI or other topics that will no longer be relevant in a few years. Therefore, project studies need AI research addressing phenomena of a more general nature, for example:

- AI triggered changes in the project manager role and responsibilities, project management processes, social interactions within projects, the wider project network environments, and AI applications;
- AI-related skills and competencies for project practitioners;
- Standards and regulations of AI in general and in project management;
- The psychological/organizational/technical or other factors influencing managers’ and organizations’ willingness to adopt AI applications for their projects. Managers in this context can be project/program/portfolio managers or managers of project-based companies or project owners in client organizations;
- AI transformation processes in projects and organizations, given the public and worldwide access to tools such as ChatGPT, Bard, and others;
- Context-contingent frameworks for determining the level of autonomy that project managers grant AI applications such as those for automated decision-making, communication across different security levels, data handling, boundaries to interpret early-warning indicators, inter-organizational exchange, and so forth;
- The characteristics of the interactions among project (manager), sponsor, and AI applications;
- Processes for project/program/portfolio-level AI strategy development and implementation;
- AI-related implications in forming and maintaining inter-organizational networks for projects;
- Ethical aspects of using AI in planning and delivering projects;
- Ways to adapt academic education and practitioner training programs to the fast-paced advancements in AI to ensure up-to-date skills and knowledge;
- The balance of knowledge and experience in AI among project management practitioners, the AI maturity level of their organizations, and the role of training and certification therein;

- Cultural (national, industry, profession, etc.) and/or generational (Boomers, GenZ/X, etc.) impacts on the perception and integration of AI and implementation of AI in project management;
- Related to the European Union's (EU) provisional artificial intelligence act: How will the AI legislation by the EU and valid in Europe impact the adoption of AI compared with those parts of the world that do not need to consider these limitations? Just like GDPR regulates privacy for Europeans but not for other continents; and
- As AI is powered by significant data infrastructures, will the adoption of AI be completely dependent on only a few huge digital providers such as Microsoft, Google, Amazon, or Meta? How does the adoption of AI relate to the control of data availability by a limited number of private companies? What kind of vulnerability are we adopting as and when such computing power becomes unavailable? What are the implications for project management?

These are just a few exemplary topics; the list is not exhaustive. Along with the variety in research questions comes the variety in research methods, types of samples, or ways of collecting data. As new phenomena often require new ways to study them, journals such as PMJ will be open to new approaches as long as the need is convincingly presented. This includes a clear outline of the benefits of a newly developed method over the use of existing methods and a discussion of the reliability and credibility of the results obtained through this method. Again, like other papers, papers dealing with AI should be ontologically and epistemologically sound.

So, what does it take for a paper about AI to be published in PMJ? The answer is surprisingly simple. AI is simply a “relevant empirical phenomenon” like many others. So, like every other topic, it takes the standard approach of academic research and writing. It is impossible to summarize countless books and editorials on the topic of management research and writing, but a few essential ideas might include:

- Clearly explain the need for your research. For instance, use classic references to derive the gap spotting or problematization. This is fundamental to building interesting and scientific aims or research questions (Alvesson & Sandberg, 2011).
- Clarify your ontological position; (Müller & Locatelli, 2023b).
- Conduct a literature review following scientific standards (Klein & Müller, 2020).
- Collect meaningful data by controlling for sample bias, asking meaningful questions, and so forth (Klein & Müller, 2019).
- Follow a scientific approach to data analysis. Whether your data are qualitative or quantitative, follow relevant epistemological approaches for data analysis (Klein & Müller, 2022).
- Use a theoretical lens to make sense of the data. Carefully explain the “what,” “why,” “how,” and “where/when/by whom” of the phenomenon you observe (Müller & Locatelli, 2023b).
- Write up your research scientifically, following PMJ standards. Read the author guidelines, the series of editorials, and papers published in the last few years in PMJ and other relevant journals, and you will see what is expected regarding length, citations, tone, and structure. For instance, it is extremely unlikely that a paper of 1,000 or 20,000 words or only a few references would be published in PMJ.

AI is an interesting and extremely relevant phenomenon for projects. Let's tackle this challenge and present good research on AI!


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