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ARTIFICIAL INTELLIGENCE IN PROJECT MANAGEMENT: ANALYSIS OF TRENDS AND CHALLENGES BY LITERATURE REVIEW

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Purpose: This paper aims to conduct a comprehensive literature review of the application of artificial Intelligence (AI) in project management, focusing on research trends, challenges, and directions for further study. The author examines whether current research sufficiently considers organisational implications and changing competence requirements for project managers, or mainly emphasizes technical aspects.
Design/methodology/approach: The article is based on a systematic literature review conducted per the PRISMA 2020 guidelines. A total of 4558 records were extracted from Web of Science and Scopus databases, from which 118 publications from 2020 to 2025 were selected. The study combines bibliometric and qualitative content analysis, focusing on the types of AI used, application areas, implementation challenges, and references to managerial competences.
Findings: The findings confirm that most of the academic literature on AI applications in project management focuses on technical and operational aspects such as predictive models, scheduling optimisation, or decision support. Only 8 of the 118 publications analysed refer directly to the organisational implications of AI implementation, and only seven address the topic of competence requirements for project managers. This confirms the research hypothesis set out regarding the marginalisation of organisational and human factors. The review also identified key thematic clusters and research gaps.
Research limitations/implications: The study was limited to English-language publications released over a six-year period and available in two databases. In the future, it is advisable to expand the sources with case studies and empirical evidence to provide deeper insights into AI's practical and organisational impact. An interdisciplinary approach is recommended.
Practical implications: The paper highlights the need for a comprehensive approach to AI implementation in a project environment, addressing not only technological issues but also organisational structures and competence requirements. The creation of new competence models for project managers in digital environments is emphasised.
Social implications: Noting the under-recognition of the organisational impact of AI implementation, the author encourages more balanced research that also includes ethical, cultural, and project team transformation issues.
Originality/value: The paper is one of the few studies that provide a systematic literature analysis of not only AI application in project management, but also neglected organisational and competence-related aspects. It offers value to researchers and practitioners interested in AI implementation in project environments.

Keywords: Artificial Intelligence, project management, AI applications, project manager competences.
Category of the paper: Scientific paper.

1. Introduction

Recent years have seen the rapid development of artificial Intelligence, which is increasingly entering project management practice. Implemented solutions range from simple process automation, such as schedule management or information flow, to advanced systems based on machine learning that support decision-making, risk management, or resource allocation (Dimcheva, 2024; Salimimoghadam et al., 2025; Fridgeirsson et al., 2021). Artificial Intelligence enables automation of routine tasks, increases productivity, and supports decision-making based on data analysis (Sarafanov, Valilai, Wicaksono, 2024; Čančer, Tominc, Rožman, 2023).

Project management has long been a field susceptible to the adaptation of new technologies, but AI application brings a new transformation dimension in terms of quality. This may affect the way in which planning, monitoring, anticipating risks or communicating within the project team is carried out (Walee et al., 2024). The literature also points to the role of artificial Intelligence in improving project outcomes and reducing risk (Sarafanov, Valilai, Wicaksono, 2024; Dimcheva, 2024).

Although the number of publications on AI application in project management continues to grow, there is no comprehensive picture of what aspects are most commonly studied, what challenges prevail, and whether there is an outline consensus on the direction of further AI development in this field (Salimimoghadam et al., 2025).

This raises the validity of the following research problem: How does AI affect project management in light of trends and challenges identified in the academic literature? The following questions are intended to be addressed to resolved the above problem:

1. What AI applications in project management are most commonly analysed in the academic literature?
2. What are the main challenges and risks associated with AI implementation in project management identified in the literature?
3. Is there a consensus in the literature on the development of artificial Intelligence in project management?

Therefore, this paper aims to conduct a systematic review of the scientific literature on AI application in project management to identify the main research trends as well as theoretical and practical challenges. The author analyses publications from two scientific databases, i.e. Web of Science and Scopus, in accordance with the PRISMA 2020 methodological

guidelines. Both bibliometric analysis and qualitative content analysis of selected publications were used.

Based on the literature analysis, the following research hypothesis was attempted to be verified: The scientific literature on AI application in project management mainly focuses on technical aspects, marginalising issues related to organisational consequences and the required managerial competences.

The verification of this hypothesis was based on an analysis of the publications, including the classification of types of AI applications, the identification of threats related to implementation challenges, and the presence of references to competences, organisational changes, and the cultural context. The results aim to add to existing knowledge by demonstrating the current research state and identifying gaps that should be addressed in future theoretical and empirical work.

2. Research methodology

The study aimed to identify current trends and challenges in AI application in project management. The study constituted a systematic review with elements of bibliometric and quality analyses. For the systematic literature review, an approach in line with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines was used to ensure transparency and clarity in the research process (Page et al., 2021). It included the following stages: research problem formulation, criteria selection and searching, selection of publications and data analysis. The research problem, questions and hypothesis are presented in the introduction, and a focus on describing the systematic literature review process.

2.1. Searching for Scientific Publications

A literature search was conducted in two leading scientific databases: Web of Science (WoS) and Scopus. The scope of the search was limited to English-language publications, published between 2015 and 2025, and to three documents: scientific papers, review papers and conference presentations.

The following search query was applied to the Web of Science database: TS = ("artificial intelligence" OR "machine learning" OR "deep learning") AND TS = ("project management" OR "project planning" OR "project manager"). On the other hand, the Scopus database featured the following query: (TITLE-ABS-KEY("artificial intelligence") OR TITLE-ABS-KEY("machine learning") OR TITLE-ABS-KEY("deep learning")) AND (TITLE-ABS-KEY("project management") OR TITLE-ABS-KEY("project planning") OR TITLE-ABS-KEY("project manager")).

A total of 4558 records were identified, of which 696 were from the WoS database and 3862 from Scopus. The results were exported in structured forms for bibliometric analysis.

2.2. Selection of Relevant Publications

The selection of publications followed the steps recommended by Page et al. (2021). The publication selection process is shown in the diagram (Figure 1), which was prepared using the free online Shiny App software developed by Haddaway, Page, Pritchard and McGuinness (2022).

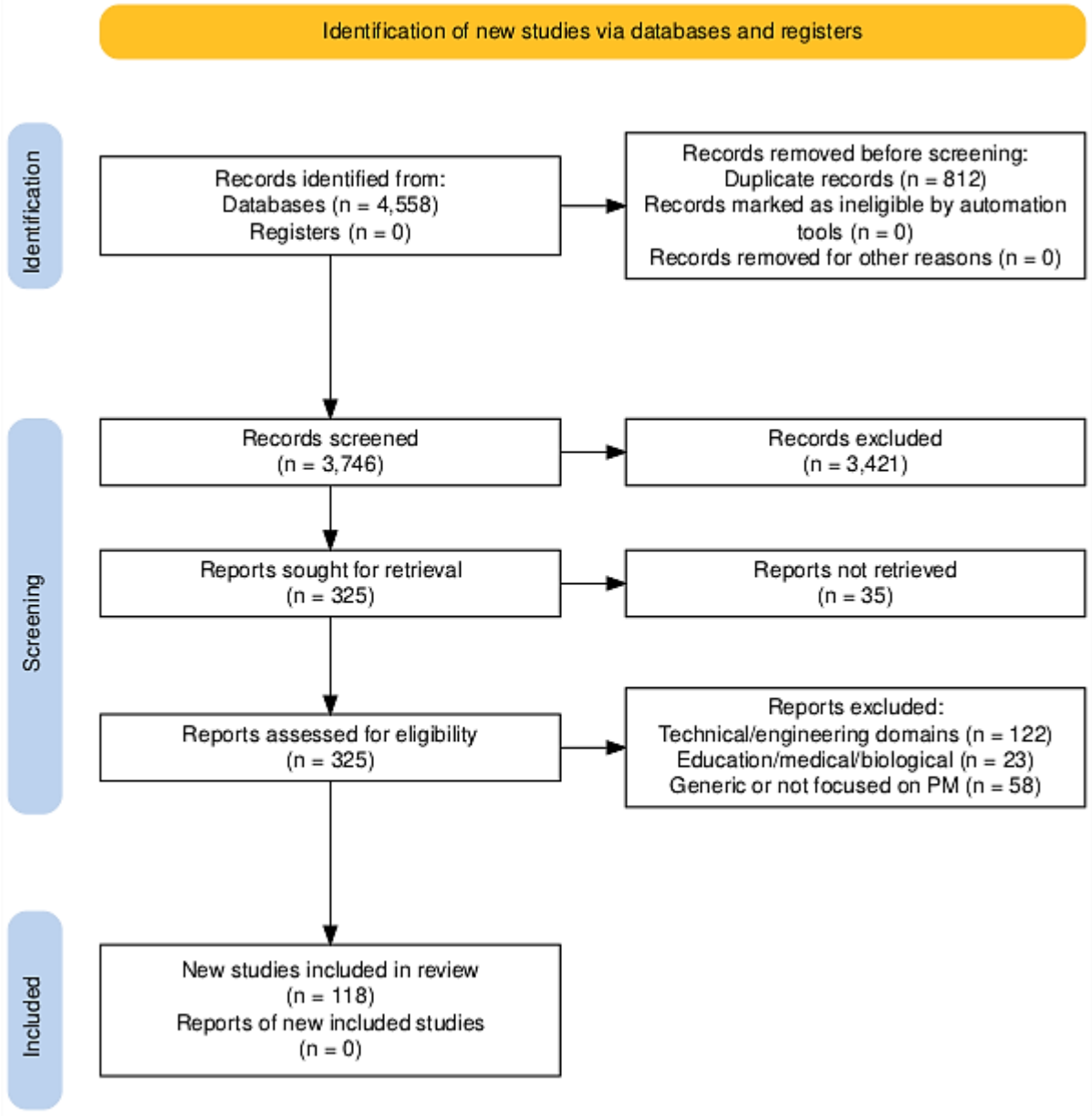


Figure 1. Diagram of a systematic literature review in line with the PRISMA2020 guidelines.
Source: elaboration prepared using the Shiny App.

In the first instance, 812 duplicate and incomplete records were removed, leaving 3746 publications. A preliminary review of titles and abstracts was then carried out, resulting in the exclusion of 3421 publications that did not relate to the topic of AI and project management. 325 publications were shortlisted for the next stage, of which 35 could not be obtained in full text. The remaining 290 publications were subjected to full-text analysis. The thematic selection excluded 203 publications that dealt exclusively with technical issues (e.g. construction, robotics, software engineering), as well as papers focused on medicine, education or biology, without reference to project management processes. The decision was made to focus on general trends and organisational challenges related to AI application. In addition, the time horizon for publication has been narrowed to 2020-2025. As a result, 118 scientific publications meeting thematic, linguistic and time criteria were included in the final analysis. A summary of all exclusion and inclusion criteria is presented in Table 1.

Table 1.
Criteria for the selection of publications for the literature review

Category	Inclusion Criteria	Exclusion Criteria
Timeframe	Publications from 2020–2025	Publications before 2020
Publication Language	English language	Other than English
Document Type	Article, Review, Conference Paper	Non-scientific (e.g., editorial, note)
Presence of Keywords	Presence of at least one keyword from AI and PM	Lack of references to artificial Intelligence or project management in the title/abstract
Main Topic	AI in the context of project management	Artificial Intelligence treated marginally, or project management as background
Excluded Fields	None	Medicine, education, biology, agriculture
Excluded Industries	No dominance of a single industry – general or organizational perspectives preferred	Construction, engineering, infrastructure, IT

Source: own elaboration.

2.3. Review of Selected Publications

Qualitative content analysis using a structured coding scheme was used to analyse 118 selected scientific publications. Each publication was assessed in terms of the following:

- areas of AI application in project management,
- type of AI used in project management,
- benefits of AI application in project management,
- barriers and challenges of AI application in project management,
- references to the project manager's competences and other contexts.

In addition, the selected publications were used to identify research gaps and areas worth considering for further research.

3. Results

3.1. Bibliometric Analysis

The bibliometric analysis identified the main research directions and thematic links in the field of AI application in project management. A co-occurrence analysis of authors' keywords was carried out using the VOSviewer tool. The source data in .txt and .cvs form was imported with the standard configuration. A minimum threshold of 10 keyword occurrences was set and the analysis was performed in co-occurrence – author keywords mode. Data from two databases were analysed: Web of Science (n = 696) and Scopus (n = 3862). The results are presented in Figures 2 and 3. The figures show a visualisation of the co-occurrence of keywords from both databases. The size of the labels reflects the frequency of occurrence, while the colour indicates affiliation to a particular thematic cluster.

In the case of the Web of Science database (Figure 2), 151 keywords were eligible for analysis, forming five clearly distinguishable thematic clusters. The most common concepts include:

- project management,
- Artificial Intelligence,
- machine learning,
- deep learning,
- optimization,
- natural language processing,
- construction management.

His analysis pointed to a strong link between concepts related to AI implementation in engineering, information management, and risk and cost management. The clusters point to thematic diversity from technical aspects (i.e.: neural network, software effort estimation) to strategic elements (i.e.: digital transformation, economic security).

In contrast, an analysis of publications from the Scopus database (Figure 3) identified 314 keywords, which also fall into five clusters. The most significant nodes include:

- project management,
- machine learning,
- deep learning,
- big data,
- BIM (Building Information Modelling),
- decision-making support systems.

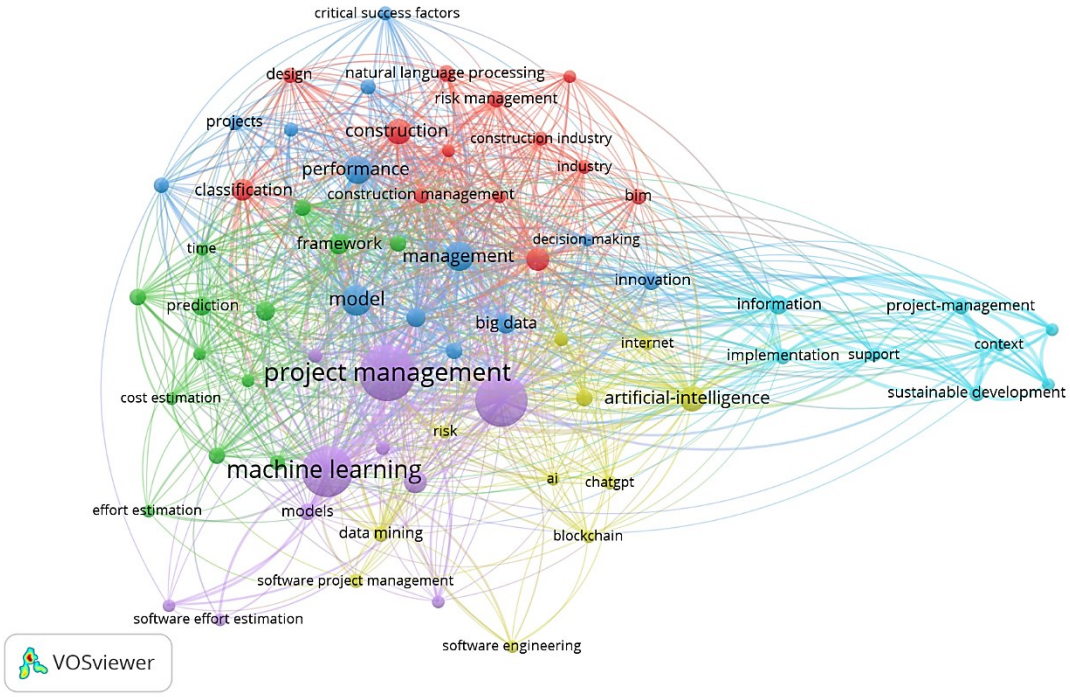


Figure 2. Map of co-occurrence of keywords in the Web of Science database (2015-2025).
Source: own elaboration prepared using the VOSviewer tool.

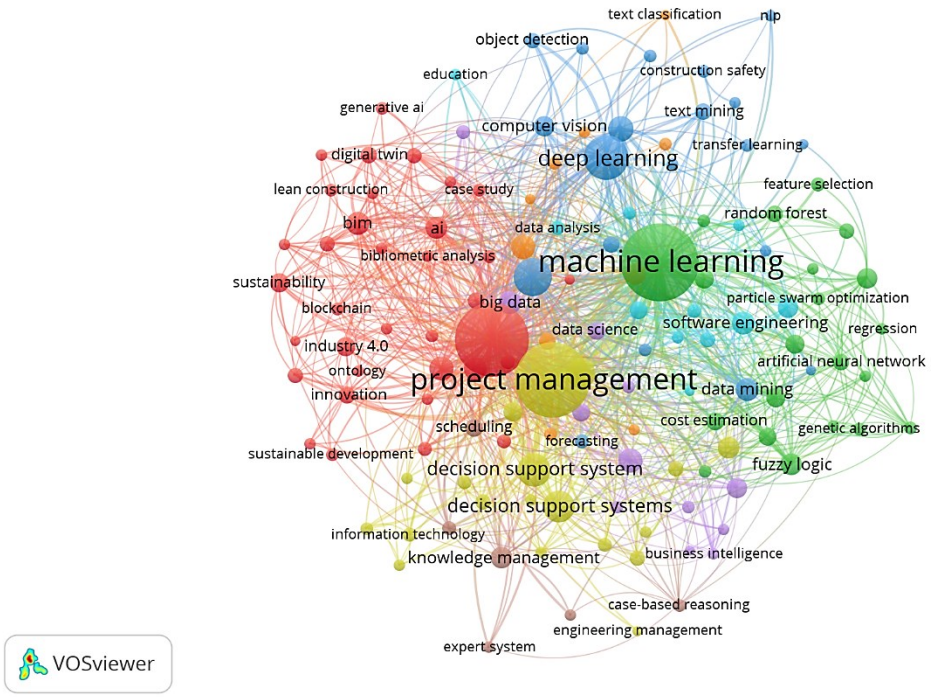


Figure 3. Map of co-occurrence of keywords in the Scopus database (2015-2025).
Source: own elaboration prepared using the VOSviewer tool.

The clusters reveal a strong link between artificial Intelligence and construction management (BIM, lean construction), decision support (decision support, knowledge management) and data mining (data mining, software engineering). In addition, there is also a growing interest in newer trends such as digital twin, generative AI or ontology.

The 15 most frequent keywords in both databases were identified based on the frequency of their co-occurrence. Table 2 provides a summary of the key terms that dominate the literature on AI application in project management in the Web of Science and Scopus databases.

Table 2.
Most frequently occurring keywords in the Web of Science and Scopus databases

Web of Science Keywords		Scopus Keywords	
Keywords	**Number of Occurrences**	**Keywords**	**Number of Occurrences**
project management	201	machine learning	506
artificial Intelligence	172	project management	485
machine learning	160	artificial Intelligence	465
model	59	deep learning	171
management	54	construction management	123
performance	52	decision support system	93
artificial-intelligence	42	decision support systems	86
construction	40	risk management	73
system	35	natural language processing	58
deep learning	35	artificial Intelligence	54
classification	32	optimization	54
big data	27	construction	53
framework	26	big data	48

Source: own elaboration.

The following keywords ranked highest in the Web of Science database: project management, machine learning, artificial Intelligence, deep learning and optimization. In the Scopus database, on the other hand, the most frequent keywords are: machine learning, project management, artificial Intelligence, deep learning, construction management and decision support systems.

Six keywords appear at the top of both bases and they are: artificial Intelligence, machine learning, project management, deep learning, big data and construction. This demonstrates a specific core of terminology that prevails regardless of the data source. However, it is worth noting the significant thematic equality between the databases. There are unique keywords in the Web of Science database such as model, classification, performance, system or prediction, which may suggest a greater interest in modelling and data analysis. On the other hand, the Scopus database includes headings typical of practical and industry applications, such as decision support systems, construction management, optimization, risk management, and natural language processing.

Based on a comparative analysis of the data from both databases, it can therefore be concluded that publications from the Scopus database are characterised by a greater range of topics and a broader keyword index than publications from the Web of Science, which may be due to differences in editorial policies and a larger number of indexed conference presentations. The observed pattern of keyword clusters in both databases confirms the interdisciplinary nature of the field under study and points to clear links between artificial intelligence technologies and their specific applications in project management.

3.2. Areas of AI Application in Project Management

A content analysis of the 118 scientific publications shortlisted for further study identified the main areas of AI application in project management, which are: automation, planning, monitoring, risk management and others. The classification was carried out in a qualitative manner based on a review of the publications and aimed to isolate the dominant functions that artificial Intelligence performs in project practice. Table 3 shows the classification of publications according to these application areas.

Table 3.
Classification of publications by areas of AI application in project management

Application area of AI	Authors of the publication
Project monitoring	Zhao (2023); Zaidouni, Idrissi, Bellabdaou (2024); Wu, Zhu, Zhao (2022); Wachnik (2022); Vergara et al. (2025); Vărzaru et al. (2022); Uddin et al. (2023); İnan, Narbaev, Hazir (2022); Georgiev et al. (2024); Tashkinov (2024); Tariq et al. (2024); Tamura el al. (2024); Sahadevan (2023); Sousa et al. (2023); Solana-González et al. (2021); Singh, Garg (2023); Sarafanov, Valilai, Wicaksono (2024); Salimimoghadam et al. (2025); Sabahi, Parast (2020); Ribeiro et al. (2024); Abd Rahman et al. (2023); Phung, Ogunshile, Aydin (2025); Pérez Castillo, Orantes Jiménez, Letelier Torres (2024); Allal-Chérif, Simón-Moya, Cuenca Ballester (2021); Nenni et al. (2025); Naz et al. (2022); Müller et al. (2024); Müller (2023); Miller (2022, 2021a, 2021b, 2020); Merhi, Harfouche (2023); Merencio, Grander (2024); Mancini, Mariani, Manfredi, (2023); Mbizo et al. (2024); Al Mamlook et al. (2024); Malik et al. (2021); Mahdi et al. (2021); Madson, Gade, Srivastava (2025); Liu et al. (2024); Kultin (2022); Biesialska, Franch, Muntés-Mulero (2021); Kanakaris et al. (2020); García Vásquez, Kumral (2025); Santos et al. (2023); Jauhar et al. (2023); Hashfi, Raharjo (2023); García Villena et al. (2022); Fridgeirsson et al. (2021); Anyadiegwu, Kabamba (2022); Engel, Ebel, van Giffen (2021); Degli et al., (2021); Das et al. (2025); Koudriachov, Tam, Aparicio, (2025); Čančer, Tominc, Rožman (2023); Bodea, Mitea, Stanciu, (2020); Bakhshi et al. (2022); Angara, Prasad, Sridevi (2020); Bahi, Gharib, Gahi (2024); Aljaž (2024); Albrecht, A., Albrecht, E. (2021); Felicetti et al. (2024); Ahmadi et al. (2023); Adamantiadou, Tsironis (2025); Dotsenko et al. (2023); Hossain et al. (2024); Titu, Pana, Moldoveanu (2025); Mariani, Mancini (2024); Jiang et al. (2022).
Project planning	Zaidouni, Idrissi, Bellabdaou (2024); Wu, Zhu, Zha (2022); Wachnik (2022); Vergara et al. (2025); Vărzaru et al. (2022); Uddin et al. (2023); İnan, Narbaev, Hazir (2022); Georgiev et al. (2024); Tashkinov (2024); Tariq et al. (2024); Tamura et al. (2024); Sousa et al. (2023); Solana-González et al. (2021); Sarafanov, Valilai, Wicaksono (2024); Salimimoghadam et al. (2025); Sabahi, Parast (2020); Rodríguez et al. (2025); Ribeiro et al. (2024); Abd Rahman et al. (2023); Phung, Ogunshile, Aydin (2025); Nenni et al. (2025); Naz et al. (2022); Müller et al. (2024); Müller (2023); Miller (2022, 2020); Merhi, Harfouche (2023); Merencio, Grander (2024); Mbizo et al. (2024); Mansoor et al. (2024); Malik et al. (2021); Mahdi et al. (2021); Madson, Gade, Srivastava (2025); Liu et al. (2024); Lishner, Shtub (2022) Biesialska, Franch, Muntés-Mulero (2021); Kanakaris et al. (2020); García Vásquez, Kumral, (2025); Santos et al. (2023); Jauhar et al. (2023); Mahdi et al. (2021); Hashfi, Raharjo (2023); Hosni, Idri, Abran (2021); García Villena et al. (2022); Fridgeirsson et al. (2021); Anyadiegwu, Kabamba (2022); Engel, Ebel, van Giffen (2021); Dimcheva (2024); Aiken et al., (2021); Das et al. (2025); Koudriachov, Tam, Aparicio, (2025); Čančer, Tominc, Rožman (2023); Bodea, Mitea, Stanciu (2020); Bakhshi et al. (2022); Angara, Prasad, Sridevi (2020); Bahi, Gharib, Gahi (2024); Aljaž (2024); Albrecht, A., Albrecht, E. (2021); Felicetti et al. (2024); Ahmadi et al. (2023); Adamantiadou, Tsironis (2025); Titu, Pana, Moldoveanu (2025); Mariani, Mancini (2024); Ammar et al. (2022); Olukoga, Feng, (2022); Alketbi, Dweiri, Dalalah, (2025); Allal-Chérif, Simón-Moya, Cuenca Ballester (2021); Hossain et al. (2024); Urata, Kawanaka, Rokugawa (2022).

Cont. table 3.

Automation of routine tasks and communication processes	Zhao (2023); Zaidouni, Idrissi, Bellabdaoui (2024); Yasmin, Haider Butt, Daud (2024); Wu, Zhu, Zha (2022); Wachnik (2022); Vergara et al. (2025); Vărzaru et al. (2022); Vărzaru (2022); Uddin et al. (2023); İnan, Narbaev, Hazir (2022); Georgiev et al.(2025); Tashkinov (2024); Tariq et al. (2024); Tamura et al. (2024); Sousa et al. (2023); Solana-González et al. (2021); Singh, Garg (2023); Sarafanov, Valilai, Wicaksono (2024); Sabahi, Parast, (2020); Rodríguez et al. (2025); Ribeiro et al. (2024); Phung, Ogunshile, Aydin (2025); Pérez Castillo, Orantes Jiménez, Letelier Torres (2024); Allal-Chérif, Simón-Moya, Cuenca Ballester, (2021); Nenni et al. (2025); Naz et al. (2022); Müller et al. (2024); Miller (2022, 2020); Merhi, Harfouche (2023); Merencio, Grander (2024); Mbizo et al. (2024); Al Mamlook et al. (2024); Malik et al. (2021); Mahdi et al. (2021); Madson, Gade, Srivastava (2025); Liu et al. (2024); Kultin (2022); Kanakaris et al. (2020); García Vásquez, Kumral (2025); Jauhar et al. (2023); Hazil et al. (2020); Hashfi, Raharjo (2023); García Villena et al. (2022); Fridgeirsson et al. (2021); Anyadiegwu, Kabamba (2022); Engel, Ebel, van Giffen (2021); Dimcheva (2024); Aiken et al., (2021); Das et al. (2025); Koudriachov, Tam, Aparicio (2025); Čančer, Tominc, Rožman (2023); Bodea, Mitea, Stanciu (2020); Bakhshi et al. (2022); Angara, Prasad, Sridevi (2020); Bahi, Gharib, Gahi (2024); Aljaž (2024); Albrecht, A., Albrecht, E. (2021); Felicetti et al. (2024); Ahmadi et al. (2023); Adamantiadou, Tsironis (2025); Sarwar, Rahman (2024); Holzmann, Zitter, Peshkess (2022); Senarath, Berntzen (2025); Popa et al. (2023); Anyadiegwu, Kabamba (2022); Muravev et al. (2025).
Project risk	Zhao (2023); Miller (2022); Merhi, Harfouche (2023); Merencio, Grander (2024); Mancini, Mariani, Manfredi, (2023); Mbizo et al. (2024); Liu et al. (2024); Kanakaris et al. (2020); Angara, Prasad, Sridevi (2020); Albrecht, A., Albrecht, E. (2021); Zaidouni et al. (2024); Titu, Pana, Moldoveanu (2025); Lai et al. (2024); Zwilling, Eckhaus (2021); Nazarenko et al. (2022); Sousa et al. (2021); Imbugwa, Gilb, Mazzara (2025); Aslan (2021).
Other	Vial et al.(2023); Taye, Feleke, (2022); Sakhrawi, Sellami, Bouassida (2022); Miller (2021b); Mbizo et al. (2024); Hosni, Idri, Abran, (2020); Hassanali et al. (2025); Mostaeen et al. (2020); Jiang et al. (2022); Bohn, Braun (2021); Anitha, Parveen (2024); Vyas (2025); Haidabrus (2024); Pastierik (2024); Mikhaylov (2023); Odeh (2023); Ogunleye (2023); Jang (2022); Holzmann, Zitter, Peshkess (2022); Ribeiro, Ramos (2023); Lopes Gomes et al. (2024); Khan, Adil (2023); Zhang, Y., Zhang, C., Hu (2025); Prakljačić et al. (2024); Mikhaylov (2023); Shukla, Kumar (2023).

Source: own elaboration.

The most significant number of studies (70 publications) were identified on AI application for project monitoring. This type of research is conducted by Singh and Garg (2023), Tariq et al. (2024) and Solana-González et al. (2021), among others. In this area, the use of artificial Intelligence is being explored for ongoing project progress tracking, data quality control and resource utilisation. Just two fewer publications (69 papers) point to research on the AI application for project planning, which focuses on areas such as predicting schedules, optimising resource allocation, or creating decision-making scenarios. Researchers working in these areas include Nenni et al. (2025), Biesialska et al. (2021) as well as Adamantiadou and Tsironis (2025). In contrast, the automation of project management processes is pointed out by the authors of 66 publications, which include, in particular, Zhao (2023), Wachnik (2022), Müller et al. (2024), and Ribeiro et al. (2024). In this area, AI is applied to streamline routine project tasks, such as communication, reports generation, documentation analysis or integration of data from different systems. Much less research was identified on risk (18 publications) and other areas such as AI impact on the role of the project manager, ethical issues or digital transformation (26 publications). In terms of risk, AI is used to identify, assess and predict project risks. Researchers on this topic include Mancini et al. (2023), Zwilling and Eckhaus

(2021), and Nazarenko et al. (2022). In contrast, research on other areas is being conducted by Vial et al. (2023), Mikhaylov (2023) or Hassanali et al. (2025), among others.

3.3. Type of AI Applied in Project Management

Four predominant types of AI technology applied in project management were identified in the scientific literature analysed, such as machine learning (ML), deep learning (DL), natural language processing (NLP) and less represented other AI forms such as expert systems or hybrid algorithms. Figure 4 shows the distribution of AI types in project management. The most common AI type was machine learning (72 publications), used, among others, to build predictive, classification and decision support models (Adamantiadou, Tsironis, 2025; Ahmadi et al., 2021; Taboada et al., 2023). In second place in terms of numbers was deep learning (65 publications), which was mainly used in image analysis, processing of large data sets and process automation (Zabala-Vargas, Jaimes-Quintanilla, Jimenez-Barrera, 2023; Mohamed, Moselhi, 2022).

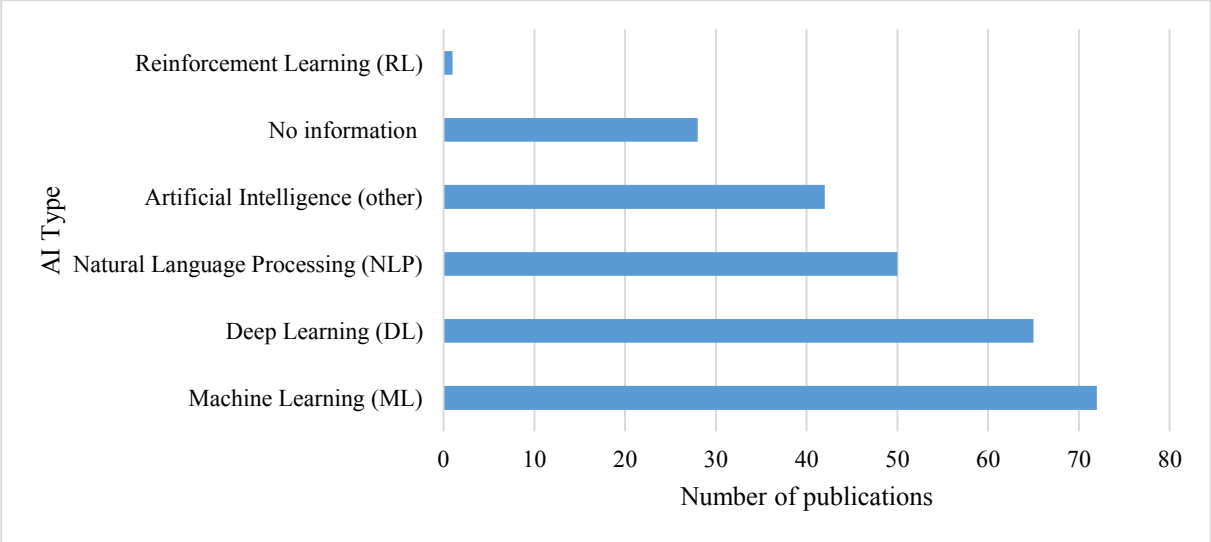
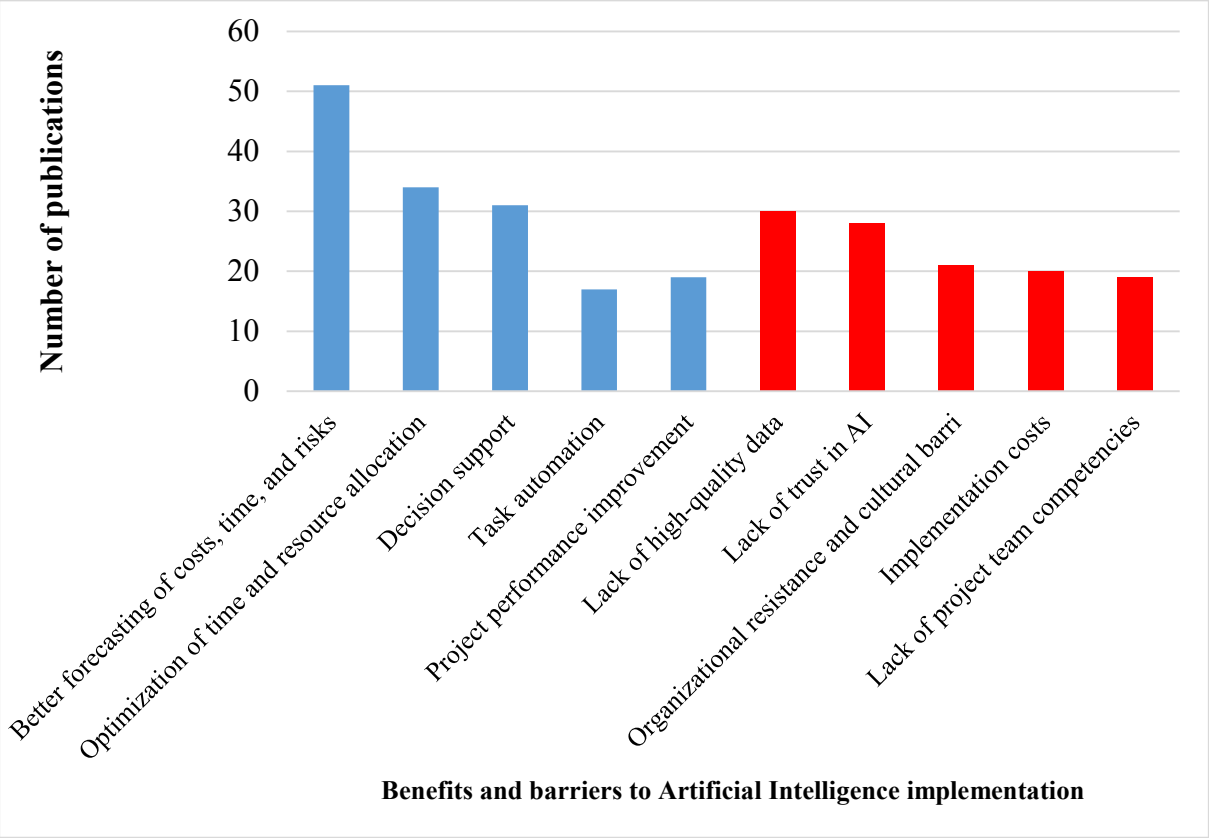


Figure 4. Type of Artificial Intelligence used in project management.
Source: own elaboration.

Just under half of the publications describe the use of natural language processing in project management (50 publications). It has been used to analyse documentation, extract information from test data and support human-machine communication (Ahmadi et al., 2021, 2023). The use of general artificial intelligence techniques without clear attribution to a specific category has been reported in a smaller number of cases, which may point to an early stage of exploration (Adamantiadou, Tsironis, 2025; Ahmadi, 2023; Yu, 2023). In addition, more than 20% of the publications analysed did not precisely specify the AI type used, making it difficult to classify them.

3.4. Benefits of and Barriers to AI application in project management

A content analysis of 118 scientific publications indicates that AI application in project management is associated with a number of essential benefits, but also barriers that may limit its implementation or effectiveness. Figure 5 provides a summary of the number of publications specifying the benefits of and barriers to AI application in project management.



Blue indicates the benefits and red the barriers to implementing AI.

Figure 5. A summary of the number of publications specifying the benefits of and barriers to AI application in project management.

Source: own elaboration.

Publications tend to identify three main areas where AI application has the greatest beneficial impact: predictability, optimisation and decision-making. More than 50 publications have indicated that AI applications have brought the benefits of better forecasting of costs and project performance. AI supports a more accurate prediction of risks, delays and budget deviations, resulting in greater control over project delivery. Such opportunities have been particularly highlighted in the work of authors such as Adamantiadou and Tsironis (2025), Fridgeirsson et al. (2023), Nenni et al. (2025), Zhao (2023), Bahroum et al. (2023)., Langroodi, Vahdatikhaki and Doree (2021), Mohamed and Moselhi (2022) and Yu (2023). The publications analysed further indicate that AI methods, including machine learning and deep learning, enable the creation of predictive models that support not only cost planning, but also the assessment of project feasibility, estimation of lead times and probability of operational success.

Another important benefit of AI implementation in project management is the optimisation of resource allocation and project duration, which appeared in 34 publications. Authors addressing this issue include Wachnik (2022), Liu et al. (2024), Fridgeirsson et al. (2021), Ribeiro et al. (2024), Tamura et al. (2024), Sousa et al. (2023), Mbizo et al. (2024), Bahi, Gharib, Gahi, (2024) and Mancini, Mariani and Manfredi (2023). The next frequently identified area is decision support, which was identified in 31 publications. Authors addressing this topic include Müller (2023), Singh and Garg (2023), Raharjo (2023), Adamantiadou and Tsironis (2025), Zaidouni, Idrissi, Bellabdaou (2024), Abd Rahman et al. (2020), Ribeiro et al. (2024), Pérez Castillo, Orantes Jiménez, Letelier Torres (2024), Kanakaris et al. (2020) and Mahdi et al. (2021). Also, the automation of repetitive tasks was identified as an important benefit and is addressed by 17 publications. Authors exploring this area include Wachnik (2022), Müller (2023), Zaidouni, Idrissi, Bellabdaou (2024), Allal-Chérif, Simón-Moya, Cuenca Ballester (2021) and Sarafanov, Valilai, Wicaksono (2024).

Despite the growing interest in AI application in project management, the literature reviewed points to a number of barriers limiting the successful implementation of these technologies. The most commonly identified challenges include limited access to quality data and a lack of adequate infrastructural and organisational preparedness (Wachnik, 2022; Adamantiadou, Tsironis, 2025). A number of publications have also pointed out the lack of trust in such solutions and the reluctance of stakeholders to delegate decisions to learning systems (Fridgeirsson et al., 2023; Tominc et al., 2024; Tominc, Oreški, Rožman, 2023). In addition, authors such as Zhao (2023) and Yu (2023) highlight the difficulties associated with the interpretability of the algorithms and the lack of transparency in the decisions made. A part of the research also emphasises the high cost of implementation, the lack of digital competence of project teams and cultural resistance in organisations (Langroodi et al., 2021; Mohamed, Moselhi, 2022). Although technically recognised, these barriers are often marginalised in publications presenting an analysis of the effectiveness of AI application, confirming the research hypothesis that the organisational consequences and changing competences of project managers are under-exposed in research.

4. Discussion

4.1. Interpretation of the Results in Light of the Study's Aim

The research aimed to determine how AI affects project management in light of the trends and challenges identified in the academic literature from 2020 to 2025. Based on a systematic review of 118 scientific publications from the Scopus and Web of Science databases, it was possible to answer the research questions posed:

1. What AI applications in project management are most commonly analysed in the scientific literature?
2. What are the main challenges and risks associated with AI implementation in project management identified in the research?
3. Is there a consensus in the literature on the development of artificial Intelligence in project management?

With regard to the first research question, the most frequently analysed AI applications include: project duration and cost forecasting (more than 50 publications), resource allocation and scheduling optimisation (34), decision support (31), automation of repetitive activities (17), and risk analysis and threat prediction (20). This points to the dominance of the technical and operational aspects of applying AI to project management. AI application in a strategic, organisational or interpersonal context was analysed far less frequently.

In answering the second question, the authors of the scientific publications analysed point to the following as challenges and threats to AI implementation: lack of high-quality data (30 publications), lack of trust in the algorithms (28), high implementation costs (21), organisational resistance and cultural barriers (20), as well as insufficient competences of project teams (19). Exactly nine publications raised issues related to the lack of clear regulations and the difficulty of prescribing responsibility for decisions made by AI.

Only eight publications (6.8%) directly addressed the organisational implications of AI implementations or the competence requirements for the project manager, which could be a starting point for further research.

Regarding the lack of a consistent consensus in the literature on the future development of AI application (the third research question), some authors predict that there will continue to be a move towards operational automation. Others point to AI potential for strategic decision support and risk management. What is lacking, however, is a deeper consideration of the transformation of project roles in an AI implementation environment.

Based on the analysis of 118 scientific publications, it can be concluded that the research hypothesis has been confirmed. The literature on AI in project management focuses mainly on the technical and functional aspects, with marginal consideration of the organisational implications and the issue of project manager competences. This is an important research gap that should be explored more extensively in future research.

4.2. Organisational and Competence Challenges for the Project Manager in the Context of AI Implementation

Despite the growing interest in AI in project management, most publications focus mainly on technological aspects, such as the accuracy of predictive models, the efficiency of algorithms or the improvement of operational processes. Only 8 of the 118 analyzed publications refer explicitly to implementing AI solutions' organizational consequences. Publications have pointed out that AI implementation necessitates a change in management structure,

transformation of processes and the need to adapt new working systems. These issues were addressed by Wachnik (2022), Vărzaru et al. (2022), Georgiev et al. (2024), Salimimoghadam et al. (2025), Rodríguez et al. (2025), Naz et al. (2022), Müller (2023), Miller (2020), Hashfi, Raharjo (2023), Engel, Ebel and van Giffen (2021), Aljaž (2024).

Even less attention has been paid to questions of project manager competences. Only seven publications (5.9%) mentioned the impact of artificial intelligence solutions on the competence requirements for project managers. This issue was raised by Fidegeirsson et al. (2021), Feliceltti et al. (2014), Senarath, Berntzen (2025), Bahi, Gharib, Gahi (2024), Aslan (2021), Khazaei et al. (2022) and Mancini, Mariani, Manfredi (2023). They mentioned the following aspects: the need to develop analytical skills, data interpretation, collaboration with intelligent systems and adaptation to new decision-making models.

This low percentage of papers referring to organisational aspects and competences of project managers confirms the research hypothesis adopted, according to which The academic literature on AI in project management focuses mainly on the technical aspects, marginalising issues related to the organisational implications and the required competences of project managers.

The results of the analysis are part of the observed trend that AI research still rarely enters into dialogue with the literature on management, organisation and competence development. The identified gap provides an important direction for future research, especially in terms of the need to build new competence models for project managers operating in digital environments.

4.3. Identified Research Gaps

Despite the growing interest in the topic of AI in project management, an analysis of the scientific literature has identified a number of significant research gaps that limit the understanding and practical implementation of AI solutions in this area. Firstly, there is a conspicuous lack of interdisciplinary research on AI application in project management. In contrast to the extensive studies on the impact of AI on finance, industry, the economy or the labour market, the area of project management remains relatively under-researched (Salimimoghadam et al., 2025; Fridgeirsson et al., 2021; Wachnik, 2022).

Another important gap is the insufficient exploration of the 'soft' aspects of project management, such as the management of communication, stakeholders or project teams. These areas, although crucial to project success, are rarely addressed in studies that focus mainly on technical issues such as cost prediction or process automation (Adamantiadou, Tsironis, 2025; Sarafanov, Valilai, Wicaksono, 2024).

Furthermore, as mentioned earlier in this chapter, there is a lack of research on the impact of AI on the roles and competences of the project manager and the project team. Few publications signal a potential deficit of AI-related knowledge and skills among project

managers, which may contribute to low organisational readiness to implement new technologies (Fridgeirsson et al., 2021; Wachnik, 2022).

The literature reviewed also identifies the following research gaps and challenges (Fridgeirsson et al., 2021; Middleton, 2024; Wachnik, 2022; Sarafanov, Valilai, Wicaksono, 2024):

- the need for empirical research into the long-term impact of AI on project management and process transformation,
- challenges related to the interpretability of AI-based decisions and the resulting organisational resistance,
- problems with data availability and consistency,
- limited level of creativity of current AI solutions, which makes it difficult to apply to complex, non-standard project situations.

These research gaps point to the need for interdisciplinary and applied research that integrates technological, organisational and competence perspectives. Complementing these can contribute to a fuller use of AI in projects and better prepare managers to manage digital transformation.

5. Conclusions

This paper presents a systematic literature review of AI application in project management between 2020 and 2025. An analysis of 118 selected publications identified the main areas of AI application, technology types as well as benefits of and barriers to AI implementation.

The analysis results indicate that the dominant AI applications in project management are forecasting, schedule optimisation and resource allocation, automation of routine tasks and decision support. The most commonly used technologies are machine learning (ML), deep learning (DL) and natural language processing (NLP).

In turn, the identified benefits of implementing AI include increased efficiency in planning processes, improved decision accuracy, reduced errors and predictability of project outcomes. However, the authors also point to a number of barriers and challenges, such as a lack of access to high quality data, a lack of confidence in AI models, high implementation costs and resistance from organisations.

One of the review's key findings is that the scientific literature mainly focuses on technical aspects. Only a small number of publications address the organisational implications of AI implementation, and even fewer address the changes in the competences required of project managers. This confirms the underlying research hypothesis and points to an important research gap.

Future research would do well to place more emphasis on the integration of organisational perspectives and project manager competences in analyses of AI applications in project management. It is also worth considering interdisciplinary research combining management, organisational psychology and computer science.

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