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Artificial Intelligence in Open Innovation and Project Management: A Systematic Literature Review of Technologies, Applications, and Future Research Directions

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ABSTRACT

Artificial Intelligence (AI) is transforming open innovation and project management by boosting knowledge discovery, collaborative innovation, intelligent decision-making and project execution. Even though research in these areas has been growing at a quick pace, literature is still scattered and does not present a comprehensive synthesis of AI technologies, applications and future research opportunities. This study aims to analyze the development of AI-based open innovation and project management research using a systematic literature review and bibliometric analysis of the published works from 2000 to 2026. Studies relevant to the research were gathered and analysed using PRISMA methodology, both bibliometric analysis and thematic analysis. The results show that there was a high level of scholarly interest, especially since 2018, due to the progress in the fields of machine learning, natural language processing, predictive analytics, and generative AI. The main areas of application are idea generation, knowledge management, crowdsourcing, project planning, risk assessment, resource optimization and decision support. The review highlights key research themes, trends, and gaps in the field of explainable AI, human–AI collaboration, governance, and sustainability. A conceptual framework and future research agenda are suggested to support the intelligent and sustainable innovation-project ecosystems.

1. Introduction

In today's digital age, Artificial Intelligence (AI) has become one of the most impactful technologies of the 21st century, reshaping the landscape of knowledge creation, management, and utilization across organizations to meet strategic goals. The recent progress in machine learning (ML), deep learning (DL), natural language processing (NLP), computer vision (CV), and generative artificial intelligence (GAI) has significantly facilitated the automation of intricate processes, optimization of

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decision-making, and advancement of innovation capabilities by organizations [1]. As big data becomes global, cloud computing grows in relevance and powerful analytics become increasingly sophisticated, the uptake of AI across industries has become a race. Big data is widely available, cloud computing plays a more and more important role, and sophisticated analytics are ever more powerful, which means AI is a key piece of organizational competitiveness and digital transformation.

Concurrently, business organisations are working in highly dynamic and interconnected business environments, where innovation cannot be developed just by R&D efforts. This trend has helped bring into being a model that encourages the free transfer of knowledge in and out of the company, namely Open Innovation (OI) [2] that proposes that a company should actively seek out new ideas from outside its own boundaries in order to enhance internal innovation and increase their potential for external commercialization. Open innovation places a strong focus on collaboration between organisations, universities, research institutes, suppliers, customers, start-ups and others, and on organisations sharing their technology and knowledge with others. Open Innovation is one of the most important concepts in innovation management as pointed out by Huizingh [3] and digital technologies have been developed to enable collaboration, knowledge sharing and value co-creation both within and between organisations.

At the same time, project management has drastically changed with the rapid technology evolution and increased project complexity. The traditional project management method was mainly to plan, schedule, monitor and manage the project activities. However, with the advent of digital technologies, the framework of project management has evolved to become data-driven and intelligent, with the ability to support prediction, real-time monitoring, and decision making based on evidence [4]. This is why it is increasingly common to hear about the use of digital platforms and AI-powered tools to optimise project efficiency, minimise uncertainty and enhance overall project performance.

The advent of Industry 4.0 has continued the trend of project management, AI, and open innovation merging. Industry 4.0 is the cyber-physical system, Internet of Things (IoT), cloud computing, big data analytics and intelligent automation in industrial and organizational environments [5]. In this context, AI is a fundamental enabling technology that turns raw data into useful knowledge, helps with collaboration and innovation processes, and optimizes the management of projects. AI's convergence with Industry 4.0 technologies has given rise to smart ecosystems that offer organizations an opportunity to learn, innovate, and adapt to the fast-changing environment.

1.1 Background

Artificial Intelligence (AI) has evolved from simple rule-based expert systems to advanced machine learning, deep learning, and generative AI technologies capable of autonomous learning, reasoning, and decision-making. Russell and Norvig [1] claim that contemporary AI systems can handle large volumes of structured and unstructured data, discover hidden patterns, and deliver actionable insights that assist organizations in making decisions. As a consequence, AI is now an integral part of today's businesses, helping with various aspects such as strategic planning, customer relationship management, product development, innovation management, and project execution. The recent progress in generative artificial intelligence (AI) technologies, like large language models and AI-driven content generation systems, extends organizational capabilities, allowing for automated knowledge generation, intelligent problem-solving, and improved decision support capabilities in complex business settings [6].

Digital technologies have also been rapidly developed, and thus the use of Open Innovation (OI) has become a new paradigm for innovation, different from the old one. Open innovation, defined by

Chesbrough [2] as the intentional transfer and receipt of knowledge in order to speed up internal innovation and increase external commercialization, is a strategy for innovation that has emerged in the last two decades. Open innovation is different from traditional closed innovation approaches by bringing in other parties such as universities, research institutions, suppliers, customers, startups, and innovation communities. These partnerships can help companies gain access to complementary knowledge, lower R&D expenses, speed up innovation cycles, and enhance innovation results. Huizingh [3] stressed that open innovation has become one of the most important concepts in innovation management and it is a way to share knowledge, strengthen collaborative network and make organizations more adaptive in the dynamically changing and competitive world.

Business operations and innovative activities have become increasingly complex, which has also contributed to the digitalization of project management practices. While traditional project management processes were largely about planning, scheduling and tracking activities, today smart devices and data-driven management processes are taking the place of the outdated methodology. Through digital transformation, project managers can leverage cutting-edge technologies like cloud computing, predictive analytics, artificial intelligence, and real-time monitoring systems as integrated solutions for managing projects. The technologies that benefit the project by making it more visible; improve communication among the project stakeholders; help you make decisions proactively; and help you to manage your project more efficiently while mitigating project risks. As a result, organizations are getting more agile and responsive to handle complex projects in uncertain business environments.

The combination of these has been further driven by the introduction of Industry 4.0, a new industrial paradigm that integrates cyber-physical systems, Internet of Things (IoT), cloud computing, big data analytics and intelligent automation technologies. In the context of Industry 4.0, AI is the key enabling technology that allows vast amounts of industrial data to be converted into useful information for decision making and process optimization. Frank *et al.* [5] claimed that AI can be integrated in the industry 4.0 technologies, thus enabling predictive maintenance, intelligent manufacturing, smart logistics, autonomous operation, and at the same time improving innovation management and project implementation. As a result, companies are increasingly investing in the use of AI-driven Industry 4.0 ecosystems to maximize collaboration, optimize resource utilization, speed up the innovation processes, and enable sustainable competitive advantages in the digital economy.

1.2 Importance of AI in Open Innovation

AI is a crucial facilitator of open innovation that enables the sharing of knowledge, the generation of ideas, crowdsourcing and the creation of innovation ecosystems. AI-enabled knowledge management systems enable the identification, collection, and sharing of valuable knowledge, which can be utilized to enhance collaborative innovation activities [6]. Furthermore, generative AI technologies have the ability to process vast amounts of data and create new ideas, which facilitates the development of creativity and innovation. AI also plays an important part in crowdsourcing efforts, gathering, assessing, and prioritizing concepts from a variety of sources such as communities of customers, researchers, and innovators. By using intelligent algorithms, organizations are able to find opportunities that could be worthwhile and speed up their innovation processes. Moreover, AI helps to build innovation ecosystems by enabling the network dynamics of innovation and improving the ability to foster continuous knowledge flows and link stakeholders together for collaboration.

1.3 Importance of AI in Project Management

AI's impact on project management has been profound, enhancing project planning, scheduling, resource management, risk identification, and decision-making. The AI scheduling systems analyse

the historical data of projects and optimize project schedules to increase efficiency and reduce delay times [7]. Likewise, machine learning algorithms help efficiently allocate resources by predicting the use of these resources and what may be a bottleneck point. Project managers can utilize AI-driven predictive analytics tools to foresee potential risks early in a project, thereby allowing them to take proactive measures to address potential risk before it becomes an issue [8]. Furthermore, intelligent decision-support systems give immediate suggestions based on the project data, aiding the managers to make informed decisions and enhance project results. The fact that digital project management practices are growing in widespread use among organizations makes AI an essential tool for boosting project success and organizational performance.

1.4 Existing Research Problems

The current research mainly focuses on AI applications in the field of innovation management, AI-integrated project management practices, open innovation ecosystems and treats them as separate fields [9]. This means that there is not a lot of knowledge about the interrelationships between these three fields. Moreover, despite the rapid development of generative AI technologies like LLM, their application in supporting open innovation and project management processes is still under-researched. Existing research also fails to provide in-depth strategic frameworks that outline how AI can support knowledge sharing, collaborative innovation, project delivery and organizational performance improvement at the same time. The limitations described emphasize the need for a systematic and integrated review which incorporates existing knowledge, streamlines and identifies trends, and outlines future research directions. Hence, this study aims to carry out a systematic literature review and bibliometric analysis of the research literature from 2000 to 2026 regarding the AI application in the field of open innovation and project management. The study is aimed at identifying main research themes, technological advances, application areas and research gaps, and proposes a conceptual framework for future research in this fast-changing field.

The rest of this paper is organized as follows: The literature review is provided in Section 2, which contains important studies, gaps in the literature, and research questions. Section 3 outlines the research methodology used, which involved conducting a systematic literature review with selection of literature. Section 4 summarizes the selected studies by conducting a bibliometric analysis. The chapter on practical applications of artificial intelligence in open innovation and project management (Section 5) further explains the application of artificial intelligence in these areas. Thematic Analysis is presented in Section 6. Section 7 identifies the research gaps and discusses them in detail. Finally, Section 8 summarizes the findings of the study and provides suggestions for future research.

2. Literature Review

2.1 Artificial Intelligence

Artificial Intelligence (AI) is the ability of a computer system to do something that normally requires human intelligence such as learning, reasoning, perception, problem-solving, and decision-making. In the last 20 years, AI has grown from a rule-based system to a highly intelligent data-driven system that can process huge amounts of information and make intelligent decisions. The use of AI has been gaining momentum across various industries, fueled by the emergence of massive amounts of data, cloud computing systems, and powerful computers. AI technologies are currently having a significant influence on the efficiency, innovation processes, customer experience and strategic decision making of organizations. AI has, therefore, emerged as a key enabler of digital transformation, open innovation, and project management. In recent times, AI has brought a plethora of technologies which enable innovation generation, knowledge management, collaboration and project execution. As stated in Table 1, with the advent of Machine Learning (ML),

Deep Learning (DL), Reinforcement Learning (RL), Computer Vision (CV), and Natural Language Processing (NLP), organizations have been able to analyse complex data sets and automate decision making processes to a great extent.

Table 1
Summary of Key Studies on Artificial Intelligence Technologies

Author(s)	Description	Key Findings	Limitation
Uriarte *et al.* [10]	Hybrid literature review of 345 AI and entrepreneurship studies using ADO and TCM frameworks.	AI enhances entrepreneurial opportunities, decision-making, and innovation; research is rapidly growing but fragmented.	Focuses only on entrepreneurship; limited discussion of Open Innovation, Project Management, and Generative AI.
Liu *et al.* [11]	Examined the impact of AI technology on corporate green innovation using Chinese listed companies.	AI significantly improves green innovation capacity through R&D investment and skilled labor.	Focuses on green innovation in China; limited discussion of Open Innovation and Project Management.
Nepal *et al.* [12]	Investigated the impact of AI technology innovation on energy resilience in China.	AI innovation enhances energy resilience, with green finance acting as a key mediator.	Focuses on China's energy sector; limited relevance to Open Innovation and Project Management.
Hirsch-Kreinsen [13]	Examined the historical evolution of AI as a "promising technology" from a social science perspective.	AI development is driven by technological expectations and societal needs, not only technological advances.	Focuses on Germany and conceptual analysis; lacks empirical evidence and practical AI applications.
Mukhamediev *et al.* [14]	Reviewed AI and Machine Learning technologies, their classification, applications, opportunities, and challenges.	AI and ML offer significant industrial potential but face organizational, technological, and societal challenges.	Focuses on AI/ML classification; limited discussion of Open Innovation, Project Management, and Generative AI.

2.2 Open Innovation

Open Innovation (OI) is now one of the most prevalent innovation management philosophies that focuses on the strategic sharing of intellectual knowledge and resources across organizational boundaries to speed up innovation and improve competitive advantage. This was first proposed by Chesbrough [15] that organizations will no longer be able to use their own research and development work to build their products, but must seek out their external partners to gain the access to complementary knowledge, technologies and capabilities. By adopting an open innovation approach, organisations can benefit from a wide variety of knowledge sources which can help to lower innovation costs, cut product development time and enhance the chances of commercialisation. With the rise of technological complexity and uncertainty in the markets, organizations are more and more turning to open innovation to boost their innovation capability and performance of their organizations [16].

The open innovation (OI) model typically involves the following three types of innovation: Inbound, Outbound and Coupled. Inbound innovation is about the process of acquiring external knowledge and technologies for internal innovation processes while outbound innovation is about the external commercialization of an internally developed knowledge and IP. Coupled innovation involves the integration of both inbound and outbound methods in a partnership between two or more companies and shared innovation efforts [17]. Open innovation requires the engagement of various actors, such as companies, universities, startups, government bodies and local communities.

Their collective role in creating knowledge, technology transfer, sharing resources, and developing ecosystems, enables sustainable innovation and long-term economic growth [18]. As shown in Table 2, open innovation is a key tool to improve the collaboration, knowledge exchange and value co-creation of AI in the digital economy.

Table 2
Summary of Key Studies on Artificial Intelligence based Open Innovation

Author(s)	Description	Key Findings	Limitation
Barile *et al.* [19]	Investigated an AI-based innovation ecosystem using the Lutech Campus case study.	AI enhances open innovation, knowledge sharing, collaboration, and sustainable innovation through AI-driven ecosystems.	Single case study; limited generalizability and lacks large-scale empirical validation.
Duong [20]	Examined the relationship between AI innovation, open innovation, and entrepreneurial performance in Vietnamese high-tech ventures.	AI innovation improves inbound and outbound open innovation, enhancing entrepreneurial performance through innovation niches.	Focuses on high-tech ventures in Vietnam; limited generalizability to other industries and project management contexts.
Johri *et al.* [21]	Examined the effects of open innovation on e-commerce performance with AI and AIS as moderators.	Open innovation significantly improves e-commerce performance, while AI and AIS strengthen this relationship.	Focuses on e-commerce; limited applicability to project management and broader innovation ecosystems.
Holgersson *et al.* [22]	Proposed a framework explaining the role of AI in Open Innovation.	AI enhances outside-in and inside-out open innovation, improving collaboration and innovation efficiency.	Conceptual study; lacks empirical validation and project management applications.
Sahoo *et al.* [23]	Examined the relationship between AI capabilities, open innovation, and business performance in multinational B2B firms.	AI capabilities enhance open innovation and improve business performance; environmental dynamism moderates outbound open innovation.	Focuses on B2B multinational firms; limited applicability to project management and SMEs.
Kuzior *et al.* [24]	Bibliometric study on AI applications in open innovation and innovation management.	AI promotes open innovation, collaboration, business model innovation, and knowledge sharing.	Bibliometric and conceptual study; lacks empirical validation and project management perspective.

2.3 Project Management

Project management is a systematic way of organizing and managing a project in order to meet a set of goals. Long-standing project management practices have been based on the sequential Waterfall and the widely accepted (PMBOK). Waterfall approach is a sequential process of the project phases, such as requirement analysis, design, implementation, testing, and deployment, and is best suited for the project having a clear requirement. Likewise, PMIBOK offers an extensive structure of knowledge areas, processes, tools, and best practices which help the project managers in managing project life cycles with an effective way. While conventional PM approaches provide structure and predictability, they can be challenging to apply to projects with rapidly changing requirements and high levels of project dynamics.

To overcome these, Agile Project Management (APM) methods like Scrum and Kanban are becoming more popular in different sectors. Agile methodologies are focused on flexibility, incremental development, engagement of stakeholders, and on-going improvements, which allow

the organizations to better adjust to the changing project needs [25, 26]. In recent years, the adoption of Artificial Intelligence (AI) has revolutionized project management, making it smarter and more data-driven. AI-powered project management systems are powered by predictive analytics, machine learning, and optimization algorithms, aiding in predictive planning, intelligent scheduling, risk identification, and decision support, as detailed in Table 3.

Table 3
Summary of Key Studies on Artificial Intelligence based Project Management

Author(s)	Description	Key Findings	Limitation
Vergara *et al.* [27]	Bibliometric analysis of AI applications in project management over the last decade.	AI improves decision-making, resource optimization, and project efficiency; Generative AI is an emerging trend.	Bibliometric study; lacks empirical validation and integration with Open Innovation.
Salimimoghadam *et al.* [28]	Systematic literature review of AI adoption in project management using the PRISMA framework.	AI improves forecasting, risk management, resource optimization, and stakeholder collaboration while identifying adoption barriers.	Review study; lacks empirical validation and integration with Open Innovation.
Shamim *et al.* [29]	Systematic review of AI techniques for project cost estimation.	Deep learning and hybrid models provide the highest accuracy for cost estimation and resource optimization.	Focuses only on cost estimation; limited coverage of Open Innovation and broader project management functions.
Mannava *et al.* [30]	Examined AI-enhanced project management, big data, and sustainability in financial processes.	AI improves decision-making, resource allocation, risk assessment, and supports sustainable financial management.	Focuses on financial processes; limited discussion of Open Innovation and empirical validation.
Almalki [31]	Proposed an AI-driven decision support system for Agile software project management.	AI improves risk prediction, resource allocation, and project efficiency in Agile environments.	Focuses on Agile software projects; limited applicability to general project management and open innovation.

2.1 Research gap

There are research papers published separately on the fields of AI, OI, and Project Management, but there is no research that has a comprehensive review that touches the three fields. In addition, there is very little research available regarding the use of Generative AI, human-AI interaction, and there is limited research that explains AI-enabled innovation ecosystems and intelligent project management practices.

2.2 Novelty of the Study

This study is one of the first to combine in a systematic way Artificial Intelligence, Open Innovation and Project Management in a single framework. It integrates bibliometric analysis and thematic analysis from 2000 to 2026, covers the developments in Generative AI, highlights emerging trends in research, and offers an overall future research agenda.

2.3 Research Question

The following research questions are raised to answer the identified gaps in research:

RQ1: What are the key technologies of AI that are being applied in Open Innovation and Project Management?

RQ2: What are the major research areas and emerging trends in the AI–Open Innovation–Project Management body of knowledge?

RQ3: What are the possible applications of using Artificial Intelligence in innovation management and project management?

RQ4: What were the gaps in the existing research or challenges to be addressed?

RQ5: How can future ecosystems of innovation with AI be designed to improve the organizational performance, sustainability, and competitive advantage?

2.6 Objectives of the Study

Based on the identified research gaps and research questions, the following objectives are set for this study:

O1: Perform a thorough systematic literature review on Artificial Intelligence applications on Open Innovation and Project Management.

O2: Carry out bibliometric analysis of the publications of the period 2000-2026 and conclude on the publication trends, the most influential authors, the most prominent institutions and the most active collaboration networks.

O3: Identify and classify the major AI technologies namely Machine Learning, Deep Learning, Reinforcement Learning, Natural Language Processing, Large Language Models and Generative AI.

O4: To explore practical uses of AI for knowledge sharing, idea generation, crowdsourcing, project planning and scheduling, resource planning and allocation, risk management, and decision making.

O5: To recognise key themes of research, new trends and key research gaps in the literature.

O6: To create an integrated conceptual framework that explains the relationships between Artificial Intelligence, Open Innovation and Project Management.

O7: To suggest a future research agenda to support the development of innovative ecosystems that are intelligent, sustainable and collaborative.

3. Methodology

The purpose of this study is to thoroughly examine the development, application, and future research trends of the intersection of Artificial Intelligence (AI) and Open Innovation (OI) in Project Management (PM) using a Systematic Literature Review (SLR) methodology with bibliometric analysis. The review methodology is based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines, to provide transparency, reproducibility and methodological rigor in the literature selection process. The PRISMA framework is made up of four stages (Identification, Screening, Eligibility and Inclusion) that allow a systematic process of selecting publications of good quality relevant to the research goals.

Literature data was retrieved from internationally reputed scientific database mainly Scopus. It is because of their broad scope of peer-reviewed journals, conference proceedings, and multidisciplinary publications on AI, innovation management, and project management that the Scopus database was chosen. The search covered the period from 2000 to 2026, reflecting the profound changes in AI technologies from the classic machine learning methods to the latest advancements in Generative AI and Large Language Models (LLMs).

A search strategy was developed to search extensively for the three research domains, with the aid of the Boolean operators and relevant keywords. To find the relevant literature, a comprehensive search strategy was created with the use of Boolean operators and relevant keywords for Artificial Intelligence (AI), Open Innovation (OI) and Project Management (PM). AI Technologies Terms used in the search included: Artificial Intelligence, AI, Machine Learning, Machine Learning AI, Deep Learning, Deep Learning AI, Reinforcement Learning, Reinforcement Learning AI, Computer Vision, Computer

Vision AI, Natural Language Processing (NLP), Natural Language Processing AI, Large Language Models (LLMs), Large Language Models AI, Generative AI, Generative AI AI, ChatGPT, ChatGPT AI, GPT, GPT AI, Claude, Claude AI, and Gemini, Gemini AI. The following keywords were used to capture the open innovation domain: Open Innovation, Innovation Ecosystem, Knowledge Sharing, Crowdsourcing, Collaborative Innovation, Inbound Innovation, Outbound Innovation, Coupled Innovation, and Business Model Innovation. The search for the project management domain covered "Project Management," "Project Planning," "Project Scheduling," "Project Monitoring," "Project Control," "Project Risk Management," "Resource Allocation," "Decision Support," "Agile Project Management," "Scrum" and "Kanban".

These keywords have been used with AND and OR operators to find relevant publications in the Scopus database. For the systematic literature review, only publications, written in the English language, published from 2000 to 2026 were included. Only peer-reviewed papers from journals, review papers, conference papers, and book chapters written in English have been taken into account. The final analysis excluded editorials, notes, non-English publications, duplicate records, documents that were not accessible, and studies that were not relevant to AI, Open Innovation or Project Management.

The process of study selection was conducted according to PRISMA 2020. All publications retrieved from the selected databases were first merged and then any duplicate publications were eliminated. The other studies were then screened for relevance to the research scope by using their title, abstract and keywords. Then, 64 full text articles were evaluated based on a set of inclusion/exclusion criteria. Studies that made important theoretical, methodological or practical contributions to AI, Open Innovation or Project Management were kept for the final review. The entire selection process is described in Figure 1 (PRISMA 2020 Flow Diagram).

Selected publications were analysed based on the data collected, through two approaches: bibliometric and thematic. The trends in annual publications, the structures of citations, the most influential authors, the most important journals, the institutional networks of collaboration, the country networks of collaboration, the most frequent co-occurrence of keywords, co-citation networks and thematic evolution were determined through bibliometric analysis using the VOSviewer software. Next, a thematic analysis was conducted to categorize literature into the various major AI technologies, Open Innovation practices, Project Management applications, research themes, practical applications, emerging technologies, and future research paths. By combining both bibliometric and thematic analysis, the study offers a comprehensive overview of the state of the art of the field and contributes to the creation of a holistic conceptual framework for the Open Innovation and intelligent Project Management ecosystem with the support of AI.

4. Bibliometric Analysis

Bibliometric analysis is a quantitative research method to assess the development, structure and trends of a scientific research field [32-34]. It offers a detailed analysis of publication trends, citation impact, key authors, top journals, research institutions and country-level contributions. The bibliometric analysis is different from conventional literature reviews because it can be used to objectively determine the intellectual structure, research hotspots, collaboration networks and emerging themes of a research field.

4.1 Annual Publication, Citation Trends

It is important to study trends in publications over the years to gain insight into the development, maturity and level of research activity of a scientific discipline. It aids in the identification of time periods of fast growth, of budding research interests, and of the overall development of the discipline

with time. The evolution of the number of publications in the field of Artificial Intelligence (AI) in Open Innovation and Project Management between 2000 and June 2026 is shown in Figure 2. The results suggest a gradual rise in research output during the study period, indicating increasing research interests within this interdisciplinary area from academic and industrial institutes. The number of publications was generally low in the period 2000–2012, before picking up slightly in 2013–2019. This grew significantly in 2020 and rose sharply to 81 publications in 2025, which was the highest number of publications for any one year. As of June 2026, 57 publications had already been identified, reflecting the swift growth of this field of research and its growing significance for future innovations and project management research.

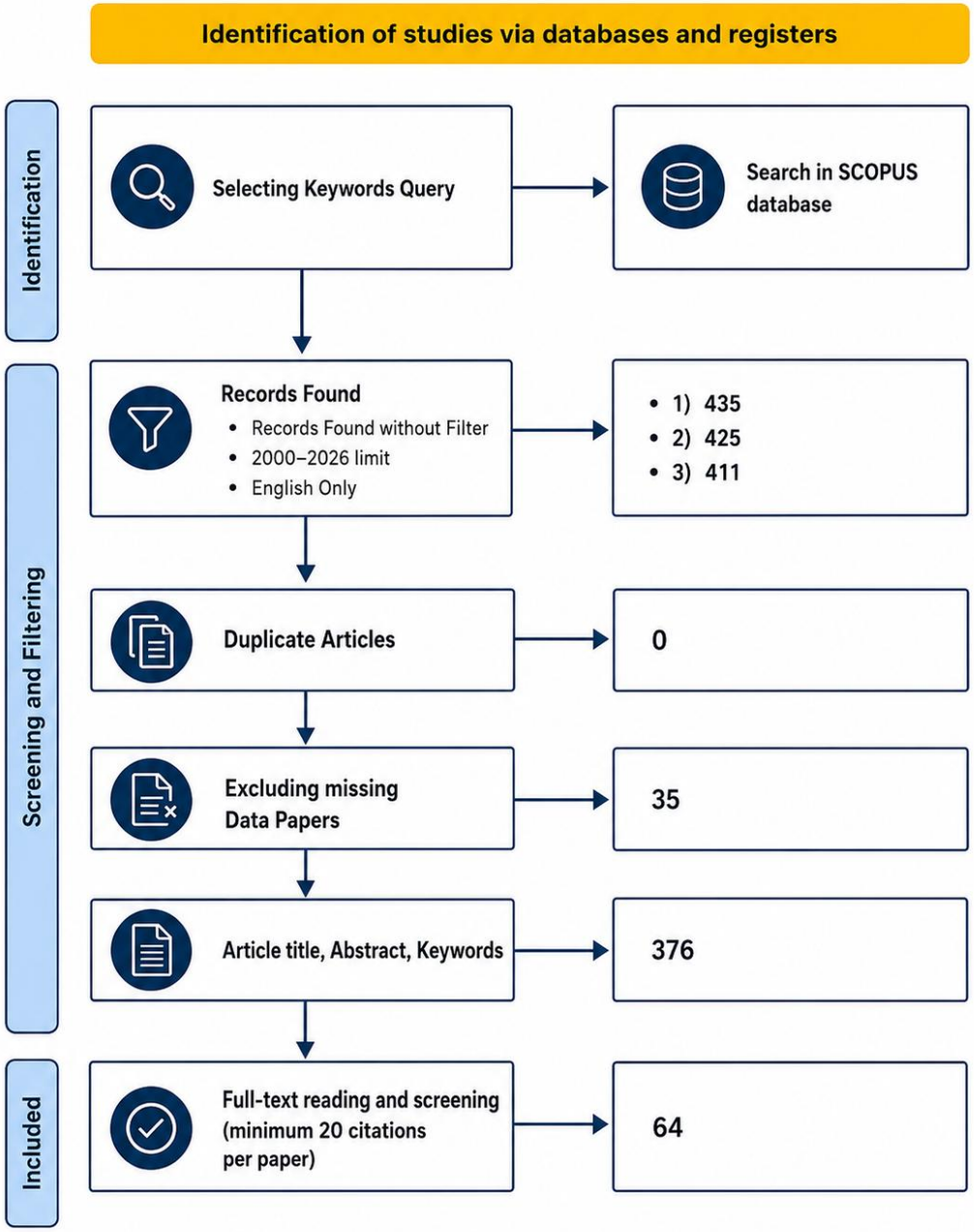


Fig. 1. PRISMA 2020 flow diagram illustrating the systematic literature review process

Citation trend analysis is vital for understanding the scientific impact, influence and recognition of research over time, and can be used to identify highly influential periods and the maturity of a

research field [35]. Figure 3 shows the citation trend of research related to Open Innovation and Project Management with Artificial Intelligence (AI) based on the literature from the year 2000 until June 2026. The number of citations has varied somewhat in early years, particularly during 2000 (234 citations) and 2005 (171 citations), when there were potentially significant publications of the foundations of the field. The impact of the citations was significantly higher after 2013, which counted 435 citations, and the citations were high in the following years. AI research appears to be gaining greater influence the more recent the year, with the greatest number of citations being achieved in 2021 (498 citations) and then 2024 (485 citations). There are citations up to June 2026 in 2026 (data only through June 2026), but citations will likely rise as more recently released studies gain scholarly notice as time passes.

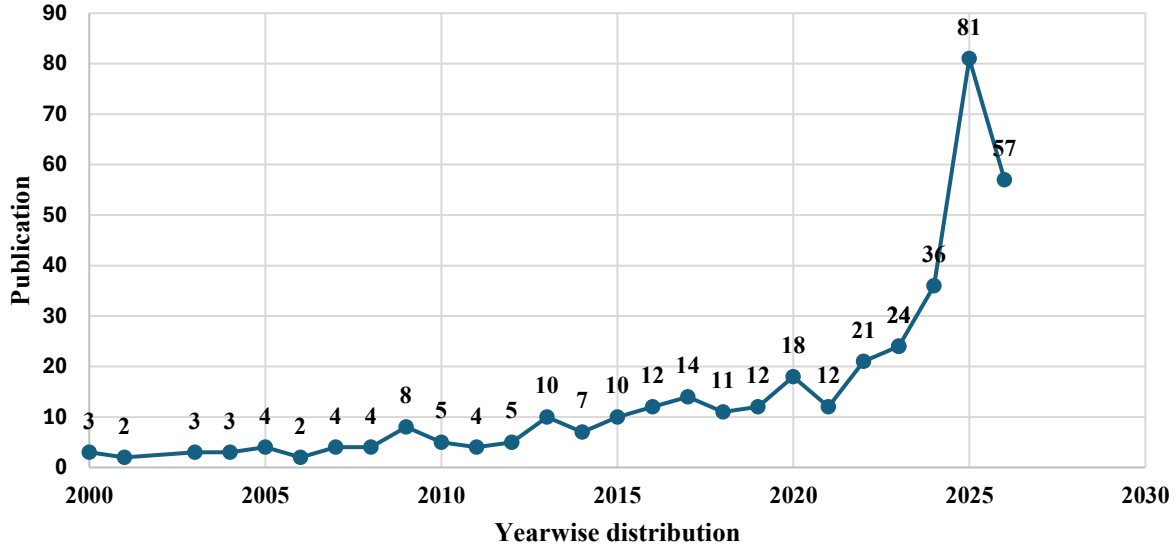
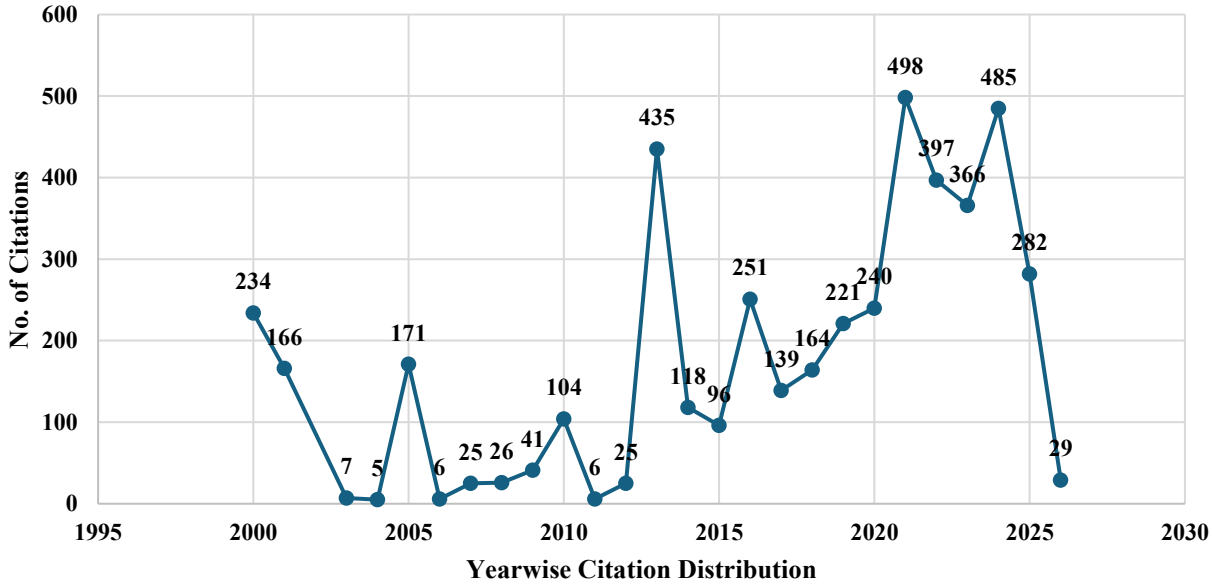


Fig. 2. Annual scientific publication trend



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4.2 Most Productive Sources

Productive sources' analysis reveals the journals and conference proceedings that are most important to a research field, and the density visualization of VOSviewer identifies the most influential sources of publications based on the number of publications and the strength of their relationships [36]. High density (yellow): high research activity and strong community ties. Moderate (green): moderate research activity and moderate community ties. Lower (blue): low research activity and weak community ties.

Figure 4 shows the density visualization of sources of publications in the field of Artificial Intelligence (AI), Open Innovation and Project Management, using VOSviewer. According to the Scopus database, Lecture Notes in Computer Science (Lecture Notes in Artificial Intelligence, Lecture Notes in Bioinformatics) was the top one with 16 publications and 83 citations and thus the densest hotspot in the visualization. The subsequent series in the LNARS series were Lecture Notes in Networks and Systems with 9 publications and Decision Support Systems with 6 publications and 80 citations. The two journals with the highest numbers of citations were Expert Systems with Applications (325 citations) and the Journal of Biomedical Informatics (5 publications, 204 citations), which indicate their high scientific relevance. Other publications that have produced useful articles are Communications in Computer and Information Science (5 publications), Lecture Notes in Business Information Processing (5), Studies in Health Technology and Informatics (5), Advances in Intelligent Systems and Computing (4), and the IEEE Internet of Things Journal (4). Therefore, one can conclude that the density map corroborates that computer science conference proceedings and high impact interdisciplinary journals are the main sources for the research into AI-enabled Open Innovation and Project Management.

4.3 Leading Authors

The analysis of the leading authors will be used to find out who the most influential authors are to drive scientific advancement; and the VOSviewer density visualization will be used to analyze the productivity and collaboration strength of the authors [37]. The density visualization of leading authors in the areas of Artificial Intelligence (AI), Open Innovation and Project Management is presented in Figure 5. Aiman Erbad and Mohsen Guizani are the authors with the highest productivity, having authored 5 publications each with 61 citations, being the densest part of the network. Each have published 4 papers and received 53 citations (showing good research influence), Emna Baccour, Fatima Haouari, Amr Mohamed. Ivo Blohm and Ujwal Gadiraju had fewer publications (3 each) but more citations (111 and 105, respectively), suggesting a higher citation impact. Other authors with 2 publications each include Obinna Anya, Can Aydin, and Stefania Bandini. The overall density visualization shows that there is a focused group of influential authors who have contributed significantly to the field of AI-enabled Open Innovation and Project Management.

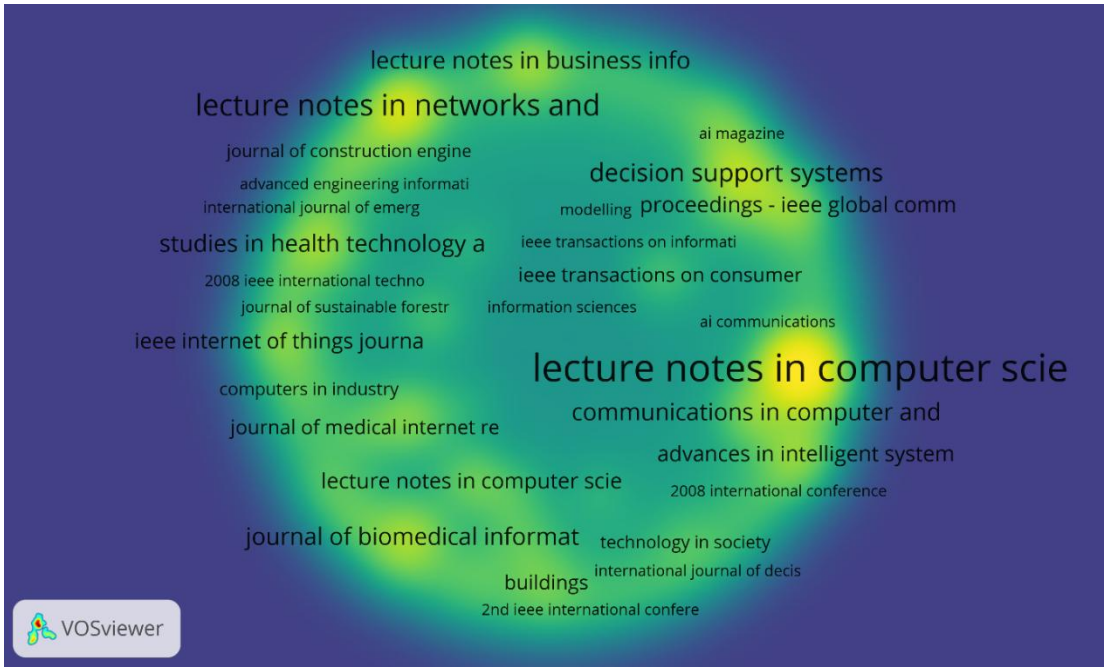

Fig. 4. Density visualization of most productive sources

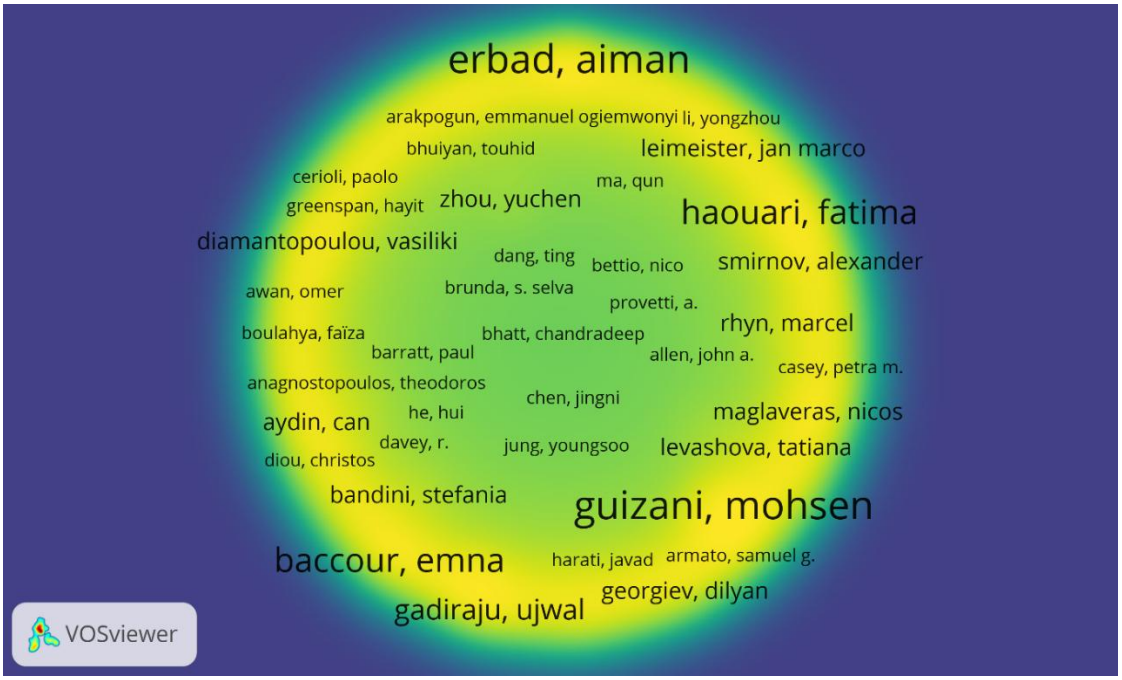

Fig. 5. Density visualization of Leading Authors

4.4 Top Institutions

Top institutions analysis indicates the top institutions that make the highest contributions to a research field, and the density visualization of institutions in VOSviewer indicates the institutional productivity and intensity of collaboration [38].

Figure 6 shows the density visualization of the leading Institutions in research on the field of Artificial Intelligence (AI) in Open Innovation and Project Management using VOSviewer. The Department of Industrial and Systems Engineering, The Hong Kong Polytechnic University, and the CSE Department, College of Engineering, Qatar University were the top two institutions having the highest number of documents published, 3 each, and the highest number of citations, 66 and 46,

respectively. A second interesting example is the research impact of Delft University of Technology, which got 2 publications with 96 and 72 citations in the entries at its four institutions. FIU published just 2 papers but had the highest number of citations (222), showing high influence of research. Other institutions of note that have published two or more items in the collection are Carleton University (2 publications, 5 citations) and the University of the Aegean (2 publications, 19 citations). The visualization of the density highlights that the institutional network for the advancement of AI related Open Innovation and Project Management research is in the center of internationally recognised universities and research centres.

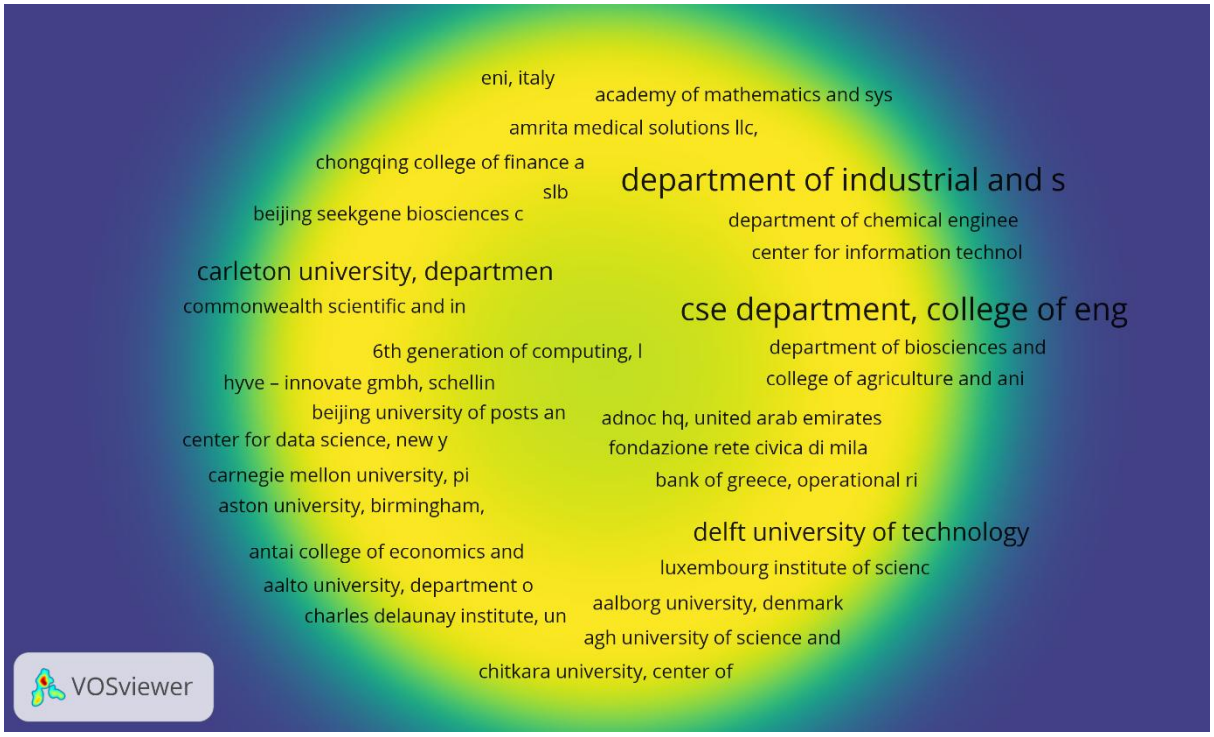

Fig. 6. Density visualization of Top Institutions

4.5 Top Country-wise Research Contribution

By analyzing country-wise research contribution, it is possible to understand who is the leading country of scientific productivity and collaboration, and by using VOSviewer density visualization, it is possible to understand the geographic distribution and density of research across countries [39].

The density visualization for country-wise research contributions in the field of Artificial Intelligence (AI), Open Innovation, and Project Management is shown in Figure 7 using VOSviewer. China led the world in publications with 77 documents, and the highest citation impact for the publications (based on the number of citations) was 1,450 citations, which is led by the United States with 681 citations for 73 publications, showing the United States' global research influence. India was at the third position with 42 publications and 183 citations, followed by the United Kingdom with 27 publications and 381 citations and Germany with 23 publications and 469 citations respectively. Other leading countries are Italy with 21 publications (168 citations), Australia with 17 publications (209 citations), Spain with 15 publications (225 citations), Canada with 14 publications (131 citations) and Greece with 13 publications (138 citations). The density visualization highlights the key global research hubs: the USA, China, India, Germany, and the UK, which are characterized by their large production, a high impact on citations, and international interactions in the development of research on AI-enabled Open Innovation and Project Management.

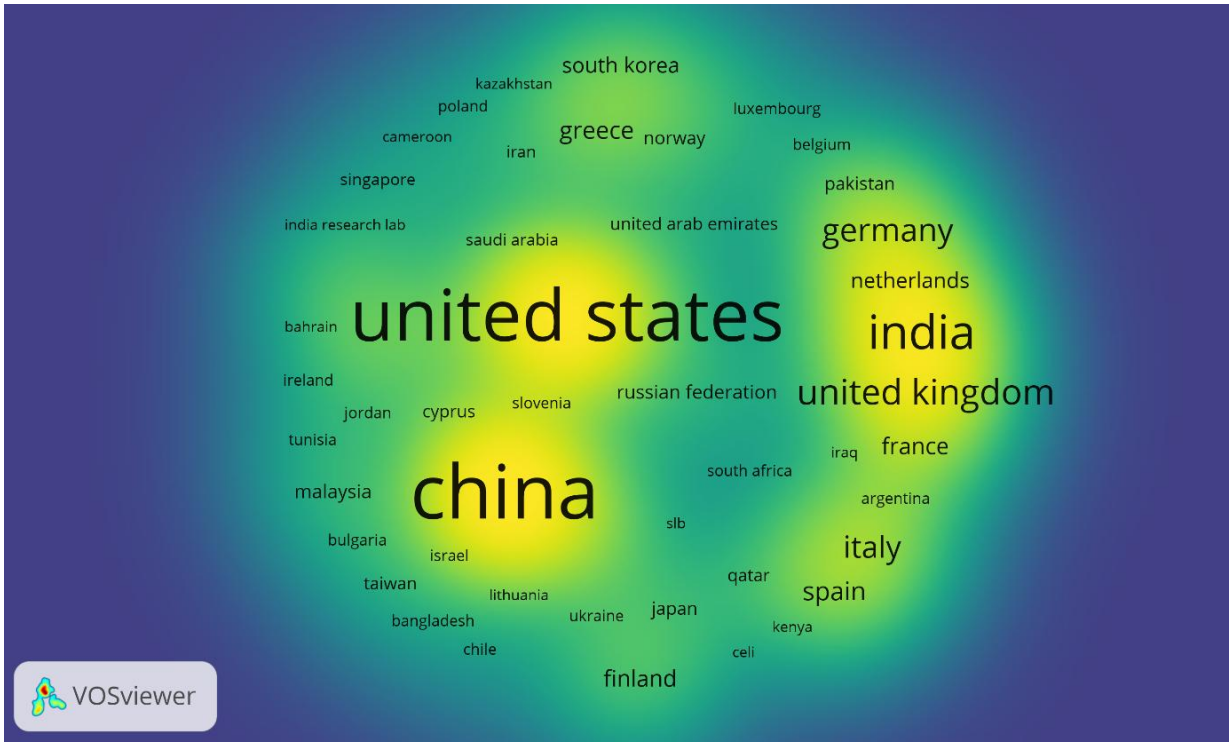

Fig. 7. Density visualization of Top Country-wise Research Contribution

5. Major Artificial Intelligence Technologies in Open Innovation and Project Management

The systematic review of 64 selected publications shows that Artificial Intelligence technologies have progressed from rule-based expert systems to high-level data-driven and generative AI that allows collaborative innovation and intelligent project management. The early studies (2000-2015) concentrated mostly on knowledge-based systems (KBS), expert systems, ontologies, case-based reasoning (CBR), fuzzy logic and decision support systems (DSS) as means of capturing organizational knowledge and assisting managerial decisions making. The technologies predominantly focused on structured knowledge representation, organization learning, and expert supported decision support.

For instance, Becerra-Fernandez [40] advocated the use of AI for People-Finder systems to enhance organizational expertise discovery and knowledge sharing. In a similar manner, Weber *et al.* [41] showed that intelligent lesson-learned systems can greatly enhance organizational learning using AI for knowledge retrieval, where the quality of knowledge repositories is a key factor for success. Okudan *et al.* [42] designed a case based reasoning approach to project risk management by facilitating the capture, retrieval, monitoring and response planning of project risks. Their results indicated significant enhancements in the project risk identification area and that historical case quality has a significant impact on the performance of prediction.

It is found that the literature post-2016 shows a shift towards Machine Learning (ML) and Deep Learning (DL). These technologies include predictive analytics, pattern recognition, forecasting, anomaly detection, and intelligent automation. According to Vergara *et al.* [27] the current most prevalent AI technologies in project management are machine learning, predictive analytics and data-driven optimization. Similarly, Shamim *et al.* [29] found that Artificial Neural Networks (ANNs), Deep Learning and Hybrid AI models outperform typical regression models for project cost estimation. Natural Language Processing (NLP) is one of the most rapidly developing AI technologies that are assisting in open innovation. NLP helps to realize automatic document analysis, patent mining, communication with stakeholders, knowledge extraction, idea clustering, sentiment analysis, and intelligent search. Sumbal *et al.* [43] have shown that ChatGPT combined with organizational

knowledge management can improve information retrieval, collaborative learning and decision support. Likewise, Gupta *et al.* [44] found that users' trust in AI-based decision-making systems can be significantly boosted by conversational AI interfaces.

Reinforcement Learning (RL) has been increasingly pursued in the fields of intelligent resource optimization and adaptive project scheduling. Dai *et al.* [45] showed that under highly dynamic conditions, asynchronously deep reinforcement learning is capable of greatly enhancing task offloading and resources allocation. Other recent studies [46] have cited the following emerging technologies across the fields of smart manufacturing, digital innovation ecosystems, healthcare, transportation and Industry 4.0 applications, among others: Graph Neural Networks (GNNs), Federated Learning, Blockchain-AI integration, Digital Twins, Computer Vision, and Explainable AI as discussed in Table 4. In general, the literature shows that a technological shift is underway from knowledge-driven AI to intelligent self-learning, predictive, collaborative and generative AI systems designed to enable innovation ecosystems and project management to change.

Table 4
Major AI Technologies in Open Innovation and Project Management

AI Technology	Major Applications	Representative Authors	Advantages	Limitations
Knowledge-Based Systems	Knowledge repositories, organizational learning	Becerra-Fernandez [40]; Weber *et al.* [41]	Structured knowledge reuse	Manual knowledge updating
Case-Based Reasoning	Risk management	Okudan *et al.* [42]	Learns from previous projects	Depends on historical cases
Generative AI	Idea generation	Sumbal *et al.* [43]	Creativity and automation	Ethical concerns
Machine Learning	Prediction, classification	Hadjiiski *et al.* [46]	High predictive accuracy	Requires large datasets
Deep Learning	Pattern recognition	Hadjiiski *et al.* [46]; Pokhrel [47]	Complex pattern discovery	Black-box models
Reinforcement Learning	Scheduling, optimization	Liang *et al.* [48]	Adaptive optimization	High computational cost
NLP	Knowledge extraction	Li *et al.* [49]	Text understanding	Language dependence
LLMs	Knowledge sharing	Patil & Gudivada [50]	Human-like interaction	Hallucination
Computer Vision	Monitoring	Mohy *et al.* [51]	Real-time inspection	Expensive implementation
Digital Twins	Project simulation	Aktürk *et al.* [52]	Real-time optimization	High infrastructure cost
Explainable AI	Trustworthy AI	Tun *et al.* [53]	Transparency	Lower predictive performance

6. Thematic Analysis

To determine the main axis of research, emerging topics and the conceptual organization in a scientific field, thematic analysis is of crucial importance [54]. Furthermore, VOSviewer density visualization can be used to facilitate this analysis by emphasizing the number and degree of association between keywords.

The keyword density visualization of the research on the intersection of Artificial Intelligence (AI) and Open Innovation and Project Management is shown in Figure 8. The "Artificial Intelligence" hotspot is the largest hotspot and the one with the highest density of keywords, meaning that it's the main research theme that is the cross-connector for various application fields. AI-driven Knowledge Management, intelligent decision-making, and digital transformation are closely

associated keywords, emphasizing the role of AI in managing knowledge and fostering innovation. The other themes like "Information Science", "Mining", "Meta Model", "Calibration", "Emergency Services", and "E-health" suggest that AI is being used in other areas, such as developing healthcare, engineering, and industrial systems. In general, the density map shows that AI research is shifting its focus to knowledge management, innovation, and intelligent digital technologies, with themes specifically focused on the application still emerging, indicating the evolving breadth of AI-enabled Open Innovation and Project Management.

Fig. 8. Density visualization of thematic analysis

7. Application of AI in in Open Innovation and Project Management

The literature reviewed reveals that Artificial Intelligence (AI) can assist with almost all phases of innovation and project management. AI technologies enable concept generation, information management, knowledge sharing, co-innovation, project planning and scheduling, risk prediction, resource utilization, intelligent decision-making, and sustainability-focused innovation. The key areas of AI applications identified as follow:

7.1 AI for Idea Generation

Artificial Intelligence (AI) has emerged as a key idea-generating aid, helping organizations develop revolutionary product concepts, business models, research ideas, and strategic solutions. Recent progress in Generative AI, Large Language Models (LLMs) and Natural Language Processing (NLP) has enhanced brainstorming and creative problem solving with relevant and context-aware suggestions. The contribution of AI to open innovation and knowledge creation has been pointed out. Holgersson *et al.* [22] showed how Generative AI enables ideation and collaboration among organizations and AI systems. Sumbal *et al.* [43] demonstrated that ChatGPT can facilitate brainstorming and organizational learning and Blohm *et al.* [54] illustrated how AI can aid in intelligent filtering and ranking of crowdsourced ideas for evaluation. The use of AI for idea generation is very common in product development, service design, business model innovation, startup incubation, research proposal writing, and digital transformation. It has a number of advantages: it allows for quicker brainstorming, greater creativity, less innovation time, and better collaboration. But AI suggestions

can be generic, need expert review, be subject to IP rights issues, and sometimes generate inaccurate or hallucinatory results [55]. Thus, human judgment and refinement are still vital in assessing and refining AI-generated concepts.

7.2 AI for Knowledge Management

Artificial Intelligence (AI) is a valuable asset in knowledge management because it can be used to capture, organise, retrieve and share explicit and tacit knowledge within an organisation. AI technologies like machine learning, natural language processing, and Generative AI enhance organizational learning by providing quick and easy access to relevant information and effective knowledge sharing. The advantages of AI in knowledge management have been proven by several researchers. Becerra-Fernandez [40] presented AI-supported expert recommendation (People-Finder) systems and Weber *et al.* [41] presented intelligent lessons-learned systems for recommending suitable past experiences during project execution. Sumbal *et al.* [43] implemented a conversational knowledge retrieval system using ChatGPT and enterprise knowledge management systems, demonstrating that AI tools can facilitate the retrieval of knowledge through conversation, thereby boosting employee productivity and organizational innovation. Malik *et al.* [56] illustrated that AI-based knowledge sharing promotes employee productivity and organizational innovations. AI is utilized in knowledge discovery, knowledge repositories, patent mining, technology scouting, semantic search, expert recommendation, organizational memory, and lessons learned systems. The benefits of using it is that it will be easy to get knowledge faster, improve organizational learning and collaboration. However, there are issues like poor data quality, privacy concerns and capturing tacit knowledge which is still significant limitation.

7.3 AI for Crowdsourcing and Open Innovation

Artificial Intelligence (AI) has revolutionized open innovation by allowing companies to manage external knowledge, assess ideas, and facilitate customer-supplier-startup-university-research partnership collaboration. By using AI-driven platforms to filter, cluster, and rank vast sets of ideas, crowdsourcing becomes more streamlined and effective, speeding up the process of generating innovation. There are a number of studies that have identified the increasing importance of AI in collaborative innovation. Blohm *et al.* [54] demonstrated how AI can enhance the evaluation of crowdsourced ideas and Holgersson *et al.* [22] highlighted the transformative impact of Generative AI on inbound and outbound open innovation by intelligent collaboration. AI has been found to positively influence open innovation practices and business outcomes by Kuzior *et al.* [24] and AI-driven innovation ecosystems have been shown to boost entrepreneurial growth and knowledge sharing, along with collaborative decision-making, by Barile *et al.* [19]. AI is broadly used in intelligent crowdsourcing platforms, innovation contests, partner recommendation, customer co-creation, innovation ecosystem management and startup ecosystem development. It offers a number of key benefits: collaborative innovation is quicker, idea evaluation is improved, stakeholders are engaged, innovation costs are reduced, and global innovation networks are supported. Some drawbacks, like the issues of intellectual property, data privacy, bias in AI-driven assessments, lack of transparency in algorithms, and platform activation are noteworthy limitations.

7.4 AI for Project Planning

With the help of AI, project planning has become a more powerful technology for increasing project efficiency, accuracy, and performance in scheduling, resource allocation, cost forecasting, prediction of delays, and other areas, because of its ability to leverage data-driven decisionmaking. The use of AI tools like machine learning, predictive analytics, and optimization algorithms helps to

create more precise and effective project plans. AI has been proven to work in project planning through several studies. Vergara *et al.* [27] pointed out that predictive analytics, machine learning and decision support systems are the prominent AI technologies for activity planning. Shamim *et al.* [29] demonstrated that the Artificial Neural Networks and Deep Learning are more precise in cost estimation than the traditional approach. Almalki [31] presented an AI-driven model for agile sprint planning and resource allocation and Salimimoghadam *et al.* [28] showed that AI enhances forecasting, schedule management, stakeholder communication and planning precision with historical and real-time project data. AI has been used broadly across various aspects of a project, including scheduling, resource allocation, budget forecasting, project monitoring, workload optimization, agile sprint planning and Digital Twin simulations. It offers the primary benefits of more accurate planning, quicker schedule optimization, improved use of resources, minimised project delays, and better forecasting. There are still several challenges to address, including availability of high-quality historical data, the difficulty of developing sophisticated models, marrying them with legacy systems, and the lack of interpretability of deep learning models.

7.5 AI for Risk Management

Artificial Intelligence (AI) has emerged as a valuable asset in project risk management, helping organizations to detect potential risks, forecast project failure and assist in decision-making. Historical and real-time data can be used to enhance risk prediction and monitoring with the help of Machine Learning, Deep Learning, Case-Based Reasoning, and Predictive Analytics. There are multiple studies that show how effective AI is with risk management. Okudan *et al.* presented a framework named Case Based Reasoning that leverages past project information for the identification and tracking of the risks [42]. Almalki presented an AI model for predicting risk with high prediction accuracy that enhances the performance of the Agile projects through proactive interventions [31]. Salimimoghadam *et al.* also found that AI also improves forecasting, stakeholder communication, safety monitoring, and project health [28]. AI is being utilized across a spectrum of applications, such as failure prediction, schedule and budget risk analysis, early warning systems, project health monitoring, risk management of safety conditions, quality assurance and predictive maintenance. It offers several significant benefits such as early risk identification, better decision making, minimization of project failure, improved safety management and ongoing monitoring. But there are several challenges to AI-driven risk management, including the need for quality data, low model explainability, high computational demands, and low generalizability between different industries.

7.6 AI for Decision Support

The integration of Machine Learning, optimization algorithms, fuzzy logic, and knowledge-based reasoning has greatly improved DSS with Artificial Intelligence (AI), bolstering strategic and operational decisions.Artificial Intelligence (AI) has transformed Decision Support Systems (DSS) by incorporating machine learning, optimization algorithms, fuzzy logic, and knowledge-based reasoning to aid in strategic and operational decision making. AI-powered DSS can analyze complex data, evaluate options, and enhance the accuracy and timeliness of decision-making. Note that there are a number of studies that emphasize how well AI tools work in decision support. Saen *et al.* [57] demonstrated the role of AI in enhancing sustainable supply chain decisions by predictive analytics and optimization. The role of Explainable AI in creating trustworthy clinical decision support systems was highlighted by Tun *et al.* [53] and the work of Almalki [31] on an AI-assisted DSS for resource allocation and project scheduling was presented. In recent studies, AI technologies have been combined with Multi-Criteria Decision Making (MCDM) techniques in the project portfolio selection,

supplier evaluation, technology selection, and investment analysis [58, 59]. AI is used extensively in tasks like decision support systems, strategic planning, project prioritization, portfolio management, supplier selection, and technology assessment. The main benefits are the speed and quality of decision making, multi-criteria analysis, minimisation of uncertainty and better strategic planning. There are some significant restrictions, though, including a lack of transparency or understanding of the decision-making process because it is a black box, requiring human oversight, and ethical issues with autonomous decisions.

7.7 Generative AI in Project Management

Project management is undergoing a revolution with the advent of Generative Artificial Intelligence (GenAI) and Large Language Models (LLMs) which are automating documentation, communication, reporting and decision support. Generative AI differs from traditional AI since it can generate project reports, meeting summaries and proposals, technical documents, etc. – this frees up project managers to do more strategic and value-added work. There are several studies that emphasize the increasing significance of Generative AI in project management.There are some studies that stress the increasing role of Generative AI in project management. Salimimoghadam *et al.* [28] found that Generative AI enhances knowledge management, forecasting, resource optimization, and stakeholder communication. Vergara *et al.* [27] have pinpointed Generative AI as a prominent new tool for project monitoring and intelligent decision making. Almalki [31] also showed that AI support in sprint planning, workload distribution and resource scheduling improves the Agile projects. Some of the most common use cases of generative AI in the project management industry include automated project reporting, meeting summarization, documentation, AI project assistant, progress monitoring, stakeholder communication, proposal preparation, knowledge retrieval, and intelligent project dashboard. The primary benefits of its use are that it saves administrative time, speeds up documentation, improves communication, makes knowledge more accessible, enables better decision making, and boosts productivity of projects. But there are problems like AI hallucination, data privacy and security concerns, IP issues, lack of explainability, reliance on good prompts, and the need for some human validation.

7.8 AI for Sustainable Innovation Projects

Artificial Intelligence (AI) is also a key factor in sustainable innovation, helping to achieve environmental, social and economic goals through intelligent decision-making, predictive analytics, and resource optimization. AI contributes to more energy efficiency, less environmental footprint, better supply chain optimization, and better pursuit of Environmental, Social, and Governance (ESG) goals. AI has been shown to play a role in sustainable innovation through several studies. Liu *et al.* [11] concluded that AI improves research and development efficiency to boost green innovation and environmental performance. The studies by Nepal *et al.* [12] and Johri *et al.* [21] demonstrate the potential of AI to enhance energy resilience through predictive analytics and intelligent resource management, and enhance innovation capability and sustainable organizational performance through data-driven decision-making. Barile *et al.* [19] have introduced the concept of an AI-powered innovation ecosystem for collaborative and sustainable product development while Mannava *et al.* [30] have emphasized the advantages of AI and Big Data in sustainable project management and resource optimization. The areas where AI is extensively used in ESG project management include green innovation, smart manufacturing, sustainable supply chains, energy optimization, Digital Twin applications, carbon emission monitoring, circular economy initiatives, and sustainable product development. The main benefits are increased environmental sustainability, increased resource efficiency, reduced operating costs, increased ESG compliance, predictive sustainability management

and improved long-term competitiveness. But the cost of implementation, lack of AI skills, data security concerns, regulatory uncertainty, lack of infrastructure, and ethical issues are all important factors to consider.

8. Research Gap and Discussion

The systematic review shows that AI systems have revolutionized Open Innovation (OI) and Project Management (PM) with features such as intelligent automation, predictive analytics, knowledge management, and collaborative decision-making. Although significant advances have been made, there are still a number of theoretical, methodological, technological and practical research gaps that have not been addressed. Most of the existing research focuses on AI, Open Innovation and Project Management as separate fields of study, and only few studies have been dedicated to combining these three fields into a single concept. Moreover, the advent of Generative AI and Large Language Models (LLMs) has opened up novel research opportunities that have yet to be fully addressed.

Current studies are centred on certain AI methods, like Deep Learning, Machine Learning, and Natural Language Processing, to address individual challenges like project scheduling, risk identification, cost forecasting, or managing innovation. However, there are limited studies that explore the combined use of multiple AI technologies in order to support the creation of intelligent innovation ecosystems spanning the entire project lifecycle. Further, the vast majority of empirical research focus on a single industry, a single organization or a single country making their results less generalizable. Table 5 presents a summary of the top 10 selected research papers.

Table 5
Summary of Research Gaps from Top Ten Research Papers

Rank	Paper	Citation	Description	Key Finding	Research Gap
1	Weber *et al.* [41]	153	AI-enabled knowledge management and lesson-learned systems.	AI improves organizational knowledge capture and sharing through intelligent retrieval mechanisms.	Limited integration with Generative AI, LLMs, and real-time collaborative innovation platforms.
2	Okudan *et al.* [42]	141	Case-based reasoning framework for construction project risk management.	AI enhances project risk identification, monitoring, and knowledge reuse.	Validation is limited to construction projects; cross-industry applicability requires investigation.
3	Koh *et al.* [59]	113	AI-enabled decision support for sustainable supply chain management.	DSS improves carbon accounting and collaborative supply chain decision-making.	Limited integration of machine learning, Generative AI, and real-time predictive analytics.
4	Dai *et al.* [45]	104	Reinforcement learning for intelligent resource allocation and scheduling.	Deep reinforcement learning optimizes task offloading and resource utilization.	Focused on vehicular networks; limited application in project management and open innovation ecosystems.
5	Xu *et al.* [60]	98	Graph neural networks for intelligent spatial classification.	GCNs effectively capture complex spatial relationships for decision-making.	Limited exploration of GNNs in innovation management and project planning applications.
6	Amith *et al.* [61]	95	Ontology-based knowledge representation and evaluation.	Ontologies improve interoperability, knowledge representation, and decision support.	Lack of automated ontology evaluation using Large Language Models and Generative AI.

Table 5
Continued

Rank	Paper	Citation	Description	Key Finding	Research Gap
7	Blohm *et al.* [54]	91	AI-assisted crowdsourcing and idea evaluation.	AI improves idea selection quality in open innovation platforms.	Human–AI collaboration and explainable AI for idea evaluation remain underexplored.
8	Balayn *et al.* [62]	90	Survey on fairness, bias mitigation, and trustworthy AI.	Fair and unbiased AI is essential for reliable decision support systems.	Limited implementation of ethical AI frameworks in innovation and project management.
9	O'Leary [63]	90	Integration of AI, crowdsourcing, and big data for decision support.	AI enhances data integration, governance, and collaborative analytics.	Data governance, privacy, and security challenges require further investigation in AI-enabled innovation ecosystems.
10	Hadjiiski *et al.* [46]	84	Best practices for AI-assisted clinical decision support systems.	Proper training, validation, and quality assurance improve AI reliability.	General AI governance frameworks for project management and open innovation are still lacking.

9. Conceptual Framework

Based on the results of this systematic review, it can be concluded that Artificial Intelligence serves as the technological enabler to link Open Innovation and Project Management, thereby enhancing the organizational performance and sustainable innovation.

The proposed framework, as depicted in Figure 9, brings together AI technologies, innovation processes, project management processes, and organizational outcomes into a unified system.

10. Conclusion

This study aims at providing a comprehensive systematic literature review on Artificial Intelligence (AI) applications in Open Innovation (OI) and Project Management (PM) literature published from 2000 to 2026. The AI-related research has been significantly expanded and accelerated, especially since 2020, with the development of Machine Learning, Deep Learning, Large Language Models (LLMs), and Generative AI. The results indicate that AI is now being used in novel ways for knowledge management, idea generation, crowdsourcing, project planning, risk management, decision support, and sustainable innovation, revealing that AI is becoming an integral part of improving organizational performance and innovation outcomes.

The review also shows the way in which AI has become a strategic enabler of intelligent innovation ecosystems, by helping to improve organization learning, speed up decision making, optimize project plans and execution and facilitate collaboration among stakeholders. With the rise of Generative AI, these features have grown, with the ability to automate documentation, provide smart project support, and collaborate with AI. But these advantages are not yet matched by challenges, including Explainability, Ethics, Data Privacy, Cybersecurity, Governance, and Organizational Readiness, which are stalling the pace of adoption.

Overall, this review builds upon and adds to the current literature base by combining and integrating all three topics of AI, Open Innovation and Project Management. The research gaps identified and the conceptual framework proposed are useful for researchers, practitioners and policy makers to develop an AI-powered innovation and project management system.

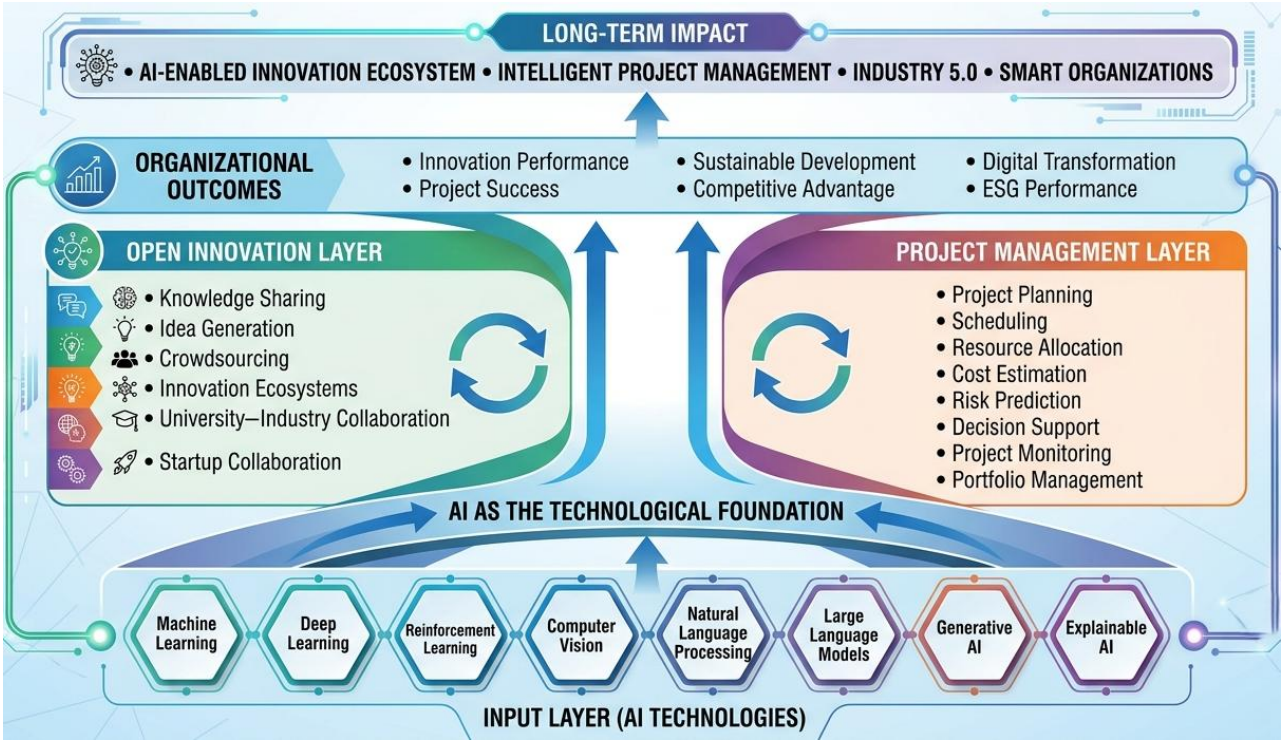

Fig. 9. Conceptual framework illustrating the integration of Artificial Intelligence, Open Innovation, and Project Management for sustainable organizational performance

10.1 Future Work

Future studies should provide the development of integrated frameworks based on Artificial Intelligence, Open Innovation and project management to support the intelligent decision-making and sustainable organizational performance. There is a need for further research on Explainable AI and Trustworthy AI, the practical application of Generative AI and Large Language Models in real-world organizations, and the combination of AI with new technologies like Industry 5.0, Digital Twins, the Internet of Things (IoT) and Blockchain.

Further, AI-based project assistants that can assist project managers should be created, AI applications in ESG, green innovation and sustainable project management should be studied and longitudinal and cross-country empirical studies should test existing results. Further research and analysis are also needed on how people and AI can work together, the readiness of organizations, and the governance of AI, specifically in relation to ethical, privacy, transparency, and intellectual property concerns. These actions will contribute to building resilient, sustainable and AI fueled innovation ecosystems.

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Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Russell, S., & Norvig, P. (2021). *Artificial Intelligence: a modern approach* (4th US ed.). https://aima.cs.berkeley.edu/

[2] Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business Press.

[3] Huizingh, E. K. R. E. (2011). Open innovation: State of the art and future perspectives. *Technovation*, 31(1), 2–9. https://doi.org/10.1016/j.technovation.2010.10.002
[4] Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. *R&D Management*, 40(3), 213–221. https://doi.org/10.1111/j.1467-9310.2010.00605.x
[5] Frank, A. G., Dalenogare, L. S., & Ayala, N. F. (2019). Industry 4.0 technologies: Implementation patterns in manufacturing companies. *International Journal of Production Economics*, 210, 15–26. https://doi.org/10.1016/j.ijpe.2019.01.004
[6] Bogers, M., Chesbrough, H., & Moedas, C. (2018). Open innovation: Research, practices, and policies. *California Management Review*, 60(2), 5–16. https://doi.org/10.1177/0008125617745086
[7] Bhavana, S., Navadeep, J., & Rao, T. V. N. (2026). AI-Enabled Transformation in Modern Project Management. In *The Role of AI in Modern Project Management* (pp. 39–72). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3373-7605-9.ch002
[8] Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., & Wright, R. (2023). So what if ChatGPT wrote it? Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71, 102642. https://doi.org/10.1016/j.ijinfomgt.2023.102642
[9] Prasetyo, M. L., Peranginangin, R. A., Martinovic, N., Ichsan, M., & Wicaksono, H. (2025). Artificial intelligence in open innovation project management: A systematic literature review on technologies, applications, and integration requirements. *Journal of Open Innovation: Technology, Market, and Complexity*, 11(1), 100445. https://doi.org/10.1016/j.joitmc.2024.100445
[10] Uriarte, S., Baier-Fuentes, H., Espinoza-Benavides, J., & Inzunza-Mendoza, W. (2026). Artificial intelligence technologies and entrepreneurship: a hybrid literature review. *Review of Managerial Science*, 20(1), 251–299. https://doi.org/10.1007/s11846-025-00839-4
[11] Liu, Y., Shen, F., Guo, J., Hu, G., & Song, Y. (2025). Can artificial intelligence technology improve companies' capacity for green innovation? Evidence from listed companies in China. *Energy Economics*, 143, 108280. https://doi.org/10.1016/j.eneco.2025.108280
[12] Nepal, R., Zhao, X., Dong, K., Wang, J., & Sharif, A. (2025). Can artificial intelligence technology innovation boost energy resilience? The role of green finance. *Energy Economics*, 142, 108159. https://doi.org/10.1016/j.eneco.2024.108159
[13] Hirsch-Kreinsen, H. (2024). Artificial intelligence: A "promising technology". *AI & Society*, 39(4), 1641–1652. https://doi.org/10.1007/s00146-023-01629-w
[14] Mukhamediev, R. I., Popova, Y., Kuchin, Y., Zaitseva, E., Kalimoldayev, A., Symagulov, A., & Yelis, M. (2022). Review of artificial intelligence and machine learning technologies: Classification, restrictions, opportunities and challenges. *Mathematics*, 10(15), 2552. https://doi.org/10.3390/math10152552
[15] Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business Press.
[16] Chesbrough, H., Vanhaverbeke, W., & West, J. (Eds.). (2006). *Open innovation: Researching a new paradigm*. Oxford University Press.
[17] Huizingh, E. K. R. E. (2011). Open innovation: State of the art and future perspectives. *Technovation*, 31(1), 2–9. https://doi.org/10.1016/j.technovation.2010.10.002
[18] Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*, 39(6), 699–709. https://doi.org/10.1016/j.respol.2010.01.013
[19] Barile, D., Secundo, G., & Del Vecchio, P. (2026). An artificial intelligence-based innovation ecosystem enabling open innovation and sustainable growth: evidence from a case study. *Innovation*, 28(1), 14–36. https://doi.org/10.1080/14479338.2025.2514468
[20] Duong, C. D. (2025). Artificial intelligence innovation, innovation niches and entrepreneurial performance: the curvilinear role of open innovation. *Business Process Management Journal*, 1–28. https://doi.org/10.1108/BPMJ-04-2025-0500
[21] Johri, A., Singh, R. K., Kushwaha, B. P., Alhumoudi, H., Alakkas, A., & Khoja, M. (2025). Leveraging open innovation for e-commerce success: The contingent role of accounting information systems and artificial intelligence. *Journal of Innovation & Knowledge*, 10(4), 100737. https://doi.org/10.1016/j.jik.2025.100737
[22] Holgersson, M., Dahlander, L., Chesbrough, H., & Bogers, M. L. (2024). Open Innovation in the Age of AI. *California Management Review*, 67(1), 5–20. https://doi.org/10.1177/00081256241279323
[23] Sahoo, S., Kumar, S., Donthu, N., & Singh, A. K. (2024). Artificial intelligence capabilities, open innovation, and business performance–Empirical insights from multinational B2B companies. *Industrial Marketing Management*, 117, 28–41. https://doi.org/10.1016/j.indmarman.2023.12.008

[24] Kuzior, A., Sira, M., & Brożek, P. (2023). Use of artificial intelligence in terms of open innovation process and management. *Sustainability*, 15(9), 7205. https://doi.org/10.3390/su15097205
[25] Rose, K. H. (2013). A guide to the project management body of knowledge (PMBOK guide). *Project Management Journal*, 44(3), e1. https://doi.org/10.1002/pmj.21345
[26] Plotnikov, A., Demiryurek, K., Plotnikova, A., Andreeva, O., & Suzdaleva, G. (2024). Agile methodology catalyzing digital transformation: Implementation objectives and evaluation criteria in organizational settings. In *The Future of Industry: Human-Centric Approaches in Digital Transformation* (pp. 141–161). Springer. https://doi.org/10.1007/978-3-031-66801-2_10
[27] Vergara, D., del Bosque, A., Lampropoulos, G., & Fernández-Arias, P. (2025). Trends and applications of artificial intelligence in project management. *Electronics*, 14(4), 800. https://doi.org/10.3390/electronics14040800
[28] Salimimoghadam, S., Ghanbaripour, A. N., Tumpa, R. J., Kamel Rahimi, A., Golmoradi, M., Rashidian, S., & Skitmore, M. (2025). The rise of artificial intelligence in project management: A systematic literature review of current opportunities, enablers, and barriers. *Buildings*, 15(7), 1130. https://doi.org/10.3390/buildings15071130
[29] Shamim, M. M. I., Hamid, A. B. B. A., Nyamasvisva, T. E., & Rafi, N. S. B. (2025). Advancement of artificial intelligence in cost estimation for project management success: A systematic review of machine learning, deep learning, regression, and hybrid models. *Modelling*, 6(2), 35. https://doi.org/10.3390/modelling6020035
[30] Mannava, M. K., Gupta, H., Mishra, M. V., & Banerjee, S. (2025). Optimizing Financial Processes Through AI-Enhanced Project Management, Big Data Engineering, and Sustainability. In *AI-Enabled Sustainable Innovations in Education and Business* (pp. 203–224). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3373-3952-8.ch009
[31] Almalki, S. S. (2025). AI-driven decision support systems in agile software project management: Enhancing risk mitigation and resource allocation. *Systems*, 13(3), 208. https://doi.org/10.3390/systems13030208
[32] Sahoo, S. K., Choudhury, B. B., Dhal, P. R., Majhi, S., Dhar, I., & Sahu, S. (2026). Three Decades of Multiple Criteria Decision-Making (MCDM) Methods (1996–2026): A Comprehensive Review of Advancements, Applications, and Future Directions. *Journal of Contemporary Decision Science*, 2(1), 400–439. https://doi.org/10.67334/cds21202631
[33] Sahoo, S. K., Choudhury, B. B., Dhal, P. R., Sahu, S., Majhi, S., & Dhar, I. (2026). Large Language Models in Multi Criteria Decision Making: A Systematic Review, Taxonomy, and Future Research Agenda. *Applied Research Advances*, 2(1), 116–136. https://doi.org/10.65069/ara21202614
[34] Wang, X., Chen, X., Yan, M., & Kong, L. (2025). A scientometric analysis of machine learning in schizophrenia neuroimaging: Trends and insights (2012–2024). *Journal of Affective Disorders*, 387, 119485. https://doi.org/10.1016/j.jad.2025.119485
[35] Choudhury, D., Nayak, S., & Sahoo, S. K. (2025, December). Emerging Trends in Nanorobotics for Environmental Remediation: A Bibliometric Review. In *2025 1st International Conference on Data Science and Intelligent Network Computing (ICDSINC)* (pp. 830–834). IEEE. https://doi.org/10.1109/ICDSINC66221.2025.11448191
[36] Sahu, S., Sahoo, S. K., Choudhury, B. B., Dhal, P. R., Dhar, I., & Imreh-Tóth, M. (2026). Artificial Intelligence Driven Sustainable Consumption Decisions of Generation Z: A Systematic Literature Review. *Decision Making Advances*, 1–21. https://doi.org/10.31181/dma0002026171
[37] Sahoo, S. K., Fischer, S., Sahu, S., Choudhury, B. B., Dhal, P. R., & Dhar, I. (2026). Mapping Tools, Techniques, and Applications for Research Excellence: A Bibliometric Study. *Spectrum of Engineering and Management Sciences*, 4(1), 120–145. https://doi.org/10.31181/sems41202672s
[38] Sahoo, S. K., & Choudhury, B. B. (2024). Autonomous navigation and obstacle avoidance in smart robotic wheelchairs. *Journal of Decision Analytics and Intelligent Computing*, 4(1), 47–66. https://doi.org/10.31181/jdaic10019022024s
[39] Bouraima, M. B. (2026). Unveiling the Challenges of Artificial Intelligence Use in Auditing: A Holistic Multi-Criteria Decision-Making Approach. *Applied Research Advances*, 2(1), 137–145. https://doi.org/10.65069/ara21202613
[40] Becerra-Fernandez, I. (2000). The role of artificial intelligence technologies in the implementation of people-finder knowledge management systems. *Knowledge-Based Systems*, 13(5), 315–320. https://doi.org/10.1016/S0950-7051(00)00091-5
[41] Weber, R., Aha, D. W., & Becerra-Fernandez, I. (2001). Intelligent lessons learned systems. *Expert Systems with Applications*, 20(1), 17–34. https://doi.org/10.1016/S0957-4174(00)00046-4
[42] Okudan, O., Budayan, C., & Dikmen, I. (2021). A knowledge-based risk management tool for construction projects using case-based reasoning. *Expert Systems with Applications*, 173, 114776. https://doi.org/10.1016/j.eswa.2021.114776
[43] Sumbal, M. S., Amber, Q., Tariq, A., Raziq, M. M., & Tsui, E. (2024). Wind of change: how ChatGPT and big data can reshape the knowledge management paradigm? *Industrial Management & Data Systems*, 124(9), 2736–2757. https://doi.org/10.1108/IMDS-06-2023-0360

[44] Gupta, A., Basu, D., Ghantasala, R., Qiu, S., & Gadiraju, U. (2022, April). To trust or not to trust: How a conversational interface affects trust in a decision support system. In *Proceedings of the ACM Web Conference 2022* (pp. 3531–3540). https://doi.org/10.1145/3485447.3512244

[45] Dai, P., Hu, K., Wu, X., Xing, H., & Yu, Z. (2021, May). Asynchronous deep reinforcement learning for data-driven task offloading in MEC-empowered vehicular networks. In *IEEE INFOCOM 2021-IEEE Conference on Computer Communications* (pp. 1–10). IEEE. https://doi.org/10.1109/INFOCOM42981.2021.9488886

[46] Hadjiiski, L., Cha, K., Chan, H. P., Drukker, K., Morra, L., Näppi, J. J., & Armato III, S. G. (2023). AAPM task group report 273: recommendations on best practices for AI and machine learning for computer-aided diagnosis in medical imaging. *Medical Physics*, 50(2), e1–e24. https://doi.org/10.1002/mp.16188

[47] Pokhrel, S. R. (2021). Blockchain brings trust to collaborative drones and LEO satellites: An intelligent decentralized learning in the space. *IEEE Sensors Journal*, 21(22), 25331–25339. https://doi.org/10.1109/JSEN.2021.3060185

[48] Liang, T., Chen, L., Huang, M., Deng, X., Zhang, S., Xiong, N. N., & Liu, A. (2023). RLTD: A reinforcement learning-based truth data discovery scheme for decision support systems under sustainable environments. *Applied Soft Computing*, 143, 110369. https://doi.org/10.1016/j.asoc.2023.110369

[49] Li, L., Yang, L., Zhao, M., Liao, M., & Cao, Y. (2022). Exploring the success determinants of crowdfunding for cultural and creative projects: An empirical study based on signal theory. *Technology in Society*, 70, 102036. https://doi.org/10.1016/j.techsoc.2022.102036

[50] Patil, R., & Gudivada, V. (2024). A review of current trends, techniques, and challenges in large language models (LLMs). *Applied Sciences*, 14(5), 2074. https://doi.org/10.3390/app14052074

[51] Mohy, A. A., Bassioni, H. A., Elgendi, E. O., & Hassan, T. M. (2026). Innovations in safety management for construction sites: the role of deep learning and computer vision techniques. *Construction Innovation*, 26(2), 551–578. https://doi.org/10.1108/CI-04-2023-0062

[52] Aktürk, B., & Irlayıcı Çakmak, P. (2025). Digital twins for enhanced construction project management. *Smart and Sustainable Built Environment*, 14(7), 2176–2200. https://doi.org/10.1108/SASBE-03-2024-0082

[53] Tun, H. M., Rahman, H. A., Naing, L., & Malik, O. A. (2025). Trust in artificial intelligence–based clinical decision support systems among health care workers: systematic review. *Journal of Medical Internet Research*, 27, e69678. https://doi.org/10.2196/69678

[54] Blohm, I., Riedl, C., Füller, J., & Leimeister, J. M. (2016). Rate or trade? Identifying winning ideas in open idea sourcing. *Information Systems Research*, 27(1), 27–48. https://doi.org/10.1287/isre.2015.0605

[55] Olatokun, W. M., & Oladokun, B. D. (2026). Hallucination in Generative AI: Challenges to data integrity, ethical concerns and implications for knowledge management. *Information Services and Use*, 18758789261463098. https://doi.org/10.1177/18758789261463098

[56] Malik, A., Nguyen, T. M., & Budhwar, P. (2022). Towards a conceptual model of AI-mediated knowledge sharing exchange of HRM practices: antecedents and consequences. *IEEE Transactions on Engineering Management*, 71, 13083–13095. https://doi.org/10.1109/TEM.2022.3163117

[57] Saen, R. F., Yousefi, F., & Azadi, M. (2024). Artificial intelligence powered predictions: enhancing supply chain sustainability. *Annals of Operations Research*, 1–44. https://doi.org/10.1007/s10479-024-06088-0

[58] Kumar, R., & Pamucar, D. (2025). A comprehensive and systematic review of multi-criteria decision-making (MCDM) methods to solve decision-making problems: two decades from 2004 to 2024. *Spectrum of Decision Making and Applications*, 2(1), 177–196. https://doi.org/10.31181/sdmap21202524

[59] Koh, S. L., Genovese, A., Acquaye, A. A., Barratt, P., Rana, N., Kuylenstierna, J., & Gibbs, D. (2013). Decarbonising product supply chains: design and development of an integrated evidence-based decision support system–the supply chain environmental analysis tool (SCEnAT). *International Journal of Production Research*, 51(7), 2092–2109. https://doi.org/10.1080/00207543.2012.705042

[60] Xu, Y., Zhou, B., Jin, S., Xie, X., Chen, Z., Hu, S., & He, N. (2022). A framework for urban land use classification by integrating the spatial context of points of interest and graph convolutional neural network method. *Computers, Environment and Urban Systems*, 95, 101807. https://doi.org/10.1016/j.compenvurbsys.2022.101807

[61] Amith, M., He, Z., Bian, J., Lossio-Ventura, J. A., & Tao, C. (2018). Assessing the practice of biomedical ontology evaluation: Gaps and opportunities. *Journal of Biomedical Informatics*, 80, 1–13. https://doi.org/10.1016/j.jbi.2018.02.010

[62] Balayn, A., Lofi, C., & Houben, G. J. (2021). Managing bias and unfairness in data for decision support: a survey of machine learning and data engineering approaches to identify and mitigate bias and unfairness within data management and analytics systems. *The VLDB Journal*, 30(5), 739–768. https://doi.org/10.1007/s00778-021-00671-8

[63] O'Leary, D. E. (2014). Embedding AI and crowdsourcing in the big data lake. *IEEE Intelligent Systems*, 29(5), 70–73. https://doi.org/10.1109/MIS.2014.82