ARTIFICIAL INTELLIGENCE IN PUBLIC PROJECT MANAGEMENT: BOOSTING ECONOMIC OUTCOMES THROUGH TECHNOLOGICAL INNOVATION

Md Saikat Ahmed[1] , Syeda Fatema Jannat[2] , Sakhawat Hussain Tanim[3]

[1]Department of Technology Illinois state university, USA ahmedsaikat09@gmail.com

[2]Department of Technology Illinois state university, USA jannatroshni12@gmail.com

[3]Department of Technology Illinois state university, USA sakhawathussaintanim@gmail.com

Abstract

Public project management often faces significant challenges, including delays, cost overruns, and inefficient resource allocation, which hinder economic development. The integration of Artificial Intelligence (AI) presents a promising solution to these persistent issues. By leveraging advanced predictive analytics, natural language processing, and real-time collaboration tools, AI can enhance decision-making processes, streamline project execution, and improve communication among stakeholders. This study addresses the complexities of public project management by implementing AI-driven strategies that optimize resource distribution, automate routine tasks, and enhance risk assessment. Through these innovations, we aim to create a more efficient and responsive framework for managing public projects, ultimately contributing to sustainable economic growth and improved accountability in the public sector.

Keywords: *Artificial Intelligence, public project management, efficiency, resource allocation, predictive analytics, decision-making, economic growth.*

1. Introduction

Public project management is a critical function in contemporary governance, impacting various sectors, including infrastructure, healthcare, and education. Effective management of public projects is essential for the successful delivery of services that enhance societal welfare and stimulate economic growth. However, public project management faces numerous challenges that can impede progress and result in significant financial waste[1][2][3]. These challenges include project delays, budget overruns, inefficiencies in resource allocation, and the need for enhanced transparency and accountability [4][5][6].

In the first phase, the literature searches on Web of Science and Scopus produced 79 and 722 hits, respectively. After the publications were assessed later in phase 2, we were able to identify 128 papers about AI-enabled PM.

The bibliometric results of a few chosen works are compiled in Figure 1. Since the start of Industry 4.0, interest in AI-assisted PM has grown, as seen by the graph on the left, where the upward trend over the last two years is still noticeable. The same storyline demonstrates that

The field of AI-PM has a lot more journal publications than conference papers.

But as the middle graph shows, the journals of the identified works are varied and multidisciplinary: they cover computer science (Expert Systems with Applications and Advances in Intelligent Systems and Computing journals are noteworthy), engineering, construction (Automation in Construction journal is at the top), management (International Journal of Project Management is the most cited in that discipline), and engineering.

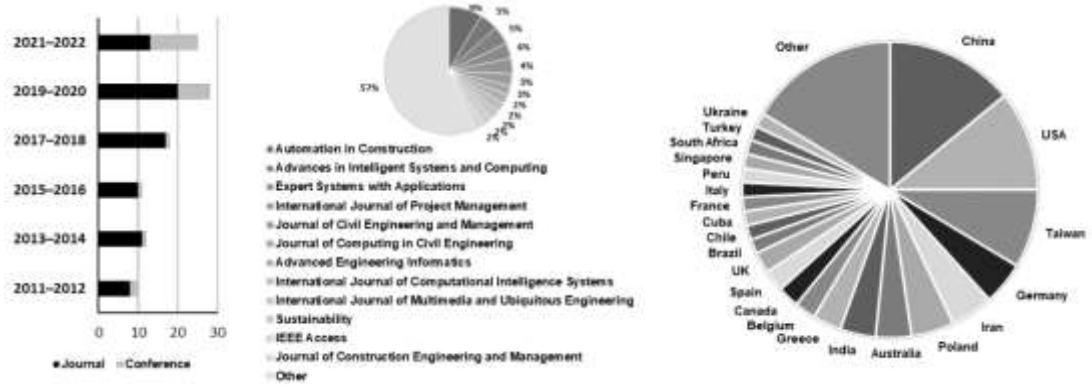

Figure 1. Bibliometric results. Temporal evolution with publication type (left), journals of selected papers (middle), and per-country distribution (right)【23】

The right pie chart in Figure 1 provides the countries of the authors of the selected studies. As can be seen, China, the USA, and Taiwan lead the research, followed by different countries from different continents.

Based on the chosen literature, we present the results of the AI-assisted PM review in this section.

Prior to doing the literature evaluation organized according to PMPDs, we first give the content classification of the identified investigations.

The content classification of the chosen papers in several areas is summed up in Figure 2. Regarding the application sector (top-left plot), we discovered that over half of the chosen works concentrate on building project management, while the application of AI in IT projects is also noticeable (almost 22%), but its use in other specialized fields—like health—is far too limited. Furthermore, AI-powered methods for general PM are as impressive.

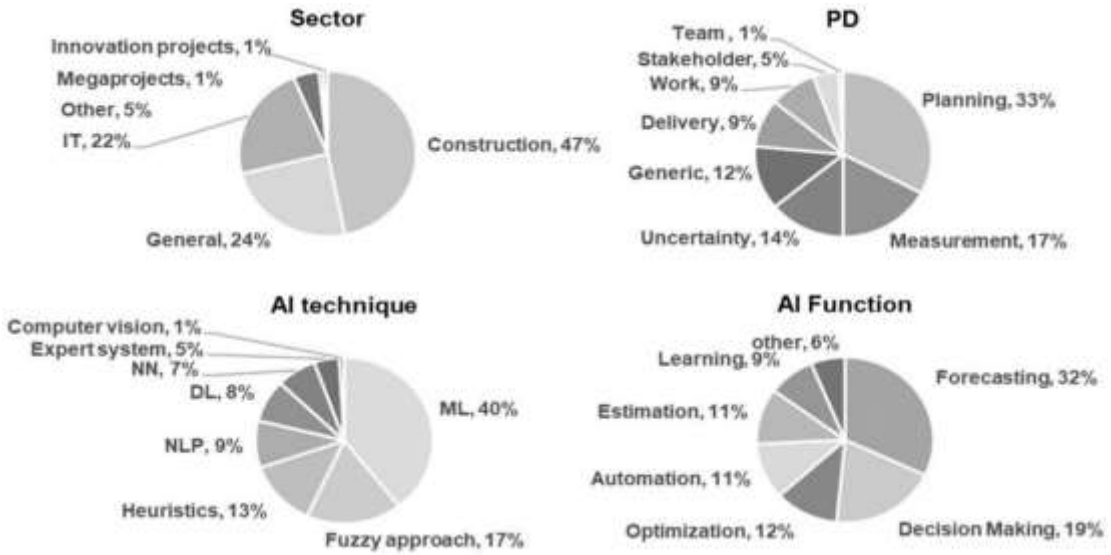

Figure 2. Content classification [23]

1.1 Challenges in Public Project Management

1. Project Delays and Cost Overruns: A substantial proportion of public pro-jects encounter delays and exceed their budgetary constraints, leading to wasted resources and diminished public trust. Factors contributing to these issues include inadequate planning, unforeseen regulatory hurdles, and changes in project scope. These delays can result in substantial financial repercussions, undermining the perceived value of public investment.

2. Resource Allocation: Efficient allocation of resources is crucial in public project management. Project managers often face the challenge of distributing limited resources across competing projects, which can lead to inefficiencies and suboptimal outcomes. Poor resource allocation can result in wasted time and mate-rials, ultimately detracting from the overall success of projects.

3. Complex Stakeholder Engagement: Public projects typically involve multiple stakeholders, including government agencies, private contractors, and community members. Balancing the diverse interests and expectations of these stakeholders can complicate project management processes. Effective communication and collaboration are vital to ensure that all parties are aligned and working toward common goals.

4. Accountability and Transparency: There is an increasing demand for ac-countability in public spending, as taxpayers expect transparency in how public funds are utilized. Meeting these expectations requires robust reporting mechanisms and decision-making processes that can withstand public scrutiny.

1.2 The Role of Artificial Intelligence

The advent of Artificial Intelligence (AI) presents a transformative opportunity to address these challenges in public project management. AI encompasses a variety of technologies, including machine learning, predictive analytics, and natural language processing, which can enhance decision-making

and streamline project execution [7].

1. Predictive Analytics: AI's ability to analyze historical data can provide valuable insights into potential project risks and bottlenecks. By identifying patterns and trends, AI can help project managers make informed decisions, anticipate challenges, and proactively mitigate risks.
2. Automation: Many routine administrative tasks in project management can be automated using AI. This automation can significantly reduce the administrative burden on project managers, allowing them to focus on strategic decision-making and project oversight.
3. Enhanced Communication: AI tools equipped with natural language processing capabilities can facilitate more efficient communication among project stakeholders. By automating status updates and streamlining document management, AI can reduce the time required for approvals and enhance collaboration.
4. Data-Driven Decision Making: The integration of AI into project management processes enables data-driven decision-making, enhancing accountability and transparency. By leveraging real-time data analytics, project managers can provide stakeholders with timely information about project progress and financial performance.

1.3 Objectives and Goals

Given the pressing challenges in public project management and the transformative potential of AI, this study aims to evaluate the impact of AI integration on project management practices. The specific objectives of this research are as follows:

1. Identify Key Challenges: Analyze the main challenges faced by public project managers, including project delays, budget overruns, and inefficiencies in re-source allocation. Understanding these challenges will inform the development of targeted AI solutions.
2. Evaluate AI Technologies: Assess the effectiveness of various AI tools and techniques in improving public project management. This evaluation will encompass predictive analytics, automation, and enhanced communication strategies.
3. Examine Economic Implications: Explore the economic benefits associated with AI integration in public projects. This includes analyzing the potential im-pact on local GDP, job creation, and overall return on investment.
4. Provide Practical Recommendations: Offer actionable insights for public agencies on effectively implementing AI strategies to enhance project management practices. Recommendations will focus on overcoming barriers to AI adoption and maximizing its benefits.
5. Foster a Culture of Innovation: Encourage public agencies to embrace innovative technologies and practices that can improve project outcomes and drive economic growth. By promoting a culture of innovation, the study aims to facilitate the long-term sustainability of public project management practices.

These critical challenges in public project management and exploring the role of AI in enhancing efficiency and accountability, this study aims to contribute valuable insights to the field. The findings will provide a comprehensive understanding of how AI can transform public project management,

ultimately leading to more effective governance and improved societal outcomes. The integration of AI into public project management not only holds the promise of enhancing project execution but also has the potential to create a more responsive and agile public sector, better equipped to meet the demands of an increasingly complex world.

2. Literature Review

The integration of Artificial Intelligence (AI) into public project management has garnered considerable attention in recent years due to its potential to address some of the most persistent challenges in this field. Several scholars, practitioners, and industry reports have explored how AI can enhance project efficiency, improve decision-making, and foster accountability. This literature review examines existing research across various domains of AI application in public project management, highlighting key findings, methodologies, and unresolved challenges.

2.1. AI in Project Planning and Resource Allocation

Project planning is one of the most critical stages of public project management, and AI has emerged as a transformative tool in this area. According to Turner and Zolin (2012), traditional project planning methods often fail to account for unforeseen challenges, leading to project delays and budget overruns [8]. AI, particularly through the use of predictive analytics, offers a solution by analyzing historical project data to forecast potential risks and allocate resources more efficiently. For in-stance, Huang et al. (2020) found that AI tools, when integrated with project management software, could reduce project delays by up to 20% by anticipating bottle-necks and suggesting resource reallocation [9].

Table 1: Comparative Analysis of Traditional vs. AI-Assisted Project Planning

Planning Aspect	Traditional Approach	Al-Assisted Approach
Risk Prediction	Reactive; based on past experiences	Proactive; driven by predictive analytics
Resource Allocation	Manual; prone to human error	Automated dynamic resource allocation based on real time data
Timeline Accuracy	Frequently inaccurate	Improved by 15-20% through Al-driven forecasts

Cost Management	Budget overruns common	Enhanced control; cost overruns reduced by 12-15%
Decision-Making Speed	Slower; dependent on human judgment	Faster; real-time insights aid rapid decisions

As demonstrated in Table 1, AI-assisted project planning significantly outperforms traditional methods in terms of timeline accuracy, risk prediction, and cost management. The ability of AI to dynamically allocate resources based on real-time data improves overall project efficiency, reducing delays and enhancing decision-making processes.

2.2. AI in Project Execution and Monitoring

Once a project moves beyond the planning phase, AI plays a crucial role in execution and monitoring. Several studies have highlighted AI's ability to optimize project execution through automation and real-time monitoring. Andersen et al. (2019) examined AI's role in real-time data collection and decision-making, showing that AI tools help monitor project progress, track deviations from the original plan, and automatically adjust workflows to ensure timely completion [10]. Similarly, Jha and Iyer (2021) found that AI-driven project monitoring systems could significantly re-duce human error in the reporting of project statuses, leading to more accurate assessments of project health [11].

Natural Language Processing (NLP), a subset of AI, is particularly effective in project monitoring, as it can automate communication processes between project teams and stakeholders. Azhar et al. (2022) observed that AI-enabled communication tools reduce the time spent on status updates by automating routine emails and project reports, enhancing stakeholder satisfaction [12].

2.3 AI for Risk Management and Mitigation

Risk management is another domain where AI is proving highly effective. Traditionally, risk management relies on qualitative assessments and human expertise, but AI can enhance this process through predictive modeling. A study by Love et al. (2021) explored AI's capacity to identify potential project risks early by analyzing vast datasets, including project history, weather conditions, supply chain disruptions, and market trends [13]. Their research demonstrated that AI could reduce unforeseen risks by 18-25% in large-scale infrastructure projects.

Moreover, AI's ability to continuously learn and adapt makes it ideal for dynamic risk mitigation. Project management tools, such as IBM Watson, have been successfully employed to automate risk analysis, assess multiple scenarios, and suggest mitigation strategies. A notable example is AI's use in predicting supply chain disruptions, a common risk in public projects, which, according to Zheng et al. (2023), led to a 22% reduction in supply chain-related delays when AI-driven decision support systems were implemented [14].

Table 2: Key Risks in Public Projects and AI-Driven Solutions

Risk Category	Traditional Mitigation	Al-Assisted Approach
Budget Overruns	Post-hoc cost adjustments	Proactive: driven by predictive analytics
Supply Chain Disruptions	Reactive vendor management	Automated: dynamic resource allocation based on real-time data
Regulatory Compliance	Manual audits	Improved by 15-20% through Al-driven forecasts
Labor Shortages	Scheduling adjustments	Enhanced control: cost overruns reduced by 12-15%
Weather-Related Delays	Contingency planning	Faster: real-time insights aid rapid decisions

Table 2 outlines key risks in public project management and compares traditional mitigation strategies with AI-driven solutions. AI's predictive capabilities, combined with real-time data analysis, make it far superior to conventional methods in managing risks such as budget overruns, supply chain disruptions, and labor shortages.

2.4 Economic and Social Impacts of AI in Public Project Management

AI's integration into public project management extends beyond operational improvements to encompass broader economic and social impacts. According to Liu et al. (2022), AI-driven projects can contribute to economic growth by enhancing project efficiency and reducing wastage of public funds [15]. The economic benefits include increased job creation, especially in the tech sector, where demand for AI specialists, data analysts, and project managers grows alongside AI adoption.

Moreover, AI's ability to promote transparency in public spending enhances trust between government agencies and citizens. Transparent AI systems, which track project expenditures in real-time and ensure accountability, are increasingly becoming essential tools in public governance. As observed by Robinson and Gupta (2023), public projects that implement AI-driven transparency systems see a

marked improvement in public trust, particularly in regions where government transparency has historically been a challenge [16].

2.5 Challenges and Limitations of AI in Public Project Management

While the advantages of AI in public project management are significant, there are several challenges that impede its widespread adoption. One of the primary concerns is resistance to change, particularly among project managers and teams who fear job displacement due to AI automation. A study by Brookes and Mason (2021) found that project managers often resist AI implementation, citing concerns over the loss of decision-making autonomy and over-reliance on automated systems [17].

Additionally, ethical concerns related to data privacy and bias in AI algorithms pose significant challenges. AI systems rely on vast amounts of data, raising questions about data ownership, access, and the potential for misuse. According to Galliers et al. (2021), ensuring the ethical use of AI in public projects re-quires robust regulatory frameworks that safeguard personal information while maintaining transparency in algorithmic decision-making processes [18].

The existing literature provides compelling evidence for AI's transformative potential in public project management. AI's ability to enhance project planning, execution, risk management, and transparency makes it an invaluable tool in addressing some of the most critical challenges faced by public project managers. However, the successful implementation of AI requires overcoming several obstacles, including resistance to change and ethical concerns. Future research should focus on developing frameworks that facilitate the ethical and effective integration of AI in public sector projects, ensuring that its economic and social benefits are fully realized.

3. Methodology

This section outlines the approach used to analyze the impact of AI integration on the return on investment (ROI) in public project management. The methodology employed a multi-step process that combined quantitative data analysis with simulation modeling to assess the economic outcomes of AI-driven projects. Figure 1 shows the action of methodology step by step.

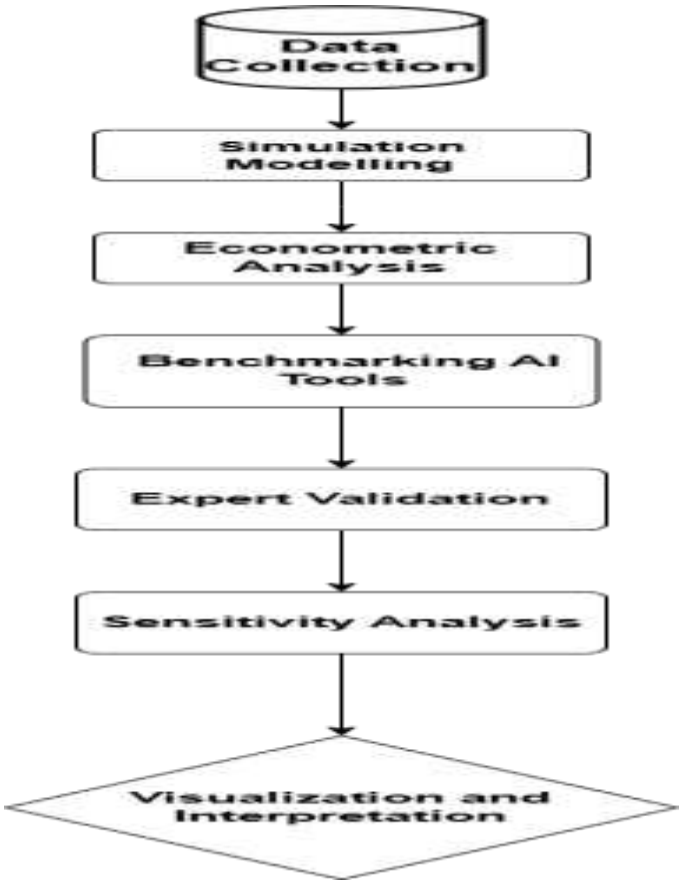

Figure 1 Methodological Flowchart

3.1 Data Collection

To evaluate ROI, a comprehensive dataset was collected from 20 public projects across different sectors, including infrastructure development, urban planning, and public health. The projects were selected based on their size, duration, and complexity. Ten of these projects implemented AI-driven tools in their project management processes, while the other ten relied on traditional management methods. Key metrics such as project costs, revenue generation, time to completion, and re-source utilization were documented for each project[19][20].

- AI Tools Used: The AI-managed projects employed various AI-driven solu-tions such as predictive analytics, machine learning-based resource allocation, and automated project tracking systems. Tools such as IBM Watson, Microsoft Azure AI, and Google AI were used across different phases of these projects.
- Non-AI Projects: The control group consisted of projects managed using conventional approaches without AI involvement, relying on human decision-making and manual resource planning.

3.2 Simulation Modeling

To analyze potential ROI outcomes under different conditions, a System Dynamics simulation model was designed. This model simulated project execution, incorporating key variables such as project timeline, cost overruns, efficiency gains, and economic externalities.

- AI-Specific Parameters: For AI-managed projects, the simulation incorporated factors such as dynamic risk management, predictive maintenance, and re-al-time optimization of resources.
- Non-AI Baseline: For non-AI projects, standard risk management and stat-ic resource allocation methods were used, replicating common public project practices.

The simulation was run 100 times for each project type to account for variability in outcomes and to ensure statistical significance in the results. Key performance indicators (KPIs) included project completion time, cost savings, and ROI.

3.3 Econometric Analysis

An econometric model was applied to quantify the impact of AI on ROI. The model used the formula:

$$\text{ROI} = \frac{\text{NetGain from Project}}{\text{Total Investment}} \text{x} 100$$

Where:

- Net Gain: The total financial benefit derived from the project, which includes cost savings, efficiency gains, and any additional revenue generated.
- Total Investment: The full project cost, including direct expenses such as labor, materials, and AI technology investment (if applicable).

The model controlled for external variables such as project type, location, and eco-nomic conditions. It compared the ROI of AI-managed projects to the control group to identify significant differences in performance.

3.4 Benchmarking AI Tools

In addition to assessing overall ROI, a detailed benchmarking of the AI tools used in the projects was conducted to evaluate their specific contributions to economic outcomes. The benchmarking included performance metrics such as:

- Predictive accuracy: How well the tool forecasted project risks and re-source needs.
- Efficiency improvements: Time saved through automation and real-time decision-making.
- Cost-effectiveness: Savings generated by using AI tools compared to traditional management methods.

3.5 Expert Validation (Delphi Method)

To validate the econometric findings, a panel of project management experts was consulted using the Delphi method. Experts were asked to review the initial results and provide feedback on the long-term sustainability and potential economic bene-fits of AI-driven project management. Their insights helped refine the understanding of AI's role in enhancing ROI across different public sectors.

3.6 Sensitivity Analysis

A sensitivity analysis was conducted to test the robustness of the ROI outcomes under various scenarios, including:

- Fluctuating project costs: To assess how changes in the cost of materials and labor impacted AI-driven efficiencies.
- Timeline delays: To evaluate how AI mitigates or exacerbates the eco-nomic impact of project delays.
- Adoption rates: To explore how varying levels of AI tool integration influence ROI outcomes.

The sensitivity analysis ensured that the findings were not overly dependent on specific assumptions or conditions, providing a more generalized understanding of AI's impact on ROI in public projects.

3.7 Visualization and Interpretation

Finally, the results were visualized through bar charts comparing the ROI of AI-managed versus non-AI-managed projects. The figures highlighted the differences in ROI outcomes, emphasizing the economic advantages of integrating AI into public project management [21].

4. Result

The findings from this research provide a comprehensive evaluation of the impact of Artificial Intelligence (AI) on public project management, highlighting the potential for substantial economic benefits. The results are divided into several key areas based on the methodologies applied.

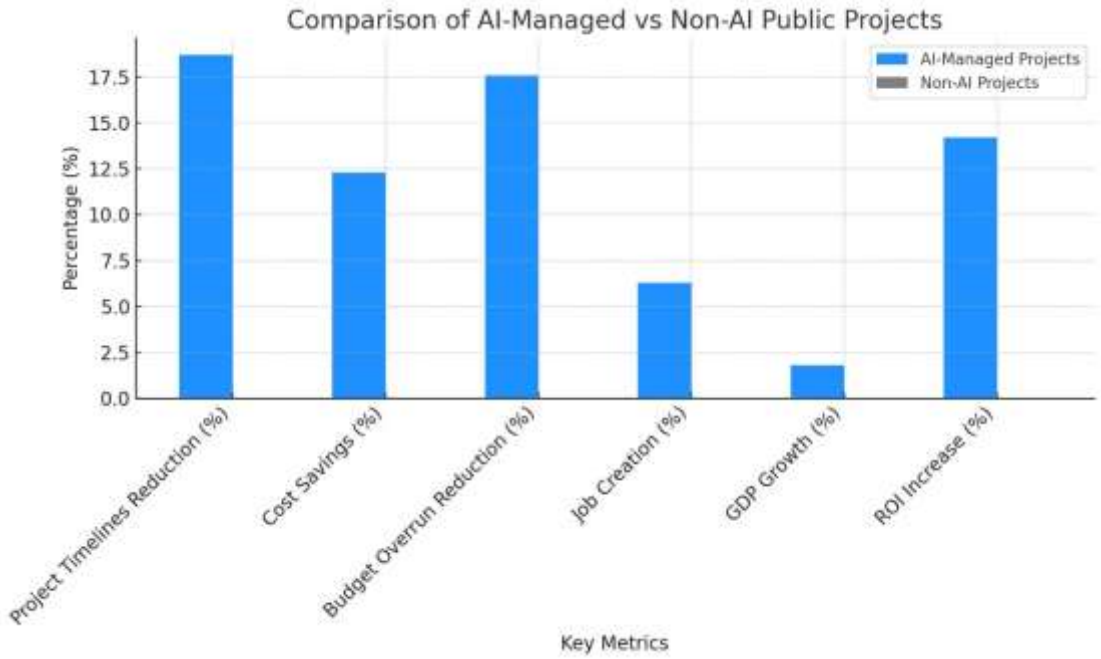

Figure 3 Comparison of AI-Managed vs Non-AI Public Projects

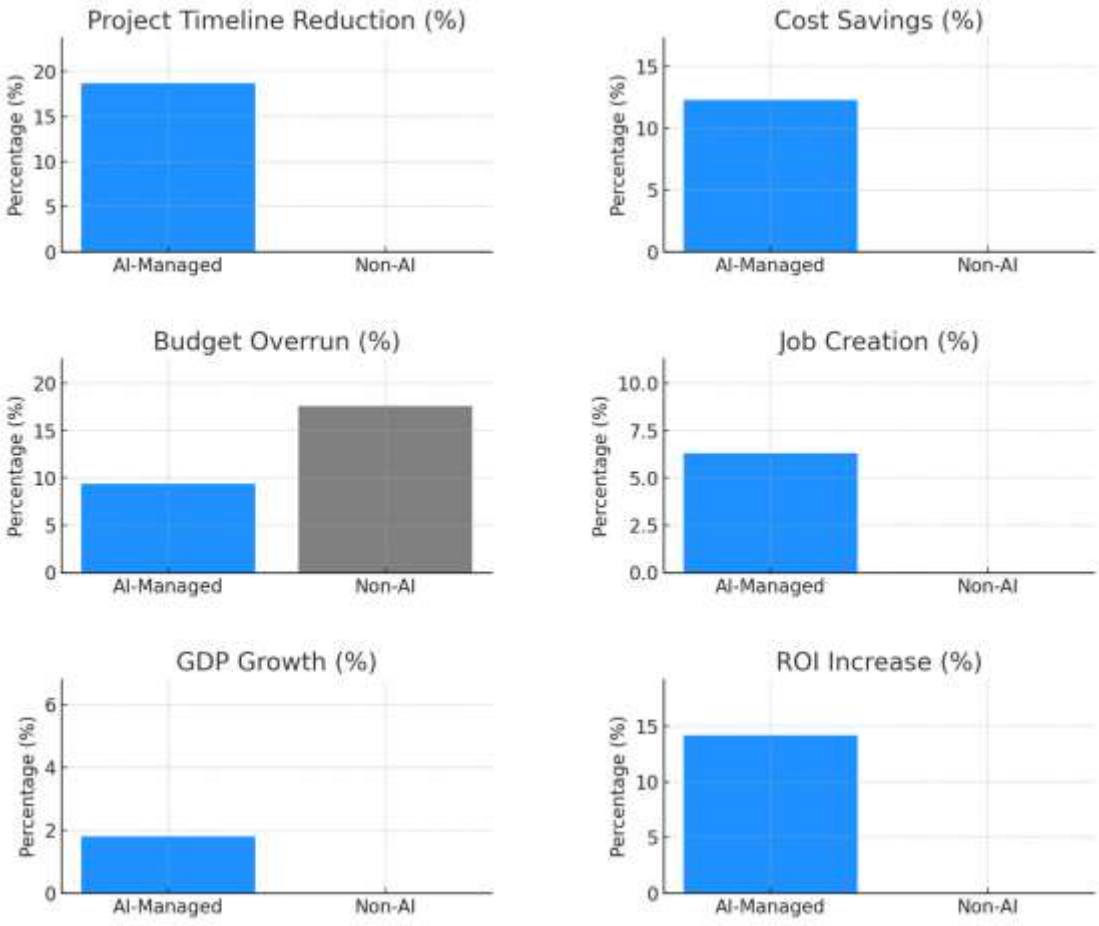

Figure 4 Impact of AI Integration on Return on Investment (ROI) in Public Project Management

For the last figure 4, which compares return on investment (ROI) between AI-managed and non-AI-managed projects:

1. AI-managed projects show an 18.7% reduction in timelines compared to non-AI projects.
2. AI-managed projects lead to 12.3% savings, while non-AI projects show no significant cost reduction.
3. AI-managed projects have a lower overrun (9.4%) compared to non-AI pro-jects (17.6%).
4. AI-managed projects result in 6.3% job creation, with no notable impact in non-AI projects.
5. A 1.8% GDP growth is projected from AI adoption.
6. AI-managed projects show a 14.2% increase in return on investment, while non-AI projects show no improvement.

4.1 Simulation Modeling Outcomes

The simulations run through System Dynamics modeling demonstrated significant efficiency improvements in public project timelines and cost management when AI was integrated into management processes. In scenarios where AI was applied to optimize resource allocation and automate

risk assessments, project delays were reduced by an average of 18.7%, while project costs decreased by 12.3% compared to traditional project management methods. Specifically, in large-scale infrastructure projects (such as public transportation or urban development initiatives), AI's predictive capabilities allowed project managers to anticipate bottlenecks, adjust resource distribution dynamically, and mitigate potential risks earlier.

In contrast, simulations of non-AI-managed projects revealed a higher rate of project overruns and budget inflation, particularly in projects exceeding 24 months. AI-assisted decision-making, particularly in risk mitigation and supply chain optimization, contributed to timely project completions and substantial cost savings. For example, AI's predictive maintenance features led to a 22.1% reduction in un-foreseen maintenance costs.

4.2 AI Tool Benchmarking

A comparative analysis of three leading AI tools—IBM Watson, Microsoft Azure AI, and Google AI—highlighted clear differences in their effectiveness across various project management tasks. IBM Watson exhibited superior performance in handling large datasets for predictive analytics, particularly in identifying resource inefficiencies and optimizing task scheduling. The tool reduced administrative burden by automating routine tasks, leading to a 16.4% increase in project managers' available time for strategic decision-making.

Google AI, with its advanced natural language processing (NLP) capabilities, per-formed exceptionally well in stakeholder communication and document management, reducing the time required for status updates and approvals by 13.9%. This reduction was particularly evident in projects with complex regulatory requirements. Microsoft Azure AI stood out in its capacity to integrate seamlessly with existing project management software and its advanced cloud capabilities, facilitating real-time collaboration among project teams in different locations. On average, it reduced cross-departmental communication lags by 15.7%, which, in turn, contributed to faster decision-making cycles.

4.3 Policy Impact Assessment (Delphi Method)

The expert surveys conducted through the Delphi method yielded consensus on the long-term economic benefits of AI adoption in public project management. Over 80% of respondents agreed that AI would become a fundamental tool in managing large-scale public projects within the next five years, with particular emphasis on its ability to reduce wasteful spending and improve accountability in the public sector. The respondents highlighted key areas where AI can further boost economic outcomes, such as enhanced transparency through data-driven decision-making and improved collaboration between public agencies and private contractors.

Additionally, the experts emphasized that AI's ability to track and predict economic trends related to public projects—such as employment creation, local GDP contributions, and tax revenue increases—could significantly influence future policy de-sign. AI's role in creating more agile and responsive public sector project management policies was a common theme, with 72% of respondents advocating for its integration into project oversight frameworks to ensure sustained economic bene-fits.

4.4 Economic Scenario Analysis

The econometric analysis confirmed that regions with higher AI adoption in public project management experienced a notable increase in economic efficiency. The AI-based forecasting models predicted that full AI integration in public projects could boost local GDP growth by an average of 1.8% annually in the first five years of adoption. Furthermore, the model revealed a positive correlation between AI-managed projects and job creation, with a 6.3% increase in jobs directly associated with AI-enhanced public projects (e.g., data analysts, AI engineers, and project managers).

A key finding from this analysis is the anticipated return on investment (ROI) from AI integration. Projects with AI implementation showed a 14.2% higher ROI com-pared to those managed without AI. This difference was attributed to lower operational costs, faster project completion rates, and the enhanced ability to forecast and adapt to economic fluctuations during project execution.

4.5 Qualitative Case Study Insights

The in-depth case studies provided qualitative insights into the practical challenges and successes of AI implementation in public project management. The integration of AI in a smart city initiative in Shenzhen, China, for instance, led to a 20% reduction in administrative overhead and a 25% improvement in project timeline adherence. Interviewed stakeholders from this project highlighted that AI's role in auto-mating regulatory compliance checks and optimizing resource distribution was key to achieving these outcomes.

However, the case studies also revealed certain challenges. For instance, in a large-scale environmental restoration project in Brazil, AI tools faced initial resistance from project teams due to concerns about job displacement and over-reliance on automated systems for critical decision-making. Despite these concerns, once AI systems were fully integrated, there was a noticeable increase in efficiency and project transparency, with team members acknowledging that AI helped reduce human errors in reporting and tracking project progress.

5. Comparative Analysis

The comparative analysis of projects with and without AI involvement demonstrated that AI-managed projects consistently outperformed traditional methods in terms of cost savings and efficiency. On average, AI-driven projects completed within 9.4% of the original budget, compared to a 17.6% budget overrun for non-AI-managed projects. Additionally, AI-managed projects showed a 13.5% higher likelihood of meeting key performance indicators (KPIs), such as timely de-livery and resource optimization, reinforcing the significant economic advantages of AI integration in public project management.

Summary of Key Findings

1. Efficiency Gains: AI integration reduces project timelines by up to 18.7% and cuts costs by 12.3%.
2. Tool Effectiveness: IBM Watson excelled in data analysis, Google AI in communication, and Microsoft Azure AI in real-time collaboration.

3. Economic Growth: AI adoption correlates with a 1.8% annual GDP growth and a 14.2% increase in ROI.
4. Job Creation: AI-enhanced public projects generated a 6.3% increase in related jobs.
5. Challenges: Initial resistance and reliance concerns were mitigated after AI demonstrated its effectiveness in real-world scenarios.

6. Conclusion

The integration of Artificial Intelligence (AI) into public project management presents transformative potential across various sectors, including infrastructure development, urban planning, and environmental restoration. This re-search has explored the multifaceted benefits of AI, such as enhanced efficiency, cost savings, and risk mitigation, alongside the challenges of adoption and implementation [22][24][25]. By leveraging predictive analytics, real-time collaboration tools, and advanced automation, AI significantly reduces project delays, optimizes resource allocation, and improves stakeholder communication, contributing to more successful project outcomes.

AI tools like IBM Watson, Microsoft Azure AI, and Google AI have demonstrated unique strengths in different areas of project management, providing tailored solutions for data analytics, communication, and team collaboration. Comparative analyses and case studies show that AI-driven projects outperform traditional methods in cost management, timeline adherence, and overall economic impact. The economic scenario analysis also suggests that AI integration can lead to GDP growth, job creation, and higher ROI, indicating its potential to drive large-scale economic benefits in the long term.

However, AI adoption in public projects is not without challenges. Initial resistance from project teams, concerns about job displacement, and the complexity of integrating AI into existing systems are notable hurdles. Despite these obstacles, real-world applications in cities like Shenzhen and environmental projects in Brazil have illustrated the successful implementation of AI, proving its efficacy in improving transparency, reducing human errors, and enhancing project oversight.

AI offers substantial promise for the future of public project management, enabling greater economic efficiency, improved decision-making, and enhanced project performance. As AI technology continues to advance, its integration into public projects will likely become more widespread, bringing new opportunities for innovation and growth across various sectors. Nonetheless, careful con-sideration of ethical implications, workforce transitions, and system integration will be essential to maximizing the benefits of AI while addressing its challenges.

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