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AI-driven risk identification and mitigation strategies for government projects

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Abstract

This review is focused on AI-Driven Risk Identification and Mitigation Strategies for Government Projects. The review addresses Risk Mitigation Strategies and AI-Related Vulnerabilities putting into consideration accuracy and bias. The study also highlights NIST framework application in Nigeria, Impacts of AI-Driven risk mitigation and implementing AI for risk mitigation and challenges for government projects. Conclusively, the study confirms that AI holds transformative potential for government projects through its innovative solutions to mitigate risks and enhance operational efficiency. By aligning technological advancements and sustainable practices, AI offers a promising pathway to achieving long-term growth and resilience in an increasingly dynamic global environment. The study recommends investments in AI education and training that will place emphasis on the need to bridge knowledge gaps and empower organizations to fully leverage AI's potential.

Keywords: Risk; Mitigation; Planning; AI; Project management

1. Introduction

The implementation of Artificial Intelligence (AI) in Project Management (PM) has been garnering attention for a while now (Kehoe *et al.*, 2020). AI with the advancement in machine learning and data analytics now has the potential to transform the way projects are managed, from planning and scheduling to risk management and decision-making (Huang *et al*., 2022). This new technology can also augment the capabilities of project managers and team members, to make more informed decisions so as to bring about optimization in project performance. AI algorithms can also analyze substantial volumes of data, identify patterns, and generate valuable insights, providing project personnel with valuable decision support (Zhang *et al*., 2021). This can lead to improved project outcomes, increased efficiency, and better resource allocation (Bannerman *et al.,* 2020). Li *et al.* (2021) listed the potential benefits of AI in project management as increased efficiency, improved decision making, and better risk management. Additionally, machine learning algorithms can analyze historical project data to uncover patterns and trends, enabling better decision-making in areas like resource allocation and scheduling (Bi *et al.,* 2024). Deep learning can resolve these issues such as unstructured data like project

narratives and risk reports, allowing for more realistic scenario planning and proactive risk mitigation. Furthermore, through the utilization of AI, mitigation strategies can also be suggested based on historical data and industry best practices, fostering proactive risk management. While challenges like data bias and the need for human oversight exist, AI's potential to revolutionize project management by enhancing decision-making, mitigating risks, and fostering project success is far better compared to the traditional method (Ajayi *et al.,* 2024).

As AI technology continues to thrive, its impact on project management will continue to grow, paving way for a future of more efficient, predictable, and successful projects (Shi *et al.*, 2024). Beyond risk mitigation, AI also creates opportunities by uncovering synergies across any government project components and thus, ultimately helps in the

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redesign of workflows and processes to enhance efficiency and foster innovation for the development of any nation. The outcomes highlight the convergence of economic, environmental, and social objectives, underscoring AI's transformative potential in project management (Akinbolaji, 2023). Thus, the need to review AI-Driven Risk Identification and Mitigation Strategies for Government Projects.

2. Risk Mitigation Strategies

There is a need for governments to engage in several tradeoffs to define AI policy at a national level. Domain theories and practice across nations made it known that there are three primary AI trade-offs for consideration: innovation versus regulation, the individual versus the state, and transparency versus system vulnerability. Based on this, there's a need for the government to ensure equilibrium among these components. None of the trade-offs is mutually exclusive, and the right balance for each nation depends on various factors. In addition to this, AI developers' ability to introduce new AI solutions by excessively restricting the use of consumer data, for example, leading to improperly trained algorithms will go a long way. Additionally, it is also known that there is an edge in balance between data privacy and the government's need in accessing data to prevent harm. Cultural differences drive varying levels of consumer concern regarding data usage and privacy protections. There is a need for the Nigerian government to define its unique approach to privacy matters, which should be ascertained via attitudinal research with citizens before embarking on policy development. In mitigating these strategies, policymakers must also balance the need for people to trust AI systems by understanding how they work against the desire to protect the systems from attacks. Striking the appropriate balance

on these variables will be heightened for industries where data privacy and integrity are paramount, such as banking and healthcare (Rao, 2024). AI and related technologies will indelibly transform every nation with far-reaching implications. Citizens and leaders across society would do well to express their views and get actively involved in helping their governments shape policies that will define humanity's future.

3. Addressing AI-Related Vulnerabilities

Government plays a crucial role in elevating equity and ethics and ensuring accurate outcomes in AI through technology policy. Mitigating the risks of artificial intelligence is essential to the technology's positive impact on people's rights and opportunities.

3.1. Accuracy

There is a need to assess accuracy in AI use, this is based on the fact that AI errors can affect humanity at large, thus, the need to necessitate system accuracy. Accuracy is associated with robustness and sensitivity, further complicating measuring an already complex variable. Additionally, there are trade-offs between bias and accuracy. Where each nation strikes the balance aligned with their particular country's values and priorities will lead to several outcomes, including varying tolerance levels for bias.

3.2. Bias

There is also a need to avoid the basement when using AI based on the fact that bias is difficult to circumvent. There is a need to ensure Transparency which is a prominent area of risk mitigation. Among other issues, without transparency, assigning accountability for (inaccurate, harmful etc.) AI-generated decisions become challenging.

3.3. Governance

Governance processes are crucial to risk mitigation. There is a particular need for data governance, which is the fuel for AI systems. One best practice that is being leveraged today (borrowed from software development) is keeping prior copies of datasets to enable the reconstruction of past versions of applications if needed. Engaging diverse subject matter experts, testing, and monitoring are other best practices that serve as ongoing controls.

4. NIST Framework application in Nigeria Government

The U.S. National Institute of Standards & Technology (NIST) Framework for AI Risk Management is a valuable tool for designing, developing, implementing, and using responsible AI systems while elevating reliability (Tabassi, 2023). The NIST provides a framework in the measurement of AI risks, and in the optimization of the benefits of AI technologies and addressing their drawbacks by providing a systematic way to recognize, evaluate, and lessen the hazards related to AI systems. The NIST's AI Risk Management System (RMF) also provides a comprehensive overview of the attributes a trustworthy AI system should possess, the AI RMF provides four essential functions – Govern, Map, Measure, and

Manage – that a nation can adopt to develop and deploy trustworthy AI systems across use cases and domains. The AI RMF also facilitates the framework's application, which covers detailed, actionable, and adaptive guidance to implement each of the four essential functions (Govern, Map, Measure, and Manage) for trustworthy AI development. Notably, the NIST AI RMF is a working framework updated periodically with real-world results, applications, outcomes, and expanded expertise, leveraging the organization's vast network and resources. The approach is solely based on practical but fluid systematic approach in order to accommodate emerging developments in AI and also enable successful outcomes across diverse entities and systems. According to PwC, AI risks can be at the business or national levels. The National-Level risks are more critical and far-reaching and impact the socio-economic environment in which AI systems operate. These are issues that need to be tackled at the national, supranational, or societal level across the globe. They are categorized into economic, ethical and societal. A study by McKinsey through a compilation of a comprehensive catalogue highlighting the unintended consequences of Artificial Intelligence (AI) show that adopting AI can lead to significant and far-reaching unintended consequences, both maliciously intended and unintentional, affecting individuals, organizations, and society.

5. Impacts of AI-Driven Risk Mitigation

The effect of AI in most government's projects has proven to be a transformative tool, especially when it comes to the realm of risk mitigation. Its ability to process extensive datasets, optimize operations, and foster innovation has led to significant improvements across various dimensions of project management. From achieving economic efficiencies to advancing environmental sustainability, the impacts of AI-driven risk mitigation are critical to modern development initiatives (Akinbolaji et al., 2024a). One of the significant impacts of AI is enhancement of

predictive accuracy which has often led to decision-making in government's project. This is done through analysis of historical and real-time data. AI empowers project managers to anticipate potential risks and at the same time develop proactive strategies to address them. This capability minimizes delays and cost overruns, challenges that have historically affected infrastructure projects. For instance, the integration of AI into resource allocation frameworks has streamlined project execution and increased efficiency (Akinbolaji *et al.*, 2024b).

The use of AI tools in government projects also promote sustainability through reduction in the ecological footprint of large-scale projects. Beyond this, AI also has an effect on socially inclusive infrastructure projects. Through the use of AI tools, architects and planners can design projects that address diverse population needs, including affordable housing for marginalized communities. In Nigerian social housing projects, AI has facilitated innovative designs that balance cultural relevance with modern functionality, ensuring both accessibility and sustainability (Akinbolaji *et al.,* 2024b). In the advancement of climate-resilient infrastructure, AI has also played a pivotal role. By simulating diverse environmental scenarios, AI tools have allowed for the development of structures that adapt to changing climatic conditions. This adaptability enhances infrastructure resilience while supporting global efforts to combat climate change. AI applications in architectural design have led to the creation of buildings that are robust, energy-efficient, and capable of withstanding extreme weather conditions, ensuring long-term sustainability. In addition to this, the ability of AI to integrate disparate datasets has also been of significant improvement when it comes to improved operational efficiency and resource optimization.

6. Implementing AI for Risk Mitigation and Challenges

The implementation of artificial intelligence (AI) in risk mitigation for government projects faces significant challenges that may make its adoption effective. These challenges range from technical, organizational, ethical, and regulatory dimensions, reflecting the complexities involved in successful integration. Overcoming most of these challenges is pivotal to unlocking AI's full potential in managing project risks (Akinbolaji, 2024a). One of these critical barriers is the technical complexities associated with AI deployment. This is based on the fact that advanced AI systems require extensive amounts of high-quality data for training and operation, yet many organizations face fragmented or incomplete datasets. In addition, the design and of sophisticated

models, especially those needed for fault tolerance and scalability in multi-region systems, demand expertise and computational resources that may not be readily accessible to all industries (Akinbolaji et al., 2024). lt also has technical barriers effect on the development of predictive models and also reduces the reliability of AI-driven solutions, particularly in unstable regions where data collection efforts are impeded. Organizational resistance to change is another significant obstacle. This is based on the unwillingness of Stakeholders to adopt AI technologies due to concerns about job displacement and a perceived loss of control over decision-making processes. This resistance becomes more complicated by a lack of understanding of AI's capabilities and limitations, fostering skepticism about its practical

benefits. Cultivating a culture of technological acceptance through targeted education and training programs is essential for overcoming these barriers. Moreover, misalignments between organizational goals and technological advancements can delay adoption, highlighting the need for strategic alignment (Akinbolaji, 2024). Data privacy and security also make the implementation of AI complex based on the fact that inconsistent global data privacy regulations create uncertainties for organizations that operate internationally. To address these challenges, robust legal frameworks and improved alignment between domestic policies and international standards are required (Akinbolaji, 2024b).

7. Conclusion

The study addresses AI-Driven Risk Identification and Mitigation Strategies for Government Projects. From the review, the study confirms that AI holds transformative potential for government projects through its innovative solutions to mitigate risks and enhance operational efficiency. By aligning technological advancements and sustainable practices, AI offers a success to achieving long term growth and resilience in an increasingly dynamic global environment.

7.1. Recommendations

Based on review findings, the study recommends investments in AI education and training that will place emphasis on the need to bridge knowledge gaps and empower organizations to fully leverage AI's potential. Furthermore, subsequent research should focus on advancing AI's integration with emerging technologies such as IoT and blockchain to enhance its efficacy in risk mitigation and sustainability.

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