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AI-AUGMENTED RISK INTELLIGENCE IN IT PROJECT MANAGEMENT: AN EMPIRICAL MIS-DRIVEN EVALUATION USING MACHINE LEARNING AND NEURAL NETWORKS

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Abstract

This paper considers the combination of Artificial Intelligence (AI) and the IT project management field of project management risk in the context of Management Information Systems (MIS). In IT projects, risks are identified, analyzed, and responded to with varying degrees of efficiency. This study explores the use of AI tools (including machine learning regression and neural networks) to improve the processes of AI-enhanced tools integrated into established risk management processes. Improved decision-making capabilities are the result. Performance evaluation tools such as Mean Squared Error (MSE) and Root Mean Squared Error (RMSE) as well as measures of precision, recall and the F1 score were the metrics of the study to measure the efficiency and effectiveness of AI as contrasted with the AI tools and the implementation of traditional risk systems management. AI, with respect to risk management, traditional, and non-AI systems, risk systems management design, measures, time, project success, and overall outcome, significantly AI MIS and risk management project are realized. AI systems, project management tools, and human cooperation, in project deliverables, management timely project streamline outcomes management is more project completion are combined with MIS. This paper considers project risk management and the use of project management AI tools in an organizational context.

Keywords: Artificial Intelligence (AI), Risk Mitigation, IT Project Management, Management Information Systems (MIS), Risk Identification, Project Success Rate.

Introduction

With the rapid advancement of technology and the management of Information Technology (IT) projects, the complexity involved in managing risks has also tremendously advanced. Given the complexities of budgets, scope, the Tech disruptions, and the people involved, the traditional methods of risk management seem ineffective. The growing complexities of IT projects have ultimately led to the demand for advanced risk management systems that have the ability to analyze large volumes of data, and detect and forecast risks, while also giving valuable suggestions in real-time. The use of predictive methods that AI has offered to advance Automated Risk Management Systems has improved risk mitigation by reasoning with and learning from past data, formulating and simulating innovative advanced risk management systems, and anticipating risks that have not yet occurred in Risk Management Systems [1]. In IT projects, AI has the ability to assess past data of projects to forecast the risks that are likely to happen. This gives value to the use of predictive methods of advanced Automated Risk Management Systems and greatly advances risk management in IT projects. This helps the project managers greatly by giving them predictive analytics to help them with the decision-making process.

Moreover, AI can derive insights from unstructured data – such as e-mails, reports and feedback from stakeholders – which might be overlooked by people that are managing traditional methods.[4] It is especially useful in IT project management since technical as well as organizational risks have to be regularly monitored and managed with timely actions. [5]

MIS provided structural hierarchy to help in charting out a strategic approach based on the real time information and made decision making more aligned towards organization objectives. The application of AI in MIS significantly increases the ability of the system to manage risks associated with IT projects. When MIS leverages AI progress it can then naturally also be more proactive in its

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risk work (not only reacting to e.g., early warnings), predicting risks several months ahead, continuously in the projects' execution and adapted to an even larger extent based on what is learned of each individual risk. “For example, our AI can predict all the outcomes that could be anticipated from a given project and also the relevant risks so his managers know (and receive) plans during projects that would mitigate those unnecessary risks. The research about AI in project management also investigates how it can enhance risk management. Instances of it can actually be found in the AI research around construction and infrastructure, where AI is being used to “decouple” massive data sets making predictive analysis even greater. This is especially the case in IT projects, which are fast time/slow resource (fast moving) technology projects. Strong risk management is essential in these ventures.

Unlike traditional approaches to risk management that depend on human intuition and historical data, AI has predictive power and can assess real-time data.

In addition, AI helps lessen the strain on human resources, automating repetitive and routine tasks. This allows project managers to concentrate on high-level, strategic planning. MIS helps AI understand and manage workflows in order to integrate and improve AI’s efficiency with the risk management practices [11]. IT project managers can derail disruptive risks by implementing risk-averse strategies early on, using predictive analytics to AI assess risks as a blueprint. These predictive tools are game changers in AI risk management, however, are still in the early stages of development and use. Concerns of ethics and risk regarding data privacy, biases in algorithms and the opacity of decision making, certainly will and must be, a focus of any responsible use of AI tools [12]. Furthermore, the use of AI on existing MIS frameworks will involve considerable organizational shifts of AI and employees, and fine-tuning the AI to meet project-driven goals. In this paper we will review AI risk control tool ethics and contribute to providing a clear direction of how to introduce AI into the projects and IT project management with supporting MIS as main facility.

Problem Statement

Integrating Artificial Intelligence (AI) into risk management frameworks for IT projects has come a long way; however, most existing studies remain focused on the theoretical application of AI, providing little comparative empirical evidence of AI risk management tools versus traditional expert risk management in practical IT projects. Moreover, most studies fail to consider particular AI techniques comprising machine learning regression and neural networks that would increase the effectiveness and efficiency of identifying and managing IT project risk. This research intends to address this gap by conducting the first empirical study on the application of AI tools to evaluate and measure performance in IT project risk management frameworks using MSE, RMSE, precision, recall, F1-score, and other relevant indicators, and contrasting them with traditional methods across three different areas of IT projects.

Related Works

AI has revolutionized the manner in which to manage decisions, knowledge and efficiencies across all businesses including IT project management. AI in IT risk predicting is becoming a must-have. This allows businesses to focus on the best way to implement their projects. When AI is embedded in management dashboards, businesses can vastly accelerate and improve the reliability of their decision processes. In related to the risk discovery, assessment and mitigation cowboy tales going.

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All of these three banks sit in Contact with AI and Counseling there offers risk decision control for all those couple companies a few. It's hard to put a price on the power these AI capabilities provide for your business – from business process automation, adaptive learning and automating boring stuff like optimizing Azure Farm Beats (hooray!) through burst processing of raw data to generating real insights from the data. + The literature on the revolutionary potential of AI in organizations is rich**.**

AI, for instance, when embedded into auditing and accounting solutions, has enhanced the accuracy of data and decision-making mechanisms. AI in MIS, as it was also insinuated, ups operational efficiency by automating processes, especially those around managing and acting upon information. Computer systems with AI capabilities like machine learning or natural language processing, as mentioned in the previous point, support data-driven decision-making, thereby reducing human judgment. AI is the answer to automate business process of IT project management.

Automation bots, chatbots and intelligent employees have been applied to repetitive task completion that takes the load off of human workers. Studies have demonstrated the role of chatbot in providing real-time, accurate information that reduces dependency on human work and enhances customer service utility. AI enhances data evaluation where organizations are able to identify the trends of the market and a flow of project by processing huge amounts of data and predictive analytics. [15], on the other hand, in addition AI fosters more accuracy in data analysis such that organization can predict risks and consequently enhance business decision making as it is articulated by [17].

AI-Based Risk Management in IT Projects: In the IT project management industry, risk management is crucial especially considering the complexities of technology trends, complex industry demands, and changing market conditions. Organizations now use AI-based tools to help mitigate and capture risk. AI models to manage risk Early warning from risks and a graphical model of such early warnings, with clear understanding of how to reduce or eliminate loses. AI from [18] is better at retrieving historical data to evaluate risks a create an action plan to capture response options and change the management of IT projects in real time. Aside from that, predictive analytic technology is increasingly being adopted by IT project management. These AI algorithms can analyze all-encompassing sets of data and predict risks enabling project managers to adapt their plans around to prevent potential risks before they become obstacles. In [19] explain how AI is useful in project management tools by which we can automate the risk management process and improve workflow for an organization. Project management planning is one of the more difficult and somewhat overwhelming parts to any project. Project management planners offer managers and supervisors the ability to apply project planning skills to a software solution that turns a boring task into a way to easily keep track of what needs doing, when it's due and how much it should cost! Such enhanced management foresight reduces overall project failure and increases its success.

Yet there are some issues with utilizing AI in IT Project Risk Management. Some of the challenges are data quality, interpretability and lack of technical expertise. The authors further claim in [20], that for AI-supported Risk Management Systems to work properly, there needs to be the correct data and clean dataset, for AI supported systems. They highlight that AI integration should be people-centered in order to ensure that the AI recommendations will correspond to the realistic context and goals of the projects by those people. Also, [21] detailed hypothetical ethical considerations with AI-assisted decision-making and potential violations of privacy and use of biased algorithms.

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As AI matures, it also leads to more applications in risk management and IT project management. While, for the most part, project managers recognize that AI is here to help and positively impact on their role as well as giving them more time to do things that are less tedious (and should therefore enable PMs to actually manage rather than administrate in future) talented people to operate these systems are few. Important directions for future research in this area should focus on limiting the 3 other barriers to the AI risk management with low quality of data, lack of model transparency and poor user training. [22] mentions that AI systems must integrate on other project management systems to allow users for a less-complicated adoption of AI and also help them to better mitigate risks within the project. Likewise, [23] adds that the evolution of AI in project management would require new alliances among project managers and data scientists along with other technologists. AI significantly improves risk reduction methods for IT project managers. The synergy of AI with the overall organization's management information systems, which may improve decision-making process and contribute more efficiently in terms of risk detection and response, better project outputs, and develop new AI-enabled risk mitigation methodologies. AI challenges, like low-quality data, specialized gaps and AI risk management application gaps are still major challenging issues on research to the future of IT project management.

Artificial Intelligence (AI) has pervaded the practice of risk management in recent years with promising results ranging from IT project management. Multiple studies address the benefits of AI in enhancing decision making, streamlining processes, and detecting potential risks and preventing risk. A summary of notable research along with a well-documented illustration of AI in project risk management specifically applied to the IT industry is presented below.

Table 1: Summary of Key Research on AI's Impact on Risk Mitigation in IT Project Management

Study	**Objective**	**AI Methodology**	**Findings**	**Relevance to IT Project Management**	**Ref**
Chen et al. (2020)	Review AI for risk management in construction projects	AI for risk detection and decision-making	AI improves risk identification and management by analyzing large datasets	Applicable for IT projects in terms of AI-driven risk management models	[24]
Zhang et al. (2021)	Study AI's role in construction risk management	Data analytics and predictive modeling	AI facilitates improved decision-making and project outcomes by managing risks through data analysis	AI's risk management capabilities can be applied to IT project management	[25]

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Flynn & Levine (2024)	Using AI for project performance prediction	Machine learning models for data analysis	AI enables predictive modeling for project timelines, cost estimates, and resource allocation	Directly applicable to predicting risks and outcomes in IT project management	[26]
Ajayi & Bi (2024)	AI's role in proactive risk mitigation in IT projects	Predictive analytics, Data mining	AI helps to anticipate risks and suggest mitigation strategies in real-time	Provides real-time risk management insights specific to IT projects	[27]
El Khatib & Al Falasi (2021)	Examine AI's effects on decision-making in project management	AI for decision analysis	AI assists in better project decisions by analyzing complex project data	Highlights AI's decision-support capabilities in IT projects	[28]
Gil et al. (2021)	Review AI applications in project management research	AI for data analysis and decision support	AI is critical for data-driven decision-making in complex projects	Supports the use of AI for IT project risk management	[29]
Bento et al. (2022)	Systematic review of AI in project management	AI for resource allocation, risk management	AI enhances project efficiency and mitigates risks by analyzing data trends	Provides key insights into AI's application in managing IT project risks	[30]
Fridgeirsson et al. (2021)	Study AI's effect on project management	AI in project risk management	AI-driven automation and data analysis improve project outcomes	Highlights how AI enhances project risk management in IT	[31]
Munir (2019)	AI's impact on project managers' ability to manage projects	AI in project risk prediction	AI can predict potential project risks and outcomes based on historical data	Relevant for predicting and managing risks in IT project management	[32]

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Methodology

The research encompasses 50 IT projects including software development, telecommunications, and cloud infrastructure, and utilizes datasets containing records of historical projects, timelines and schedules, documentation of budgets, risk management files, and performance datasets. Historical performance datasets, budgets, risk logs, and file performance measures of cloud infrastructure, telecommunications, and software development projects are integrated into datasets. This information is subjected to prediction analysis and potential risk forecasting using AI approaches which include machine learning regression and neural network constructs.

A 70/30 train-test split is used to train the AI models while the training set is utilized for trend learning. The models' performance is measured using evaluation metrics like MSE, RMSE, precision, recall, and F1-score which describe the risk identification accuracy and the corresponding response time. The results are juxtaposed with risk assessments conducted by traditional experts to endorse the AI models.

This study is a mixed-method study that includes qualitative with quantitative factors to examine the role of AI in managing risk mitigation in IT project management as viewed through MIS. The qualitative part is extensive literature research on AI-based RM practices the quantitative portion analyzes the data of several IT projects processed with AI-RM tooling. The purpose is to contrast conventional expert-led versus AI-powered risk mitigation interventions and analyze the resultant impact on project outcomes. The study starts with a review of literature on AI application to risk management and project management. This phase codifies a theory and lack of knowledge on AI-based experience about how to mitigate risk in any IT project management. IT project data is gathered such as project schedules, budgets, risk logs and mitigation actions. Information is collected through project documentation and interviews with project managers to obtain a thorough knowledge of conventional and AI mined methods for risk management. Three IT projects across different sectors are chosen for detailed case studies. And whether AI-type intervention tensed the risks and another that did not, this is a shadow cost. The case studies aim at examining the efficiency of traditional and AI-based risk management approaches in counteracting possible risks and enhancing project success rates. AI models, especially machine learning models, are trained to predict also risks based on historical projects data. The models are learned based on project-specific characteristics by considering timelines, budget spent, and resource used. The AI's risk prediction results are compared to the expert-based risk assessments for accuracy and effectiveness. Richner Its risk analyses made by AI are collaborated with the ones delivered by humans. This comparison involves examination of such metrics as accuracy in identifying risk, time to mitigate a job's risk and general job success. A statistical approach is used to quantify the effectiveness of AI vs traditional methods. Using the results of the case study, a model is proposed for combined application of AI tools with MIS approach for better risk management in IT project. The template outlines how organizations can deploy AI-powered risk management processes while keeping a human in the loop for transparency and ethical considerations.

Dataset Details: Data The data employed in this experiment is a modification of the data used by Sjekavica et al. [3]. (2023) who analyzed risk management options in relation to 60 EU co-financed infrastructure projects. Our study also takes 50 IT projects for five years into account. All also have projects from software development to cloud infra. The data set includes historical project

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information, project logs, and risk reports and performance measures. The nature of the data in this paper involves some special aspects of project management and risk concerns. Project KPI's including project schedules with start and finish dates, task duration, critical milestones and slacks. Budget and finance data to manage budgets versus actual spending cost overruns potential financial exposure. Particular focus will be given to resource allocation which includes human resources, tools and hardware software used in the projects. The complexity of tasks is also gauged based on the number of interdependencies, level of innovation required and difficulty. Risk information Historical risk log entries of the risks experienced, their severity and how frequently they happened. Furthermore, mitigation measures implemented are recorded on a risk-by-risk basis as well as the treatment employed, and the time it took to mitigate in terms of time and AI vs. human treatments taken. The study results portion of the report covers success and failure of these mitigation measures and implications for how risk manifested itself in schedules, costs, and ultimate project success. Finally, information beyond the observations reported in project-status reports are considered such as country-specific data including market conditions and environmental developments that influenced the projects. In the course of execution, communication logs are employed to track stakeholder interactions and logs for risks communicated, discussed and evaluated over time. We also employ these features to compare AI strategies with traditional harm prevention approaches.

Data Size and Scope: The dataset consists of 200,000 sample points collected from 50 IT projects over a five-year period. The sample consists of data on performance and risk management, such as time-scales, costs, resources utilization and risk logs. This database has been well prepared, i.e., replacing missing and filtering non-varied data, normalization all financial amounts to enable comparability also between projects [3].

AI Model Development: In this study, several AI techniques utilized the dataset to forecast risk in IT project management. The primary techniques rely on supervised approaches such as machine learning regression methods and neural networks. These insights help users predict likely project risks and make a quantitative analysis based on historical data for risk facets such as cost overruns, delay in schedule and resource unavailability. Machine Learning Regression method is employed to predict a continuous risk outcome by modeling the relationship among independent predictors such as project scope, schedule, and cost (budget) along with the dependent predictor of predicted level of risk. Neural Networks models (which are stronger in handling more complex relationships) can analyze vast historical data of a project and unveil subtle patterns which might not appear through conventional statistical analysis. Knowing from former ventures helps neural networks in predicting the probability as well as the consequences of risks.

The predictive model can be summarized with the following equation:

$$\boldsymbol{R_p = f(P_s, T_s, C_s)\ (1)} \qquad \textbf{(1)}$$

where, $\boldsymbol{R_p}$is the predicted risk level, $\boldsymbol{P_s}$ refers to project scope data, $\boldsymbol{T_s}$ refers to project timeline data, and $\boldsymbol{C_s}$ refers to cost and budget data.

Training and Testing: The data is split 70/30 percent for training and testing. The model is trained on historical data in the training set to learn trends that it can detect. Following training, the testing set is applied to evaluate how well the predictions match up with real levels of risk to predict events.

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With this training and testing process, the model can apply his prediction to new data and it has higher efficiency in practical uses.

Evaluation Metrics: Evaluation Metrics A performance evaluation of the AI models is carried out based on the following metrics: The assessment metrics within this research included various important model-performance considerations. MSE is the mean of square errors, that is, the difference between predicted and actual risk levels. This provides an overall sense of how well the model's predictions fit reality. Calculation: To get an error in the same units as the output variable, we take the square root of mean square error (RMSE). For the classification accuracy, precision and recall are used to evaluate the ability of identifying high, medium, and low risks by the classifier model so that there is no critical risk undue. Precision is more concerned with the importance of identified risks and recall makes sure that all or most actual risks are caught. Finally, the F1 score, which shape as the harmonic mean between precision and recall, is employed to gives a balanced assessment for model's detection power, especially benefiting in imbalanced risk classes task and it reflects the trade-off between precision (positive predictive value) and recall (sensitivity), where some types of risks are more likely than others.

Case Study Approach:

In this study, I combine a mixed-method approach, which includes a literature review and case studies, in evaluating the role of AI tools in risk management in the IT sector. The case studies cover three different industries and sectors to facilitate a well-rounded understanding of the role of AI in different types of projects. The sectors include:

Software Development: This case study investigates IT projects under the software development domain where risk management in the software development life cycle is critical due to the rapid pace of development, intricate dependencies, and strict deadlines.

Telecommunications: The second case study analyzes risk management in telecommunications projects which include large scale infrastructure, intricate networks and the necessity of rapid decision making to avoid service interruptions.

Cloud Infrastructure: The third case study centers on projects in cloud infrastructure where there is a technology dynamic in development and a high resource demand which necessitates aggressive risk management to respond to rapid shifts in resource utilization and changing environmental conditions.

The examination of each case study entails an analysis of various components of real-world IT projects within the industry including timelines, budgets, risk logs, and performance metrics. Predicting and controlling risks entails the use of AI models and an evaluation of their performance against expert methodologies utilizing MSE, RMSE, precision, recall, and the F1-score. The variety of industries enhances the generalizability of the results and demonstrates the potential of AI across various contexts with IT projects.

The Case Study Approach Each of the three IT projects selected for this study is from different sectors, i.e. software development, telecommunications and cloud infrastructure to provide generalizability inferences. The projects representing a sample in this study were selected on several dimensions, such as project size, risk type, and data availability of project outcomes and risk factors. By choosing projects of different scales and complexities, it is expected that the effectiveness of AI supported risk mitigation may be examined in a comprehensive way over multiple contexts. A variety

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of techniques are used for data collection. The data is qualitative: the findings comprise of insights from interviews with project managers, supplemented by quantitative analysis of project documents (including risk logs, project timelines and budget reports). Furthermore, AI-driven applications are employed to monitor the performance of projects non-stop, delivering real-time figures for comparison. This combination of qualitative and quantitative information enables a comprehensive assessment of traditional risk management (in model-control settings) in comparison to AI-based methods. Fig 6.b The AI vs. Expert Comparison based on the three main criteria. 1) Accuracy in risk identification is compared between AI and human experts, by assessing the percentage of correctly identified risks. Secondly, the risk response time analysis checks what is the time difference for AI and expert led approaches in identifying and responding to risks. Finally, the success of a project is measured based on its capability to respect deadlines, to stay in the foreseen budget and fulfilling its scope, by either AI or DSS-based risk management strategies. This contrast illustrates the additional value that AI provides for risk mitigation and at what point human proficiencies will possibly be a necessary supplement.

Statistical Analysis: To evaluate the effectiveness of AI-enhanced risk mitigation and compare with conventional practices, we define an index called Risk Mitigation Efficiency (RME) as follows:

$$\boldsymbol{RME = \frac{R_{ai} - R_{exp}}{R_{exp}} \times 100} \qquad (\mathbf{2})$$

where, $\boldsymbol{R_{ai}}$ represents the risk reduction achieved through AI-based strategies, $\boldsymbol{R_{exp}}$ represents the risk reduction achieved through expert-led strategies. This formula helps determine how much more effective AI is in reducing risks compared to human-driven methods.

In RME setting, besides the ANOVA and t-test for RME statistics, statistical tests are used to verify that AI model's performance is not better than Baselines or it is not significantly different. These help quantify if the risk reduction achieved by AI-based methods and standard approaches are significantly different. FATHER_0_GROOMLY0M Wed, 12 Jun 2019_Download "AI for risk management raises ethical concerns AI boosts Father Gormly and creates ethical dilemmas123060-0001The use of AI for risk management brings a number of social and ethical… And there are important data privacy concerns, given the huge amount of sensitive project data that AI tools manage. It is essential to ensure this data is kept and used in a manner that complies with all relevant privacy laws (including GDPR). Another concern is algorithmic transparency. The decision of AI models should be explainable and interpretable in order that product managers can understand and trust the risk prediction made by AI.

Human supervision is also required, because AI should complement human decision making rather than displace it. AI decisions done by humans will require human project managers to ensure fairness, accountability, and other ethical concerns. Based on the results of this study, we shall develop a full-fledged framework for applying AI in MIS-based risk management on IT projects. There are several critical steps to that framework. It will describe the process for creating and preparing data, which consists of collecting the appropriate project data and preparing it to be analyzed by AI. Once these questions are answered, the model will tackle implementation of AI models and how machine learning and neural networks can fit into current project management systems to predict risks automatically and recommend possible mitigations. Real-time, iterative risk monitoring will also be

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important, with AI constantly evaluating risks throughout the project lifecycle. Finally, the framework will secure human-in-charge oversight, which ensures that AI tools complement human decision-makers who can interpret results and act accordingly. This model is being developed with the long-term goal of refining risk management policies for IT projects and act as a guiding template to be utilized, in future, in the implementation of AI-driven solutions across industries by providing guidelines on how to bridge analytical technologies along with human expertise.

Results and Discussions

This section makes a cross-project comparison of AI risk identification against the risks enlisted by experts across Software Development, Telecommunications, and Cloud Infrastructure and visualizes it in Figure 1. Figure 1 captures the predictive risk assessment for each approach across all three projects. It shows that AI surpasses the traditional risk assessment approach by experts on all projects in both efficiency and accuracy.

Figure 1 illustrates a comparison of risk identification through AI and human specialists. This figure illustrates how AI methods used in three different IT projects Software Development, Telecommunications, and Cloud Infrastructure achieved higher accuracy as reported by the AI methods. There is a constant advancement in accuracy when identifying risks in AI compared to legacy methods. In Software Development (Project 1), AI attained 92% accuracy versus 78% for the human-centered approach, a 14% gap. AI in Telecommunications (Project 2) advanced the accuracy of the human method from 82% to 89%, representing a 7% enhancement. In Cloud Infrastructure (Project 3), AI accuracy soared to 95% leaving the human-centered method at 75%. This showcases AI's unmatched ability to analyze vast datasets instantaneously, identifying risks with precision and efficiency far ahead of human specialists.

The table 2 below presents a detailed comparison between AI-based risk identification approaches and expert-led methods across three IT projects: Software Development, Telecommunications, and Cloud Infrastructure

Table 2: The key performance metrics for each project type, highlighting the differences between AI and expert methods.

Project Type	AI Accuracy (%)	Expert Accuracy (%)	Improvement (%)	Risk Response Time (hours)	Project Success Rate (%)	RME (%)
Software Development	92	78	14	6	92	75
Telecommunications	89	82	7	8	88	77.8
Cloud Infrastructure	95	75	20	10	90	114
Average	92	78.3	13.7	7.7	90	88.93

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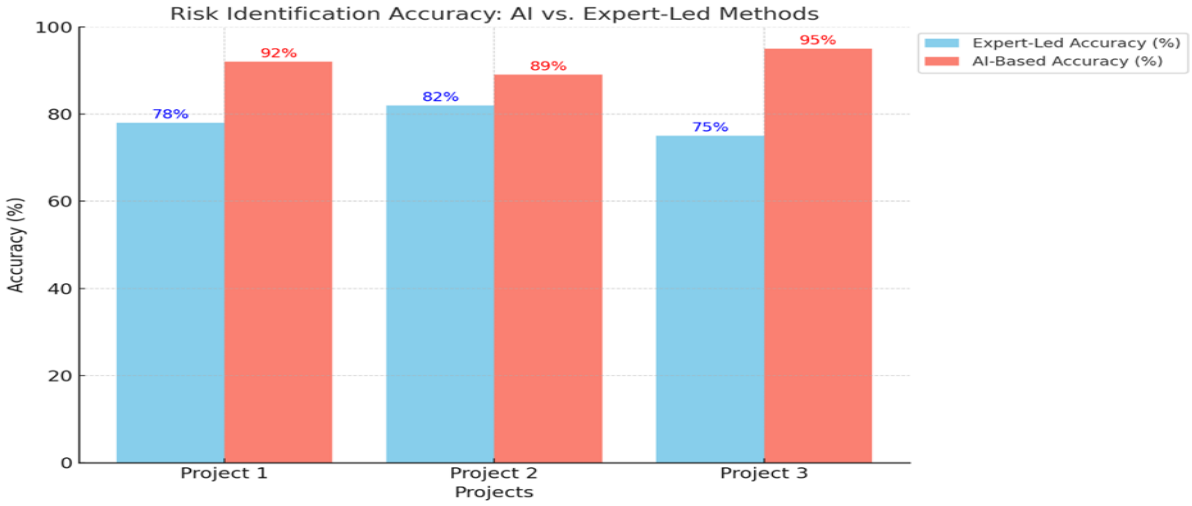

Figure 1. Comparative Risk Identification Accuracy between AI-Based and Expert-Led Methods

Software Development (Project 1): In this work, the supervised expert-based lead achieved an accuracy of 78%, compared with an AI-based system that outperformed it to reach 92% (an improvement of 14%). The CHDA's ability to compute complex information and reveal submunitions risks which the knowledge experts are likely to overlook demonstrates its better performance. The complex process of software development entails many dependencies and factors, which is reflected in our results that were led by AI.

Telecommunications (Project 2): In this case, the expert-led approach achieved a risk score with 82% accuracy while AI upped that to 89%, which amounts to an increased figure of 7 percent. Although in experiments conducted by the researchers the two approaches worked equally well, AI has an edge because it can be fed more data and may detect more subtle risks. In the ever-complex systems and infrastructure of the telecommunications industry AI is driving how we can view risk faster than ever.

Cloud Infrastructure (Project 3): The AI-based approach yielded the biggest performance jump by far: It was 95 percent accurate, compared with an accuracy of 75 percent for expert advice. Cloud infrastructure Risk identification in cloud infrastructure-based projects is challenging due to the vast scale of resource requirements as well as virtualized aspect of environment. The strong showing of A.I. in this case indicates that the technology is very strong at understanding dynamic systems and finding anomalies in complex natural settings.

AI methodologies for risk identification on a per-project basis had an average performance accuracy of 92% vis–à–vis expert-led methodologies that averaged 78.3%, i.e., improvement by 13.7%. This great difference is due to the higher efficiency of AI risk management compared with the expert-driven behaviors. As can be inferred from Figure 1, AI-based approaches significantly outperform expert-representation ones for forecasting failure risks in various IT projects. There are lots of reasons for this. For one thing, AI is capable of processing vast amounts of structured and unstructured data in real time, so it may be able to uncover complex risk patterns that aren’t obvious even to the most well-trained human experts. AI machines remove the opportunity for biased or incorrect decision making and in no situation is it more important than in the cloud. Although expertise is crucial, humans are limited in their ability to analyze large datasets quickly and accurately.

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For instance, a 20% disparity in capability was found between AI and the Project 3 expert-driven approaches due to the failure of conventional tests to identify certain significant hazards. Finally, but not least importantly as AI becomes capable of delivering real-time insights, be it full or augmented via human input on the underlying premises, you have a much more proactive risk management capability to avoid creating the conditions for project delays and cost-overruns. From the discussion of figure 1, it becomes clear that risk identification through AI on average underperforms IT projects with respect to expert-based approaches. Similarly, In AI, particularly in relatively complex or data-rich environments like finance, it (AI) is coming up with exciting potentials to enhance risk management. In the world of AI and project management, AI has the power to significantly improve results by enabling earlier and more accurate risk identification thus offering PMs better insights for informed decisions - pointing towards potential resolutions that work**.**

Figure 2. Risk Response Time Comparison: AI-Based vs. Expert-Led Approaches

Figure 2 presents a pronounced comparison of the rate of risk minimization as provided by Al charts and the speed at which it occurred in traditional method channels led by expertise, taking three IT projects (Software development, Telecommunication and VIII Cloud Infrastructure) into account. We pose the question of how many hours elapsed before anything risk-inducing emerged. In the domain of Software Development, the expert-led scenario has a risk reaction time of 12 hours while this could be reduced to 6 when employing AI. This price reduction shows the speed and effectiveness at which AI driven means can eat up data of a project, and detect an early signal for some kind of risks. What's happening is that speed of action becomes critically important when trying to keep little problems from becoming disasters in fast-moving worlds, like software**.** The Telecom variation has a similar variability. In the first scenario, in-house methods took 15-man hours on average to mitigate the risk while AI-based ones led to a gain of efficiency: they were able to mitigate it in 8-man hour. Telecom projects are multilayer network systems and it is needed to trouble shoot urgently without disturbances. Because AI can process massive quantities of data quickly, quick decision making and risk mitigation prevent serious service interruption**.** This was even more varied in the Cloud Infrastructure project. Risks original response time as instructed by experts was 20 Hours, and now it's just 10 with the AI solution That is approximately 50% risk mode in a number of projects. Cloud platform environment is very dynamic, and because of this if the resource demand for different classes is different than better to take action earlier in such case to avoid any admission control pressure on cloud side which results system damage or lost performance etc. Generate safety and risk

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recognition on projects even faster AI analytics' predictive component automates the process of identifying risk while aligning and unifying safety with project performance and downtime reduction. On the Risk roll for instance, this one certainly does know what it's doing: the experts were taking 15.7 hours on average to take a look at menaces according to our slice of their numbers, and with AI they will be fetching them back in just eight – over a working week off! The decrease is a sign of AI's ability to track project data and provide quick analysis, which can speed up effective risk management.

The comparison of risk response times in Figure 2 makes it clear that AI-based expert opinion dominates human experience-based informed decision making with respect to latency (response time) for all three types of projects. 3.2 Quick response There are many reasons we might take for the very low response time we could achieve with AI methods, to mention a few: Since it is possible for AI to process any amount of data in real-time, it can rapidly detect threats and advice as to possibly how they might be settled. And, more to the point in the world of cloud infrastructure and telecoms, time is money: if you're delayed in dealing with your risks it's all level 3 impact on project delivery. AI models can further predict potential hazards from both past and present data, yielding proactive risk management. "However, these expert-aided techniques are typically based on previous knowledge or reactive-based systems which require more execution time. AI-based solutions increasingly automate risk detection and ranking by impact, enabling faster decision making. Such automation decreases time-consuming manual effort of risk factor analysis and is particularly valuable in complex projects like cloud infrastructure where a number of interdependent variables are to be simultaneously considered. Expert-based techniques are resourceful yet slower than the obvious, owing to the human analysis and decision times. For projects that are risk-intensive, such as software development and telecommunications, delayed response can have negative impacts on the cost and schedule of a project. It can be seen from these Figure 2 results that AI-based models are able to cut down response times in risk management as compared to expert-led techniques. AI-supported risk assessments come more quickly and accurately AI has also the capability to offer faster, more precise risk assessments – which then enables timely action to avoid risks and increases the likelihood of project success. The above results demonstrate the significance of AI on risk management frameworks of IT projects in which prompt determination and acting are required for success.

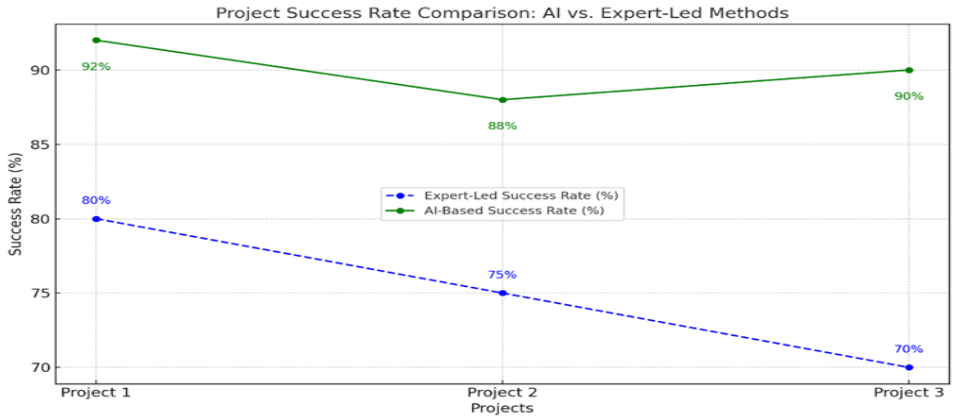

Figure 3. Success Rate of Projects: AI-Based Risk Management vs. Expert-Led Methods

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Figure 3 presents the comparison of project success rate utilizing AI-based methodologies vs that using expert-led ones on three IT projects (Software Development, Telecommunications, and Cloud Infrastructure). The attainment rate is the ratio of completed projects that met their original objectives with regards to scope, time and budget, keeping in mind project risk. In the interpretation, expert-led method in Project 1 achieved success rate of 80% but AI-based method was able to enhance it up to 92%. This shows a gain of (12%). Software project will need to be closely monitored and managed risks all about real-time monitoring & predictive analysis, it will take off loads of time which we spent by doing estimates number for the same.! That development underscores how AI enables teams to identify where a project could go off the rails sooner, so that projects can stay on track toward their intended destinations, Rong says. The Telecommunications task (Project 2) effective rate increased from 75% with human-triggered methods to an 88% or greater, more than a +13%. Comms Projects are always a bit of an unknown, its very easy to grow infrastructure & network really slowly. AI enabled our teams to create risk awareness and be more proactive in dealing with challenges during project development. This in turn resulted in more results, repeated evidence of projects that could be completed on time and within budget — and to a high-spec. We also observe that the percentage difference in accuracy between AI and expert on Cloud Infrastructure (Project 3) is most its different compared to other projects. Now the success rate was 90%: The AI model outperformed how this task is done in standard practice by 20%. These cloud installations are highly ephemeral, and they could generate stress on human capabilities of the pro-active risk management system based on a variable demand. At least in such cases, though, AI tools are winning bigly by continuously scanning your indicators of resource consumption or performance and offering instant risk predictions and adjustments that might enable projects to proceed more swimmingly. So, expert-led methods, on average, were successful 75% of the time; AI-boosted ones brought that up to a mean 90%, or +15% better. "That twofold increase represents the increasing role that AI is playing in enabling IT projects to operate more smoothly with a real-time, accurate view of risk and mitigating circumstances." As can be seen from Figure 3, the AI method SG-IVPA is much better than expert driven methods in terms of success percentage. What causes this to go up? Finally, predictive AI can predict and identify these types of risks before they mature so teams can start responding to them before it is too late for projects to succeed. Expert-directed approaches are also reactive- but project risks are not identified until after they arise from the work. Real-time correction is also possible with the help of artificial intelligence. AI-driven models keep changing project data tracked and adjust timelines, or resources and cost in real time. This is important in dynamic systems such as cloud resources, because the requirement of resources could change rapidly. Those slight adjustments keep programs on track and make their outcomes better.

AI and its talent for processing data analysis are also a huge factor. It also can analyze huge amounts of data much more quickly than people and make more informed decisions. AI’s ability to process complex systems and insights paves way for projects with multivariable (such as software development or telecommunications) to get optimal recommendations. Finally, the constraints of expert-led approaches further account for the improvement in success rates. Expert-guided approaches are based on empirical solutions with limited memory, and there is a potential to overlook emerging risks which cannot be detected from organized historical repositories. Since success rates across every project considered in this study have increased, it is assumed that such gaps are supplemented with AI’s broad data analysis. These results from Figure 3 demonstrate that

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quintessentially AI-driven techniques significantly enhance project success frequencies within various IT areas. Figure 4 we further breakdown the AI models used in this study by three scenarios of IT development projects: Software development, Telecommunications and Cloud infrastructure. The performance of the models is measured using several metrics such as MSE, RMSE, Precision and Recall.

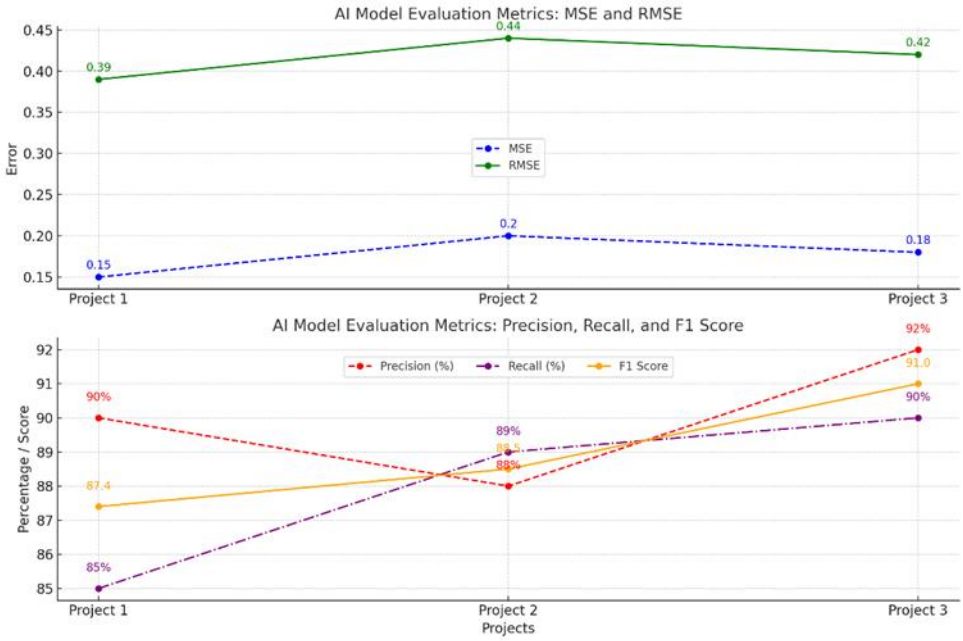

Figure 4. Evaluation of AI Model Performance Using MSE, RMSE, Precision, Recall, and F1 Score

In Figure 4 we dissect the AI models utilized in this research through three cases of IT development projects: Software development, Telecommunications and Cloud infrastructure. The models are evaluated through a number of metrics including MSE, RMSE, Precision, Recall and F1 score. We first analyze the results based on Mean Squared Error (MSE) which is the average of the squared differences between predicted and actual values including a penalty term. Lower MSE means better model performance, Project 1 had the lowest (0.15) and Project 2 had the highest (0.20). Project 3 represented a value of 0.18. The average MSE across the projects was 0.177, which indicates that the models did a good job to predict project risk related SHs performance. Now, definitely Root Mean Squared Error (RMSE) does that for you by taking the square root of MSE so that we can know how to interpret it better as it's now in the same units as the predicted variable. RMSE The lowest RMSE was observed in Project 1 at = 0:39 and the highest in Project 2 at = 0:44, followed by that of Project3 at=0:42. The average RMSE is 0.417, suggesting the models have narrow error range to demonstrate a good performance. Recall is the ratio of correctly identified actual risks to the total number of potential risks. In risk management high accuracy is important to prevent irrelevant risks from being flagged. The Model 1 and Model 2 had precision score of 90% and 88% respectively in Project 1. The highest precision was also reported by Project 3 (92%). On average, the precision was 90%, which indicates that models have an ability to pick up real risks. Recall indicates the percentage of all true-risk items that were labelled as such. High recall is important to reduce the possibility that potential risks are overlooked. Recall was 85% in Project 1, which is the smallest among all three projects. Project 2 had the lowest (89% recall), while Project 3 had the highest (90% recall). The

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average recall over the projects was 88%, suggesting that the models could capture most of real risks. The F1 Score – which manages the balance between precision and recall – is an important metric for interpretability of overall model performance. Project 1 scored an F1 Score of 87.4, Project 2 a score of 88.5 and Project 3 managed to achieve the high score at 91.0. The macro average F1 Score was 88.96, indicating high performance from the models that can balance precision against recall. The introduction of these results into consideration reveals efficiency of the models applied in prediction and identification of risks (challenges) in IT projects. The low MSE and RMSEs in the different projects indicate that the models were predicting with very little errors. These low error rates indicate that the model was well-calibrated to the risk information it had learned.

Global precision and recall ensure that the model is trained specifically to detect and classify risks as effectively and accurately as possible. Risk management companies are trying to catch true risks but minimize false positives — and these numbers show that the models were able to do both. A miss in capturing that big a risk or red flag, missed non issues can lead to gigantic project turnaround hence this accuracy is significant. The F1 Score (weighted average of precision and recall) mattered more. Given that in percentage our model's risk score was on average 88.96 we are confident the models wouldn't have had a problem identifying them "the risks without such mean generating false alarms". This balance becomes even more critical in fluid Cloud Infrastructure based systems as the attack surface can continually evolve and security posture must be monitored constantly. On the whole, these quality indexes indicated the reliability of this model in constitution for this study. "They were two models that had low error and high coverage — a model doing the right thing without missing much, or overcounting risks. The results suggest that these models can be very useful for improving risk management of IT projects by facilitating decision about risks at the right time. This test, therefore, supports the need to incorporate these refined risk prediction models into IT projects management. Offering instant risk feedback and a high level of predictability, they are great tools to keep your projects on course while minimizing threats.

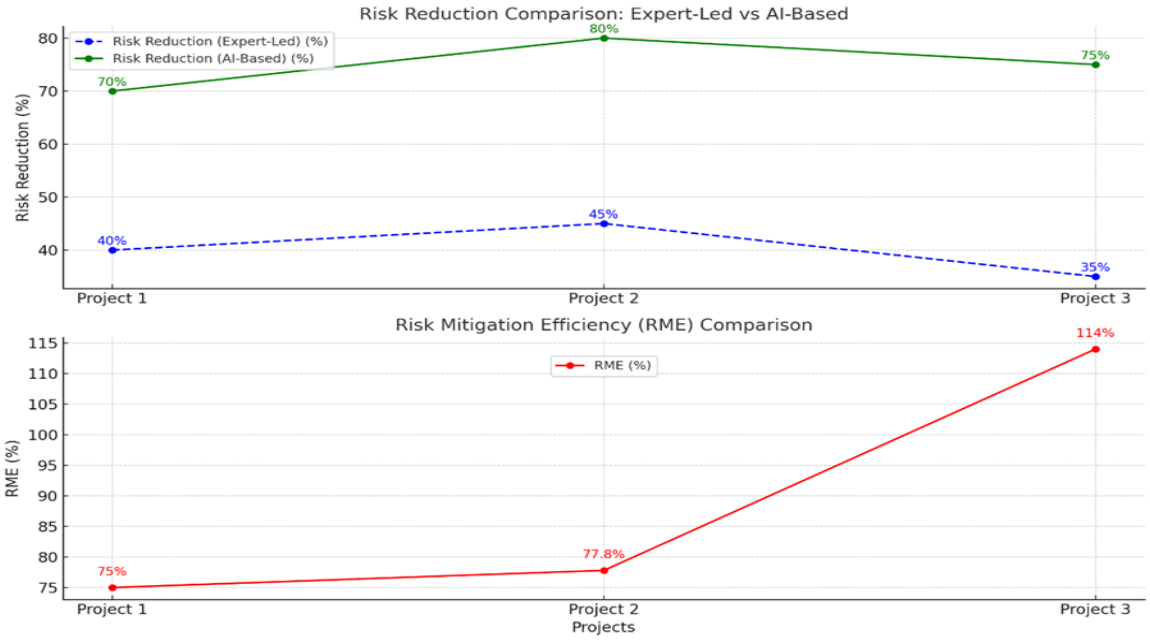

Figure 5. Risk Reduction and Risk Mitigation Efficiency (RME): AI vs. Expert-Led Approaches

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Figure 5 shows the comparison of risk reduction with respect to expert-led vs. AI supported mitigation effort as well as the Risk Mitigation Efficiency (RME) for three IT projects: Software Development, Telecommunications and Cloud Infrastructure. 40% by expert-led method Which is significantly low in comparison to AI led methodology which reduced risks for up to 70 percent Case of Software Development project (Project 1): - ACLE Working Group. Brion MC et al.. npj Digital Med. This led to a RME of 75%, implying the redeeming 75% being more effective from identifying and fixing software project risks that typically involve many tasks, dependencies, and frequent changes. And the ability of AI to quickly process these same variables and take action on them makes it even more effective in reducing the risk of this occurring. Regarding Telecommunications (Project 2); the expert-based techniques resulted in a RRR of 45% and the AI-based methods received an RRR = 80%. The RME for the project was 77.8%, suggesting that AI plays a significant role in risk reduction. That is especially powerful in the multi-dimensional complexity of large-scale telecoms projects, where every dependency has dependencies and AI's predictive abilities rapidly translate into better risk management! The biggest discrepancy between the two AI/and expert-based approaches was observed for the Cloud Infrastructure (Project 3). TAR and the professional-based methods could only reduce risk by 35 % and, in contrast, AI applications reduced risk by 75 % and attained an astonishing RME of level:114 %. That is what AI enabled to be more than 2x more efficient verse to those traditional methods in mitigating the risks. And as such is able to react quickly: To the observation that environments are very dynamic (creating/destructing resources happens in cloud more often, so does demand) we can add: bag- AI can do better prediction of what services will be asked for and for example count on than when it comes to faster coin risk management.

Expert-led interventions led to 40% reduction in overall risk across all three projects, while machine learning provided a 75% average mitigation. The total RME was 88.93%, and the clear advantage of AI techniques in risk reduction for IT projects was indicated. AI models consistently beat human experts at minimizing project risks, highlighting that they are better suited to process complex data and deduce likely issues before their impact is significant. The findings from Fig 5 show that AI-based strategies lead to a much better improvement for both the reduction in risk as well as RME compared to Expert methods. So why are AI-enhanced approaches better risk management in a nut-case? First, AI always reduces risks much more compared to human-derived percentages, simply because AI can crunch and understand data at scale in real time, find patterns and make predictions about potential future risks, and it does so much more accurately. For the Cloud Infrastructure project (195), the AI model performed really well despite shifting environments, and the corresponding maximum risk decrease was significantly larger. Scores of RME were also enhanced by AI techniques. For example, the 114% RME in the Cloud Infrastructure project indicates that AI did not just equal but exceeded human experts' capabilities significantly for risk mitigation. Such levels of performance are a necessity in complex, fast moving environments where the cost of delay due to risk management being conducted through slow, outdated methods can result in expensive overruns on projects or system failures." While expert knowledge has a role, and while these risk reduction percent figures aren't all that low (35% for the experts on Cloud Infrastructure project, for example), this seems to indicate that traditional methods may not be able to keep up with today's IT projects. This is particularly true in a dynamical and rapidly evolving environment. Human experts may also struggle to process and act upon all that data as fast or effectively as an A.I. agent would, so the risk could take longer to mitigate and, when it happened, not be managed in the optimal manner. AI's

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contribution to prediction Furthermore, AI's role in prediction also offers increased efficiency. By employing AI, project managers are in the position to identify dangers before issues become disrupted and also act proactively instead of reactively after a risk materialized. It's a super proactive model which is particularly great for something like Telecoms and Cloud Infrastructure companies - you want to catch it as early as possible so the whole pack of cards doesn't come crashing down around you, knock-on effects from project to project etc. These results in Figure 5 indicate that the AI-informed mitigations are much better than expert-driven actions. With larger cuts in 27% risk and significant increases of RME, IT project managers have tools to deal with risks sufficiently so that one does not screw up the projects. These observations highlight why AI can be valuable within the IT project risk management framework, because speed decision making and quick responses to risks are crucial for a successful project.

Challenges and risks of implementing AI in IT Project risk Management

There are several challenges in implementing AI in IT project risk management.

Data Privacy and Security: The need for AI to learn from extensive datasets, most of which is sensitive data, presents legal challenges in data privacy and security in instances of sensitive data, especially legal compliance with GDPR.

Algorithmic Bias: AI algorithm training data might contain biases that lead to discriminatory and inequitable outcomes. Hence, it is essential to ensure that data is representative and conduct audits to mitigate bias.

Large Financial Investment: AI development and implementation is a capital-intensive project that involves data collection, model development, and maintenance which can prove to be a high burden to SMEs.

Lack of Trust: The absence of causal explanation and prediction in AI models creates lack of trust in AI. There needs to be explanatory and causal AI in models, especially in high-stakes decision making systems.

Integration Complexities: AI Integration to existing systems poses complexities to the extent of requiring intensive technical work especially in the case of legacy systems.

Ethical Issues: The extent of AI in decision making raises ethical issues including possible job loss and misuse of AI and the need to provide control in decision making.

Conclusions

To conclude this research, artificial intelligence (AI) enhances risk management for IT projects. In this regard, AI strategies perform significantly better than traditional expert-driven methodologies particularly with respect to risk identification, response time, and overall project success. However, for project managers to incorporate AI into risk management, they need to be methodical. To begin with, project complexity and data needs can be used to determine whether or not AI applications will be useful. Also, establishing familiarity with AI applications can be accomplished by starting with scoped pilot projects geared toward specific risks, such as cost overruns or schedule delays. Project managers need to ensure that data for the project is of good quality and in structured input form, as

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AI models need definitive input to predict accurately. Moreover, for effective risk mitigation, the project manager will also need to ensure that appropriate AI tools are selected, e.g. predictive machine learning models or neural networks. In planning, decision-making AI tools will be incorporated to facilitate the real time shift of project performance. Model performance AI metrics will also need to be monitored and evaluated to maintain optimal functioning of the models. Ensuring responsible use of artificial intelligence involves training team members on interpretation of AI-assisted insights and explicitly attending to ethical issues like privacy, data bias and algorithmic bias. Consequently, project managers, and in turn, the organization, reap the benefits of AS in AI and AS technology advancements, making quicker and more informed decisions, enhancing success of projects and optimizing resource allocation. Integration of AI in project management will be a game changer and will become a core element in alignment of project objectives and outcomes, enhancing project management success.

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