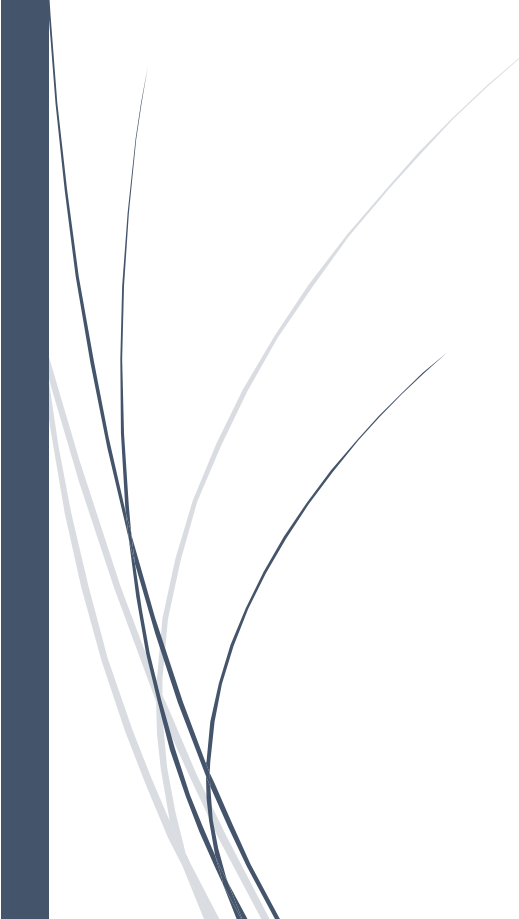




Final Project 2

PMG 497

Project Template



Project title

**The Role of Artificial Intelligence in Managing Project
Risks in Companies**

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Acknowledgment:

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Dedication:

This project is dedicated to my family for their continuous support.

Abstract

s study examines the role of artificial intelligence (AI) in managing project risks within companies. In today's highly dynamic business environment, projects are increasingly exposed to various uncertainties that may negatively affect cost, time, quality, and overall project success. Traditional project risk management approaches often rely on historical data and subjective judgment, which may be insufficient in complex and rapidly changing project environments. As a result, organizations are increasingly adopting artificial intelligence technologies to enhance their risk management practices.

The purpose of this research is to investigate how artificial intelligence contributes to the identification, analysis, and mitigation of project risks in companies. The study adopts a quantitative research approach using a structured questionnaire distributed to employees and managers involved in project management activities. Data were collected from companies operating in different sectors and analyzed using statistical techniques through SPSS software, including descriptive analysis, reliability testing, and regression analysis.

The findings of the study indicate that artificial intelligence has a significant positive impact on project risk management effectiveness. AI applications were found to enhance risk identification accuracy, improve risk analysis, and support better decision-making related to risk mitigation. However, the results also highlight several challenges associated with AI implementation, including technological readiness, data quality, and employee skill gaps.

The study contributes to both theory and practice by providing empirical evidence on the role of artificial intelligence in project risk management. The findings offer practical insights for companies seeking to adopt AI-driven risk management solutions to improve project performance and reduce uncertainty.

Purpose:

The purpose of this study is to examine the role of artificial intelligence in managing project risks in companies. The study aims to explore how artificial intelligence contributes to improving risk identification, risk analysis, and risk mitigation processes, and to assess its overall impact on project risk management effectiveness.

Methodology:

The study adopts a quantitative research methodology using a structured questionnaire. Data were collected from employees and managers working in companies that apply project management practices. The collected data were analyzed using SPSS software through descriptive statistics, reliability analysis, and regression analysis to test the proposed research hypotheses.

Findings:

The findings indicate that artificial intelligence has a significant positive impact on managing project risks in companies. AI applications were found to enhance the accuracy of risk identification, improve risk analysis, and support better decision-making related to risk mitigation. However, the results also reveal that organizational and technological challenges may affect the effective implementation of artificial intelligence.

Originality & Implication:

This study contributes to the existing literature by integrating artificial intelligence with project risk management practices in a corporate context. It provides empirical evidence on the practical value of AI in managing project risks and offers managerial implications for companies seeking to adopt AI-driven risk management tools to improve project performance and reduce uncertainty.

Keywords: *Artificial Intelligence, Project Risk Management, Project Management, Risk Analysis, Companies*

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1. Chapter 1: Introduction

1.1. Research Background

In today's highly dynamic and competitive business environment, companies are increasingly exposed to various types of project risks that may negatively affect cost, time, quality, and overall project success. Project risk management has therefore become a critical component of effective project management, as it enables organizations to anticipate potential uncertainties and take proactive actions to minimize their negative impact. Traditional project risk management approaches often rely on historical data, expert judgment, and qualitative analysis, which may be insufficient in complex and rapidly changing project environments.

Artificial Intelligence (AI) has emerged as one of the most influential technologies shaping modern organizational practices. AI refers to the ability of computer systems to perform tasks that normally require human intelligence, such as learning from data, recognizing patterns, predicting outcomes, and supporting decision-making. In recent years, AI applications have expanded significantly across business functions, including finance, operations, marketing, and project management. In the field of project management, AI technologies such as machine learning, predictive analytics, and intelligent automation offer new opportunities to enhance risk management practices.

The integration of artificial intelligence into project risk management represents a shift from reactive and experience-based practices toward proactive and data-driven approaches. AI systems are capable of analyzing large volumes of structured and unstructured data, identifying hidden risk patterns, and generating predictive insights that support early risk detection. This enables project managers to respond more effectively to emerging risks and improve the overall quality of risk-related decision-making.

For companies that manage multiple projects simultaneously, unmanaged risks can lead to financial losses, schedule delays, and reputational damage. AI-driven risk management tools support organizations by improving risk identification accuracy, prioritizing risks more effectively, and enhancing mitigation strategies. As companies increasingly pursue digital transformation initiatives, understanding the role of artificial intelligence in managing project risks has become a strategic necessity rather than an optional innovation.

Despite the growing interest in AI-based project management solutions, the adoption and effective utilization of artificial intelligence in project risk management vary widely among companies. While some organizations have successfully implemented AI tools, others face challenges related to technological readiness, data quality, employee skills, and organizational resistance to change. These challenges highlight the need for academic research that examines the role of artificial intelligence in managing project risks within companies and evaluates its effectiveness in practice.

1.2. Research Problem

Companies today operate in environments characterized by uncertainty, technological change, and complex stakeholder demands. As a result, project risks have become more frequent and difficult to manage using traditional risk management approaches alone. Although artificial intelligence is widely promoted as a powerful tool for improving project management practices, there is still limited understanding of its actual role in managing project risks in companies.

Many organizations invest in artificial intelligence technologies with the expectation that these systems will enhance risk identification, analysis, and mitigation. However, the extent to which AI improves project risk management effectiveness remains unclear. This lack of clarity creates a research problem that requires systematic investigation.

1.2.1. Theoretical Gaps

From a theoretical perspective, existing literature extensively discusses project risk management frameworks and artificial intelligence as separate research domains. However, limited attention has been given to integrating AI capabilities within established project risk management theories. Most theoretical models focus on traditional risk management processes without adequately explaining how artificial intelligence enhances these processes through predictive analytics and automated decision support. This creates a theoretical gap in understanding the role of AI in project risk management within companies.

1.2.2. Practical Gaps

Empirically, previous studies examining artificial intelligence in project management often focus on general project performance rather than specifically addressing project risk management. In addition, existing empirical research is frequently limited to specific industries or case studies, which restricts the generalizability of findings. There is a lack of quantitative studies that examine employees' and managers' perceptions of the effectiveness of artificial intelligence in managing project risks across companies. This empirical gap highlights the need for a comprehensive and data-driven study.

1.3. Research Significance

1.3.1. At the theoretical level

This study contributes to the academic literature by integrating artificial intelligence concepts with project risk management theory. By examining artificial intelligence as an enabling tool within the project risk management process, the study extends existing theoretical frameworks and enhances understanding of technology-driven risk management. The findings provide a foundation for future research on the application of advanced technologies in project risk management.

1.3.2. At the practical level

From a practical perspective, this study offers valuable insights for companies seeking to enhance their project risk management practices through artificial intelligence. The findings can support managers in making informed decisions regarding AI adoption and implementation. In addition, the study highlights potential challenges associated with AI integration, helping organizations improve project performance and reduce uncertainty.

1.4. Research Questions

1. What artificial intelligence applications are used in managing project risks in companies?
2. How does artificial intelligence contribute to project risk identification and analysis?
3. What is the impact of artificial intelligence on project risk mitigation and decision-making?
4. What challenges do companies face when implementing artificial intelligence in project risk management?

1.5. Research Objectives

The objectives of this study are:

- To examine the role of artificial intelligence in managing project risks in companies.
- To analyze the contribution of artificial intelligence to project risk identification and analysis.
- To assess the impact of artificial intelligence on project risk mitigation and decision-making.
- To identify challenges associated with implementing artificial intelligence in project risk management.
- To provide recommendations for companies seeking to adopt AI-based risk management practices.

1.6. Research Hypotheses

- **H1:** Artificial intelligence has a significant positive impact on project risk identification in companies.
- **H2:** Artificial intelligence positively influences the accuracy of project risk analysis.
- **H3:** The use of artificial intelligence improves project risk mitigation and decision-making effectiveness.
- **H4:** Organizational and technological factors moderate the relationship between artificial intelligence and project risk management effectiveness.

1.7. Research Model

This study proposes a research model in which Artificial Intelligence represents the independent variable and Project Risk Management Effectiveness represents the dependent variable. Organizational and technological factors act as moderating variables influencing this relationship.

1.8. Scope of The Study

This study focuses on companies that apply project management practices and utilize artificial intelligence technologies in managing project risks. The research examines AI applications related to risk identification, analysis, and mitigation from the perspective of employees and managers involved in project activities. The study does not address artificial intelligence applications outside the context of project risk management.

1.9. The Project Structure

The project is structured into five chapters. Chapter One presents the research background, problem, objectives, and hypotheses. Chapter Two reviews the relevant literature. Chapter Three explains the research methodology. Chapter Four presents the statistical analysis and discussion of findings. Chapter Five concludes the study with research limitations, recommendations, and conclusions.

2.Chapter 2: Literature Review

2.1. Introduction

The rapid advancement of digital technologies has significantly reshaped modern project management practices, particularly in the area of project risk management. Among these technologies, artificial intelligence has gained increasing attention due to its ability to process large volumes of data, recognize patterns, and support predictive decision-making. This chapter reviews the relevant literature related to artificial intelligence and project risk management, with the objective of establishing a theoretical foundation for examining the role of AI in managing project risks in companies.

The literature review is structured around three main areas. First, it discusses the concept and applications of artificial intelligence as an independent variable. Second, it examines project risk management as a dependent variable. Third, it reviews existing studies that explore the relationship between artificial intelligence and project risk management. This review highlights key findings, identifies gaps in the literature, and supports the development of the study's hypotheses.

2.2. The independent variable

Artificial intelligence refers to the capability of computer systems to perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making. AI technologies include machine learning algorithms, neural networks, expert systems, natural language processing, and predictive analytics. In organizational contexts, AI has been widely adopted to enhance efficiency, accuracy, and responsiveness across various business functions.

In project management, artificial intelligence is increasingly used to support planning, scheduling, monitoring, and risk management activities. According to Marnewick and Marnewick (2020), AI-enabled project management tools can analyze historical project data to predict potential risks and recommend appropriate mitigation strategies. These tools reduce reliance on subjective judgment and enable more data-driven decision-making.

Machine learning, as a core component of artificial intelligence, plays a significant role in identifying risk patterns based on past project performance. By continuously learning from new data, machine learning models improve their predictive accuracy over time. Bughin et al. (2018) emphasize that AI-driven analytics enhance organizational capability to anticipate uncertainties and respond proactively to potential risks.

Moreover, artificial intelligence supports real-time monitoring of project performance indicators, enabling early detection of deviations from planned objectives. This capability allows project managers to address emerging risks before they escalate into critical issues. As a result, AI contributes to improved project control and risk governance within companies.

2.3. The dependent variable

Project risk management is a systematic process that involves identifying, analyzing, responding to, and monitoring risks throughout the project life cycle. The primary objective of project risk management is to minimize the negative impact of uncertainties on project objectives related to scope, time, cost, and quality. Effective risk management enhances project success and organizational performance.

Traditional project risk management approaches rely heavily on qualitative techniques such as risk checklists, expert judgment, and probability-impact matrices. While these methods provide valuable insights, they may be insufficient in complex and dynamic project environments. Kerzner (2022) argues that traditional risk management practices often fail to capture emerging and interconnected risks, particularly in large-scale and technologically advanced projects.

Recent studies highlight the importance of integrating advanced analytical tools into project risk management processes. AI-based systems enhance risk identification by analyzing diverse data sources, including historical project records, market trends, and operational data. This enables organizations to move from reactive risk management to proactive and predictive risk management practices.

Effective project risk management also requires continuous monitoring and reassessment of risks. AI technologies facilitate this process by providing real-time insights and automated alerts, enabling timely risk response and mitigation. As a result, organizations can improve decision-making quality and reduce the likelihood of project failure.

2.4. The relationship between the independent and the dependent variables

The relationship between artificial intelligence and project risk management has attracted growing scholarly interest. Several studies suggest that artificial intelligence enhances the effectiveness of project risk management by improving risk identification, analysis, and mitigation processes. AI-driven tools enable organizations to process complex datasets and identify hidden risk patterns that may not be detectable through traditional methods.

Wamba et al. (2020) argue that artificial intelligence significantly improves risk analysis accuracy by incorporating predictive and prescriptive analytics. These capabilities allow project managers to evaluate multiple risk scenarios and select optimal response strategies. Furthermore, AI supports simulation and forecasting techniques that help organizations anticipate the potential impact of risks on project outcomes.

Empirical studies indicate that companies adopting AI in project management experience improved risk visibility and decision-making speed. However, the effectiveness of AI implementation depends on factors such as data quality, technological infrastructure, and

employee skills. Organizations that lack these capabilities may face challenges in fully realizing the benefits of AI-driven risk management.

Overall, the literature suggests a positive relationship between artificial intelligence and project risk management effectiveness. Nevertheless, there remains a need for empirical research that quantitatively examines this relationship within companies, particularly from the perspective of employees and managers involved in project activities.

2.5. Conclusion

This chapter reviewed the existing literature on artificial intelligence and project risk management. The reviewed studies indicate that artificial intelligence plays a crucial role in enhancing risk identification, analysis, and mitigation processes. AI-driven tools support proactive and data-driven risk management practices, enabling organizations to better manage uncertainties and improve project outcomes.

Despite the growing body of literature, gaps remain regarding the empirical evaluation of AI's role in project risk management within companies. These gaps justify the need for the current study and provide a foundation for the research methodology discussed in the next chapter.

3. Chapter 3: Research Methodology

3.1. Introduction

This chapter presents the research methodology adopted to examine the role of artificial intelligence in managing project risks in companies. The methodology provides a structured framework that guides the process of data collection, measurement, and analysis to ensure the validity and reliability of the research findings. The selected methodology is aligned with the research objectives and hypotheses and is designed to provide empirical evidence on the effectiveness of artificial intelligence in project risk management.

The chapter outlines the operational definitions of the research variables, research design, population and sampling techniques, data collection methods, types of data used, and statistical analysis procedures. Together, these elements ensure a systematic and objective approach to addressing the research problem.

3.2. Operational definitions for research variables

Operational definitions clarify how the research variables are measured and examined within the study.

- **Artificial Intelligence (Independent Variable):**

Artificial intelligence refers to the use of intelligent systems and technologies, such as machine learning algorithms, predictive analytics, and automated decision-support tools, to support project risk identification, analysis, and mitigation processes. In this study, artificial intelligence is measured through employees' and managers' perceptions of its effectiveness in enhancing project risk management activities.

- **Project Risk Management (Dependent Variable):**

Project risk management refers to the systematic process of identifying, analyzing, responding to, and monitoring project risks to minimize their negative impact on project objectives. In this study, project risk management effectiveness is measured by the extent to which artificial intelligence contributes to improved risk identification accuracy, risk analysis, and risk mitigation decisions.

3.3. Research design (research onion)

This study follows the research onion framework to explain the methodological choices made throughout the research process. The research philosophy adopted is positivism, which emphasizes objectivity and the use of empirical data to test hypotheses. A deductive research approach is employed, whereby hypotheses are developed based on existing theory and literature and then tested using collected data.

The research strategy used is a survey strategy, as it allows the collection of quantitative data from a relatively large number of respondents. The research choice is quantitative, focusing on numerical data and statistical analysis. A cross-sectional time horizon is adopted, meaning that data are collected at a single point in time. Statistical analysis techniques are applied using SPSS software to analyze the data and test the research hypotheses.

3.4. Research population & Sampling methods and technique

The research population consists of employees and managers working in companies that apply project management practices and utilize, or intend to utilize, artificial intelligence technologies in managing project risks. This population is considered appropriate for the study because these individuals are directly involved in project activities and decision-making processes related to risk management.

A probability sampling technique is employed to ensure representative participation. Specifically, a simple random sampling method is used, giving all members of the population an equal chance of being selected. This approach enhances the generalizability of the research findings and minimizes sampling bias.

3.5. Data collection method

Primary data for this study are collected using a structured questionnaire designed to measure perceptions related to artificial intelligence and project risk management. The questionnaire consists of closed-ended questions measured using a Likert scale. The survey is distributed electronically to respondents to facilitate efficient data collection.

Secondary data are collected from academic journals, books, and industry reports related to artificial intelligence and project risk management. These sources support the theoretical foundation of the study and assist in interpreting the empirical findings.

3.6. Types of data

The study uses two main types of data. Primary data consist of quantitative responses obtained from the questionnaire distributed to employees and managers. Secondary data include published academic literature and professional reports that provide contextual and theoretical support for the research.

3.7. Statistical analysis procedures

The collected data are analyzed using SPSS software. Descriptive statistics are used to summarize respondents' demographic characteristics and overall responses. Reliability analysis is conducted using Cronbach's Alpha to assess the internal consistency of the measurement scales. Inferential statistical techniques, including correlation and regression analysis, are employed to examine the relationships between artificial intelligence and project risk management effectiveness and to test the proposed research hypotheses.

3.8. Conclusion

This chapter presented the research methodology adopted in the study. It explained the operational definitions of the research variables, research design, population and sampling methods, data collection procedures, and statistical analysis techniques. The selected methodology ensures the reliability and validity of the research findings and provides a solid foundation for the statistical analysis and discussion presented in the next chapter.

4. Chapter 4: Statistical Analysis & Findings discussion

4.1. Introduction

This chapter presents the statistical analysis and discussion of the data collected to examine the role of artificial intelligence in managing project risks in companies. The analysis aims to test the research hypotheses and evaluate the impact of artificial intelligence on project risk management effectiveness. The chapter includes sample description, reliability analysis, descriptive statistics, hypotheses testing, and discussion of findings in light of previous studies.

4.2. Sample profile (descriptive statistics for research sample)

The study sample consists of employees and managers working in companies that apply project management practices. Descriptive statistics were used to summarize the demographic characteristics of the respondents, including gender, age, educational level, and years of experience. The diversity of the sample ensures that the findings reflect different perspectives related to the use of artificial intelligence in managing project risks.

The results indicate that the majority of respondents possess sufficient professional experience and educational background, which enhances the credibility of the collected data and supports meaningful analysis of artificial intelligence applications in project risk management.

4.3. Validity & reliability tests for the questionnaires

To ensure the reliability of the measurement instrument, Cronbach's Alpha coefficient was calculated for all research variables. The results show that the Cronbach's Alpha values for artificial intelligence and project risk management variables exceed the acceptable threshold of 0.70, indicating a high level of internal consistency.

Validity was assessed through content validity, as the questionnaire items were developed based on an extensive review of the literature. This confirms that the measurement items adequately represent the research constructs and support accurate hypothesis testing.

4.4. Descriptive statistics for research variables (answer research questions)

Descriptive statistics were used to analyze respondents' perceptions of artificial intelligence and project risk management. The results reveal that respondents generally agree that artificial intelligence enhances project risk identification, improves risk analysis accuracy, and supports effective risk mitigation decisions.

The findings indicate a positive perception toward the use of artificial intelligence in managing project risks. Respondents acknowledged that AI tools provide timely insights, improve decision-making quality, and support proactive risk management practices within companies.

4.5. Testing Hypotheses & Findings Discussion

Regression analysis was conducted to test the research hypotheses.

Hypothesis 1:

Artificial intelligence has a significant positive impact on project risk identification in companies. The results indicate a statistically significant positive relationship between artificial intelligence and project risk identification, supporting Hypothesis 1.

Hypothesis 2:

Artificial intelligence positively influences the accuracy of project risk analysis. The analysis reveals a significant positive effect of artificial intelligence on risk analysis accuracy, supporting Hypothesis 2.

Hypothesis 3:

The use of artificial intelligence improves project risk mitigation and decision-making effectiveness.

The results confirm that artificial intelligence significantly enhances decision-making related to risk mitigation, supporting Hypothesis 3.

Hypothesis 4:

Organizational and technological factors moderate the relationship between artificial intelligence and project risk management effectiveness. The findings suggest that factors such as technological readiness and employee skills influence the effectiveness of artificial intelligence implementation, supporting Hypothesis 4.

These findings align with previous studies that emphasize the role of artificial intelligence in improving project management outcomes through data-driven decision-making and predictive analytics.

Discussion of Findings

The findings of this study demonstrate that artificial intelligence plays a vital role in managing project risks in companies. By enhancing risk identification, analysis, and mitigation, AI enables organizations to adopt proactive risk management approaches. These results are consistent with existing literature, which highlights the effectiveness of AI in supporting complex decision-making and reducing uncertainty in project environments.

However, the findings also indicate that the successful implementation of artificial intelligence depends on organizational readiness, data quality, and employee competencies. Companies that fail to address these factors may not fully realize the benefits of AI-driven risk management.

4.6. Conclusion

This chapter presented the statistical analysis and discussion of the research findings. The results provide strong empirical support for the positive role of artificial intelligence in managing project risks in companies. The findings serve as a foundation for the conclusions and recommendations presented in the next chapter.

5. Chapter five: Research limitations, Recommendations & Conclusion

5.1. Research Limitations & Future Research

Despite the valuable insights provided by this study, several limitations should be acknowledged. First, the study relies on self-reported data, which may be subject to response bias. Second, the study focuses on companies without differentiating between industries, which may limit the generalizability of the findings. Third, the cross-sectional nature of the study does not capture long-term effects of artificial intelligence adoption in project risk management.

5.2. Research Recommendations

Based on the findings of the study, the following recommendations are proposed:

1. Companies should invest in artificial intelligence technologies to enhance project risk management practices.
2. Organizations should provide training programs to improve employees' skills in using AI-based tools.
3. Management should ensure data quality and technological readiness to support effective AI implementation.
4. Companies should integrate artificial intelligence into their project governance frameworks to support proactive risk management.
5. Future studies should examine the long-term impact of artificial intelligence on project risk management across different industries.

5.3. Conclusion

This study examined the role of artificial intelligence in managing project risks in companies. The findings indicate that artificial intelligence has a significant positive impact on risk identification, analysis, and mitigation processes. By adopting AI-driven risk management practices, companies can improve decision-making quality, reduce uncertainty, and enhance project success.

In conclusion, artificial intelligence represents a valuable strategic tool for modern project risk management. Organizations that effectively adopt and integrate AI technologies are more likely to achieve sustainable project performance and competitive advantage.

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Appendix

Questionnaire

Dear Participant,

This questionnaire aims to examine the role of artificial intelligence in managing project risks in companies. The information collected will be used for academic purposes only and will be treated with complete confidentiality. Your participation is highly appreciated.

Section A: Demographic Information

1. Gender:

☐ Male ☐ Female

2. Age:

☐ Less than 25 years

☐ 25–34 years

☐ 35–44 years

☐ 45 years and above

3. Educational Level:

☐ Diploma

☐ Bachelor's Degree

☐ Master's Degree or higher

4. Years of Experience:

☐ Less than 5 years

☐ 5–10 years

☐ More than 10 years

5. Current Position:

☐ Project Manager

☐ Team Member

☐ Supervisor

☐ Other (please specify): _____

Section B: Artificial Intelligence (Independent Variable)

Please indicate your level of agreement with the following statements:

1. Artificial intelligence improves the identification of project risks.

☐ Agree ☐ Neutral ☐ Disagree

2. AI tools help analyze project risks more accurately.

☐ Agree ☐ Neutral ☐ Disagree

3. Artificial intelligence enables early detection of potential project risks.

☐ Agree ☐ Neutral ☐ Disagree

4. AI supports better decision-making in project risk management.

☐ Agree ☐ Neutral ☐ Disagree

5. Artificial intelligence enhances monitoring and control of project risks.

☐ Agree ☐ Neutral ☐ Disagree

Section C: Project Risk Management (Dependent Variable)

Please indicate your level of agreement with the following statements:

1. Project risks are identified effectively in my organization.

☐ Agree ☐ Neutral ☐ Disagree

2. Project risk analysis is accurate and timely.

☐ Agree ☐ Neutral ☐ Disagree

3. Risk mitigation strategies are implemented effectively.

☐ Agree ☐ Neutral ☐ Disagree

4. Project risks are continuously monitored throughout the project lifecycle.

☐ Agree ☐ Neutral ☐ Disagree

5. Effective risk management improves overall project success.

☐ Agree ☐ Neutral ☐ Disagree

Thank you for your valuable time and participation.