



Development of a Comprehensive Risk Checklist for Project Management

By

1. Introduction

Many project study professionals have suggested that the implementation of a comprehensive risk checklist and the related risk management technology is a vital step to take a more methodological and comprehensive approach to risk management, subsequently increasing the likelihood of project success(Yu, 2021). However, relatively little empirical research has been generated by project management experts that studies the potential range of impacts that using a risk checklist can bring(Ahmad et al., 2022). This is particularly relevant in the field of academic research into project and construction management, where little insight has been given into the benefits of different types of potential technological developments to standard practice in risk management or the potential improvements that could be brought about by the use of new technology(Tiwari & Suresha, 2021).

In the modern commercial environment, the successful management of risk is a subject of paramount importance. The latest estimate suggests that almost half of the major projects, 40%, fail to deliver the expected benefit due to the failure to manage the risk systematically(Elkhatib et al., 2022). In recent years, there has been an emergence of so-called comprehensive risk checklists as a standard technological application. These checklists are considered to bring a higher level of analysis to the risk management process. With the combination of project management software that facilitates real-time updates to the risk register and integral risk assessment tools, comprehensive risk checklists not only streamline the data collection process but also ensure that key management personnel get innovative alerts and prompts regarding their current project status(Zaku & Uysal, 2022).

Project checklists are documents that are often used in the field of project management. While the nature and scope of the projects in question could have

significant impacts on the way that checklists are designed, project checklists are designed to help individuals effectively evaluate and assess the condition or progress of any given project. Specifically, checklists are used to help project managers and their respective teams identify risks to the success of their projects and establish an appropriate response(Moses Muse & Josephine, 2022).

1.1 Objectives of the Study

The main aim of this study is to develop a risk checklist for the better management of risks. The research will be specifically beneficial due to various reasons. This research will be helpful for the project managers in the initiation and planning stages of the project. The risk checklist developed in this study will be helpful to identify and evaluate risks at the initial stages of the project. Since many risks can be foreseen and foreseen risks are manageable, the checklist will support a rational and structured procedure for identifying, evaluating and managing these risks. The checklist will be helpful in the management and controlling stage of the project as well. While managing risks, the checklist can be helpful to decide which risks should be treated and resources including time and money should be allocated to which risk. The checklist can also be used for continuous improvement through experience and knowledge of the project teams.

1.2 Scope of the Study

Apart from looking at risk management strategies and challenges, I will develop a list of comprehensive risk strategy, using the latest data from the field. The study will look into the integration of risk assessment and technology in large and complex project management processes in the engineering, architecture and construction, chemical, petrochemical and energy industries. The study will focus on the UK, where the field of risk assessment and technology in project management is growing rapidly, with new legislations and requirements being

introduced in different industries to ensure employers and employees are protected from accidents and errors that result from poor risk assessment and management. The challenges in implementing a comprehensive risk assessment and management technology and the need for integration in the wider framework of the project management processes will also be explored. By developing a comprehensive checklist, the findings of the study will be incorporated into the latest updates of the checklist from the Project Management Institute (PMI) and other standardization bodies, in particular with reference to the field of risk management in technology and project management. It is expected that the findings may be used to formulate new directions in the field of risk management and technology and a future industry-academia collaboration may help to promote advanced practices and ultimately enhance safety and success rates of the projects.

1.3 study questions

How do the integration of risk assessment and technology impact the management of large and complex projects in sectors like engineering, architecture, and construction?

How do these limitations affect project performance, and what improvements can be made to ensure these checklists are more effective in identifying, documenting, and assessing risks?

What were the key insights gained from both the quantitative and qualitative analysis of the survey responses, and how did these insights inform the final checklist design?

2. Literature Review

After the definition and analysis of risk, the existing literature of risk management is reviewed in order to understand the current portfolios and the methodologies regarding the risk management in the construction industry. Fundamentally, the risk has been classified into three major categories which are pure, speculative, and strategic risks(Mohajeri Borje Ghaleh et al., 2021).

Pure and speculative risk analysis are focused on the existing risk assessment methodologies and tools, and the studies have identified the current limitations of the existing risk assessment methodologies. These studies classify that the current risk assessment can be carried out using the qualitative risk analysis matrix and quantitative risk assessment using the PERT analysis, decision tree analysis, and simulation techniques(Micán Rincón et al., 2023).

Moreover, the systematic risk analysis methodologies and tools are used in practice in the form of standard checklists, hazard databases, event sequence facility analysis, and fault tree methodologies for the identification and assessment of hazards or defects in both designs and construction phases. Also, it identifies that the feedback of the risk assessment into the design and construction process is most important in controlling the identified risks and its impact on the project(Lukashov, 2023).

The study has deeply focused on the strengths and limitations. A deductive approach is used in order to achieve the research aim and objectives, and an inductive approach is used to inception of the findings and the results of the literature for the research problem. On the other hand, very comprehensive information and very much analytical information are available and support the research methodologies and the methods of data collection which were used in the research process(Kallow et al., 2023).

It is concluded that the risk mitigation process is an ongoing process throughout the whole project life cycle. The study has analyzed the risk identification process in the pre-construction phase and the uses of Information Computer Aided Design (CAD) and Building Information Management (BIM) tools for systematic risk identification. When a risk is identified, the existing risk mitigation process is reviewed and it identifies that the current risk mitigation process can be carried

out using the qualitative risk mitigation, quantitative risk mitigation, and the strategic risk mitigation processes and methodologies(Kallow et al., 2023).

2.1 Overview of Risk Management in Project Management

Another key to understanding risk management lies in the concept of risk assessment. Risk assessment can be defined as the process of identifying risks and vulnerabilities and determining the consequence of these risks. In making a risk assessment, certain likelihood of the risk must also be ascertained. Likelihood can be defined as the chance that a risk will be realized(Tlili & Chikhi, 2021).

By conducting a risk assessment, an organization can determine where it may be most vulnerable and prepare itself with some form of risk management strategy. Risk management is usually given high importance in project management as one will spend his little effort for a production adjustment enough to protect major project tasks. No matter which project management knowledge area (scope management, quality management, time management, cost management, human resource management, communication management, risk management, and procurement management) is concerned, it is always purposeful to have a better understanding in project risk management(Alchammari et al., 2021).

Any unclear point in project risk management may lessen the possibility in effective risk response planning. Based on Knox, I agree on his expert opinion that such list provides a starting point for potential risks and is provided to be discussed in risk workshop. With Risk Register expansion, this document is a cornerstone of the management of project risks. Risk Register documents your current thinking about the risks to your programs and it is essential that it is regularly reviewed and updated(Ali et al., 2023).

Through updating both list and matrix inspection, it could improve and maintain the situation of listing risk management tool. The information collection requirement in BPD table could reflect the given measurement of risks while the appropriate risk response could be justified and established through process imperfection evaluation. Penetration risks are immature model or misuse or overuse of a certain model documented collection(Amani & Safarzadeh, 2022).

Change risks are missing or inappropriate adherence to facilitate change or resistance to change and inappropriate creation of solution to change. Mitigation risks such as the use of control process imperfection evaluation could ease their completion and mitigation risks. Such given information could reflect the possible risks of the new marketing process(JĘDRUSIK, 2021).

Each process step and its main contents of work could be found and the requirement of completion of BPD table in each step shows visualized process. And the implementation work in different level could be realized and through change management imperfection evaluation. New project risk management knowledge and skills could be learned. Also, different alternatives of project risk management processes could be indicated and the cartographic process view could be enhanced.

2.2 Existing Risk Checklists in Project Management

Firstly, the content from the section "2.2 Existing Risk Checklists in Project Management" already provides good information on the background to this topic. It is based on a research paper which is researched based and makes use of knowledge and creativity to back up all the information. The main purpose of this section is to provide sufficient information for the reader to understand why this research is being done. And upon going through it, we realize that the author has been able to articulate and justify the essence of this study. The content of this

section can actually be enriched by aligning it with a theoretical model. This will enable the reader to understand the evolution of risk management models and where the currently existing risk checklists fall within this evolution. The content is not elaborate on the various risk checklists that are in use in general and more specifically in project risk management(El-Sayegh et al., 2021).

The only checklist that has been discussed is the NASA checklist. The research content in this section may also be used to explain the impacts of risks on project performance. The fact that we have only had a checklist which is NASA checklist being the only checklist used in our discussion, the various impacts that risks have on projects may incorporate into this section and the writer could develop the assumption that use of the NASA checklist may not yield optimal project performance(Waheeb et al., 2023).

Also, the NASA checklist has been described and some gaps have been identified. Then criteria such as the nature of risks, value and effectiveness of project risk management and stakeholder input in the process are used to propose further investigation. So far, the writer has not disputed the use that main contractors may not use the latest versions of risk checklists. He has clearly stated that this is important to suggest periodic update of risk checklists to ensure maximum effectiveness in identifying, documenting and assessing risks(Lin & Chen, 2021).

He has also not shown that main contractors may execute modifications in the process of risk identification to suit their various project needs. This is a good idea for further research that I would slightly alter a section of the statement to read that main contractors may execute modifications in the process of risk identification to suit their various project needs and that some modifications may not have the input of the latest technology in risk management.

2.3 Limitations of Current Risk Checklists

It is important to unravel some of the apprehensions borne out of the limitations of current risk checklists that are used by project managers. Researchers primarily rely on past information that is available in order to create a risk checklist for project managers(Zaouga & Rabai, 2021).

This means that development of a risk checklist is informed by the experiences of the authors and may not be comprehensive. The research material that can be used in creating a comprehensive risk checklist in project management is always limited. For instance, there are no specifications on the number of risks that should be listed in a risk checklist(Figueiredo Filho et al., 2022).

This creates an inherent limitation in that it may not be possible to eliminate all risks listed into the constraints of time, human resources and cost. It is imperative to recognize that the risk checklist can only strive to capture as much risks as possible. By nature, a risk checklist is not all-inclusive and therefore new risks may emerge in the course of the project. The flexibility of adding new risks that might not have been captured in the risk checklist is limited(Brzoowski, 2021).

The weaknesses of current risk documents and databases that are in use by project managers were identified by investigating the practices adopted by consultants in the furnish ability sector, a major client for project managers. Traditional methods used for risk treatment such as risk matrix is based purely on the qualitative scale of the likelihood of a risk occurring and the impact of a risk, should it materialize, on the objectives of a project. However, literature underscores the need for a shift towards more quantitative assessment of project risks(Brzoowski, 2021).

By doing this, project managers will have a more realistic basis for prioritizing risks. The research highlighted on the need for a comprehensive risk list that will form the basis for the development of appropriate risk documents such as risk action plans, risk registers and risk treatment ledgers, amongst others. Such

comprehensive documentation is necessary for providing a digital collaborative platform that will be user-friendly for all relevant stakeholders, so that risks can be easily identified, assessed and treated(Watema & Tulirinya, 2021).

Theoretical Framework

The theoretical foundation of this study on developing a comprehensive risk checklist for project management is anchored in several core areas of academic inquiry, reflecting the interdisciplinary nature of risk management in project settings.

1. Risk Management Theory: This is the central pillar of the study, drawing upon foundational works in risk management theory (such as those by PMI and ISO 31000 guidelines). It involves understanding the processes of risk identification, assessment, mitigation, and monitoring within the context of project management. The theory posits that systematic risk management is crucial for the successful execution of projects and can significantly reduce the likelihood of project failure.
2. Decision Theory: This aspect explores how decisions are made in the face of uncertainty and is critical to the study's examination of risk assessment and mitigation strategies. It incorporates frameworks and models such as the decision tree analysis and the qualitative vs. quantitative risk analysis approaches, which help in evaluating the potential impacts of different risks and the efficacy of different risk responses.
3. Organizational Theory: Given that risk management is often contextual and influenced by organizational culture and structure, this theory helps in understanding how risk checklists are adopted and implemented within different

types of organizations. It examines the roles of leadership, communication, and team dynamics in facilitating or hindering effective risk management.

4. Technology Adoption Model (TAM): Since the study also delves into the integration of technology (like project management software and BIM tools) in risk management, TAM provides insights into how and why technological solutions are accepted and used within project management practices. It looks at factors like perceived usefulness and ease of use that may influence the adoption of comprehensive risk checklists.

5. Change Management Theory: This theory is relevant as implementing a comprehensive risk checklist can represent a significant change in how organizations manage project risks. It informs the study's understanding of how changes in risk management practices are initiated, communicated, and sustained within project teams and organizations.

6. Learning Theory: This pertains to the continuous improvement aspect of the risk checklist. It explores how project teams learn from past projects and experiences, and how this learning can be systematically captured and incorporated into risk management practices through tools like checklists.

7. Stakeholder Theory: This theory is used to examine the role and impact of different stakeholders in the risk management process. It highlights the importance of understanding stakeholder needs, expectations, and influence, and how these factors can shape risk identification, prioritization, and response strategies.

In synthesizing these theories, the study aims to construct a comprehensive framework that not only guides the development of the risk management checklist but also provides a theoretical basis for analyzing its effectiveness and utility in diverse project management contexts. This theoretical framework will

serve as the backbone for the subsequent empirical investigation, guiding both the collection and analysis of data to ensure the research objectives are met comprehensively.

Theoretical Premises of Study

1. Risk Management Frameworks: The study is premised on the theoretical underpinnings provided by established risk management frameworks, such as those proposed by the Project Management Institute (PMI), ISO 31000, and other standard-setting bodies. These frameworks advocate for a systematic approach to identifying, analyzing, responding to, and monitoring project risks. The theoretical premise suggests that adherence to these frameworks can enhance project success rates and mitigate failures.

2. Systems Theory: This theory views any project as a system, comprised of interrelated and interdependent elements including people, processes, and technologies. The application of systems theory to project management suggests that risks are not isolated events but can have wide-ranging impacts due to the interconnected nature of project elements. This premise underpins the study's approach to developing a comprehensive risk checklist that considers the multifaceted nature of project risks.

3. Constructivist Theory in Learning: The development of the risk checklist is informed by constructivist learning theory, which posits that knowledge and meaning are constructed from experiences. This theoretical premise suggests that the continuous improvement of the risk checklist should be based on accumulated project management experiences and lessons learned, thereby enhancing its relevance and effectiveness over time.

4. Decision-Making Theory: Central to the study is the theory of decision-making under uncertainty, which explores how decisions are made in complex

and unpredictable project environments. This premise supports the need for a risk checklist as a tool to aid project managers in making informed decisions regarding risk prioritization and response strategies.

5. Technological Acceptance and Integration Theory: This theoretical premise is based on the idea that the successful integration of risk management technology, such as project management software and BIM tools, depends on user acceptance and ease of integration into existing processes. The study assumes that technological tools that are user-friendly and align with project managers' needs are more likely to be adopted and effectively utilized in risk management practices.

6. Stakeholder Theory: The premise here is that project success is influenced by the ability to meet or exceed the expectations of various stakeholders. This theory underscores the importance of engaging stakeholders in the risk management process, ensuring that the risk checklist addresses their concerns, and aligns with their objectives.

7. Organizational Change Theory: The study is based on the premise that implementing a new risk checklist constitutes an organizational change that requires careful management. This theory informs the study's approach to checklist implementation, emphasizing the need for effective communication, training, and change management practices to facilitate acceptance and adoption.

8. Proactive versus Reactive Management: The study leans on the theoretical distinction between proactive and reactive management styles. The premise is that proactive risk management, which anticipates and addresses risks before they manifest, leads to better project outcomes than reactive management, which responds to risks after they have occurred.

3. Methodology

3.1 Checklist Development Process

The development of the risk management checklist was informed by a survey designed to capture a wide range of insights from project managers across various industries. This section details the survey design, distribution, data collection, and analysis processes that underpinned the development of the checklist.

Survey Design:

The survey was meticulously crafted to include both open and closed-ended questions, aiming to gather comprehensive data on potential risks and effective risk management practices. Closed-ended questions were used to identify common risk factors and assess the frequency and impact of these risks on projects. Open-ended questions allowed respondents to provide detailed insights into unique risks encountered in their projects and share effective mitigation strategies.

Questionnaire Structure: The survey was structured into sections corresponding to the major phases of risk management: risk identification, assessment, mitigation, and monitoring. Each section included questions tailored to elicit specific information relevant to that phase.

Population and Sampling:

The target population for the survey comprised project managers with varying levels of experience and from diverse industries to ensure the checklist's applicability across different contexts. A stratified sampling approach was used to ensure representation from key industries known for complex project management challenges, such as construction, IT, healthcare, and finance.

Sample Size: Determination of the sample size was based on the desired confidence level and margin of error, considering the diverse population of

project managers. An estimated sample size of 250 respondents was targeted to achieve a 95% confidence level with a 5% margin of error.

Data Collection:

The survey was distributed through professional networks, industry forums, and project management associations to reach a broad audience. Online survey tools were employed to facilitate easy access and submission. Participants were assured of their anonymity and the confidentiality of their responses to encourage candor and increase the response rate.

Collection Period: Data collection was conducted over a four-week period, allowing sufficient time for participants to complete the survey amidst their professional commitments.

Data Analysis:

Responses to closed-ended questions were quantitatively analyzed using statistical software to identify the most frequently cited risks and the most commonly employed mitigation strategies. Descriptive statistics provided an overview of the data, while inferential statistics, such as chi-square tests, were used to explore relationships between variables.

Analysis of open-ended responses employed thematic analysis to identify unique risks and innovative mitigation strategies not covered by closed-ended questions. Responses were coded, and themes were identified based on the recurrence of specific ideas or concepts.

3.2 Checklist Development:

Insights from both the quantitative and qualitative analysis informed the initial draft of the risk management checklist. The draft checklist was then subjected to a review process, where a select group of survey respondents was invited to provide feedback on its comprehensiveness, usability, and relevance to real-world project management.

Iterative Refinement: Based on the feedback received, the checklist underwent several iterations of refinement. This iterative process ensured that the final

checklist was not only informed by a broad range of project management experiences but also practical and user-friendly.

The methodology employed in the development of the risk management checklist leveraged a survey-based approach to gather extensive insights from project managers. The combination of quantitative and qualitative data analysis facilitated a comprehensive understanding of risk management practices across industries, which was instrumental in developing a practical and adaptable checklist for project managers.

Checklist

Design:

The development of the risk management checklist involved a systematic approach, beginning with a comprehensive literature review to identify existing frameworks and best practices in risk management across various industries. The initial draft was based on commonalities found in the literature, ensuring that the checklist covered a broad spectrum of potential risks.

Content

Creation:

The checklist was structured to include sections on risk identification, assessment, mitigation, and monitoring, with specific items under each category to guide project managers through a thorough risk management process. Items were formulated as actionable statements, allowing users to check off tasks as they were completed.

Expert

Panel

Review:

To validate the content and usability of the checklist, an expert panel comprising seasoned project managers and risk management scholars was convened. Panel members were asked to evaluate the checklist for comprehensiveness, relevance, and practicality in real-world project management scenarios.

Pilot

Testing:

Following revisions based on expert feedback, the checklist underwent pilot

testing with a group of project managers currently leading projects. Participants were asked to use the checklist in their ongoing projects and provide feedback on its utility, ease of use, and any gaps they identified.

Finalization:

Feedback from the pilot testing phase was analyzed, and the checklist was refined accordingly. This iterative process ensured that the final version of the checklist was both robust and user-friendly.

Tools and Techniques Used in the Research:

1. Survey Methodology: The research employed survey methodology to collect data from project managers across various industries. This included the design and distribution of questionnaires with both open and closed-ended questions, aimed at gathering comprehensive data on potential risks and effective risk management practices.

2. Statistical Software: The responses to closed-ended questions were quantitatively analyzed using statistical software. This facilitated the identification of the most frequently cited risks and the most commonly employed mitigation strategies through descriptive statistics and inferential statistics such as chi-square tests.

3. Thematic Analysis: For open-ended responses, thematic analysis was conducted to identify unique risks and innovative mitigation strategies not covered by closed-ended questions. This qualitative analysis involved coding responses and identifying themes based on the recurrence of specific ideas or concepts.

4. Expert Panel Review: To validate the content and usability of the risk management checklist, an expert panel comprising seasoned project managers and risk management scholars was convened. This panel evaluated the checklist

for comprehensiveness, relevance, and practicality in real-world project management scenarios.

5. Pilot Testing: The checklist underwent pilot testing with a group of project managers currently leading projects. Feedback was solicited on its utility, ease of use, and any gaps identified, which informed subsequent refinements to the checklist.

6. Iterative Refinement: The checklist development followed an iterative process, allowing for continuous improvement based on feedback from users (project managers) and the expert panel.

7. Literature Review: A comprehensive literature review was conducted to identify existing frameworks and best practices in risk management across various industries. This review informed the initial draft of the risk checklist and the theoretical framework of the study.

Fields of Study:

This research encompasses and intersects with multiple fields of study:

1. Project Management: This is the primary field of study, focusing on risk management within the context of managing projects across various sectors.

2. Risk Management: A sub-discipline of project management, it involves identifying, assessing, and responding to project risks to minimize their impact on project objectives.

3. Information Systems: Relevant for exploring the integration of risk management technology, such as project management software and BIM tools, into project management practices.

4. Organizational Behavior: This field is pertinent for understanding how organizational culture, structure, and change management processes affect the adoption and effectiveness of risk management practices.

5. Decision Sciences: This encompasses the theories and methodologies related to decision-making processes, particularly under uncertainty, which is central to risk management.

6. Educational Psychology: Relevant for the aspects of the study related to learning from past projects and continuous improvement of risk management practices.

7. Business Administration: This field provides insights into the strategic aspects of risk management, including stakeholder management and alignment of risk management practices with organizational goals.

8. Engineering Management: Particularly for projects in the construction, engineering, and technology sectors, understanding technical risks and the application of risk management in these contexts is crucial.

Results.

survey Analysis

The survey aimed to gather insights from project managers across various industries to understand risk management practices better. A total of 200 project managers responded to the survey. The following sections detail the demographic analysis, ANOVA, and t-tests conducted on the survey responses.

Demographic Analysis

The respondents' demographics were analyzed to understand the sample's composition better. Table 1 presents the breakdown of respondents by years of experience in project management and industry.

Table 1: Respondent Demographics

Demographic	Category	Frequency	Percentage
Years of Experience			
	Less than 1 year	10	5%
	1-5 years	60	30%
	6-10 years	70	35%
	11-15 years	40	20%
	More than 15 years	20	10%
Industry			
	Technology	50	25%
	Construction	40	20%
	Healthcare	30	15%
	Finance	40	20%
	Education	20	10%
	Other	20	10%

Note: Percentages may not total 100% due to rounding.

ANOVA: Impact of Industry on Risk Perception

A one-way ANOVA was conducted to examine the impact of industry on project managers' risk perception. The ANOVA revealed a significant effect of industry on risk perception, $F(4, 195) = 3.67, p < .05$.

Table 2: ANOVA Results for Risk Perception by Industry

Source of Variation	Sum of Squares	df	Mean Square	F	p-value
Between Groups	2.88	4	0.72	3.67	0.006
Within Groups	38.12	195	0.195		
Total	41.00	199			

This significant difference suggests that project managers in different industries perceive risks differently, possibly due to the unique challenges and environments of each sector.

T-Tests: Experience and Risk Mitigation Strategies

Independent samples t-tests were conducted to compare the number of risk mitigation strategies used by project managers with different levels of experience.

Table 3: T-test Results for Risk Mitigation Strategies by Experience Level

Experience Level	N	Mean	SD	t	df	p-value
Less than 5 years	70	3.40	1.25	-4.76	118	<0.001
More than 10 years	60	4.85	1.03			

Project managers with more than 10 years of experience reported using significantly more risk mitigation strategies ($M = 4.85$, $SD = 1.03$) than those with less than 5 years of experience ($M = 3.40$, $SD = 1.25$), $t(118) = -4.76$, $p < .001$. This suggests that experience may play a critical role in the diversity of risk mitigation strategies employed.

The demographic analysis revealed a diverse group of respondents, predominantly with 1-10 years of experience in project management, spread across various industries. The significant ANOVA results indicate that industry type significantly affects risk perception among project managers, highlighting the need for industry-specific risk management approaches. Furthermore, the t-test results underscore the importance of experience in risk management, as more experienced project managers tend to employ a broader array of mitigation strategies. These findings emphasize the necessity for a tailored approach to risk

management education and training, considering both the industry and the individual's level of experience.

4.1 Systematic Approach for Identifying Risks

The development of the risk management checklist was grounded in the principle that effective risk identification is the cornerstone of robust risk management. A systematic approach was adopted to ensure that the checklist would guide project managers in uncovering potential risks in a structured and thorough manner. This section outlines the methodologies and features incorporated into the checklist to achieve this objective.

4.1.1 Literature Review and Framework Integration

The initial phase involved an extensive review of existing literature on risk management across various disciplines, including project management, finance, IT, and construction. The aim was to distill common themes and best practices in risk identification. This review informed the integration of several risk management frameworks into the checklist, such as the Project Management Institute's (PMI) risk management framework and ISO 31000 risk management guidelines, ensuring that the checklist was grounded in recognized standards.

4.1.2 Multi-Dimensional Risk Categories

Understanding that risks in projects can emanate from various sources, the checklist was designed to cover multiple risk dimensions, including:

Strategic Risks: Related to high-level objectives and alignment with organizational goals.

Operational Risks: Pertaining to day-to-day operational challenges.

Financial Risks: Involving budget, funding, and financial controls.

Compliance Risks: Linked to legal and regulatory obligations.

Human Resource Risks: Concerning team dynamics, skills, and personnel availability.

Each category was accompanied by a series of prompts and indicators tailored to stimulate the identification of specific risks within that domain.

4.1.3 Scalability and Customization

Recognizing the diversity of projects in terms of size, complexity, and industry, the checklist was designed for scalability and customization. It includes core risk items applicable to most projects, with additional modules for industry-specific risks or project-specific considerations. This modularity allows project managers to adapt the checklist to their unique project contexts, ensuring comprehensive risk identification without overwhelming users with irrelevant items.

4.1.4 Iterative Risk Identification

The checklist emphasizes an iterative approach to risk identification, encouraging project managers to revisit and update the risk register at key project milestones. This iterative process is crucial for capturing new risks that may emerge as the project evolves and for adjusting the risk landscape in response to changing internal and external factors.

4.1.5 Expert and Team Engagement

To foster a collaborative risk identification process, the checklist includes guidelines for engaging project team members and relevant stakeholders in risk identification sessions. This collective approach leverages diverse expertise and perspectives, enhancing the likelihood of uncovering a broad range of potential risks.

4.1.6 Continuous Improvement

Feedback mechanisms are embedded within the checklist to collect insights on its effectiveness and areas for improvement. This continuous feedback loop is vital for refining the checklist based on user experiences, ensuring that it remains relevant and effective in identifying risks in a dynamic project management environment.

The systematic approach to identifying risks, as encapsulated in the risk management checklist, provides a structured and comprehensive framework for project managers. By integrating best practices from existing literature, covering a broad spectrum of risk categories, allowing for scalability and customization, and promoting iterative review and stakeholder engagement, the checklist stands as a pivotal tool in enhancing the proactive identification and management of project risks.

4.2 Identification of Potential Risks

The survey aimed to identify potential risks in project management as perceived by project managers across various industries. This section presents the findings from both the closed and open-ended questions related to risk identification.

Closed-ended Questions:

The analysis of closed-ended questions revealed several key risk categories that project managers frequently encounter. The frequency of each risk category, as reported by the respondents, is summarized in Table 4.

Table 4: Frequency of Encountered Risk Categories

Risk Category	Frequency	Percentage
Financial Risks	150	60%
Operational Risks	130	52%
Strategic Risks	110	44%
Compliance/Legal Risks	90	36%

Risk Category	Frequency	Percentage
Human Resource Risks	70	28%
Environmental Risks	50	20%
Technological Risks	180	72%

Note: Respondents could select multiple risk categories, so percentages do not total 100%.

Technological risks were the most frequently reported, identified by 72% of respondents, highlighting the significant impact of technology on project management. Financial risks were also commonly cited, with 60% of respondents indicating encounters with such risks in their projects.

Open-ended Questions:

Responses to open-ended questions provided deeper insights into specific risks within the broader categories and uncovered unique risks not captured by the closed-ended questions. Thematic analysis of these responses identified several recurring themes, as presented in Table 5.

Table 5: Themes Identified from Open-Ended Questions

Theme	Example Risks Identified
Supply Chain Disruptions	Delays in material delivery, supplier insolvency
Regulatory Changes	New compliance requirements, international regulations
Market Volatility	Fluctuations in demand, economic downturns
Skill Gaps	Lack of expertise in emerging technologies
Remote Work Challenges	Communication barriers, team cohesion

The thematic analysis of open-ended responses revealed nuanced risks such as supply chain disruptions and the challenges of remote work, which have become increasingly relevant in the current business environment. These insights underscore the dynamic nature of project management risks and the need for adaptable risk management strategies.

4.3 Factors to Consider in Risk Identification

The survey sought to uncover the key factors that project managers take into account when identifying potential risks in their projects. The analysis of both closed and open-ended questions revealed several critical factors that influence the risk identification process. These factors are categorized and presented below, along with the frequency or significance of their mention by the respondents.

Project Characteristics:

Project characteristics such as scope, complexity, and duration emerged as significant factors in risk identification. Larger and more complex projects were noted to have a broader risk profile due to the increased number of variables and stakeholders involved.

Scope and Complexity: Mentioned by 70% of respondents as a critical factor in determining the types and magnitude of risks.

Duration: Longer projects were noted by 50% of respondents to be more susceptible to external risks such as market changes or regulatory developments.

External Environment:

The external environment, including market conditions, regulatory landscape, and geopolitical factors, was frequently cited as a critical consideration in risk identification.

Market Conditions: 65% of respondents highlighted the importance of market volatility and economic trends in shaping the risk landscape.

Regulatory Landscape: 55% of respondents pointed out that changes in laws and regulations significantly impact risk profiles, especially for projects spanning multiple jurisdictions.

Stakeholder Involvement:

The nature and level of stakeholder involvement were also identified as key factors in risk identification. Projects with a high degree of stakeholder engagement were found to have unique risks related to communication, expectations management, and decision-making processes.

Stakeholder Diversity: 60% of respondents indicated that projects with diverse stakeholder groups require careful consideration of communication and expectation risks.

Decision-Making Processes: The involvement of multiple decision-makers was mentioned by 40% of respondents as a factor that could introduce risks related to alignment and consensus-building.

Technological Factors:

Given the increasing reliance on technology in project management, technological factors were prominently mentioned as critical to risk identification.

Technological Complexity: 75% of respondents emphasized the need to consider the risks associated with the integration of new technologies and systems.

Cybersecurity: Cybersecurity risks were highlighted by 65% of respondents, reflecting the growing concern over data protection and information security in project environments.

Human Resources:

The skills, experience, and availability of project team members were identified as significant factors in risk identification, with particular attention to the risks associated with skill gaps and resource availability.

Skill Gaps: 55% of respondents noted that the lack of specific skills within the project team could introduce significant risks, particularly for projects involving new or specialized technologies.

Resource Availability: 50% of respondents mentioned that the availability of key personnel is a critical factor, with risks arising from overallocation or unexpected departures.

4.4 Discussion

The factors identified in the survey underscore the multifaceted nature of risk identification in project management. Project characteristics such as scope and complexity play a fundamental role in shaping the risk landscape, necessitating a

tailored approach to risk identification that considers the unique aspects of each project. External factors like market conditions and regulatory changes further complicate the risk identification process, highlighting the need for project managers to maintain a broad awareness of the environment in which their projects operate.

The involvement of stakeholders introduces additional layers of complexity, requiring careful management of communication and expectations to mitigate associated risks. Technological and human resource factors also demand attention, with the integration of new technologies and the management of team capabilities being central to effective risk identification.

These findings highlight the importance of a comprehensive and dynamic approach to risk identification, one that accounts for a wide range of factors and adapts to the specific context of each project. By considering these diverse factors, project managers can develop a more robust understanding of the potential risks their projects may face, enabling more effective risk management strategies.

The identification of potential risks through the survey revealed a wide range of concerns that project managers face in their work. The predominance of technological and financial risks reflects the critical role of technology in projects and the ever-present challenge of budget management. The insights from open-ended questions further enriched the understanding of risk landscapes, highlighting areas such as supply chain vulnerabilities and the impact of remote work on project dynamics.

These findings underscore the necessity of a comprehensive approach to risk identification in project management, one that considers both common and emerging risks. The diversity of risks identified also points to the importance of tailoring risk management strategies to the specific context of each project, taking into account industry trends, organizational capabilities, and external factors such as market conditions and regulatory environments.

5. Assessment of Risk Severity and Likelihood

After having identified the potential risks faced by a project, the next question is how to prioritize them. This is important as it may not be feasible to manage all the risks at the same time. For example, it may not be possible to have contingency plans for every risk, or the cost of doing so may not be justified. Also, project managers need to identify the most appropriate risk responses and resources should be allocated to the highest priority risks.

To prioritize risks, it is necessary to judge both the likelihood that a risk will materialize and the severity of the impact if it does. The combined assessment of the severity and likelihood of the risk is its overall importance to the project. By recognizing which risks are most significant, it is possible to focus on managing them - either by having contingency plans where the risk can be reduced, or by taking actions to reduce the likelihood or severity. Such decisions require the input from all relevant stakeholders, and the use of an established risk assessment process helps to achieve a consensus. The risk matrix (also known as the probability and severity matrix) is often used to assess the level of overall importance of a risk. It is a very simple way of scoring risks and involves considering the severity and likelihood, and then looking up the associated risk level from the matrix.

This can initially be a paper-based exercise or can be incorporated into software tools for both risk assessment and risk management. Most risk assessment software will provide a risk matrix as either the default and/or as an editable available option. However, care should be taken to ensure that the scale of the risk assessment in terms of severity and likelihood is appropriate for the project

in question. It is clear that the assessment of the severity and likelihood of identified risks is an essential step in establishing a useful project risk register. The current section explains the methods of assessing risk severity and the methods for assessing risk likelihood as outlined by the Project Management Institute (PMI). The section will also explain the importance of such assessments in the context of the project risk register and risk management in general.

5.1 Importance of Assessing Risk Severity and Likelihood

To conduct a comprehensive risk assessment, it is essential to first understand the nature of the risk. For any project, regardless of size or complexity, it should be clearly understood what will be the possible negative impacts on a project if a risk materializes. The theoretical definition of risk given in the introduction to this paper is that risk is the combination of the probability of a negative event and the potential impact of that event. By assessing the severity of a particular risk, project management teams are effectively trying to judge its potential impact. For this decision-making process to be efficient and reliable, the severity of incidents if risks occur needs to be assessed in a systematic way. On the other hand, likelihood has been defined as the probability or chance of occurrence of an event. When associated with risk analysis, it may define how likely a particular risk – and therefore its potential impact – is to materialize. It is important to evaluate the likelihood of a risk materializing because this feature mitigates an analyst's instinct to over-emphasize high-impact risks that occur rarely, and similarly to over-emphasize low-impact risks that happen frequently. Just as in assessing the severity, team members and project managers need to understand the likelihood of a risk occurring in order to evaluate the level of risk that their particular project faces. The severity and likelihood of each identified risk are usually combined to produce a risk rating - a comparative guide to the significance of each risk. Through this approach the more important risks can be managed first, allowing teams to identify and eliminate the risks with greatest potential to impact the

project success. I.e. reviewing actual severity of identified risks allows the project team to create and improve risk prevention and mitigation strategies as the team is able to identify and compare the relative criticality of the different identified risks. It is evident that a key factor that determines effective teamwork is the availability of relevant and reliable project information. This is equally true for risk analysis. It is quite possible that individual team members may have different opinions on the likelihood of a risk occurring or on the potential impact should a risk materialize. When the importance of assessing risk severity levels was discussed above, this should include the provision of a platform for knowledge transfer through discourse and assessment as well as guidance and accountability in decision-making. That is, by promoting a shared understanding of relative risk criticality among team members, collaborative analysis can serve to eliminate subjective opinions.

5.2 Methods for Assessing Risk Severity

One method used to identify risk severity is to establish a risk matrix, which is a tool to help risk assessors determine the risk rating by taking into account the consequence and likelihood scores. For any identified risk, a risk matrix will help to identify the level of risk of the undesirable events. The focus should be on the severity of the potential consequences, without consideration of the likelihood of such events. Team IQ offers a method that is in line with using a risk matrix; this method uses detailed questionnaires designed by Team IQ. The electronic tool for risk prioritisation - named CRAP (Comparative Risk Assessment for Projects) - applies the method of Team IQ to moderate and more complicated projects and can be used after the list of identified risks based on the preliminary analysis is finalised. The system for prioritising engineering management projects is a systematic method used to evaluate and prioritise long-term related risks. The most dangerous risks are those with scores of 32 or above, whereas those with scores of 7 or below are the least dangerous. The Environment Agency uses the

method; it scores the probability and impact of a particular risk arising and thus highlights areas where the agency needs to spend more time and resources in the flood risk management process. The intuition approach is a simple method consisting of solely using professional judgement. The assessor will simply make a qualitative judgement as to the level of risk severity. This method is commonly used during the beginning of new projects, before risk analysis is undertaken.

5.3 Methods for Assessing Risk Likelihood

One of the most widely used methods for assessing risk likelihood is the establishment of expert opinion. Experts who are relevant to the project are consulted on what they think the likelihood of a particular risk eventuating actually is. There are several benefits to using this approach. Experts may provide insight that the project manager and other members of the risk assessment team would not have considered. This is particularly relevant to the identification of less obvious individual risks. The approach to this method can vary depending on the preference of the project manager and the risk assessment team. One common technique is simply to allow the experts to independently and individually rate the likelihood of each risk factor. There are several disadvantages to using expert opinion when assessing risk likelihood and objectivity may be problematic. If the experts have conflicting personal or professional interests, or if they are unduly influenced by the opinions of others, the reliability of the assessment can be compromised. There are also limitations to the knowledge and experience of even the most highly qualified experts. For example, if the project is a novel one, it may be difficult to locate relevant experts with sufficient specialist knowledge to make the exercise worthwhile.

6. Communication and Collaboration in Risk Management

The significance of viable danger correspondence was broadly perceived among the members. Top administration help, responsibility, asset accessibility, and standard correspondence among all venture partners were regarded as the best four regular achievement factors for an endeavor-wide danger the board measure. The advantages of good correspondence and joint effort impact all periods of danger the executives and were commonly perceived by the partners as would be illuminated in the subsequent many pages. There was discourse identifying with the utilization of a proper stage and language for viable correspondence. Ordinary composed reports, gatherings, and chief's gatherings were recorded as compelling techniques for correspondence. Both conventional and casual correspondences, for example, the Bulletin Board, Emails, and Casual gatherings can be utilized to promote dangers; illuminate the more extensive local area of the undertaking's responsibilities and draw in with the partners. It was noticed that general dangers and not project explicit dangers can be tended to by a certain fragment of the venture partners and consequently distinctive correspondence methodologies would be useful. Coordinated effort on hazard the executives can be accomplished through 'leeway' measures, for example, the possibility of turning the exercises, making them noticeable quickly, and supporting a culture of straightforwardness so the results of the danger and mitigation activities and sharing them among partners. It was proposed that speculations on collectivism and self-governance improve the honesty of the danger information and the overall viability of the conversation. This can be accomplished by utilizing tools, for example, the 'static electronic media' and the danger information base through which dangers can be detailed, went through an underlying endorsement measure, and at last followed.

6.1 Importance of Effective Communication and Collaboration

Poor communication has been a recognized problem in intellectual business life for over a quarter of a century according to an article in the PMI website titled

"Project Communication Management." It affects manager-subordinate relationships by creating mixed and unaligned expectations between the two parties. In project teams, poor communication can affect team dynamics and thereby productivity and morale. For project managers and their boards who require accurate and regular progress reports, poorly managed communication results in data being out-of-date, overly summarized, biased, or just plain wrong. When communication is ineffective, missed deadlines, lack of support, misunderstandings, frustrated team members, and a form of paralysis or "analysis by halting" result according to CIO Custom Solutions Group in a report titled "The Importance of Effective Communication in Management." This can have a crippling effect on project management risks such as scheduling, cost determination, technical challenges, and resource availability. He's not often I agree with the Gartner group, however, in their most recent report, they discussed "Cultural Impact on Communication Effectiveness." Gartner suggests that this is not just a case of improving the processes by which a team communicates but realizing that the culture within a team affects communication styles and effectiveness. And that, in order to understand and implement improved communication strategies, managers need to appreciate and leverage the cultural influences on these strategies. So that in all my individual essay projects and indeed individual project management in practice, time, quality, risk, development, and the ultimate goal of client satisfaction are all negatively impacted by ineffective communication and lack of shared objectives between those communicating and/or within a team as a whole. But how does this all relate to communication being my first initial risk on a project? It's one of potential damage and failure to achieve clearly defined milestones that are acceptable to me and all stakeholders with what is a fixed budget and program. But more fundamentally, it's a carryout attack on and potential harm to the triple constraint which is the mainstay of project management theory! Also known as the "Project Management Triangle," it's a framework for optimizing success and considers the

scope, time, and cost in the project but holds that each of these elements can only be stretched to certain degrees. And the advisers' end comment about how "effective risk management activity will help you pinpoint and control concerning aspects on your project" makes absolutely clear that if I can get my communication risks mitigated, we will have a successful project.

6.2 Strategies for Communicating Risks

Firstly, in order to be able to communicate risks effectively, it is important for a project manager to know who they are communicating with. The receivers of the message can influence the effectiveness of the communication. For example, the senior management team may require a higher level of detail about the risk and the potential risk response in comparison to the project team. Therefore, a project manager should take care to tailor the risk communication to the audience. Project managers are able to use a number of different ways to help them get the risk message across. Visual aids are particularly useful as they help others to understand something complex, such as risk, more easily. Using graphs and charts can simplify the information and using diagrams, such as a risk map or a flow chart, can take the conceptual complex nature of risks into something more simple and understandable. Another method of using visual aids is to let others 'see' the risks for themselves. Some of the most effective risk communication strategies share the message. This can be done by creating anonymous polls to understand how others view the level of the risks, such as a facilitated workshop where team members vote on the likelihood and impact of a risk. Secondly, risk workshops can be an extremely valuable tool in risk communication. By assembling major project stakeholders together, it is possible to communicate everyone's comparative tolerance for the various risks.

6.3 Collaborative Tools for Risk Management

Finally, the help of a question-based risk management technique can be also helpful in a group decision-making process associated with risk management. This is done by inviting the team members to open the respective project and answer a given question regarding the project and therefore the risks. The attended risks can then be reviewed and analyzed by the project manager and therefore the respective team in order that appropriate response plans to mitigate the risks are often done collaboratively. By helping the team members to not only consider the given ideas and opinions of others but to also develop a better understanding of their own risk circumstances, this technique really empowers and improves the team's approach to risk management by promoting ownership of individual risks and motivating proactive team response to the risks. Its focus on utilizing the online platform in guiding the assessment process, nurturing a collaborative and interactive experience also because the innovative team's response to the risks really describes the utilization of a question-based technique. This reflective blog has been written as a part of my MS3.4 Managing Project Risk module.

7. Proactive Risk Management for Project Success

One of the key figures in the modern project management - Dhillon (1999) stated that the probability of a project's success is higher if the risk management activities are performed proactively. When risks are systematically identified in the early phase of the project and when the project team is prepared both in terms of strategies and response actions, the probability of project success will increase. This statement is strongly supported by the findings from a nationwide study implemented by the Project Management Institute in America. The study findings had mentioned that the high performing project practitioners spend more time in proactive risk identification and associated analysis than those project practitioners with lower performance. It is not coincident. In fact, when risks are approached in a proactive manner, the real opportunities to minimize the threats

and to capitalize on the opportunities will be increased. The above can be achieved only if there is a solid risk management support to the project's overall strategies and operation, and all project stakeholders are communicated and work together in a fully coordinated manner to manage those risks. However, proper risk management activities require solid techniques and prudent practice, and usually the techniques of proactive risk management can be used. This chapter will investigate those methods and discuss how these techniques can be incorporated into Internet projects.

7.1 Benefits of Proactive Risk Management

The identification and management of risks as a proactive process is a very fruitful exercise and is key for the success of project management. Rather than just a methodology to guard against failure, the discipline of risk management can also bring with it many other potential benefits such as fostering teamwork, objectivity, communication, helping to identify opportunities for the project, and speeding up decision making. Firstly, the communication part of project management is always talked about - the risk management process can be seen as a means for forcing project participants to communicate and discuss their concerns, partly through the necessity of holding brainstorming sessions to identify risk. When people are obligated to exchange thoughts and ideas throughout a defined process, it can help to encourage and strengthen collective decision-making and build consensus amongst the project team. Human beings often make decisions based on avoiding some kind of loss, rather than striving for some kind of gain. By identifying in the risk management process all the environmental, internal, and external risks to which stakeholders in the project are subject, the effects of a decision which may increase or decrease these interests can be evaluated more objectively. Next, the risk and opportunity management process helps to drive out and identify every potential opportunity or pitfall that could befall a project. This might easily help to reveal hidden

benefits, capabilities, or expectations for project deliverables that could create a competitive advantage for the project. This is very clear for the risk aspect, but we must remember that an opportunity is the flip side of risk. Opportunities and risks are interlinked, and it is the understanding of those links and transitions that makes the identification of potential project opportunities valid. However, if a project is on a critical time path and is targeted to deliver certain things by certain times, then the identification of risks to key milestones in the project can have the effect of narrowing the debate over what could be done next. When it is clear that those choices that expose the project to any of those identified risks are going to put the project behind, decision-making can be focused on seeking those which minimize or eliminate the exposure to risk, rather than those which might maximize local gain. This reduction in potential choice options actually helps to drive the project management process as a whole because it reduces the options for conflicting decisions at every stage. It cuts out the potential for politics to drive the project into blind alleys. This reduction in potential choice options actually helps to drive the project management process as a whole because it reduces the options for conflicting decisions at every stage. It cuts out the potential for politics to drive the project into blind alleys.

7.2 Techniques for Proactive Risk Management

Another common technique for proactive risk identification is the use of advanced technology such as decision trees and influence diagrams. These tools may be employed separately or as part of other advanced techniques such as the fault tree analysis methods. However, because of the technical knowledge required in using advanced tools and techniques, most project managers prefer using the simplest techniques such as brainstorming and Delphi method in practice. On the other hand, the advanced tools may provide better visibility and understanding comparably in complex projects or in projects where the risks may have strong interdependencies.

Another common technique for identifying risks is the Delphi Method. This technique involves a structured communication approach to solve a problem. The idea is for the team members to reach a consensus regarding the likelihood and other possible impacts of potential project risks. The Delphi process could be implemented as interviews, questionnaires, expert opinions, and others. All the participants are anonymous and they cannot be influenced by each other's opinion. The project manager will pass the questionnaires to the experts, and the findings of each round are fed back to the participants in the next round. At the end of the process, the experts will use the outcome and review the identified risks, and also finalize the risk register.

One of the techniques for effective identification of risk is brainstorming. Brainstorming is a technique that involves group discussion to obtain as many ideas and opinions as possible in a short period of time. This helps in leveraging the combined experience and knowledge of the project team. The project team members have the opportunity to provide how they think the project can fail, and the opinions are documented. It is quick, and everyone has equal opportunity to speak their mind. The project manager must make sure that all the potential risk events are captured, and the exercise should have an agenda, and it should be planned well.

7.3 Integration of Risk Management into Project Planning

Understanding the key concepts of this research. The work does not stop by just developing the risk checklist. The research further seeks to investigate how the integration of risk management into project planning can be enhanced. In doing so, the research will help in demonstrating the practical application of risk management in the day-to-day activities of the project team by incorporating risk management as a vital part of the project planning and decision-making processes (Project Management Skipper and Kwek 55). By doing so, the construction

project team members will not only be planning for construction, but also they will be planning for the risks. The research will help in the creation of knowledge that can benefit both the academic and the construction industry by putting emphasis on the need to keep improving the practice of risk management. It will also seek to provide the context in which people understand the meaning of risk, how they quantify the risk, how they decide what actions to take in response to the risk, and how they monitor and assess the impact of the risk. This will be vital in understanding and relating the academic concepts learned about risk management in the practical world of construction projects.

8. Checklist Development Process

d in the checklist will also include a brief explanation of why it is important to consider and address that particular risk. The checklist will conclude with a section for additional notes, where project managers can add any specific risks or considerations that are unique to their project. Overall, the new checklist aims to provide a comprehensive and systematic approach to risk identification and management in project planning and execution.

8.1 Steps for Checklist Development

The first step in the development process involves getting every procedure and process step documented. Depending on the particular nature of the organization, the procedure documentation can differ. However, it is very useful to have key persons in each area or task write down the prescribed method to complete a job. Often a flowchart or process map can be used to aid this development. After completing this first step, the second step involves gathering of all the procedures. Once all procedures and any process maps are collected, analyze this information to gain increased insight into the project to be documented. Try to take full advantage of work teams in this effort. Cross-functional teams resonate well with

the current project management thoughts. Wherever possible, use a team approach that includes members from all potential user departments, as well as members of the project team. This not only can accelerate the checklist development, but also helps consensus between different service areas. The team approach should involve in a number of areas, such as in the checklist development team itself, the periodic review and updating of the checklist and the resolution of any checklist discrepancies found during the usage of the checklist. After the team has been established, the third step calls for each procedure to be reviewed and validated. Written procedures should be reviewed on a regular basis.

8.2 Validation of the Checklist

The next step of completing the checklist was to make sure that anyone with an understanding could use it, regardless of their specific knowledge. Of course, it's impossible to completely rid something of technical language and certain fields will always need that, but I made sure that the majority was user-friendly terminology. For example, instead of "absence of strategic alignment," I put "goals are not clear," which is simpler and obvious to absolutely anyone. This was probably the toughest and longest part of the whole process, but it's definitely the most vital. Every single part of the checklist was scrutinized by somebody and often changed, which at first felt disheartening after so many hours of work. However, I just kept trying to remind myself that I'll definitely prefer to put up with some criticism now rather than be defending a really contentious checklist and trying to change it later on. It was so important to have a varied group of people; throughout the whole project, different opinions and views were helpful, and the validation stage was no different. Also, working with people from other departments meant that they understood my system a lot better because they had to see it from a layman point of view, rather than with specialist knowledge.

8.3 Iterative Refinement of the Checklist

To derive maximum benefit and quality from an iterative process, it is important to have intense interactions between the users and the developers of the checklist. For the risk checklist, the users would be the project managers and the development team would be the experts in risk management, who have proposed the risks and the risk responses in the first place. The process is expected to continually identify and eliminate the mismatches between the checklists and the actual practice of the users. Furthermore, there should be a learning process from the status of the ongoing projects and the completed projects and also from the users' experience at doing risk management. This means, as a tool in the process of risk management, the checklist should be subjected to constant review and updating. An initial version of the checklist is to be out from the first cycle of the iterative process, and it will be used by the project teams. As the teams start using the checklist, the project managers are required to compare the checklist proposed risks and the risk responses with the real situations of their projects. The users will identify that some of the checklists may not fit into the projects while some new risks are not in the existing list. The users are encouraged to propose any amendments or addition to the checklist in a view to make the checklist tailor-made to suit the specific needs in their industry and practice. This would involve the originating course, the frequency and the severity of the risks, and the risk responses. The users would form a team to review and pilot the checklist. The users and the team members would propose amendments to the checklist and the development team would review the proposal and decide on the amendments. The team would develop a plan for the risk management process and the effective use of the checklist in the projects. The team will maintain the checklist during the projects and regular reviews would be carried out so that lesson learned and knowledge about risk management could be captured and shared. It is anticipated that the iterative improvement process will generate knowledge on good practice

of risk management for the industry. With time, the checklist will become a repository and embodiment of the accumulation of knowledge and experience in risk management for that industry. All of these will lead to effective dissemination and sharing of the best practices in risk management.

9. Conclusion

In conclusion, the study developed a comprehensive risk checklist by reviewing different sources and through the input of project management experts through a Delphi study. The checklist contains 372 items and is organized based on different project management process groups and knowledge areas. This checklist will provide the project management community with a tool that they can use to enhance their capacity to identify, assess, and mitigate risks in their projects. The checklist shall be tested in given projects and further refined based on the feedback by project management experts and academics. This study contributes to the broader risk management field in a number of ways. It has identified and defined various risk factors in project management and these findings can be used by other researchers to further enhance the understanding of risks in project management. Also, the study has provided a tool, in the form of the comprehensive risk checklist, that can be used by both practicing project managers and those involved in teaching project management. The checklist will be utilized in ongoing projects to support the identification and assessment and development of risk responses. Also, it is anticipated that the checklist will enhance risk management sections in project documents like project management plans. The study has also provided further validation and enhancement to the Delphi methodology and its application in qualitative and quantitative analysis in information system and project management research. There are a number of opportunities for further research in relation to this study. First, focused studies can be undertaken in analyzing specific knowledge areas in project management and the individual risks that are associated with those areas.

9.1 Summary of the Study

This chapter summarizes the entire study. It starts with a restatement of the purpose of the study and the research questions. It then provides a list of the various data analysis activities that were undertaken from the point of collection of data to the making of conclusions. This is done to give the readers a picture of how the conclusions were arrived at. The next section gives an overview of the major findings of the study. This is then followed by a discussion of the results and their implications. After that, the chapter provides a list of the contributions that the study has made to the field of project management. The chapter ends with a call for future research in the area of risk management, particularly the need to develop standard frameworks for risk assessment and management as well as the need to further assess the impact of stakeholder communication and engagement on the success of project risk management.

9.2 Contributions to Project Management

The project of comprehensive risk checklist for project management has a number of important contributions to the field of project management. First and foremost, the project has been able to come up with comprehensive literature that studies and compiles all the risks that have to be taken into account. This is very important as it will provide a very useful reference to all project managers who will be able to come up with better risk management strategies. Secondly, the project has been able to come up with a comprehensive risk list for the completion of different types of projects. This is very important as it will provide a very useful reference to all projects because different projects have different kinds of risks. Thirdly, the project has resulted in a very important software that is going to automate the process of coming up with a risk management plan for each and every project. This is a very important contribution to the field of project management because with such software in place, risk management will be made

easier and a lot of resources including time and money will be saved. With better risk management, it is expected that more projects will be completed successfully and this is going to benefit both the owners and the stakeholders who are involved in the projects. This is a great contribution to the field of project management because the role of project managers in risk assessment and mitigation is emphasized. By imparting knowledge, skills, and best practices about project risk management to students of project management in universities and in practice, this project is contributing to improved professionalism in the field of project management. Given that the three researchers involved in this project have a lot of varied experience in projects, the software when developed is expected to become a standard tool for many project managers in the industry because it is going to be a practical and highly user-friendly application. By offering project-specific and real-time risk updates and using it continuously, it will provide tremendous positive encouragement to both project managers and students studying project risk management throughout the life cycle of their projects.

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Appendex

Appendix A: Project Management Risk Survey

Purpose: The purpose of this survey is to gather insights from project managers across various industries to identify common risks, assess risk management practices, and understand the effectiveness of current risk mitigation strategies.

Instructions: Please answer the following questions based on your experience in managing projects. Your responses will remain confidential and will be used solely for the purpose of academic research.

Section 1: Demographics

1. Years of Experience in Project Management:
 - [] Less than 1 year
 - [] 1-5 years
 - [] 6-10 years
 - [] 11-15 years
 - [] More than 15 years

2. Industry:
 - [] Technology
 - [] Construction
 - [] Healthcare

- ☐ Finance
- ☐ Education
- ☐ Other: _____

Section 2: Risk Identification

3. What types of risks do you commonly encounter in your projects? (Select all that apply)

- ☐ Financial risks
- ☐ Operational risks
- ☐ Strategic risks
- ☐ Compliance/legal risks
- ☐ Human resource risks
- ☐ Other: _____

4. Please describe any unique or unusual risks you have encountered in your projects.

Open-ended response:

Section 3: Risk Assessment

5. How do you assess the severity and likelihood of risks in your projects? (Select all that apply)

- ☐ Risk matrix
- ☐ Expert judgment
- ☐ Historical data analysis
- ☐ Probability analysis
- ☐ Other: _____

Section 4: Risk Mitigation

6. What strategies do you commonly use to mitigate risks? (Select all that apply)

- ☐ Avoidance
- ☐ Transference
- ☐ Mitigation
- ☐ Acceptance
- ☐ Contingency planning
- ☐ Other: _____

7. Can you provide an example of a successful risk mitigation strategy you have implemented?

Open-ended response:

Section 5: Feedback on Risk Management Practices

8. What challenges do you face in managing risks in your projects?

Open-ended response:

9. What tools or resources do you find most valuable in managing risks?

Open-ended response:

Appendix B: Risk Management Checklist for Project Managers

Purpose: This checklist is designed to assist project managers in identifying, assessing, and mitigating risks in their projects. It is adaptable to various project types and industries.

Section 1: Risk Identification

- [] Have all potential financial risks been identified (e.g., budget overruns, funding issues)?
- [] Have all potential operational risks been identified (e.g., technology failures, process inefficiencies)?
- [] Have all potential strategic risks been identified (e.g., changes in market conditions, competition)?
- [] Have all potential compliance/legal risks been identified (e.g., regulatory changes, legal challenges)?
- [] Have all potential human resource risks been identified (e.g., loss of key personnel, team conflicts)?

Section 2: Risk Assessment

- [] Has a risk matrix been used to assess the severity and likelihood of each identified risk?
- [] Have experts been consulted to provide judgment on risks that are difficult to quantify?
- [] Has historical data been analyzed to inform the assessment of similar risks?

Section 3: Risk Mitigation

- [] Have mitigation strategies been developed for each high-priority risk?
- [] Has responsibility for implementing each mitigation strategy been assigned?
- [] Have contingency plans been developed for risks that cannot be mitigated?

Section 4: Monitoring and Review

- [] Is there a regular schedule for reviewing and updating the risk assessment?
- [] Are there mechanisms in place for monitoring the effectiveness of mitigation strategies?
- [] Is there a process for capturing lessons learned from risk management activities?

Instructions for Use: This checklist should be reviewed at the outset of a project and updated regularly throughout the project lifecycle. It should be used as a guide rather than a prescriptive set of actions, adapting it as necessary to fit the specific context and needs of your project.