ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF PROJECT MANAGEMENT

COMPARATIVE STUDY ON PROJECT RISK MANAGEMENT PRACTICE OF LOCAL CONTRACTORS AND CHINESE CONSTRUCTION COMPANY: CASE ON SELECTED BUILDING CONSTRUCTION PROJECTS IN ETHIO – TELECOM.

BY

MARIYAMAWIT G/LIBANOS

ID NO: SGS/0493/2015A

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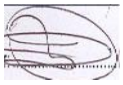
Dejene Mamo	 _____
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I would also like to thank God for making this possible. I feel blessed to have him guide and protect me in every step I take towards any achievement.

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LIST OF ABBREVIATION AND ACRONYMS

RMP: Risk Management Process

PMIS: Project Management Integrated System

WBS: Work Breakdown Structure

FMEA: Failure Mode and Effects Analysis

SWOT: Strength, Weakness, opportunity and Threat Analysis

PLC: Project Life Cycle

ABSTRACT

Effective project risk management is essential for the successful completion of construction projects, particularly in dynamic and complex environments. This study conducts a comparative analysis of project risk management practices between local Ethiopian contractors and Chinese construction companies, focusing on selected building construction projects under Ethio-Telecom. The research aims to identify the specific risk management techniques employed by both groups and assess their effectiveness in influencing project outcomes, such as completion time, budget adherence, and quality of work. The study utilizes a mixed-methods approach, combining quantitative data from 79 respondents out of 94 distributed questionnaires and qualitative insights from interviews with Ethio-Telecom engineers and project managers. The findings reveal that Chinese contractors employ more structured and technologically advanced risk management practices compared to local contractors. These practices include comprehensive risk identification, detailed risk analysis, systematic risk response planning, and rigorous risk monitoring and control. As a result, Chinese contractors achieve better project outcomes in terms of cost efficiency, adherence to schedules, quality maintenance, and safety performance. The study highlights the significant differences in risk management approaches between the two groups and suggests that local contractors could benefit from adopting the advanced practices of their Chinese counterparts to enhance their project management capabilities and improve overall project success in Ethiopia's construction industry. Based on the findings, the study recommends that local contractors enhance their risk identification and analysis techniques, improve risk response planning, and strengthen risk monitoring and control mechanisms. By adopting these practices, local contractors can improve their project performance and align more closely with the successful strategies employed by Chinese contractors.

***Keywords**: Project Risk management; Local Contractors; Chinese Contractors; risk management techniques; Costoverun; Schedule; Quality Standards; Safety Incident*

Chapter one: Introduction

1.1 Background of the Study

The field of project risk management is crucial in the construction industry, serving as a cornerstone for ensuring the success of various projects (Smith, N. J., Merna, T., & Jobling, P. , 2006).Project risk management is usually associated with the development and evaluation of contingency plans supporting activity-based plans, but effective project risk management will be instrumental in the development of base plans and contingency plans for all six Ws. Really effective risk management will strongly influence design and may significantly influence motives and parties. It will certainly influence basic timing and resource allocation plans (Chapman C & Ward S. , 2003). Risk management in the construction project management context involves identification, assessment and prioritization of risks by monitoring, controlling, and applying managerial resources with a coordinated and economical effort so as to minimize the probability and/or impact of unfortunate events and so as to maximize the realization of project (Douglas, 2009).

According to (Yadeta, 2019) statement the rapid growth of the Ethiopian economy calls for massive development of infrastructures and assets. While this brings opportunities to project stakeholders, employing effective risk management method to cope with risks associated with variable construction activities is of importance to implement the projects aligning with project objectives including time, cost, quality, safety and environmental sustainability.

As (Kesto, D.A. & Leulseged, E., 2022) mentioned research indicates that only 8.25% of construction projects are completed by the initially intended deadlines, with the remaining projects experiencing delays averaging 352% beyond the planned schedule. Additionally, projects often face an average cost overrun of 21.5%. Similarly, a study conducted around local and foreign contractors of developing countries states that call for more engagement of local contractors has been gaining support by construction stakeholders. However, due to the increasing complexity of the construction industry and technological advancement, the influx and engagement of foreign contractors has been on the increase and their contribution is also germane to the economy development of the country. The authors examined the strengths, weaknesses, opportunities and threats of indigenous and foreign contractors in the country with a view to understanding their differences in the quest of improving their service delivery. The authors ultimately found foreign

contractors have better strengths than their indigenous counterparts, and this has made them gain better expertise. Also, they enjoyed more opportunities than the threats they are faced with, but the reverse is the case for indigenous contractors (Oke et al., 2018). a focal point of this analysis is the comparison between the risk management approaches of local Ethiopian contractors and Chinese construction firms. the differing methodologies and practices in managing project risks by these two groups provide a rich ground for exploration and understanding. This comparison is vital as it illuminates the varied approaches in a diverse construction landscape. By exploring these practices in detail, the study aims to offer a comprehensive understanding of the effectiveness and adaptability of different risk management approaches in the dynamic and rapidly evolving construction sector of Ethiopia.

Ethio-Telecom, the leading telecommunications service provider in Ethiopia, serves as a relevant case study for this comparative analysis. Ethiotelecom has ongoing construction projects awarded to both local and foreign contractors. For this research one project that is under supervision by foreign contractors is compared with two projects under supervision by local contractors. The head quarter building is being constructed by the Chinese company CGCOC and the construction of the other buildings is being undertaken by local contractors, the Jimma district and Dessie district projects which are ongoing. The largest current ongoing projects at Ethio Telecom includes regional offices that are found at Dessie, and Jimma are facing construction delay. Also the headquarter construction is also experiencing delay and the construction is hold following for the high level decision. Dessie regional office project is 3B+G+Mez. +5 office building which is being constructed for the region employees as a head office for the specific area. The site covers 5925.17-meter square area and a total of 474,324,125.17birr of contract price including VAT. The project includes structural, architectural, sanitary, electrical installation, mechanical works, site work and guard house work. The contract was signed on June 29,2018 and completion time on August 5, 2020. The site at Jimma is 2B+G+8 Office Building with area of 2339.59 meter square and contract amount of 247,947,372.79 with VAT. The project was started on November 14/2018 and the completion time according to the contract was intended to be on April 9, 2021.The building project that locate at Addis ababa held by the foreign contractor is five connected blocks of buildings have a total built-up area of about 124,980.67m2 that includes a. 2nd Basement + 1st Basement + semi-basement = 34,829.10m2 and b. Ground floor to 10th floor = 87,833.14m 2.

1.2 Statement of the Problem

The construction sector represents a substantial investment and profit opportunity, characterized by its large-scale and multifaceted nature. While the construction industry has the potential to transform economies in developing nations such as Ethiopia, it often faces significant hurdles. Issues such as delays in schedules, cost overruns, and concerns over safety and quality frequently impede progress (Kesto & Leulseged, 2022). Various studies have explored the reasons behind these challenges, frequently linking them either directly or indirectly to aspects of project management.

One critical aspect of project management that significantly impacts construction projects is risk management. Effective risk management practices are essential for ensuring project success by mitigating potential negative impacts on time, cost, quality, and safety. However, there is a gap in comprehensive studies that compare the performance of local and foreign contractors in Ethiopia across these critical dimensions.

This research aims to fill this knowledge gap by comparing and evaluating the effectiveness of risk management strategies employed by local Ethiopian contractors and Chinese construction companies. The dominance of Chinese contractors in the Ethiopian construction industry presents an opportunity to analyze their advanced practices and benchmark them against local practices. By focusing on a key project management knowledge area—risk management—this study seeks to uncover the underlying factors contributing to the varying success rates of these two groups.

The intention of this research is not only to identify and understand the risk management techniques and processes utilized by both local Ethiopian contractors and Chinese construction companies but also to foster knowledge sharing between them. Given the dominance of Chinese contractors in the Ethiopian construction industry, there is a critical need to compare their advanced risk management practices with those of local contractors. This comparison aims to facilitate the transfer of best practices and lessons learned, thereby enhancing the overall risk management practices within the Ethiopian construction industry.

Specifically, the study will investigate the risk identification methods employed by both local and Chinese contractors, analyze the systematic approaches used in risk analysis by both groups, compare the structured approaches to risk response strategies, and evaluate the effectiveness of

risk monitoring and control mechanisms. Additionally, it will assess the impact of risk management practices on project outcomes, including cost overruns, meeting deadlines, quality standards, and reducing safety incidents. By examining and comparing these aspects, the research seeks to provide recommendations that can improve the efficiency and effectiveness of project management in Ethiopia's construction sector. The insights gained from this study could lead to better risk management practices, ultimately contributing to the success and sustainability of construction projects in Ethiopia.

In conclusion, this research addresses a significant gap in the current literature by providing a detailed comparative analysis of risk management practices between local and Chinese contractors. The findings aim to facilitate knowledge transfer and the adoption of advanced risk management techniques, thereby enhancing the overall performance of the Ethiopian construction industry. This study emphasizes the importance of learning from the dominant Chinese contractors to improve the risk management practices of Ethiopian contractors, fostering a more collaborative and effective construction industry in Ethiopia.

1.3 Research Objectives

1.3.1 General Objective

To compare and analyze the project risk management practices of local contractors and Chinese construction companies in selected building construction projects under Ethio – Telecom.

1.3.2 Specific Objectives

- To determine the specific risk management practice employed by local Ethiopian contractors in high-stakes construction projects, particularly those under Ethio-Telecom.
- To determine the specific risk management practice employed by Chinese construction companies in high-stakes construction projects, particularly those under Ethio-Telecom.
- To assess the effectiveness of these risk management practices on the overall success rate of construction projects in Ethiopia, focusing on factors like project completion time, budget adherence, quality of work and safety incidents.

1.3.3 Research Questions

- What specific risk management practices are employed by local Ethiopian contractors in high-stakes construction projects, particularly those under Ethio-Telecom?
- What specific risk management practices are employed by Chinese construction companies in high-stakes construction projects, particularly those under Ethio-Telecom?
- How effective are these risk management practices on the overall success rate of construction projects in Ethiopia, focusing on factors like project completion time, budget adherence, quality of work, and safety incidents?

1.4 Significance of the Study

The research, focused on comparing the specific risk management practices of local Ethiopian contractors with those of Chinese construction companies in Ethio-Telecom projects, holds considerable significance in several key areas. Firstly, it offers the potential to identify the most effective risk management practices utilized by both groups, providing valuable insights for enhancing the overall quality of project management in the construction industry. This analysis is crucial for understanding how different risk management approaches directly affect project efficiency, cost-effectiveness, and quality, which can lead to significant improvements in project outcomes, such as reduced delays, budget adherence, and improved quality of construction.

The findings from the study could also contribute to the standardization of risk management practices within the Ethiopian construction industry. By understanding what strategies work well under specific conditions, industry-wide best practices could be developed, which would be instrumental in elevating the standard of construction projects in the country. Moreover, these insights can inform policymakers and regulatory bodies, potentially leading to improved regulations that better support successful project execution and risk mitigation.

In an educational and professional context, the research findings can serve as valuable material for training future project managers and construction professionals. This knowledge transfer is essential for equipping them with practical, effective risk management strategies. Additionally, the study can foster better collaboration and communication among stakeholders in joint projects, considering the differing approaches of Ethiopian and Chinese firms. Such understanding is key to smoother project execution and stakeholder management.

Economically, effective risk management translates into tangible benefits. Successful completion of projects like those under Ethio-Telecom not only benefits the construction companies involved but also contributes to the broader economy through the development of critical infrastructure. Furthermore, the research may reveal opportunities for local Ethiopian contractors to adapt and adopt global best practices in risk management, potentially elevating their operational standards to international levels and enhancing stakeholder confidence in these vital construction projects.

In essence, the research is poised to make a significant contribution to the construction industry, particularly in the context of Ethiopian and Chinese collaboration, with far-reaching implications for project success, industry standards, economic efficiency, and professional education and development.

1.5 Scope of the Study

the study centers on selected building construction projects under Ethio-Telecom within Ethiopia, providing a specific operational context. The organizational scope involves a comparative analysis between local Ethiopian contractors and a Chinese construction company, offering insights into the differing risk management practices of these two distinct groups.

1.6 Limitation of the study

The study focuses on a specific subset of construction projects and companies, which may limit the breadth of risk management strategies observed. This selection bias could influence the study's outcomes, as the practices of the chosen companies might not reflect the broader industry standards or the full range of risk management approaches used in similar projects.

the temporal scope of the study, focusing on recent projects, may not account for the evolution of risk management practices over time. This temporal limitation means that the study might not capture long-term trends or changes in risk management strategies.

1.7 Organization of the study

The study organizes into several chapters to Compare the Project Risk Management Practice of Local Contractors and Chinese Construction Company: Case on Selected Building Construction Projects in Ethio – Telecom. Chapter One provides the introduction, background, statement of the problem, research objectives, research questions, significance of the study, scope, and limitations. Chapter Two presents a comprehensive literature review, covering theoretical and empirical

perspectives on construction Project Risk Management Practice of local contractors and Chinese construction Company. Chapter Three outlines the research methodology, including the research approach, design, population, sample size, sampling procedure, and data collection methods. Chapter Four presents the data analysis and findings, exploring how local Ethiopian contractors and Chinese construction companies differ in their implementation of specific risk management practices, such as risk identification, analysis, response planning, monitoring, and control, in Ethio-Telecom's construction projects, and what effect do these differences have on project outcomes like success rates, delays, cost overruns, and safety incidents. Finally, Chapter Five concludes the study by providing recommendations for improving project risk management practices in Ethiopia's construction industry based on the findings of this comparative study.

Chapter two: Literature Review

2.1 Theoretical Literature Review

2.1.1 Introduction to Risk and Risk Management

Risk is exposure to the consequences of uncertainty. In a project context, it is the chance of something happening that will have an impact upon objectives. It includes the possibility of loss or gain, or variation from a desired or planned outcome, as a consequence of the uncertainty associated with following a particular course of action. Risk thus has two elements: the likelihood or probability of something happening, and the consequences or impacts if it does.

Risk management refers to the culture, processes and structures that are directed towards the effective management of potential opportunities and adverse effects. Project Risk Management includes the processes of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project. The objectives of project risk management are to increase the likelihood and impact of positive events, and decrease the likelihood and impact of negative events in the project (PMBOK Guide, 2013). Effective risk management involves doing the right things with respect to the risk management process (RMP) so that the project is risk efficient in the corporate sense and all other project objectives are achieved (Chapman C & Ward S. , 2003) .

Risk management is "one of the most creative tasks of project management" and consist of four steps; that is, to recognize the risk sources, to measure their effects (risk assessment and analysis), to expand managing responses to risk, and finally to provide for residual risk in the project estimates. "The language of project risk management explains this phenomenon: Known unknowns represent identified potential problems and unknown unknowns are the problems that arrive unexpectedly" (Verzuh, (2016)).

2.1.2 Steps in the Risk Management Process

The initial process to conduct in a risk management process is plan for risk management. Plan Risk Management is the process of defining how to conduct risk management activities for a project. (PMBOK Guide, 2013). The book outlines the Plan Risk Management process involves several key inputs, tools and techniques, and an essential output. As inputs, it uses the Project Management Plan, which includes all subsidiary management plans and baselines; the Project Charter, offering high-level risks and project descriptions; the Stakeholder Register, detailing project stakeholder

roles; Enterprise Environmental Factors, encompassing the organization's risk attitudes and tolerances; and Organizational Process Assets like risk categories and standard templates. The tools and techniques employed include Analytical Techniques for understanding the project's risk management context, Expert Judgment from various knowledgeable sources, and Meetings with project team members and stakeholders to develop the risk management plan. The primary output of this process is the Risk Management Plan, which is part of the project management plan and outlines the approach, tools, roles, budgeting, and timing for managing risks throughout the project lifecycle. This comprehensive approach ensures that risk management is integrated and aligned with the overall project plan and objectives.

According to (Dale Cooper, Stephen Grey, Geoffrey Raymond, Phil Walker, 2005) risk, management method encompasses the organized use of management policies, processes, and procedures: to the responsibilities of making the circumstance, recognizing, and examining, measuring, handling, observing, and interconnecting risk and applies across all phases of the project.

Risk management process intended to decrease or remove the risk of some categories of activities taking place or having an influence on the project (Rumane, 2018). Risk management procedures of construction project describe the work of all project life cycle. Project management body of knowledge described risk management processes, “plan risk management, perform qualitative risk analysis, perform quantitative risk analysis, plan risk responses, implement risk responses, and monitor risks” (PMBOK Guide, 2013)

The purpose of project risk management is to obtain better project outcomes, in terms of schedule, cost and operations performance. Risk management is essential because it is key to understanding how well various resources (human, financial, technical, and data resources) can be pulled together to achieve a security risk management system. The knowledge of these challenges further helps to solidify the decision making character of decision-makers within the domain of construction risk management (Wang and Yuan, 2011).

Subsequently risk identification is the important step in risk management. Identify Risks is the process of determining which risks may affect the project and documenting their characteristics (PMBOK Guide, 2013). In the "Identify Risks" process, the book mentions several inputs are crucial. The Risk Management Plan outlines roles, responsibilities, and risk categories. The Cost

Management Plan and Schedule Management Plan provide insights into potential financial and time-related risks. The Quality Management Plan offers quality metrics, while the Human Resource Management Plan details roles and organizational charts, essential for identifying risks in human resources. The Scope Baseline, including project assumptions and the Work Breakdown Structure (WBS), helps in understanding potential risks at various project levels. Activity Cost and Duration Estimates give a quantitative view of potential financial and schedule risks. The Stakeholder Register ensures that risks relevant to key stakeholders are considered. Project Documents, such as the project charter and schedule, provide information on decisions that impact risk identification. Procurement Documents highlight risks associated with external procurement. Enterprise Environmental Factors and Organizational Process Assets also influence the process by providing external and internal contextual information. Tools and techniques used include Documentation Reviews of project documents, Information Gathering Techniques like brainstorming, the Delphi technique, interviewing, and root cause analysis. Checklist Analysis helps in identifying risks through predefined lists, while Assumptions Analysis explores the validity of project assumptions. Diagramming Techniques, including cause and effect diagrams and flow charts, help visualize potential risks. SWOT Analysis identifies internal and external risks. Expert Judgment from experienced individuals also plays a crucial role. The primary output from the Identify Risks process is the Risk Register. This document records identified risks, their causes, and potential responses. It begins with a list of identified risks and root causes and is continuously updated with more detailed information as the project progresses. This process is essential in developing a comprehensive understanding of all potential risks in a project.

The next notable step in risk management process is to Perform Qualitative Risk Analysis. Perform Qualitative Risk Analysis is the process of prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact (PMBOK Guide, 2013). In the "Perform Qualitative Risk Analysis" process, various inputs are utilized to assess and prioritize project risks. These inputs include the Risk Management Plan, which outlines roles, responsibilities, and risk categories; the Scope Baseline, providing an understanding of project complexity; and the Risk Register, containing identified risks. Additional inputs are Enterprise Environmental Factors, offering industry insights, and Organizational Process Assets, which include information from similar past projects. Tools and techniques employed in this process involve Risk Probability and Impact Assessment, where each risk's likelihood and potential effect

are evaluated, and the Probability and Impact Matrix, which helps prioritize risks based on their ratings. Other techniques include Risk Data Quality Assessment, assessing the usefulness and quality of risk data; Risk Categorization, organizing risks by sources or project areas; Risk Urgency Assessment, determining the immediacy of risk responses; and Expert Judgment, leveraging expertise for risk assessment. The output of this process is updated Project Documents, particularly the Risk Register. The updates may include new assessments of risks, risk rankings, urgency information, risk categorization, and a watch list for lower-priority risks. The Assumptions Log may also be updated to reflect new information from the risk assessment, ensuring that project planning remains aligned with current risk perceptions and priorities.

Following qualitative risk analysis perform quantitative risk analysis is the next step. Perform Quantitative Risk Analysis is the process of numerically analyzing the effect of identified risks on overall project objectives (PMBOK Guide, 2013). The inputs for this process include the Risk Management Plan, which outlines the guidelines for quantitative analysis; the Cost and Schedule Management Plans, guiding the management of risk reserves; the Risk Register, containing identified risks; Enterprise Environmental Factors, providing external insights; and Organizational Process Assets, including information from similar past projects. various tools and techniques are employed in this process. Data Gathering and Representation Techniques, such as interviewing and probability distributions, quantify risk probability and impact. Quantitative Risk Analysis and Modeling Techniques, including sensitivity analysis, expected monetary value analysis, and simulation (like Monte Carlo), evaluate and prioritize risks. Expert Judgment is crucial in defining inputs and interpreting data. The outputs of this process lead to updates in Project Documents. These updates include probabilistic project analyses, estimates of achieving cost and time objectives, a prioritized list of quantified risks, and trends in risk analysis results. These updates aid in forming contingency reserves and refining project objectives, reflecting new insights gained through quantitative risk analysis. This process is vital for managing project risks effectively and making informed decisions.

Next to the quantitative analysis of risk the subsequent step is to plan risk response. Plan Risk Responses is the process of developing options and actions to enhance opportunities and to reduce threats to project objectives (PMBOK Guide, 2013). The inputs include the Risk Management Plan, which provides guidelines for risk analysis and thresholds; the Risk Register, detailing

identified risks, root causes, potential responses, and risk prioritization; along with the Cost Management Plan, Schedule Management Plan, Enterprise Environmental Factors, and Organizational Process Assets providing additional context and historical data. Tools and techniques used in this process include a range of strategies for both negative risks (threats) and positive risks (opportunities). For negative risks, strategies such as avoid, transfer, mitigate, and accept are considered, each tailored to the specific risk's probability and impact. For positive risks, strategies include exploit, enhance, share, and accept. Contingent response strategies and expert judgment are also crucial in this process, providing tailored responses based on certain predefined conditions and expertise in risk management. The outputs of this process lead to updates in the Project Management Plan, including changes to the schedule, cost, quality, procurement, human resource management plans, and the scope, schedule, and cost baselines. Project documents, particularly the Risk Register, are also updated to reflect the chosen risk response strategies, including details on risk owners, actions to implement strategies, trigger conditions, budget and schedule requirements, contingency and fallback plans, as well as residual and secondary risks. Additionally, updates may be made to the assumptions log, technical documentation, and change requests as new information becomes available through the application of risk responses. This process ensures that the project is prepared and responsive to potential risks, enhancing its likelihood of success.

The final step in risk management is control risk. Control Risks is the process of implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project (PMBOK Guide, 2013). Key inputs to this process include the Project Management Plan, which offers guidance for risk monitoring and control, and the Risk Register, detailing identified risks, responses, and other critical information such as residual and secondary risks, and contingency reserves. Work Performance Data and Reports are also vital inputs, providing information on the project's progress and performance impacted by risks. Several tools and techniques are employed in this process. Risk Reassessment involves regularly revisiting and updating the risk landscape, while Risk Audits assess the effectiveness of risk responses and the overall risk management process. Variance and Trend Analysis, as well as Technical Performance Measurement, are used to monitor project performance and technical accomplishments against planned targets. Reserve Analysis evaluates the adequacy of remaining contingency reserves against remaining risks. Regular Meetings are

also crucial for discussing and managing risks. The outputs of the Control Risks process are varied and essential for effective risk management. Work Performance Information is used to support decision-making regarding risks. Change Requests may arise from implementing contingency plans or workarounds. The Project Management Plan and Project Documents, especially the Risk Register, are updated to reflect the latest risk assessments, audits, and reviews. Organizational Process Assets are also updated with new templates, lessons learned, and risk breakdown structures, contributing valuable information for future projects. This ongoing process of monitoring and controlling risks is fundamental to ensuring the project remains aligned with its objectives and can adapt to any changes in the risk environment.

2.1.3 Overview of Risk Management in Construction Projects

In sight of (Shou Qing Wang, Mohammed Fadhil Dulaimi, Muhammad Yousuf Aguria, 2004)) risk management may be a structured observes that contains of three central phases: a) recognizing risk; b) risk examination and assessment; and c) risk response. The risk management method instigates with the first identification of the many and prospective risks related with the building project. It is of in depth significance because the progression of risk investigation and response management might solely accomplish on recognized prospective risks.

Plan Risk Management (Kerzner, 2013) describes risk management as the procedure of evolving and recording a prearranged, complete, and collaborative plan. It approaches for recognizing and examining risks, evolving risk, counteraction strategies, monitoring and controlling how risks have transformed. Moreover, (PMBOK Guide, 2013)defined plan risk management as the process of describing how to conduct risk managing activities for a development. The key benefit of this process is that it ensures that the degree, type, and visibility of risk management are proportionate to both threats and the importance of the project to the organization and other stakeholders. This activity done on one time or at predetermined instances in the project.

Risk Identification Building construction project progression, from conception, viability investigation and principal design to finishing points of a project consume an extended period and includes various stages. It requires several individuals with diverse expertise and many interests, an appropriate material procurement scheme and the usage of equipment and machineries. All of these multifaceted circumstances need managed with proper harmonization to deliver a series of events without difficulties. It is essential to identify and distinguish risks that might come in to

insight throughout this course (Djoen san santoso, Stephen O. Ogunlana, Takayuki Minato., 2003). Efforts, in several researches have been made to manage the identification of risk areas and categorization in diverse clusters because of the magnitude of influence, root cause, etc. on the course of building construction projects. (Nerja Banaitiene and Audrius Banaitis. , 2012)considered that risk identification is the principal and possibly the ultimate significant phase in the risk management process, as it tries to recognize the origin and kinds of risks. It comprises the recognition of prospective risk characteristic situations in building project and the interpretation of risk responsibilities. Risk identification builds the foundation for the subsequent phases: analysis and control of risk management.

In addition, (Djoen san santoso, Stephen O. Ogunlana, Takayuki Minato., 2003) classified risks in to nine groups: physical risk, personal risk, technical risk, safety-accident risk, construction and design cause risk, political and regulation risk, financial risk, contractual risk, environmental regulations cause risk. Each personal risk and technical risk divided into six sub-groups; i.e.; technical and labor, sub-contractor, staff/foreman, engineer, consultant, client; and material, equipment, technique, construction process, construction site, and ground condition respectively. The outcomes indicated very evidently that the managerial and design factor is the main and most important problem in high-rise construction projects both in terms of rate of incidence and magnitude of risk influence. On the other hand, (Edmundas Kazimieras Zavadskas , Zenonas Turskis & Jolanta Tamošaitiene. , (2010))recommended three ways of categorizing the project risk: external, project, and internal risks. External risks are those risks that are outside the control of the project management group such as political, economic, social, weather risks. Project risks are time risk, cost risk, work quality, constructing risk, and technological risk. Internal risks can be categorized based on the participants who might be the source of risk events such as participants, consultant, contractor, etc. these are resource risk, project member risk, construction site risk, documentation and information risks. All the above-mentioned main categories sub-divided into associated sub-groups. Furthermore, building project risk factors were classified in to 5 major classes as per (Scott., (2005))These are outside the project and site situation risks, financial and economic risks, written agreement and technical risks, and decision-making risks. Besides, every main class sub-divided into four sub-groups. Consequently, the topmost five decisive risk aspects influencing project schedule in hierarchy of significance were thus: high

inflation/increased price, design change by owner, defective design, weather, and delayed payments on a contract.

Risk Assessment, a broad list of risks generated by risk identification that might influence the project and it is essential to isolate the significant issues from less significant ones. This procedure is termed as risk assessment (Dale Cooper, Stephen Grey, Geoffrey Raymond, Phil Walker, 2005) that commonly have two wide classes, that is, qualitative and quantitative analysis which are notable in literature on risk assessment support this notion. Similarly, (Shou Qing Wang, Mohammed Fadhil Dulaimi, Muhammad Yousuf Aguria, 2004) describes that risk assessment is a procedure in-between risk identification and risk response and controlling. It takes part improbability in a quantitative and qualitative way to assess the likely effect of risk. The assessment would usually focus on risks with high likelihoods, high economic effect or unions thereof which produce a considerable economic effect. (Szymanski, 2017)concludes that, it might explicitly mention that both qualitative and quantitative analyses rotate about the estimation of risk and its implications. Nevertheless, qualitative analysis frameworks the pillar for a process, and quantitative analysis displays concrete advantage of these examines - statistics, numeric data that are the foundation for additional investigation.

Risk Response Strategies Once the risks of the project have been recognized and examined, appropriate risk response strategy adopted in order to take the necessary steps to minimize the negative effects of risk on project objectives. The nature and potential consequences of the risk will be bases for the mitigation measures to be established. The central goal is to avoid as much as possible the likely effect and to raise the degree of control of risk. The more effective the measure is on one risk, depends on the more control of one mitigation measure (Shou Qing Wang, Mohammed Fadhil Dulaimi, Muhammad Yousuf Aguria, 2004). Additionally, (Banaitiene & Banaitis, 2012) suggested that there are four alternative approaches: risk avoidance, risk transfer, risk mitigation, and risk acceptance, for treating risks in a constructing project. The appropriate managing of risks need that it should be recognized and assigned in a distinct way. If agreed bodies understand their risk responsibilities, risk event conditions, and risk treatment abilities, can be real. After recognizing all risks that take place or may take place in the project, actions need to start to suggest explicit responses for each of the identified risk.

These actions can be dual. Firstly, they might target to finish removal of negative impacts on the project or emphasis on decreasing the negative effect. These responses grouped into four key parts: acceptance of risk, transfer of risk, reduction/mitigation, and avoiding risk. Nevertheless, the Risk Management Group discusses by dividing the risk response strategies in to two main categories, i.e. responses for treats (avoid, transfer, and mitigate) and responses for opportunities (exploit, share, and enhance); and acceptance being common for both categories. Acceptance of risk: (John M. Nicholas, Herman Steyn, 2017) described that risk are an escapable, but only the prominent substantial ones that need consideration. If a risk and its effect are important, techniques needs establishment to remove or decrease the risk to a tolerable degree. What is taken in to account "acceptable" is to be determined by on the risk "tolerance" of project participants. Retaining of the risk implies understanding the risk, its result, likelihood, and accommodating by choosing to do nothing about it. If the risk happens, the project group will respond. This is a usual plan when the results or likelihood that a risk will happen is negligible. Providing the results are more inexpensive than the cure, this strategy makes sense (Verzuh, (2016)) Moreover, accepting a risk carried out when a project group recognizes a risk that might happen and chooses not to decrease the probability of the risk takes placing or the effect it would have if it does takes place. Transfer of risk/Sharing: is relate with the relocation of risk to another body indicating the capacity to resolve risk. One form of relocation is a direct relocation of losses results to another body. The main method of such an action is insurance, which permits lawful relocation of happening results. An example of risk relocation is to contract an 'uncertain task' to the service provider or transportation facilities to the freight firm (Szymanski, 2017). An approach to relocate the risk is to relocate the support scheme to a different group or another site such as another organization. The accountability of the support scheme exists in another institute, thus relocating the risk to a different group.

Reduction/Risk mitigation/: Mitigating a risk happens when a project group is responsive to risks and prepares a strategy of achievement to decrease the effect a risk will have on the project should the risk happen in the course of the project. Effecting primary deeds to decrease the possibility and/or effect of a risk, needs frequent operation than trying to restore the loss later the risk has happened. Risk mitigation might need means or period and accordingly presents a balance between doing nothing against the cost of mitigating the risk (ibid). Activities that decrease the likelihood of takes placing and mitigate the effects of risk, for example, by the creation of properties accounts or matching one risk by another and hence decreasing the total risk. The value of risk reduction

might need explanation at each phase of the project, from the preparation time and managerial actions (Szymanski, 2017).

2.1.4 Risk Management Tools and Techniques

A risk management development acknowledges tools and techniques to help in reducing risk by recognizing, evaluating, and handling the risk intrinsic in projects. It presently accepted that recognized procedures associated to the current of the project would have an operative effect on 29 successive project actions. Consequently, a proof of those activities proves to be a part of the activities for the risk management subdivision within the project strategy and therefore the foundation to demonstrate how risk in a project setting is handled. Tools and Techniques for Plan Risk Management The Project Management Body of Knowledge (PMBOK Guide, 2013) describes the tools and techniques for plan risk management as expert judgment; data analysis; Stakeholder analysis; meetings. ii) Tools and Techniques for Risk Identification For classifying risk related to projects, there are many tools and techniques according to (Dale Cooper, Stephen Grey, Geoffrey Raymond, Phil Walker, 2005)It comprises, Brainstorming; Checklists; Interviews and Focus Group Discussions; Scenario analysis; Surveys and Questionnaires; Work Breakdown Structure Analysis; and, Examination of indigenous or overseas experience with similar activities and projects, together with analysis of Post-Project Completion Reports and Audits. Furthermore (Chapman C & Ward S. , 2003)the strategies to spot potential risks, which gathered into three separate classifications utilized by construction experts: 1) Identification conducted exclusively by the risk analyst; 2) Identification by the expert, questioning a contributor of project group; 3) Identification by the analyst, leading a working team; iii) Tools and Techniques for Qualitative Analysis Qualitative investigation, in keeping with (Szymanski, 2017) practices various tools in valuation and categorization of risk. The foremost important of those contain indicative assessment of probability of risk issue prevalence and its impact; risk index assessment matrix; estimated assessment of risk significance to the project; study of project assumptions stability and project sensitivity to any changes of those assumptions; information ranking techniques in terms of usability for risk analysis. iv) Tools and techniques for Quantitative Analysis A number of approaches normally used in quantifiable risk analyses. The methods and procedures for computable investigation in keeping with the (PMBOK Guide, 2013)are expert judgment; data gathering; interpersonal and team skills; representations of uncertainty; and, data 30 analysis. According to (Kerzner, 2013) quantitative risk analysis tools and techniques comprised, but are

not restricted to Payoff matrices; decision analysis (typically decision trees); expected value; and A Monte Carlo process. v) Tools and techniques for Risk Response According to project management body of Knowledge Guide; tools and techniques for risk response are the following: Professional judgment; data gathering; interviews; interpersonal and the team skills; facilitation; strategies for threats; strategies for opportunities; contingent response strategies; strategies for overall project risk; data analysis; alternatives analysis; cost-benefit analysis; decision making; and multi-criteria decision analysis.

Risk management is a major aspect that can either influence a construction project positively or negatively, depending on how it is done. Good risk management protocols, when followed, can lead to high capital value, better competitive advantage, maximum market profit margins, and good shareholder equity. In the same way, poor risk management, which involves the use of wrong tools for risk management and control, the inadequate utility of required management processes, poor quality of management, and assessment can lead to calamitous results in any construction project set-up (Dosumu and Aigbavbo, 2018).

2.2 Empirical Literature Review

2.2.1 Risk Management and processes in Construction Project

(Flyvbjerg, Holm and Buhl , 2003) argue that instituting risk management in construction projects is crucial for increasing value-added along the construction value chain. By ensuring compliance with best practice construction approaches, risk management minimizes waste and inefficiencies, optimizes shareholder value, and maximizes overall profitability. This is achieved through minimizing or eliminating the potential adverse impact of uncertain events that may affect the achievement of project objectives. Effective risk management increases value by ensuring adherence to budget, schedule, and quality expectations.

(Grace F. M., 2010) categorizes construction projects into residential, building, institutional, commercial, and specialized industrial sectors. Each sector presents unique risks requiring tailored risk management strategies. (Gray and Larson,, 2008) highlight two primary approaches to risk management in construction projects: qualitative and quantitative. Quantitative methods, such as decision tree analysis and Monte Carlo simulation, use statistical data to calculate risk probabilities and impacts. Conversely, qualitative approaches rely on judgment and criteria, employing methods like precedence diagramming and process risk lists to determine priorities and outcomes.

However, Larson and Gray (2011) streamline the process into four essential steps: risk identification, risk assessment, risk response planning, and risk response control. in this study, the researcher follows only According to (Larson, E. W., & Gray, C. F., 2011) risk management process has the following steps.

Step1: Risk identification:

Risk identification is foundational, aiming to pinpoint potential hazards and types of risks impacting a construction project. This phase involves recognizing potential risk events and assigning management responsibilities. Effective risk identification ensures successful risk management by documenting the nature and characteristics of each identified risk. (Hillson, 2002) advocates for a mix of techniques, such as brainstorming sessions, checklists, structured questionnaires, Delphi groups, and various diagrammatic methods, to identify risks and understand their origins, triggers, and impacts. The construction sector typically categorizes risks into acts of God, physical risks, financial and economic risks, political and environmental risks, design-related risks, and construction-related risks.

Step 2: Risk Assessment

Risk assessment follows identification, evaluating the likelihood and severity of potential risks. Tools and techniques used include the Risk Severity Matrix, Failure Mode and Effects Analysis (FMEA), scenario analysis, and probability analysis. These methods help project managers visualize risks, anticipate failure points, and understand potential impacts, thus preparing robust risk management strategies. Integrating risk assessment with other project management activities ensures comprehensive oversight and proactive management, addressing potential problems before they significantly impact the project.

Step 3: Risk response Planning

This step develops strategies to address identified risks, including avoidance, mitigation, transfer, and acceptance. Avoidance involves changing the project plan to eliminate risks. Mitigation reduces the impact or probability of risks to acceptable levels. Transfer shifts risk impacts to third parties, such as through insurance. Acceptance acknowledges the risk without proactive management steps. Contingency planning sets actions to minimize impacts if risks materialize, while secondary risks from implemented measures are also considered. Effective risk response

planning integrates with overall project management processes, ensuring risk management throughout the project lifecycle.

Step 4: Risk Response Control

Risk response control involves implementing planned risk responses and ensuring their effectiveness over the project's lifecycle. This process includes monitoring and adjusting responses, managing changes through integrated change control systems, and tracking and recording risk management activities. Evaluating the effectiveness of the risk management plan at the end of the process helps understand successes and areas for improvement in future projects.

2.2.2 Risk Management practice in Ethiopian Construction Projects

In the Ethiopian construction industry, the adoption of sustainable construction practices remains limited, largely due to significant challenges and high risks involved (Tessema, A. T., Alene, G. A., & Wolelaw, N. M., 2022). Research underscores Ethiopia's lag in management practices compared to global standards, with reports indicating a poor ranking in management efficiency, even falling behind several developing African countries (Ayalew, T., Dakhli, Z., Lafhaj, Z. , 2016) .The sector is characterized by fragmented operations and conflicting components rather than integrated planning (Koshe and Jha, 2016).

(Yadeta, 2019) identified major construction risks in Ethiopian projects, including inadequate scheduling, equipment, and labor productivity, alongside financial risks such as payment delays and approval issues. Political risks like bribery and corruption, economic risks such as inflation, and management risks involving project supervision and subcontractor performance further compound the challenges. (Ferede, 2020) highlighted critical obstacles to effective risk management in the Ethiopian context, emphasizing deficiencies in innovation, risk assessment processes, transparency, and accountability within the industry.

Overall, the Ethiopian construction sector faces substantial hurdles hindering the uptake of sustainable practices and effective risk management. Empirical studies consistently underscore the need for improved management practices and innovative approaches amidst economic pressures and skill shortages (Ferede, 2020).

2.2.3 Chinese Construction Firms Operating Internationally

The construction industry has long been a cornerstone of China's economy, with recent liberal trade policies facilitating increased export and import activities. These policies have encouraged Chinese construction firms to expand internationally, supported by initiatives like online portals and governmental agreements offering incentives (Sui Pheng, L., & Hongbin, J. , 2003). This expansion was catalyzed by China's robust economic growth, averaging 11.6% annually in the 1990s and resulting in substantial investments, particularly in construction, which has grown at an average rate of 8% since 2000 (Ferede, 2020).

Over the past 25 years, China's construction sector has undergone significant structural changes, with many domestic firms becoming global players and adopting new technologies (Ferede, 2020). However, despite these advancements, competition has intensified, particularly from foreign contractors with superior technology and lower-cost rural teams (Ferede, 2020).This competitive landscape underscores the importance of effective risk management practices, an area where many Chinese construction firms have shown varying degrees of commitment. Research highlights a prevalent awareness of risk management among these firms, yet practical implementation remains inconsistent ((Gao et al., 2019).

According to (Low, S. P., Liu, J., & He, S. , 2009), managing external risks—such as financial risks, country-specific risks, and cultural differences—is crucial for Chinese firms. Their study reveals that while some firms rely on skilled personnel and overseas experience for risk management, there is a general deficiency in systematic risk management practices (Low, S. P., Liu, J., & He, S. , 2009). They advocate for the establishment of dedicated external risk management task groups, particularly in lower-risk environments like Singapore, to enhance preparedness and proactive response strategies.

2.2.4 Effectiveness of Risk Management Practice on Construction Project Outcomes

Construction projects are inherently susceptible to various risks, impacting critical objectives such as time, cost, and quality (Iqbal et al., 2015). The construction industry is widely recognized for its high-risk nature, attributed to complex activities and dynamic project environments that necessitate rigorous risk management during decision-making processes (Banaitiene & Banaitis, 2012). According to Banaitiene and Banaitis, effective risk management in construction project

management involves a systematic approach to identify, analyze, and respond to risks, thereby enhancing project management processes and resource utilization.

Effective risk management not only mitigates potential negative impacts but also presents opportunities for identifying favorable alternatives, increasing confidence in project success, and improving decision-making precision (Renault & Agumba, 2016). Research underscores that construction firms that implement robust risk management strategies benefit from financial savings, enhanced productivity, improved project success rates, and better overall decision-making capabilities (Banaitiene & Banaitis, 2012)

(Ferede, 2020) highlights empirical evidence indicating that effective risk management in construction projects delivers significant benefits, including time savings, enhanced competitive advantage, cost reduction, increased legal certainty, and improved shareholder value.

Chapter Three: Research Methodology

3.1 Research design

The research was descriptive, focusing on how local Ethiopian contractors and Chinese construction companies differed in their implementation of specific risk management practices, such as risk identification, analysis, response planning, monitoring, and control, in Ethio-Telecom's construction projects. It examined the effects of these differences on project outcomes, including success rates, delays, cost overruns, and safety incidents.

3.2 Research approach

The research used both qualitative and quantitative approaches. The qualitative approach helped cover subjective perspectives and experiences, while the quantitative approach provided numerical data for analysis and verification.

3.3 Target Population

The study was conducted using the census method of data collection, as the targeted population of all respondents was involved. The census approach ensured complete coverage of the population, enabling a holistic and detailed comparison of risk management practices across the selected projects. This approach was meticulously designed to encompass every individual associated with three specific construction projects: one supervised by a foreign contractor and two by local contractors. By engaging in a census, the study aimed to capture comprehensive insights from every team member, ranging from project managers to field engineers, involved in these projects. This exhaustive data collection strategy was crucial for the comparative analysis, as it ensured that no perspectives or experiences were overlooked, providing a holistic view of risk management practices. The 99 targeted participants were those directly involved in the Ethio-Telecom building construction projects: fifty-four (54) from the Jimma and Dessie construction projects (Local Contractors), forty (40) from the Addis Ababa Head Office construction project (Chinese Contractor), and five (5) from the Ethio-Telecom civil work department. Thus, census sampling was conducted in this study.

3.4 Data sources and data collection method

3.3.1 Primary Data

The primary data were gathered from the responses of the subjects of the study through questionnaires and interviews. The questionnaires were distributed to fifty-four (54) contractors from the Jimma and Dessie construction projects (Local Contractors) and forty (40) contractors from the Addis Ababa Head Office construction project (Chinese Contractors). The interviews were conducted with five managers and three supervisors who had direct experience with the construction projects. The type of data used for this study was ordinal, utilizing five-point Likert scale items in the questionnaire.

3.5 Data Collection Instrument

The questionnaire was structured into four primary sections, each tailored to address specific research objectives. The initial section gathered personal background information about the respondents. The subsequent section delved into details about the respondents' company backgrounds. The third section explored various risk management practices, including risk identification, risk analysis, response planning, monitoring, and control. The final section assessed the impact of these risk management practices on project outcomes.

The types of questions included were a mix of scaled responses (Likert scale from Strongly Agree to Strongly Disagree), open-ended responses for detailed insights, and multiple-choice questions for demographic and background information. This comprehensive approach ensured a robust evaluation of risk management practices and their effectiveness across different construction projects within Ethio-Telecom.

3.6 Procedure for Data Collection

The questionnaires were distributed to the respondents via Google Forms. This method allowed participants a three-day window to complete and submit their responses at their convenience. Providing this timeframe ensured that respondents could reflect on their answers and respond under stress-free conditions. This digital approach not only facilitated easy access and submission but also aimed to gather high-quality data for analysis efficiently.

3.7 Method of Data analysis

The data was analyzed using a relative importance index, Spearman's rank correlation and coding. Importance Index (RII) is used to determine the relative importance of quality factors involved. The points of Likert scale used are equal to the value of W, weighting given to each factor by the respondent.

Relative Importance Index =($5n5 + 4n4 + 3n3 + 2n2 + 1n1)/(A * N)$

The Spearman's rank correlation coefficient was used to measure the degree of agreement or disagreement between performance of foreign and local contractors.

r_k=1-$\left(\frac{6-\sum d2}{n3-n}\right)$

To analyze the interviews, coding was used. Codes were labels that helped identify themes, ideas, concepts, or phrases from the interviews. Initially, open coding was employed, where data was labeled without predefined categories. Subsequently, axial coding was utilized to group these codes into categories or themes.

Chapter 4: Results and Discussion

4.1 Introduction

This chapter presents an in-depth analysis and discussion of the survey results obtained from a comparative study on the risk management practices of local and Chinese contractors in Ethio-Telecom construction projects. Based on 94 questionnaires distributed among the involved firms, with a high response rate of 84%, this chapter scrutinizes the effectiveness of the distinct risk management strategies adopted by the two contractor groups. By evaluating the quantitative data and qualitative insights gathered, the chapter aims to understand the impact of these practices on crucial project outcomes such as adherence to schedules, budget management, quality control, and safety standards. Further, it explores the educational and professional backgrounds of the respondents to contextualize their understanding and implementation of risk management techniques. This chapter provides a comprehensive comparison that not only highlights the differences and similarities in risk management approaches between local and Chinese contractors but also assesses their implications for project success and efficiency within the dynamic environment of Ethio-Telecom's construction projects.

4.2 Analysis of Questionnaire Response

A total of 94 questionnaires were sent to the respondents from the three firms that have a direct relation to the projects at Ethio Telecom. Out of the distributed 94 questionnaires 79 were collected which are 49 from the local contractors (Dessie and Jimma), and 30 from Chinese. This gives a response rate of 84 % as shown in Table 4.1 below.

Table 4.1 questionnaire response

Firms	Provided	Returned
Local Contractors	54	49
Foreign Contractor	40	30
Total	94	79
response rate	84.04%	

Source: Own computation, 2024

4.2.1 Analysis and Discussion of Results

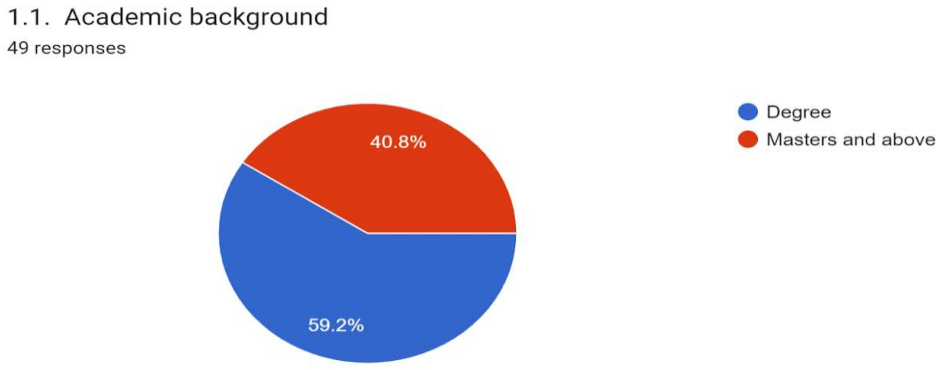
In this part of the study the sights and understandings of the respondents on how local and Chinese company practice risk management at ET building construction projects have been reflected and discussed.

The responses to the questionnaire (Appendix A) were analyzed and discussed in the following sections.

4.2.2 Academic Background

This section helps to know the educational and professional ability of. The questionnaire was accomplished by respondents those were involved in preparation of design and specification, preparation of technical and financial requirements, bid evaluation, contract awarding, contract administration, payment for contractor and consultant, claim and dispute resolution and construction site supervision work.

According to the collected survey result local contractors shows that 40.8% of the respondents have MSc. Educational qualification and the rest 59.2 % BSc. Degree Educational qualification as shown in the figure below. Again to the collected survey result Chinese contractor shows that 50% of the respondents have MSc. Educational qualification and the rest 50 % BSc. Degree Educational qualification as shown in the figure below The professional's percentage distribution shows that all the responses have been completed by professional that are involved in the building construction sector at the specific company. The study also indicates these professional respondents are expected to have adequate knowledge on the issue.



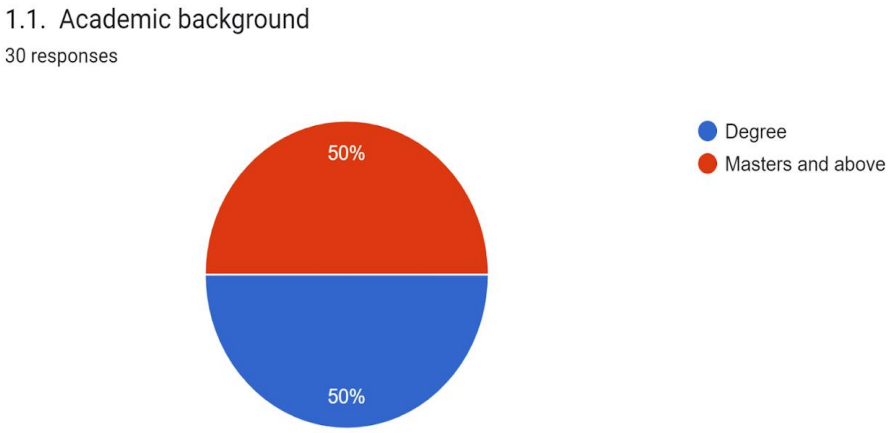


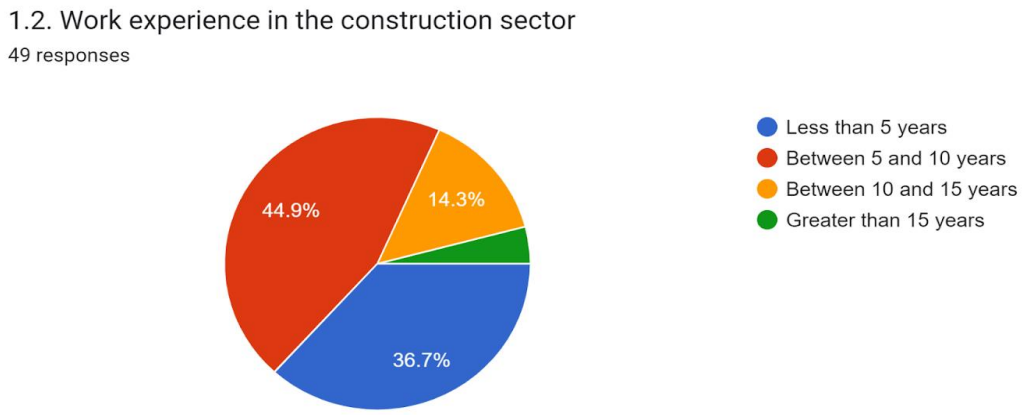
Figure 4.1 academic background of Local and Chinese the respondents

Source: Own computation, 2024

4.2.3 Respondents Experience

Out of the 49 respondents from local contractors 36.7% of the respondents had less than 5 years of working experience in construction sector, 44.9% had 5 to 10 years of experience, 14.3% had 10 to 15 years of experience and 4.1% had more than15 years of experience.

Out of the 30 respondents of Chinese contractors 6.7% of the respondents had less than 5 years of working experience,50 % had 5 to 10 years of experience and 30% had 10 to 15 years of experience13.3% had more than15 years of experience.



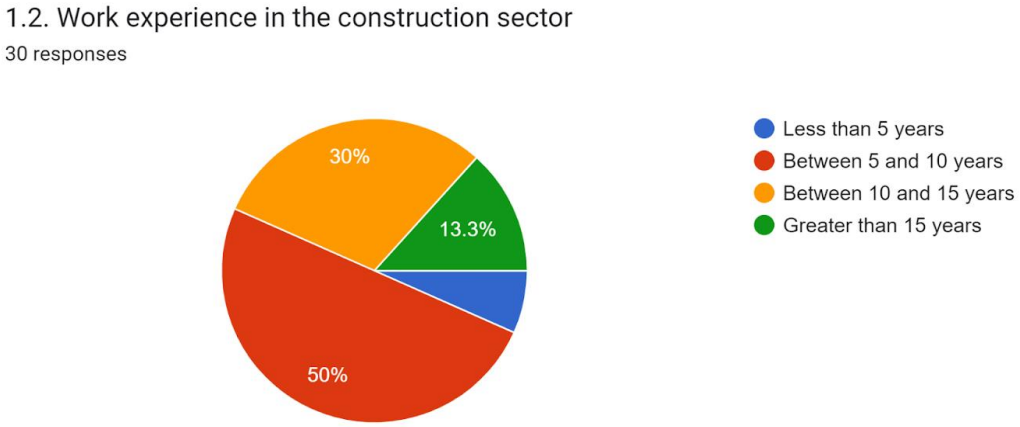


Figure 4.2 Work experience of respondents

Source: Own computation, 2024

4.2.4 Risk management practice

4.2.4.1 Risk Identification

The Analysis result shows practices such as " data analytics tools to predict potential risks, Risk identification sessions include a formal evaluation of environmental and regulatory compliance risks, The risk identification process is integrated with (PMIS), identifying risks are validated by external risk management consultants, conduct scenario planning sessions, Stakeholder feedback is systematically collected and analyzed, review and update risk identification protocols and assess the interdependencies between different risks " have low RII scores (0.3, 0.28, 0.31, 0.33, 0.327, 0.29,0.36 and 0.31respectively), indicating these are highly valued and probably well-implemented practices among Chinese contractors. The practice with the highest RII is " review and update risk identification protocols " with an RII of 0.36, reflecting a consensus on its importance in managing risks effectively.

The Analysis result of the RII scores for local contractors also shows generally higher compared to Chinese contractors, suggesting either a variance in practice effectiveness or a lower consensus on certain practices. For instance, the RII for "data analytics tools to predict potential risks" is 0.481, which is significantly lower than that of foreign contractors. Again the other results like: Risk identification sessions include a formal evaluation of environmental and regulatory compliance risks, the risk identification process is integrated with (PMIS), identifying risks are validated by external risk management consultants, conduct scenario planning sessions,

Stakeholder feedback is systematically collected and analyzed, review and update risk identification protocols and assess the interdependencies between different risks have low RII scores (0.7, 0.68, 0.71, 0.72, 0.69, 0.72, 0.69 and 0.69 respectively). Local contractors rank "identifying risks are validated by external risk management consultants and Stakeholder feedback is systematically collected and analyzed " higher (RII of 0.72) than other practices, but still lower than Chinese contractors, indicating room for improvement in adopting structured risk identification sessions.

The given Spearman's correlation of 0.250 implies a very weak positive correlation between the rankings of risk identification practices by the two groups. This suggests that Chinese and local contractors have significantly different priorities or effectiveness ratings for these practices.

The differences in RII scores and the weak correlation between the practices' rankings suggest divergent approaches to risk identification between the two groups. Chinese contractors are using more structured and technologically advanced methods compared to local contractors. Local contractors benefit from adopting more of the practices highly rated by Chinese contractors to enhance their risk management capabilities.

This result indicates that while both contractor groups recognize the importance of effective risk identification, their approaches and the emphasis on specific practices differ significantly. This might reflect differences in resources, experience, or organizational culture between local and foreign contractors. Further training or knowledge exchange could help align these practices more closely, potentially improving overall project risk management.

From the secondary document review CGCOC is commitment to adhering to local and international environmental standards and regulations. This shows an integration of environmental risk management into the project lifecycle, which is a crucial aspect of effective project risk management. Also The document reflects CGCOC's compliance with Ethiopian environmental laws and international conventions. This compliance indicates a structured risk management approach that aligns with legal standards, which is essential for minimizing project risks associated with non-compliance.

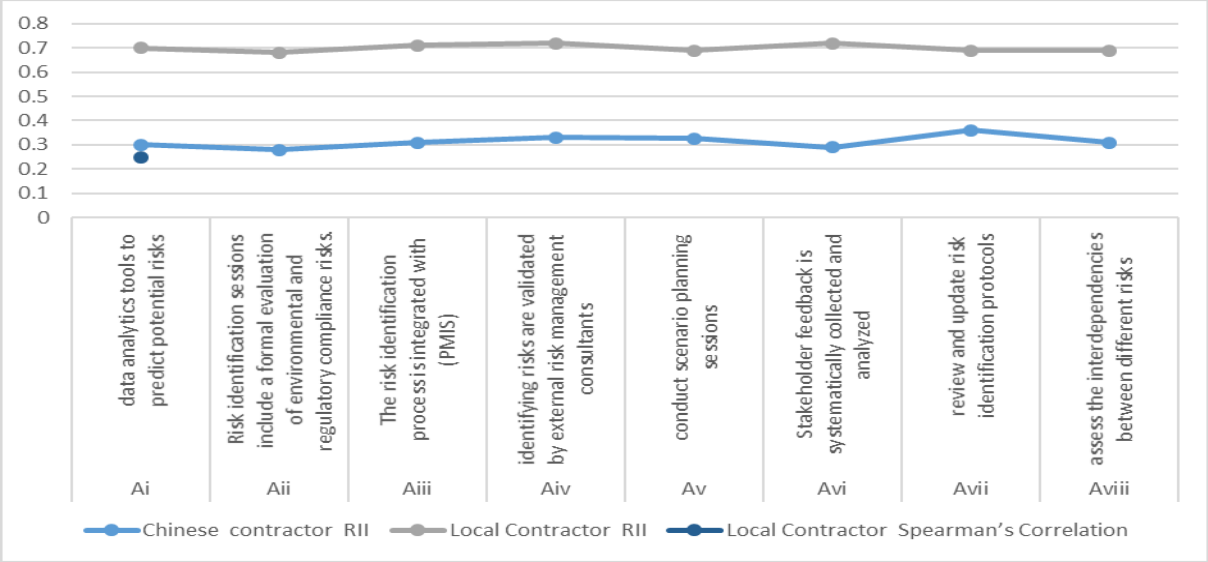


Figure 4.3: Relative Importance Index (RII) for various risk identification practices, comparing Chinese and local contractors:

Table 4.2 Correlation of Risk Identification Practice between Chinese and local contractors

		Chinese contractor		Local Contractor				
	Risk identification performance indicator	RII	Ranking	RII	Ranking	d	d2	Spearman's Correlation
Ai	data analytics tools to predict potential risks	0.3	6	0.7	4	2	4	0.250
Aii	Risk identification sessions include a formal evaluation of environmental and regulatory compliance risks.	0.28	8	0.68	8	0	0	
Aiii	The risk identification process is integrated with (PMIS)	0.31	4	0.71	3	1	1	
Aiv	identifying risks are validated by external risk	0.33	2	0.72	1	1	1	

	management consultants							
Av	conduct scenario planning sessions	0.327	3	0.69	5	-2	4	
Avi	Stakeholder feedback is systematically collected and analyzed	0.29	7	0.72	1	6	36	
Avii	review and update risk identification protocols	0.36	1	0.69	5	-4	16	
Aviii	assess the interdependencies between different risks	0.31	4	0.69	5	-1	1	
					∑ d2 =		63	

Source: Own computation, 2024

4.2.4.2 Risk analysis

The analysis of risk management practices between local contractors and Chinese construction companies in the Ethio – Telecom building projects reveals significant insights. The Relative Importance Index (RII) was employed to assess the criticality of various risk analysis practices. The data indicates that while both groups prioritize similar practices, there are notable differences in the importance assigned to certain risk analysis activities. Chinese contractors generally exhibit a more systematic and rigorous approach to risk management. For instance, Chinese contractors (RII = 0.35) view quantitative methods as moderately significant (Rank 3), while local contractors (RII = 0.68) see it as highly significant (Rank 5). This indicates a disparity in the perceived importance of quantitative methods between the two groups. Chinese contractors (RII = 0.42) rank financial impact assessment relatively low (Rank 9), whereas local contractors (RII = 0.67) consider it highly important (Rank 2). This suggests that local contractors might be more focused on the financial implications of risk. But overall the risk analysis practice is more exercised by the Chinese contractors as we see the RII value indicates.

Here is a visualization of the Relative Importance Index (RII) for various risk analysis practices, comparing foreign and local contractors:

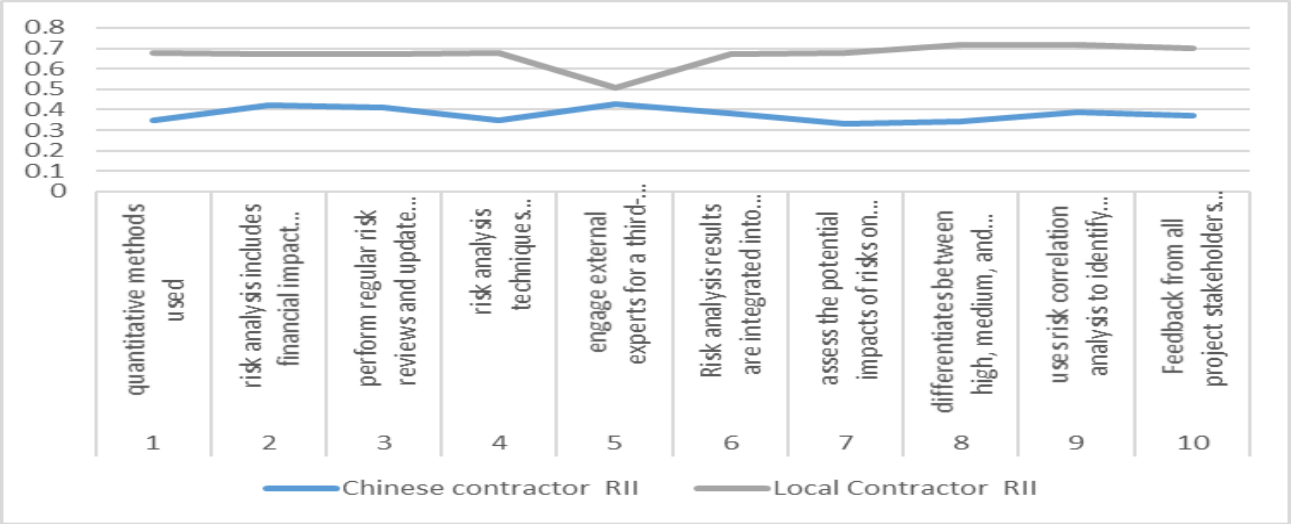


Figure 4.4: Relative Importance Index (RII) for various risk analysis practices, comparing Chinese and local contractors:

The Spearman's correlation coefficient of -0.610 indicates a moderate negative correlation between the rankings of Chinese and local contractors. This suggests that there is some level of disagreement between the two groups regarding the importance of specific risk analysis practices. The highest ranking differences were implicated on use of financial impact assessment (Ranking of 9 for Chinese and 2 for local contractors) might show Chinese contractors focus more on technical or operational risks due to their experience and exposure to diverse markets and complex projects, considering financial impacts as a subsequent step. Whereas for local contractors less experience with advanced risk management techniques, making financial impact a more immediate and visible concern. external experts for a third-party review of the risk analysis (Ranking of 10 for Chinese and 1 for local contractors) might show foreign contractors might have in-house expertise and robust risk management teams, reducing the perceived need for third-party reviews. Their internal processes might already align with best practices, making external reviews less critical. In contrast local contractors might rely more on external experts due to a lack of specialized risk management knowledge or experience. Engaging third-party experts could provide them with the necessary insights and validation of their risk assessments. differentiates between high, medium, and low-priority risks, allocating resources accordingly (Ranking of 2 for Chinese and 9 for local contractors) might show Chinese contractors likely have well-established,

systematic approaches to risk management, where differentiating and prioritizing risks is a critical component. They might use sophisticated tools and methodologies to categorize risks effectively. Whereas Local contractors might face more significant resource constraints, making it challenging to implement detailed risk prioritization processes. They might lack access to advanced tools and technologies that facilitate effective risk categorization.

Table 4.3 Correlation of Risk Analysis Practice between Chinese and local contractors

		Chinese contractor		Local Contractor				
	Risk Analysis performance indicator	RII	Ranking	RII	Ranking	d	d2	Spearman's Correlation
Bi	quantitative methods used	0.35	3	0.68	5	-2	4	-0.610
Bii	risk analysis includes financial impact assessments	0.42	9	0.67	2	7	49	
Biii	perform regular risk reviews and update the analysis	0.41	8	0.67	2	6	36	
Biv	risk analysis techniques incorporate the use of decision trees	0.35	3	0.68	5	-2	4	
Bv	engage external experts for a third-party review of the risk analysis	0.43	10	0.51	1	9	81	
Bvi	Risk analysis results are integrated into project dashboards	0.38	6	0.67	2	4	16	

Bvii	assess the potential impacts of risks on project timelines, delivering detailed timeline adjustments	0.33	1	0.68	5	-4	16	
Bviii	differentiates between high, medium, and low-priority risks, allocating resources accordingly	0.34	2	0.72	9	-7	49	
Bix	uses risk correlation analysis to identify and prepare for risks that might trigger or influence each other.	0.39	7	0.72	9	-2	4	
Bx	Feedback from all project stakeholders is systematically incorporated	0.37	5	0.7	8	-3	9	
						∑ d2 =	268	

Source: Own computation, 2024

4.2.4.3 Risk Response planning

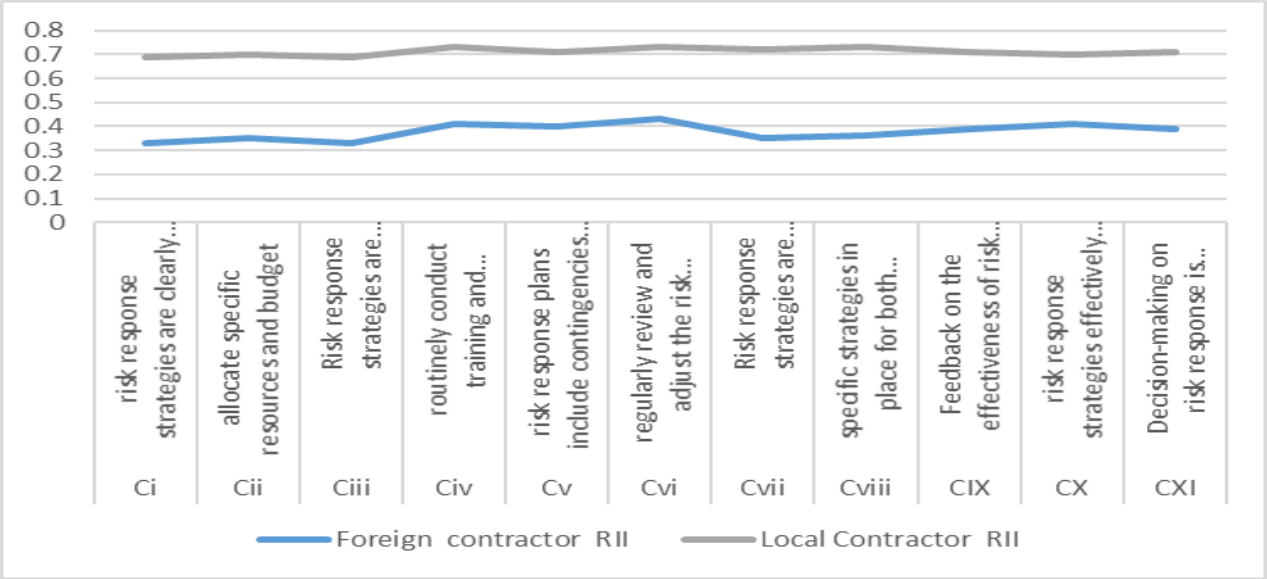


Figure 4.5: Relative Importance Index (RII) for various risk response planning practices, comparing Chinese and local contractors:

The comparative analysis of risk response planning practices between local contractors and Chinese construction companies in selected building construction projects within Ethio Telecom reveals significant differences. The Relative Importance Index (RII) values indicate that Chinese and local contractors consistently assign higher importance to risk response strategies such as, clearly defining and communicating risk response strategies (RII: 0.33 vs. 0.69), allocating specific resources and budget (RII: 0.35 vs. 0.7), and Risk response strategies are developed through collaboration among all project stakeholders (RII: 0.33 vs. 0.69). These practices reflect a more structured and proactive approach to risk management.

Despite this, moderate positive Spearman's correlation coefficient of 0.585 for the risk response planning of local and Chinese contractors indicates that there is some level of consistency in how both groups rank the importance of different risk response planning practices. In other words, the way that local contractors rank the importance or effectiveness of various risk response practices moderately correlate with how Chinese contractors rank them. This correlation indicates that there is some shared practices or strategies in risk response planning between the two groups. Both local and Chinese contractors may prioritize certain risk responses similarly. Despite this moderate correlation, differences still exist. The correlation is not strong, indicating that while there is some

agreement, significant variations in risk response planning practices remain between the two groups.

Chinese contractors often have more extensive international experience and exposure to a variety of complex projects, equipping them with advanced risk management techniques and practices, such as clearly defining and documenting risk response strategies. Likewise, local contractors may have exposure to diverse project environments, leading to emphasis on comprehensive documentation for each identified risk. But the RII value shows (0.33 vs 0.69) Chinese contractors give more emphasis for clearly defining and documenting risk response strategies. Organizational culture also plays a significant role; Chinese contractors typically operate within organizations that emphasize stringent protocols and structured approaches to project management, reflecting in their higher rankings for detailed planning and documentation. Conversely, local contractors might adopt a more flexible or ad-hoc project management approach, which can result in less structured risk response planning.

specific strategies in place for both mitigating risks and capitalizing on opportunities differentiate the two groups. Chinese contractors consider specific strategies for mitigating risks and capitalizing on opportunities as relatively important, while local contractors place less emphasis on these strategies. Additionally, Chinese contractors likely have better access to financial and technological resources, enabling them to develop and implement risk response strategies that are integrated into the overall project management plan. Local contractors may face resource constraints, making it challenging to develop comprehensive risk mitigation strategies that are integrated into the overall project management plan. The scale and complexity of projects also influence risk management practices; Chinese contractors are often involved in large-scale, complex projects that require sophisticated risk management, while local contractors typically handle smaller or less complex projects, where the perceived need for detailed risk response strategies might be lower. Lastly, regulatory and industry standards can contribute to these differences. Chinese contractors may operate under stricter regulatory frameworks and industry standards that mandate thorough risk management practices, including regular training and detailed documentation, whereas local contractors might be subject to less stringent regulations, resulting in a more relaxed approach to risk management. Addressing these differences through targeted interventions and capacity-building initiatives can enhance the overall effectiveness of

risk management practices in building construction projects for Ethio – Telecom, leading to better project outcomes for all stakeholders involved.

Table 4.4 Correlation of Risk Response Planning Practice between Chinese and local contractors

		Chinese contractor		Local Contractor				
		RII	Ranking	RII	Ranking	d	d2	Spearman's Correlation
Ci	risk response strategies are clearly defined and documented for each identified risk	0.33	1	0.69	1	0	0	
Cii	allocate specific resources and budget	0.35	3	0.7	3	0	0	
Ciii	Risk response strategies are developed through collaboration among all project stakeholders	0.33	1	0.69	1	0	0	
Civ	routinely conduct training and simulations	0.41	9	0.73	9	0	0	
Cv	risk response plans include contingencies for risks that may become critical	0.4	8	0.71	5	3	9	0.585

Cvi	regularly review and adjust the risk response strategies	0.43	11	0.73	9	2	4	
Cvii	Risk response strategies are integrated into the overall project management plan	0.35	3	0.72	8	-5	25	
Cviii	specific strategies in place for both mitigating risks and capitalizing on opportunities	0.36	5	0.73	9	-4	16	
CIX	Feedback on the effectiveness of risk responses is systematically collected	0.39	6	0.71	5	1	1	
CX	risk response strategies effectively minimize disruptions to the project schedule and budget.	0.41	9	0.7	3	6	36	
CXI	Decision-making on risk response is decentralized	0.39	6	0.71	5	1	1	
						∑ d2 =	92	

Source: Own computation, 2024

4.2.4.4 Risk Monitoring and control

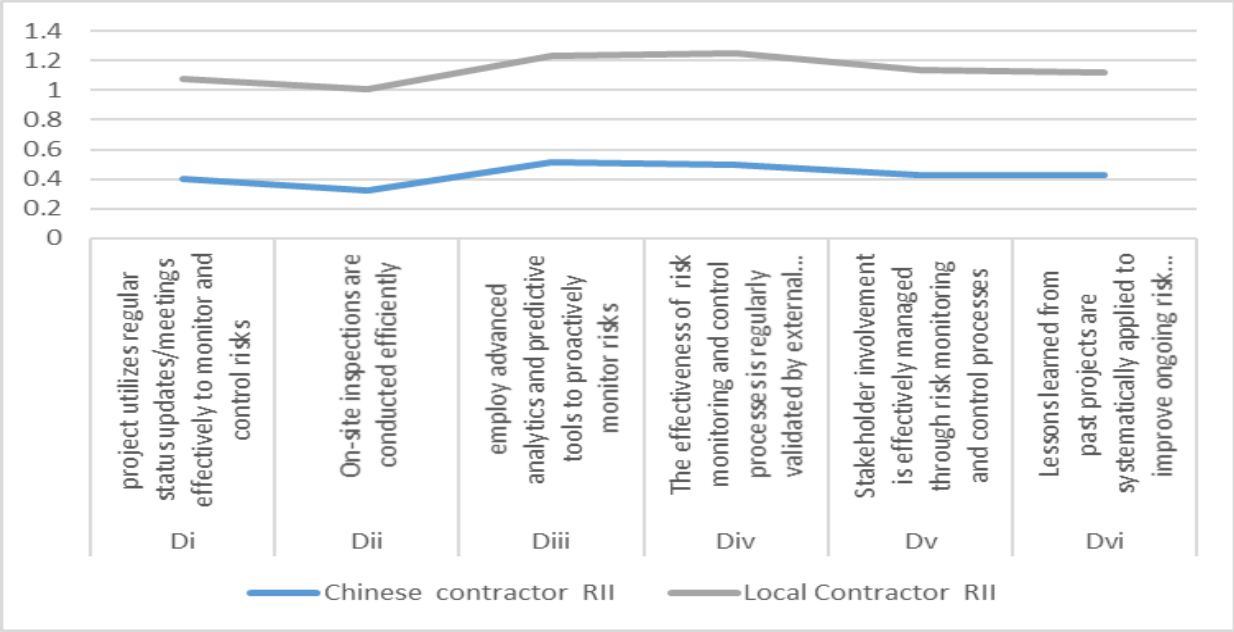


Figure 4.6: Relative Importance Index (RII) for various risk monitoring and control practices, comparing Chinese and local contractors

The analysis reveals that Chinese contractors are widely perceived as more effective in several key areas of risk monitoring and control compared to local contractors. This distinction is evident across various practices. Chinese contractors excel in utilizing regular status updates and meetings. This effectiveness might stem from their more structured communication protocols and superior implementation of project management practices, ensuring that everyone is aligned and informed, thereby enhancing overall project coordination.

Furthermore, Chinese contractors significantly outperform in conducting efficient on-site inspections. This can be attributed to better resource allocation, more rigorous inspection protocols, and higher standards of compliance and quality control, contributing to maintaining high construction standards and minimizing risks associated with on-site activities. The use of advanced analytics and predictive tools is another strong suit of Chinese contractors. Their greater investment in technology and reliance on data-driven decision-making processes lead to more accurate risk assessments and effective mitigation strategies, enhancing their ability to foresee and address potential issues before they escalate.

In addition, Chinese contractors are perceived as more effective in their overall risk monitoring and control methods. This could be due to their systematic approaches, standardized procedures,

and the presence of more experienced personnel in risk management, ensuring that risks are managed proactively and efficiently. Managing stakeholder involvement is another area where Chinese contractors excel, likely due to more inclusive engagement practices, better communication, and more effective management of stakeholder expectations and concerns, leading to smoother project execution and stronger stakeholder relationships.

Moreover, Chinese contractors are seen as superior in their documentation and reporting systems. Their rigorous documentation practices, efficient reporting systems, and high emphasis on transparency and accountability contribute to this perception, helping in maintaining clear records and facilitating better project tracking and accountability. Overall, the comparative analysis indicates that Chinese contractors demonstrate a higher level of effectiveness across various risk management practices. Their structured methodologies, advanced technological investments, and rigorous standards set them apart, providing a benchmark for local contractors to aspire to, enhancing their risk management capabilities and overall project performance.

The strong positive Spearman correlation (0.829) indicates that both Chinese and local contractors have similar ranking patterns for the importance and effectiveness of these risk monitoring and control practices. Despite this similarity, Chinese contractors consistently score better in terms of perceived effectiveness.

Table 4.5 Correlation of Risk Monitoring and Control Practice between foreign and local contractors

		Chinese contractor		Local Contractor				
	Risk Monitoring and Control performance indicator	RII	Ranking	RII	Ranking	d	d2	Spearman's Correlation
Di	project utilizes regular status updates/meetings effectively to	0.4	2	0.68	1	1	1	

	monitor and control risks							
Dii	On-site inspections are conducted efficiently	0.32	1	0.69	2	-1	1	
Diii	employ advanced analytics and predictive tools to proactively monitor risks	0.51	6	0.72	5	1	1	
Div	The effectiveness of risk monitoring and control processes is regularly validated by external auditors	0.5	5	0.75	6	-1	1	0.829
Dv	Stakeholder involvement is effectively managed through risk monitoring and control processes	0.43	3	0.71	4	-1	1	
Dvi	Lessons learned from past projects are systematically applied to	0.43	3	0.69	2	1	1	

	improve ongoing risk monitoring and control practices							
						∑ d2 =	6	

Source: Own computation, 2024

4.2.5 Effectiveness of the risk management practice on the project out come

The RII for Chinese contractors on their risk management practices reduce cost overruns compared to planned budgets is 0.51. Given the Likert scale where lower values indicate stronger agreement, this RII suggests a moderate level of agreement that risk management practices reduce cost overruns. It means Chinese contractors somewhat agree that their risk management practices are effective in controlling costs, but there is room for improvement. The RII for local contractors is 0.65, which is higher than that of Chinese contractors. This indicates a weaker agreement that risk management practices are effective in reducing cost overruns. Local contractors do not believe as strongly in the effectiveness of their risk management practices compared to Chinese contractors. The ranking of 3 for Chinese contractors suggests that, among other factors considered in the analysis, the effectiveness of risk management practices in reducing cost overruns is important but not the most critical concern. For local contractors, the ranking of 2 shows that they place more emphasis on the effectiveness of risk management in controlling costs, even though their overall agreement is weaker (as indicated by a higher RII). The higher RII for local contractors (0.65) compared to Chinese contractors (0.51) suggests that local contractors are less confident in their risk management practices' effectiveness in keeping costs within the planned budget.

The RII for Chinese contractors on risk management practices ensure that projects meet their deadlines without significant delays is 0.53. Given the Likert scale where lower values indicate stronger agreement, this RII suggests that Chinese contractors have a moderate level of agreement that their risk management practices are effective in ensuring projects meet their deadlines. This indicates that while they believe in the effectiveness of their practices, there might still be challenges in consistently meeting project timelines. The RII for local contractors is 0.68, which indicates a weaker agreement compared to Chinese contractors. This means local contractors are less confident in the effectiveness of their risk management practices in preventing significant

project delays. Both Chinese and local contractors have assigned a ranking of 4 to the effectiveness of risk management practices in meeting deadlines. This suggests that, while important, there are other factors they consider to be more critical in their risk management evaluation.

The results indicate that both Chinese and local contractors prioritize ensuring that projects meet all predefined quality standards, as reflected by the rank of 1 given by both groups. However, Chinese contractors demonstrate a much stronger agreement (RII 0.31) in the effectiveness of their risk management practices in achieving this goal compared to local contractors (RII 0.64). This disparity suggests that local contractors may benefit from reviewing and possibly adopting some of the risk management strategies employed by Chinese contractors to improve their confidence and effectiveness in quality management, thereby reducing rework or defects in their projects.

The results show that both Chinese and local contractors recognize the importance of risk management practices in reducing safety incidents, with Chinese contractors giving it the highest priority (RII 0.31, rank 1). Local contractors also value this aspect highly but see room for improvement (RII 0.65, rank 2). This indicates a significant gap in confidence between the two groups regarding the effectiveness of their safety-related risk management practices. Local contractors could benefit from examining and potentially adopting some of the safety management strategies used by Chinese contractors to improve safety performance and reduce incidents on their projects.

Table 4.6 Correlation of Effectiveness of their risk management practice on project outcome between foreign and local contractors

		Chinese contractor		Local Contractor				
	project outcome performance indicator	RII	Ranking	RII	Ranking	d	d2	Spearman's Correlation
Ei	risk management practices reduce cost overruns compared to planned budgets	0.51	3	0.65	2	1	1	

Eii	risk management practices ensure that projects meet their deadlines without significant delays	0.53	4	0.68	4	0	0	0.800
Eiii	the project meets all predefined quality standards and requirements, potentially reducing the rework or defects	0.31	1	0.64	1	0	0	
Eiv	risk management practices reduce the number of safety incidents	0.31	1	0.65	2	-1	1	
						∑ d2 =	2	

Source: Own computation, 2024

According to the structured interview, engineers overseeing the construction projects at Ethio-Telecom have extensive experience with both local and Chinese contractors. Their roles include project management, design oversight, contract compliance, and supervision of new builds. They observe that local contractors tend to rely on traditional, reactive risk management practices with minimal documentation, whereas Chinese contractors have structured and documented risk management plans, including environmental assessments. Their response shows Local contractors' inadequate risk management often results in repeated mistakes, project delays, and budget overruns. Chinese contractors' proactive risk assessments have mitigated some risks but have not entirely prevented delays and budget issues. Specific instances show that documented plans from Chinese contractors have sometimes prevented major issues, but bureaucratic and external factors continue to pose challenges. Also from their response both local and Chinese contractors face significant challenges in managing risks. Local contractors struggle with financial instability, poor scheduling, and limited technical capacity, while Chinese contractors encounter difficulties

navigating local regulations and bureaucratic delays. Ethio-Telecom's involvement in the risk management process varies between local and Chinese contractors. Local contractors tend to involve Ethio-Telecom reactively, leading to less effective risk management, whereas Chinese contractors engage stakeholders early and consistently, resulting in better-prepared projects. This difference in stakeholder engagement highlights the need for local contractors to adopt a more proactive approach, involving stakeholders from the beginning of the project. In general, the engineers recommend adopting these best practices and making continuous improvements to the risk management processes to ensure better project outcomes in terms of schedule adherence, budget compliance, quality of work, and safety standards.

Chapter Five: Summary, Conclusion and Recommendations

5.1 Summary of findings

The study reveals significant differences and similarities in the risk management practices and their effectiveness between local Ethiopian contractors and Chinese construction companies working on Ethio-Telecom projects. Key findings include:

- Risk Identification**:** Chinese contractors employ data analytics, scenario planning, and stakeholder feedback, whereas local contractors rely on traditional methods. The RII scores are higher for Chinese contractors, with a weak positive Spearman correlation (0.250) indicating some similarity in rankings.
- Risk Analysis: Chinese contractors use a systematic approach that includes financial impact assessment and external experts, whereas local contractors are less systematic. The Spearman correlation shows a moderate negative correlation (-0.610), indicating significant differences between the groups.
- Risk Response Strategies: Both groups prioritize defining risk response strategies, but Chinese contractors use a more structured approach. The Spearman correlation shows a moderate positive correlation (0.585), indicating consistency in rankings despite differences.
- Risk Monitoring and Control: Chinese contractors are more effective, employing regular status updates, on-site inspections, and advanced analytics, whereas local contractors use less frequent and less advanced methods. The Spearman correlation shows a strong positive correlation (0.829), reflecting high agreement in rankings but with Chinese contractors consistently scoring higher.
- Effectiveness on Project Outcomes: For cost overruns, Chinese contractors show moderate agreement (RII 0.51) compared to weaker agreement among local contractors (RII 0.65). In meeting deadlines, Chinese contractors also show moderate agreement (RII 0.53) whereas local contractors exhibit weaker agreement (RII 0.68). Regarding quality standards, Chinese contractors demonstrate strong agreement (RII 0.31), while local contractors show weaker agreement (RII 0.64). For reducing safety incidents, Chinese contractors display stronger confidence (RII 0.31) compared to local contractors (RII 0.65).

5.2 Conclusion

This comparative study on project risk management practices between local Ethiopian contractors and Chinese construction companies in selected Ethio-Telecom building projects highlights significant differences in approaches and effectiveness. Chinese contractors demonstrate more structured, systematic, and technologically advanced risk management practices across various dimensions including risk identification, risk analysis, risk response planning, and risk monitoring and control. These practices result in better project outcomes in terms of cost control, meeting deadlines, maintaining quality standards, and reducing safety incidents.

The study also reveals that Chinese contractors have a stronger agreement on the effectiveness of their risk management practices in reducing cost overruns, meeting deadlines, ensuring quality standards, and minimizing safety incidents compared to local contractors. The differences in RII scores and Spearman correlations across these dimensions suggest that local contractors can benefit from adopting the advanced practices and structured approaches of Chinese contractors to enhance their risk management capabilities and improve project outcomes.

In conclusion, the findings indicate that while both local and Chinese contractors recognize the importance of effective risk management, Chinese contractors' more structured and technologically driven approaches lead to better project performance.

5.3 recommendation

Based on the comparative analysis of project risk management practices between local Ethiopian contractors and Chinese construction companies in Ethio-Telecom building projects, the following recommendations are made to enhance the performance of local contractors:

5.3.1 Adopt Structured Risk Identification Practices

Local contractors should adopt more structured and technologically advanced methods for risk identification to enhance their risk management capabilities. This includes integrating data analytics tools to predict potential risks, conducting scenario planning sessions to anticipate various outcomes, and systematically collecting and analyzing stakeholder feedback to ensure all perspectives are considered. Regular reviews and updates of risk identification protocols are essential to keep these practices current and effective. Furthermore, involving external risk management consultants can provide an objective validation of the identified risks, ensuring that

no critical risks are overlooked. By implementing these strategies, local contractors can significantly improve their ability to identify and manage risks, leading to better project outcomes in terms of cost control, meeting deadlines, and maintaining high-quality standards.

5.3.2 Enhance Risk Analysis Techniques

To enhance risk analysis techniques, local contractors should implement more systematic and rigorous approaches by incorporating quantitative methods and conducting financial impact assessments. Engaging external experts for third-party reviews of risk analyses can provide additional insights and validation, ensuring a thorough evaluation of potential risks. Additionally, using advanced tools like decision trees and risk correlation analysis can help better understand and prepare for interdependencies between risks, ultimately leading to more effective risk management and improved project outcomes.

5.3.3 Improve Risk Response Planning

To improve risk response planning, local contractors should clearly define and document strategies for each identified risk, ensuring these strategies are developed collaboratively with all project stakeholders. Specific resources and budgets should be allocated for risk response activities, accompanied by regular training and simulations to prepare for potential risks. Integrating these risk response strategies into the overall project management plan is crucial, along with continuously reviewing and adjusting them to maintain their effectiveness.

5.3.4 Strengthen Risk Monitoring and Control

To strengthen risk monitoring and control, local contractors should more effectively utilize regular status updates, meetings, and on-site inspections to keep track of and manage risks. Employing advanced analytics and predictive tools will help proactively identify and address potential risks. It is essential to ensure stakeholder involvement in risk monitoring processes and apply lessons learned from past projects to enhance ongoing practices. Additionally, maintaining rigorous documentation and reporting systems will enhance transparency and accountability throughout the project.

5.3.5 Focus on Project Outcomes

To focus on project outcomes, local contractors should develop and implement risk management practices that effectively reduce cost overruns, ensure projects meet their deadlines, and maintain high-quality standards. Prioritizing safety is also crucial, which involves adopting comprehensive

safety management strategies that minimize incidents and enhance overall project safety. By focusing on these areas, contractors can improve the overall success and reliability of their projects.

By adopting these recommendations, local Ethiopian contractors can enhance their risk management capabilities, leading to improved project performance and better alignment with international best practices observed among Chinese construction companies.

5.5.6 Recommendations for Future Studies

Future studies should expand the scope to include a larger sample of projects and contractors from various sectors beyond building construction. Comparative analyses involving contractors from different countries or regions can provide broader insights into global best practices and the effectiveness of diverse risk management strategies. Additionally, conducting longitudinal studies will help track the evolution of risk management practices over time, providing a deeper understanding of how changes in technology, regulations, and market conditions influence these practices and project outcomes.

Research should also focus on the impact of emerging technologies, such as artificial intelligence and block chain, on risk management in construction. Exploring cultural and organizational influences can reveal how different management styles and workforce characteristics affect the implementation and effectiveness of risk strategies. Furthermore, studying stakeholder engagement and communication will highlight best practices for collaboration and transparency. Evaluating training programs' effectiveness and examining regulatory impacts can guide the design of initiatives that enhance local contractors' risk management capabilities and inform supportive policy development.

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Appendix A: Questionnaire

St. Mary's University

Department of Project Management

MSc Program in Project Management

Dear respondents,

The objective of this questionnaire is to compare and analyze the project risk management practices of local contractors and Chinese construction companies and also to assess the effectiveness of these risk management practices on the overall success rate of construction projects in ethiotelecom.

This questionnaire is prepared for data collection of a research on Comparative Study on Project Risk Management Practice of Local Contractors and Chinese Construction Company: Case on Selected Building Construction Projects in Ethio – Telecom.

Part one: personal data

1.1. Academic background

Degree ◯ Masters and above ◯ Other _____

1.2. Work experience in the construction sector

Less than 5 years ◯ Between 10 and 15 years ◯

Between 5 and 10 years ◯ Greater than 15 years ◯

Part two: Company background information

2.1. You are working for:

Local Ethiopian Contractor: Jimma ◯ Chinese Construction Company ◯

Dessie ◯

2.2. Working experience in the building construction sector

Less than 5 years ◯ between 10 and 15 years ◯

Between 5 and 10 years ◯ Greater than 15 years ◯

Part three: Comparative Study on Project Risk Management Practice of Local Contractors and Chinese Construction Company: Case on Selected Building Construction Projects in Ethio – Telecom.

3.1. How do your companies implement risk management practices, such as risk identification, analysis, response planning, monitoring, and control, in Ethio-Telecom's construction projects?

Please indicate the degree to which you agree or disagree with the following statements using the following scale.

1. Strongly Agree 2. Agree 3. Neutral 4. Disagree 5. Strongly Disagree

	NO	performance indicators	1	2	3	4	5
Risk Identification	1	data analytics tools to predict potential risks based on historical project data and current market trends					
	2	Risk identification sessions include a formal evaluation of environmental and regulatory compliance risks.					
	3	The risk identification process is integrated with project management information systems (PMIS) for real-time tracking and updates.					
	4	identifying risks are validated by external risk management consultants to ensure credibility and comprehensiveness.					
	5	conduct scenario planning sessions to understand the potential impact of various risk events on project outcomes.					

	6	Stakeholder feedback is systematically collected and analyzed to identify risks that may not be apparent through internal assessments.					
	7	review and update risk identification protocols after each project to incorporate lessons learned and new risk landscapes.					
	8	assess the interdependencies between different risks to understand complex risk scenarios and their combined impact on project objectives.					
Risk Analysis	1	quantitative methods (like Monte Carlo simulations or probabilistic modeling) to estimate the impact and likelihood of risks.					
	2	risk analysis includes financial impact assessments to quantify potential cost overruns associated with identified risks.					
	3	perform regular risk reviews and update the analysis to reflect changes in the project scope or external environment.					
	4	risk analysis techniques incorporate the use of decision trees to evaluate different response strategies and their outcomes.					
	5	engage external experts for a third-party review of our risk analysis to ensure objectivity and comprehensiveness.					

	6	Risk analysis results are integrated into project dashboards for real-time monitoring by project managers and stakeholders.					
	7	assess the potential impacts of risks on project timelines, delivering detailed timeline adjustments as needed.					
	8	differentiates between high, medium, and low-priority risks, allocating resources accordingly to address these categories.					
	9	uses risk correlation analysis to identify and prepare for risks that might trigger or influence each other.					
	10	Feedback from all project stakeholders is systematically incorporated into our risk analysis process to ensure diverse perspectives are considered					
Risk Response Planning	1	risk response strategies are clearly defined and documented for each identified risk					
	2	allocate specific resources and budget to implement risk response actions**.**					
	3	Risk response strategies are developed through collaboration among all project stakeholders					
	4	routinely conduct training and simulations to prepare the project team for potential risk scenarios.					
	5	risk response plans include contingencies for risks that may become critical.					

	6	regularly review and adjust the risk response strategies to reflect changes in the project's environment.					
	7	Risk response strategies are integrated into the overall project management plan					
	8	specific strategies in place for both mitigating risks and capitalizing on opportunities that arise from potential risks.					
	9	Feedback on the effectiveness of risk responses is systematically collected and used to improve future risk planning					
	10	risk response strategies effectively minimize disruptions to the project schedule and budget.					
	11	Decision-making on risk response is decentralized to allow rapid and localized handling of arising issues					
Monitoring and Control	1	project utilizes regular status updates/meetings effectively to monitor and control risks					
	2	On-site inspections are conducted efficiently					
	3	employ advanced analytics and predictive tools to proactively monitor risks					
	4	The effectiveness of risk monitoring and control processes is regularly validated by external auditors					
	5	Stakeholder involvement is effectively managed through risk monitoring and control processes					
	6	Lessons learned from past projects are systematically applied to improve ongoing risk monitoring and control practices					

3.3 **How do you describe the risk management approach utilized in your projects for Ethio-Telecom?**

_____

_____

Part four: - effectiveness of the Risk Management practice on the Project Outcomes

4.1 Please rank effectiveness of the risk management practice on the project outcome below in what you consider to be the most influential effect.

Please indicate the degree to which you agree or disagree with the following statements using the following scale.

1. Strongly Agree 2. Agree 3. Neutral 4. Disagree 5. Strongly Disagree

	NO	performance indicators	1	2	3	4
Effectiveness of the Risk Management practice on the Project Outcomes	1	risk management practices reduce cost overruns compared to planned budgets				
	2	risk management practices ensure that projects meet their deadlines without significant delays				
	3	the project meets all predefined quality standards and requirements, potentially reducing the rework or defects				
	4	risk management practices reduce the number of safety incidents or near-misses in our projects				

4.2 If you have comments regarding effectiveness of the risk management practice on the project outcomes, please specify here:

_____

_____

4.3 What is your professional opinion on how to improve contractors` performance in the building projects at Ethio Telecom?

_____

_____

4.4 What is the main stakeholder's responsibility in improving risk management practice of contractors` performance on building construction projects at Ethio Telecom?

Contractor:_____

_____

_____

_____

Thank you for your cooperation!

Structured interview questions

1. Could you describe your role and experience with construction projects managed by both local and Chinese contractors at Ethio-Telecom? How do their risk management practices compare, particularly in terms of approach, thoroughness, and effectiveness?
2. From your observations, can you discuss specific instances where the risk management strategies of either local or Chinese contractors had a clear impact on project outcomes such as schedule adherence, budget compliance, quality of work, and safety standards?
3. What are the most significant challenges that both local and Chinese contractors face in managing risks within Ethio-Telecom projects? How have these challenges been addressed, and what gaps still exist?
4. How are different stakeholders, including Ethio-Telecom, integrated into the risk management process? Are there noticeable differences in how local and Chinese contractors engage these stakeholders?
5. Based on your experience, what best practices in risk management have emerged from projects handled by Chinese and local contractors? What key improvements or adaptations have you noticed over time, and what further enhancements would you recommend to both groups to advance their risk management practices.

Appendix B Response frequency and RII assessment

Frequency of local contactors response

NO.	AI	AII	AIII	AIV	AV	AVI	AVII	AVIII	BI	BII	BIII	BIV	BV	BVI	BVII	BVIII	BIX	BX
Frequency of "1" responses	2	3	2	1	1	1	2	1	1	1	1	2	14	2	2	2	1	2
Frequency of "2" responses	11	13	13	11	14	11	14	15	15	18	15	13	4	15	14	10	12	13
Frequency of "3" responses	2	3	2	5	2	4	1	2	3	3	2	4	21	2	2	4	3	2
Frequency of "4" responses	29	22	21	21	26	24	23	23	23	17	28	23	10	23	24	23	23	23
Frequency of "5" responses	5	8	11	11	6	9	9	8	7	10	3	7	0	7	7	10	10	9
total	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49

NO.	CI	CII	CIII	CIV	CV	CVI	CVII	CVIII	CIX	CX	CXI
Frequency of "1" responses	1	2	1	1	2	1	1	1	1	2	3
Frequency of "2" responses	14	13	13	13	8	10	13	10	11	12	12
Frequency of "3" responses	1	4	6	3	5	6	4	4	4	2	2
Frequency of "4" responses	29	18	21	18	29	21	18	25	25	25	20
Frequency of "5" responses	4	12	8	14	5	11	13	9	8	8	12
total	49	49	49	49	49	49	49	49	49	49	49

NO.	DI	DII	DIII	DIV	DV	DVI
Frequency of "1" responses	2	5	3	3	4	2
Frequency of "2" responses	16	11	11	7	8	14
Frequency of "3" responses	0	2	0	2	2	2
Frequency of "4" responses	22	19	24	25	26	21
Frequency of "5" responses	9	12	11	12	9	10
total	49	49	49	49	49	49

NO.	EI	EII	EIII	EIV
Frequency of "1" responses	3	4	2	5
Frequency of "2" responses	16	14	18	14
Frequency of "3" responses	0	2	1	1
Frequency of "4" responses	21	16	23	21
Frequency of "5" responses	9	13	5	8
total	49	49	49	49

Frequency of Chinese contactors response

NO.	AI	AII	AIII	AIV	AV	AVI	AVII	AVIII	BI	BII	BIII	BIV	BV	BVI	BVII	BVIII	BIX	BX
Frequency of "1" responses	16	20	15	18	12	18	12	17	10	8	10	11	8	9	11	9	11	7
Frequency of "2" responses	13	8	13	7	17	11	14	11	17	16	12	16	14	16	18	21	14	20
Frequency of "3" responses	1	2	2	2	1	1	2	1	3	1	4	2	4	4	1	0	1	3
Frequency of "4" responses	0	0	0	3	0	0	2	1	0	5	4	1	3	1	0	0	4	0
Frequency of "5" responses	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
total	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30

NO.	CI	CII	CIII	CIV	CV	CVI	CVII	CVIII	CIX	CX	CXI
Frequency of "1" responses	13	11	11	10	8	10	10	11	10	7	8
Frequency of "2" responses	15	17	18	12	17	10	17	14	15	18	17
Frequency of "3" responses	1	1	1	4	2	5	3	5	2	1	4
Frequency of "4" responses	1	1	0	4	3	5	0	0	3	4	1
Frequency of "5" responses	0	0	0	0	0	0	0	0	0	0	0
total	30	30	30	30	30	30	30	30	30	30	30

NO.	DI	DII	DIII	DIV	DV	DVI
Frequency of "1" responses	9	12	6	4	7	7
Frequency of "2" responses	16	18	11	16	15	15
Frequency of "3" responses	1	0	4	2	5	5
Frequency of "4" responses	4	0	9	7	3	3
Frequency of "5" responses	0	0	0	1	0	0
total	30	30	30	30	30	30

NO.	EI	EII	EIII	EIV
Frequency of "1" responses	4	2	14	15
Frequency of "2" responses	14	15	15	14
Frequency of "3" responses	3	4	1	1
Frequency of "4" responses	9	9	0	0
Frequency of "5" responses	0	0	0	0
total	30	30	30	30

RII result for Local Contractors

Risk Identification										
Item	Frequency of "1" responses	Frequency of "2" responses	Frequency of "3" responses	Frequency of "4" responses	Frequency of "5" responses	Total respondents (N)	Weighted total	RII	Rank	Item Mean
Ai	2	11	2	29	5	49	171	0.70	4	3.49
Aii	3	13	3	22	8	49	166	0.68	8	3.39
Aiii	2	13	2	21	11	49	173	0.71	3	3.53
Aiv	1	11	5	21	11	49	177	0.72	1	3.61
Av	1	14	2	26	6	49	169	0.69	6	3.45
Avi	1	11	4	24	9	49	176	0.72	2	3.59
Avii	2	14	1	23	9	49	170	0.69	5	3.47
Aviii	1	15	2	23	8	49	169	0.69	6	3.45

Risk Analysis										
Item	Frequency of "1" responses	Frequency of "2" responses	Frequency of "3" responses	Frequency of "4" responses	Frequency of "5" responses	Total respondents (N)	Weighted total	RII	Rank	Item Mean
Bi	1	15	3	23	7	49	167	0.68	4	3.41
Bii	1	18	3	17	10	49	164	0.67	8	3.35
Biii	1	15	2	28	3	49	164	0.67	8	3.35
Biv	2	13	4	23	7	49	167	0.68	4	3.41
Bv	14	4	21	10	0	49	125	0.51	10	2.55
Bvi	2	15	2	23	7	49	165	0.67	7	3.37
Bvii	2	14	2	24	7	49	167	0.68	4	3.41
Bviii	2	10	4	23	10	49	176	0.72	1	3.59
Bix	1	12	3	23	10	49	176	0.72	1	3.59
Bx	2	13	2	23	9	49	171	0.70	3	3.49

Risk Response Planning										
Item	Frequency of "1" responses	Frequency of "2" responses	Frequency of "3" responses	Frequency of "4" responses	Frequency of "5" responses	Total respondents (N)	Weighted total	RII	Rank	Item Mean
Ci	1	14	1	29	4	49	168	0.69	11	3.43
Cii	2	13	4	18	12	49	172	0.70	8	3.51
Ciii	1	13	6	21	8	49	169	0.69	10	3.45
Civ	1	13	3	18	14	49	178	0.73	1	3.63
Cv	2	8	5	29	5	49	174	0.71	6	3.55
Cvi	1	10	6	21	11	49	178	0.73	1	3.63
Cvii	1	13	4	18	13	49	176	0.72	4	3.59
Cviii	1	10	4	25	9	49	178	0.73	1	3.63
CIX	1	11	4	25	8	49	175	0.71	5	3.57
CX	2	12	2	25	8	49	172	0.70	8	3.51
CXI	3	12	2	20	12	49	173	0.71	7	3.53

Monitoring and Control										
Item	Frequency of "1" responses	Frequency of "2" responses	Frequency of "3" responses	Frequency of "4" responses	Frequency of "5" responses	Total respondents (N)	Weighted total	RII	Rank	Item Mean
Di	2	16	0	22	9	49	167	0.68	6	3.41
Dii	5	11	2	19	12	49	169	0.69	5	3.45
Diii	3	11	0	24	11	49	176	0.72	2	3.59
Div	3	7	2	25	12	49	183	0.75	1	3.73
Dv	4	8	2	26	9	49	175	0.71	3	3.57
Dvi	2	14	2	21	10	49	170	0.69	4	3.47

Effectiveness of the Risk Management practice on the Project Outcomes										
Item	Frequency of "1" responses	Frequency of "2" responses	Frequency of "3" responses	Frequency of "4" responses	Frequency of "5" responses	Total respondents (N)	Weighted total	RII	Rank	Item Mean
Ei	3	16	0	21	9	49	164	0.67	2	3.35
Eii	4	14	2	16	13	49	167	0.68	1	3.41
Eiii	2	18	1	23	5	49	158	0.64	4	3.22
Eiv	5	14	1	21	8	49	160	0.65	3	3.27

RII result for Chinese Contractors

Risk Identification										
Item	Frequency of "1" responses	Frequency of "2" responses	Frequency of "3" responses	Frequency of "4" responses	Frequency of "5" responses	Total respondents (N)	Weighted total	RII	Rank	Item Mean
Ai	16	13	1	0	0	30	45	0.30	6	1.50
Aii	20	8	2	0	0	30	42	0.28	8	1.40
Aiii	15	13	2	0	0	30	47	0.31	4	1.57
Aiv	18	7	2	3	0	30	50	0.33	2	1.67
Av	12	17	1	0	0	30	49	0.33	3	1.63
Avi	18	11	1	0	0	30	43	0.29	7	1.43
Avii	12	14	2	2	0	30	54	0.36	1	1.80
Aviii	17	11	1	1	0	30	46	0.31	5	1.53

Risk Analysis										
Item	Frequency of "1" responses	Frequency of "2" responses	Frequency of "3" responses	Frequency of "4" responses	Frequency of "5" responses	Total respondents (N)	Weighted total	RII	Rank	Item Mean
Bi	10	17	3	0	0	30	53	0.35	7	1.77
Bii	8	16	1	5	0	30	63	0.42	2	2.10
Biii	10	12	4	4	0	30	62	0.41	3	2.07
Biv	11	16	2	1	0	30	53	0.35	7	1.77
Bv	8	14	4	3	1	30	65	0.43	1	2.17
Bvi	9	16	4	1	0	30	57	0.38	5	1.90
Bvii	11	18	1	0	0	30	50	0.33	10	1.67
Bviii	9	21	0	0	0	30	51	0.34	9	1.70
Bix	11	14	1	4	0	30	58	0.39	4	1.93
Bx	7	20	3	0	0	30	56	0.37	6	1.87

Risk Response Planning										
Item	Frequency of "1" responses	Frequency of "2" responses	Frequency of "3" responses	Frequency of "4" responses	Frequency of "5" responses	Total respondents (N)	Weighted total	RII	Rank	Item Mean
Ci	13	15	1	1	0	30	50	0.33	10	1.67
Cii	11	17	1	1	0	30	52	0.35	9	1.73
Ciii	11	18	1	0	0	30	50	0.33	10	1.67
Civ	10	12	4	4	0	30	62	0.41	2	2.07
Cv	8	17	2	3	0	30	60	0.40	4	2.00
Cvi	10	10	5	5	0	30	65	0.43	1	2.17
Cvii	10	17	3	0	0	30	53	0.35	8	1.77
Cviii	11	14	5	0	0	30	54	0.36	7	1.80
CIX	10	15	2	3	0	30	58	0.39	5	1.93
CX	7	18	1	4	0	30	62	0.41	2	2.07
CXI	8	17	4	1	0	30	58	0.39	5	1.93

Monitoring and Control										
Item	Frequency of "1" responses	Frequency of "2" responses	Frequency of "3" responses	Frequency of "4" responses	Frequency of "5" responses	Total respondents (N)	Weighted total	RII	Rank	Item Mean
Di	9	16	1	4	0	30	60	0.40	5	2.00
Dii	12	18	0	0	0	30	48	0.32	6	1.60
Diii	6	11	4	9	0	30	76	0.51	1	2.53
Div	4	16	2	7	1	30	75	0.50	2	2.50
Dv	7	15	5	3	0	30	64	0.43	3	2.13
Dvi	7	15	5	3	0	30	64	0.43	3	2.13

Effectiveness of the Risk Management practice on the Project Outcomes										
Item	Frequency of "1" responses	Frequency of "2" responses	Frequency of "3" responses	Frequency of "4" responses	Frequency of "5" responses	Total respondents (N)	Weighted total	RII	Rank	Item Mean
Ei	4	14	3	9	0	30	77	0.51	2	2.57
Eii	2	15	4	9	0	30	80	0.53	1	2.67
Eiii	14	15	1	0	0	30	47	0.31	3	1.57
Eiv	15	14	1	0	0	30	46	0.31	4	1.53