Examination of the Interplay Among Legal Risks-Related Issues, Risk Management Practices, and Construction Project Performance: In the case of Addis Ababa Public Buildings Construction Projects

Lami Fufa Hunde

A Thesis is Submitted to the Department of Civil Engineering

College of Civil Engineering and Architecture

Presented in Partial Fulfillment of the Requirement for the Degree of Master's in Construction Engineering and Management

Office of Graduate Studies

Adama Science and Technology University

May, 2025

Adama, Ethiopia

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DECLARATION

I declare that this Master's Thesis entitled ***"Examining the Interplay Among Legal Risks-Related Issues, Risk Management Practices, and Construction Project Performance"*** is my original work. That is, it has not been submitted for the award of any academic degree, diploma, or certificate in any other university. All sources of materials that are used for this thesis have been duly acknowledged through citation.

Lami Fufa Hunde _____ _____

Name of Student Signature Date

RECOMMENDATION

I, the advisor of this thesis, hereby certify that I have closely advised/supervised the student while developing this thesis and read the draft thesis entitled “Examining the Interplay Among Legal Risks-Related Issues, Risk Management Practices, and Construction Project Performance: The Case of Addis Ababa City” Prepared under my guidance by (Lami Fufa Hunde) submitted in partial fulfillment of the requirements for the degree of Masters science in Construction Engineering and Management. Therefore, I recommend submitting the thesis to the department for further review and evaluation.

Fikreyesus Demeke (PhD). _____ _____

Advisor Signature Date

APPROVAL OF THE ADVISOR

I hereby certify that all the corrections and recommendations suggested by the board of examiners are incorporated in to the final thesis intitled **"Examining the Interplay Among Legal Risks-Related Issues, Risk Management Practices, and Construction Project Performance: In the case of Addis Ababa Public Buildings Construction Projects"** by Lami Fufa Hunde.

_____	_____	_____
Advisor	Signature	Date

APPROVAL OF BOARD OF REVIEWERS

We, the undersigned, members of the boards of examiners of the thesis by Lami Fufa Hunde, have read and evaluated the thesis entitled "**Examining the Interplay Among Legal Risks-Related Issues, Risk Management Practices, and Construction Project Performance**" and examined the candidate during the open defense. This is, therefore, to certify that the thesis is accepted for partial fulfillment of the requirements of the degree of Master of Science in Construction Engineering and Management.

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Internal Examiner	Signature	Date
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Final approval and acceptance of the thesis are contingent upon submission of its final copy to the Office of Postgraduate Studies (OPGS) through the Department Graduate Council (DGC) and the College Graduate Committee (CGC).

Department Head	Signature	Date
College Dean	Signature	Date
Office of Postgraduate Studies, Dean	Signature	Date

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LIST OF ACRONYMS

PLS-SEM	Partial Least Squares Structural Equation Modeling
ADR	Alternative Dispute Resolution
BIM	Building Information Modeling
OSHA	Occupational Safety and Health Administration
ABA	American Bar Association
BIM	Building Information Modeling
CR	Composite Reliability
CFA	Confirmatory Factor Analysis
AVE	Average Variance Extracted
HTMT	Heterotrait Mono-Trait Ratio
SEM	Structural Equation Modeling
VAF	Variance Accounted For
CB-SEM	Covariance-Based Structural Equation Modeling
PCA	Principal Component Analysis
OLS	Ordinal Least Squares
LRRI	Legal Risk Related Issues

ABSTRACT

Legal risks were significant issues in Ethiopia's public buildings construction projects. Several studies have addressed this issue previously, but there was a *lack of modeling the interrelationship, and many public buildings construction sectors in Addis Ababa continue to face legal challenges and inadequate legal risk management strategies. Therefore, this study aims to fill this gap by examining the direct and indirect interrelationship between legal risk-related issues, legal risk management strategies, and construction project performance by the PLS-SEM framework at the 36 public buildings construction projects in Addis Ababa, Ethiopia. A hypothesis was drawn to test this interrelationship, and a theoretical model was developed based on the literature. Mixed-method approaches would be used in this study. The purposive and stratified sampling methods were used. The data gathering was closed-ended structured questionnaires, quantitative insights using by 5 Likert scale from strongly disagree to strongly agree. The 95 respondents were selected based on proportionate stratified random sampling. Stakeholders were categorized based on their roles and importance to legal risk-related issues in the 36 public building construction projects using a purposive and stratified sampling technique out of 126 total population. In this study, the two data collection methods used were primary and secondary. The primary data would be collected through closed-ended structured questionnaires, document analysis, and personal interviews. The collected data were prepared for analysis using SPSS version 27 analytical software. The analysis was conducted using partial least squares structural equation modeling. The results of the study show that dispute resolution and litigation risks, contractual and financial risks, force majeure, environmental, and labor risks, of legal risks-related issues have the highest impact on the performance of a project. The results indicated that dispute resolution and litigation risk factors were found to have a path coefficient beta of 0.967, the highest impact in comparison with other legal risk factors issues. When it comes to the legal risk management strategies, financial and insurance risk management strategies, and stakeholder, community legal management had a major impact and contribution to the performance of projects. The R^2 value results show that legal risks and management practices explain 35.1% of the variation in project performance.*

Keywords: *Legal risks-related issues, risk management strategies, project performance, and PLS-SEM*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Industry is widely recognized to be inherently complex and to comprise a wide range of risks involved; among them, legal risks were of specific significance as they could play a major role in impacting project financing, timelines, and overall success (Siraj & Fayek, 2019). There were legal disputes in the construction industry, which were commonly created by differences in contracts, deviations from building regulations, and management issues with subcontractors (Lannyati et al., 2024). Legal issues would result in project delays that significantly affect the timeline, financial penalties, and interpersonal conflict between various stakeholders, impacting the outcomes of projects (Sharma & Bhatnagar, 2013). Legal issues in the construction industry mostly occur as a result of contract disputes, non-compliance, and construction defects (Fan et al., 2018). Contract disputes may be due to vague terms, such that there was a misunderstanding of the roles and responsibilities of the concerned parties(Silva et al., 2024). Legal disputes could have severe financial and reputational consequences within the construction sector (Khawaja & Mustapha, 2021). They were different types of legal risks-related issues like contract disputes, regulatory compliance issues, liability and insurance issues, intellectual property issues, litigation issues, procurement and bidding issues, force majeure events issues, and stakeholder conflicts (Shrestha et al., 2020). The risk management practices, such as identification, assessment, mitigation, and monitoring and controlling, were essential when studying legal risk management in construction projects (Mauelshagen et al., 2014). According to the study by Aladayleh (2024) stated that it was necessary to synthesize knowledge of the relationship between legal risk-related issues and effective risk management practices to enhance construction project performance. According to studies, Zhao (2024) shows that firms employing systematic methods in risk management practices could more effectively minimize legal risks and improve project performance. Through integrating legal risk management into project planning and implementation, stakeholders in projects were made to be more compliant and responsible to actively prevent potential legal challenges (Ramsay, 2015). The relevance of this study was due to the growing complexity and size of public construction projects, which

require efficient legal risk management strategies. Inefficient management of legal risks may cause project delays, financial losses, and conflicts that harm project performance (Alfayos Ondara et al., 2017). The challenges of legal risk management practices were huge in developing countries such as Ethiopia, due to a lack of regulatory frameworks, unawareness of legal obligations, and reliance on informal agreements. Furthermore, legal risk management practices in the construction industry have become increasingly complex due to evolving legislation and the growing emphasis on environmental compliance and sustainability (Boustani, 2021). Several studies have explored how legal risks impact construction project performance (Chan, 2024). These legal risks, such as contract disputes, regulatory non-compliance, and land acquisition problems, have been recognized as key obstacles to project success (Kassem, 2022). The study on public construction projects emphasizes that poor legal risk management results in cost overruns, delays, and disputes/litigation (Ampratwum et al., 2023). The anticipatory legal risk management approaches, including alternative dispute resolution, contractual risk allocation, and regulatory compliance strategies, help achieve more orderly project implementation (Perera et al., 2023). The PLS-SEM framework model was employed in this study to examine the interrelationship among legal risk-related issues, legal risk management practices, and construction project performance. This study tries to fill this gap by formulating a Partial Least Squares Structural Equation Model to show the multi-faceted interaction among legal risk-related issues, legal risk management strategies, and the success of construction projects in Addis Ababa, Ethiopia. This study was imperative in enhancing a deeper insight into legal-related risks in public building projects, promoting forward-looking legal risk management practices, and supporting the long-term development of Ethiopia's construction sector (Khawaja & Mustapha, 2021).

1.2 Statement of the Problem

The construction industry in Addis Ababa, Ethiopia, particularly public buildings construction projects, was significantly affected by legal risks that hinder project performance (Yisakor et al., 2020). Previous studies have pointed out numerous risks in public building construction projects, such as financial, technical, environmental, and managerial risks (Hair & Alamer, 2022). Legal risks were usually generalized under other broad categories of risks, hence not receiving sufficient attention in risk management strategies (Alghamdi, 2022). Few studies

identify and evaluate the major legal risks public construction projects face in Addis Ababa, Ethiopia (Boateng et al., 2022). The interaction among legal risk-related issues, risk management practices, and project performance remains unclear, even though the construction sector faces significant legal risks that profoundly influence project performance (Fan et al., 2018). Legal risks were the primary issues that increased cost and decreased quality (Yadeta, 2019). These risks include contractual disputes, regulatory non-compliance, liability and insurance risks, intellectual property risks, force majeure risks, public procurement and bidding issues, financial and payment risks, political instability and policy, labor and employment issues, in the construction industry (Nguyen et al., 2023). Despite increasing awareness of these legal challenges, most construction companies still employ reactive strategies towards managing legal risks, hence inadequately addressing the complexity inherent in these legal uncertainties (Adeleke et al., 2019). A study by Terefe (2021) examined risk management practices in Ethiopian public building projects and established the absence of integrated frameworks that enhanced legal risks. This absence results in reactive management of legal problems, thereby causing conflict and project inefficiency. The PLS-SEM offers a robust analytical framework for the modeling of such relationships (Hair & Alamer, 2022). No established PLS-SEM framework that shows the complex interrelationships among legal risk-related issues, legal risk management strategies, and the performance of construction projects (Guerra, 2019). This study aims to fill the gap by identifying effective legal risk management strategies to mitigate legal risks and improve project performance, using a PLS-SEM framework. By addressing these gaps, the study contributes to better legal risk management practices and supports the successful execution of public buildings construction projects in Ethiopia.

1.3 Objective of the Study

1.3.1 General Objective

The general objective of this study is examination of the interplay among legal risk-related issues, risk management practices, and impacts on the public buildings' construction project performance in Addis Ababa, Ethiopia.

1.3.2 Specific Objective

Objective of this study

1. To investigate the critical legal risks-related issues that affect the construction project performance.
2. To explore the different legal risk management the success of construction project performance.
3. To develop a comprehensive partial least squares structural equation modeling (PLS-SEM) framework.

1.4 Significance of the Study

The significance of this study was to improve decision-making through the comprehension of intricate interrelationships among legal risk-related issues, legal risk management practices, and construction project performance in Ethiopian public buildings construction projects. This study aims to provide insights into key legal issues and effective risk management strategies to guide legal professionals, project managers, and stakeholders in the public construction sector of Addis Ababa. This study contributes to identifying the critical legal risks with mitigation strategies faced by public building construction projects in Addis Ababa. The success and performance of public construction projects then finally rely on this knowledge because it enhances the outcome of the project performance by minimizing delays and legal disputes. This study would address these knowledge gaps by developing a PLS-SEM model through a methodological mixed-method approach. The study analyzes the impact of critical legal risks on risk management strategies, project performance, and develops a model using PLS-SEM.

1.5 Scope of the Study

The scope of this study focuses on examining the impact of legal-related issues and their management practices on the performance of public building construction projects in Addis Ababa, Ethiopia. It was limited to 36 selected public building projects that have reached over 75% completion status, ensuring a reliable assessment of project performance. The study covers active public building projects in Addis Ababa, Ethiopia, aiming to provide relevant insights for

improving legal risk management practices and enhancing project performance in the public sector.

1.6 Limitations of the Study

The scope of this study was limited to the construction of public buildings in Addis Ababa; it may not have included developments in other areas or the private sector. The study was based on a purposive sample of 36 projects that have reached over 75 percent completion, potentially excluding insights from projects at earlier or final stages that might experience different legal risk dynamics. This study is constrained by the limited time frame and resources, preventing a longitudinal assessment of how legal risks and management practices evolve throughout the entire lifecycle of construction projects. There were limitations in accessing complete and accurate project documentation, especially legal contracts and confidential records, which could affect the depth of the analysis. Findings are derived solely from public building projects in Addis Ababa, limiting transferability to private sector projects or other Ethiopian regions with distinct regulatory environments.

1.7 Organization of the Document

This research was organized into five chapters as described below. Chapter One: Introduction. The introduction part contains discussions on the background of the study, the statement problem, the objective of the study, the significance of the study, the scope of the study, limitations of the study, and the organization. Chapter Two: The literature review provides suitable, related literature on the subject and an overview of risk management practices, the critical legal risk-related issues, and project performance. It also includes the developed hypothesis, the theory behind a hypothesis, and the proposed theoretical model. Chapter Three: This chapter addresses how the research was carried out. The research methodology, target population, sample size, data collection tools, and data analysis method were all addressed in this section. Chapter Four: Results and Discussion. This chapter summarizes the results of the analysis based on the data gathered through the process of questionnaires. A detailed discussion of the findings was also included. Chapter Five: Conclusions and Recommendations draws the final statement of the overall findings and suggests possible solutions for the problem of the study based on what has been discussed in the previous chapters.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Legal risks in the construction industry refer to the potential for financial loss, disputes, and reputational damage that arise from non-compliance with laws, regulations, and contractual obligations (Khalef et al.,2021). These risks may come in many forms, such as contractual conflicts due to ambiguous terms, regulatory non-compliance regarding zoning and building regulations, liability problems due to work-related accidents, and delays due to force majeure and unexpected changes in project scope (Tessema et al., 2022). Due to the intricate structure of building contracts, regulatory requirements, and the interactions among numerous parties involved, legal risk in construction projects was a crucial issue for stakeholders (Kivrak & Udan, 2023). This includes careful management of contracts, following regulatory compliance, and encouraging active communication between all parties to identify and solve potential legal problems (Zhou et al., 2024). According to (Shrestha et al., 2020), administrative legal risks, breach of contract, and safety laws could result in fines and disruption in the construction industry, while criminal legal risks entail fraud that exposes firms to severe legal penalties.

2.2 Overview of Legal Risk in the Construction Industry

Legal risks in construction projects refer to uncertainties or disputes arising from failure to meet contractual, statutory, and regulatory requirements (Barman & Charoenngam, 2017). In building projects, legal risk issues could result in litigation, financial loss, project delay, and reputation damage (Chynoweth et al., 2007). Liability was one of the critical legal risks in the building industry (Shrestha et al., 2020). Both the builder and his subcontractors may be held responsible for their acts if construction mistakes result in costly replacements and legal action (Yang, 2012). In construction law, "strict liability" makes parties liable for unsafe and defective products regardless of how technically reckless they performed (Friedman, 2021). According to the ABA, the complexity of legal risks requires active management practices through contract reviews, compliance audits, and comprehensive insurance (Benedek & Bognár, 2024).

2.3 Importance of Managing Legal Risks Issues in Construction Projects

In construction activities, legal risk management was quite important to the success of the project and the reduction of potential liabilities (Hussen & Mamo, 2023). Effective management of legal risks would decrease the likelihood of controversies significantly, which were mostly time-consuming and expensive (Endris Yadeta, 2019). Clear communication and precise contract administration processes were paramount because recent studies identify misconceptions regarding contractual responsibilities as a leading cause of disputes in construction works (Kalogeraki & Antoniou, 2024). Several reasons, such as vague terms in the contract, scope variations, and poor documentation, may result in disputes (Charlson & Oduoza, 2014). Additionally, using technologies like smart contracts and BIM has enhanced stakeholder accountability and transparency, supporting better legal risk management practices (Kalogeraki & Antoniou, 2024). Proactive legal risk management practices would remain crucial for the successful completion of construction projects, ensuring they were delivered on time(schedule), within budget, with quality, safety, stakeholder satisfaction, environmental sustainability, and in compliance with all laws and regulations (Lannyati et al., 2024).

2.4 Critical Legal Issues Impacting Construction Project Performance

In public building construction projects, ambiguities in contracts were the most common legal risks, affecting project scope, schedules, and payment terms (Fan et al., 2018). Poorly drafted contracts could cause change order disputes over task scope, leading to project delays and cost overruns (Sun, 2024). Compliance with regulations in the construction of buildings was the act of adhering to rules, regulations, and laws that govern construction activities (Hlatshwayo, 2024). They range from compliance with local, state, and national building codes, zoning ordinances, safety regulations, and environmental laws (Getu, 2009). The public buildings Construction projects might be halted, as legal risks-related issues may follow non-compliance with the local building regulations and the failure to obtain permits for construction (Agapiou, 2020). Fines imposed by law, labor strikes, and loss of reputation due to failure to comply with zoning, safety, and environmental laws can negatively impact project performance (Khan & Ullah, 2024). Liability issues, particularly concerning on-the-job injuries, represent significant dangers (Anderson et al., 2022). Construction projects were prone to accidents, and the liability for accidents could invoke legal claims and increased insurance costs (Romanosky, 2016). Both

project owners and contractors must navigate complicated liability frameworks to reduce the threat of lawsuits and claims, which could result in additional effects on project time, safety, quality, and budgets (Anantatmula, 2015). Payment and delay claims were another fundamental aspect of legal risk issues (Li et al., 2024). Delay liquidated damage clauses were often included in contracts, leading to disputes over enforcement and interpretation (Chen et al., 2021).

2.4.1 Identifying and categorizing legal risk-related issues in the construction projects

Identifying critical legal risk-related issues in public building construction projects was crucial for effective legal risk management practices and had significant impacts on the project performance (Siraj & Fayek, 2019). This requires a thorough understanding of the critical legal risk-related issues within the industry, geography, and project scope (Chan, 2024).

2.5 Implications of Legal Risks in the Construction Industry

Legal risks were disputes arising from failure to adhere to contractual, statutory, and regulatory stipulations (Cheung, 2020). Their impacts were high, ranging from financial losses to litigation, reputational loss, and strained stakeholder relations (Shrestha et al., 2020). Proactive legal risk management practices ensure smoother project execution and fewer liabilities (Smith et al., 2022).

2.5.1 Main and Subcategories of Legal Risks in the Public Construction Industry

Understanding the many kinds of legal risk-related issues was essential for any firm to handle legal risks successfully (Provenzano & Iddas, 2020). The following were the critical categories of major and minor causes of legal risk-related issues (Simon, 1999).

2.5.1.1 Contractual and Financial Risks

The basis of construction work agreements was contractual issues (Yao et al., 2021). Unspecified contract terms, breach of contract, liquidated damages, and poor contract administration were the causes of these risks (Abdul Nabi et al., 2020). Sub-themes include breach of contract, change orders, termination of contract, violations of contract clarity, and ambiguity in terms of contract (Stallworth, 2018). Clear and enforceable agreements were needed since failure to manage these risks leads to litigation, delay in the project, and financial

fines (Smith, 2024). According to Lanka. (2023) study, financial risks include budget mismanagement, payment bankruptcy, budget overruns, bond issues, and fraud.

2.5.1.2 Regulatory Compliance, Liability, Insurance, and Safety Risks

Regulatory compliance was necessary to accomplish compliance since failure to comply could lead to penalties, project termination, and reputational loss (Cohen, 2019). Sub-themes include zoning law and land use breaches, environmental law, permits and licenses, building regulation and standards, which result in regulatory compliance issues (Osei-Asibey et al., 2021). Liability risks entail design errors (design defects), professional negligence, and operational mishaps that result in damage, injury, or legal claims (Spilbergs et al., 2022). Injuries at work, design errors, data loss, standard of care, defective workmanship, professional negligence, third-party liability, and claims of sub-standard materials and productivity were some of their sub-themes in the construction (Nwogu & Emedosi, 2024). As studied by (Belkher & Masood, 2023), safety and health risks arise from the unprotected use of occupational health and safety standards, including defective machinery, accidents, and inadequate protective measures.

2.5.1.3 Dispute Resolution and Litigation Risks

Dispute resolution risks were the uncertainties and potential adverse outcomes associated with the mechanisms, processes, and effectiveness of resolving conflicts between contractual parties, often resulting in delays, increased costs, and strained relationships (Charlson & Oduoza, 2014). Cross-border disputes, mediation failure, arbitration issues, absence of qualified dispute resolvers, cultural or institutional barriers, lack of timely dispute resolution mechanisms, and litigation risks were sub-themes (Manninen, 2024).

2.5.1.4 Force Majeure, Environmental, and Labor Risks

Force majeure risks were unanticipated events that disrupt project execution, such as pandemics, natural disasters, labor strikes, and political instability (Hansen, 2020). Force majeure risks refer to unforeseeable and uncontrollable events that prevent parties from fulfilling contractual obligations (Guo et al., 2024). The environment was vulnerable when sustainability and environmental standards were violated (Lambin & Thorlakson, 2018). The sub-themes included environmental degradation, disposal of waste, human-made events, and pollution belong to these sub-categories (Nurullayev, 2023).

Table 1: Summary of main and sub-themes of legal risk-related issues in construction projects

Main themes	Sub-themes	Implications	Citations
Contractual and financial risks	Ambiguities in contracts, late payments. Bond issues and fraud.	lead to disputes over scope, design errors, timelines, and payment.	(Adetoyese Latilo, Hendrickx Oreoluwa Imosemi, et al., 2024); (Smith et al., 2022) & Anteneh, 2018).
	Change Order Disputes.	Conflicts regarding the scope of work and disputes arise from change orders.	(Cheng & Darsa, 2021); (Hailemarkos et al., 2020).
	Breach of contract, termination of a project.	Failure to fulfill contractual obligations can lead to legal action and financial penalties.	(Cooter & Eisenberg, 1985); (Hansen, 2020)
	Liquidated Damages for delays.	Inconsistency of liquidated damages can lead to disputes.	(Yadeta, 2019), (Assaad & Abdul-Malak, 2020)
Regulatory and compliance issues	Non-compliance with Building codes	could result in project cancellations.	(Lu & Karunasena, 2022), (Sahadev, 2024).
	Environmental regulation violations, tax compliance, permitting, and licensing	Non-compliance with environmental laws could lead to fines, termination, and reputational damage.	(Degirmenci et al., 2021)
	Zoning laws and land use breaches.	Project suspensions, redesign, costs, and potential legal disputes.	(Ayano, 2024) Fenn et al., 2020; EPA, 2022)
Liability and insurance issues	Workplace injuries, design errors, and loss of data.	lead to litigation and increased insurance costs.	(Ahmed et al., 2024); (Uge & Beljige Bitane, 2020).
	Defective Workmanship.	can result in financial losses and legal risks.	(Desbalo et al., 2024); Smith & Jones, 2020)
Intellectual Property Risks	Patent, trademark breaches, and Copyright infringement.	Disruptions, reputational harm.	Anderson et al., 2020, (Adetoyese Latilo, Ngozi Samuel Uzougbo, et al., 2024)

Dispute Resolution Risk.	cross-border disputes, mediation failures, and arbitration issues.	High legal costs, disruptions. Contract cancellations.	Smith, 2021
Litigation risks.	lawsuits related to construction defects.	lead to financial losses, project delays, and reputational damage.	(Zeberga et al., 2024), & (Taddele, 2022).
Force Majeure events issues	Natural disasters, pandemics, labor strikes, and supply chain disruptions.	Delays, potential disputes, costs, and termination of contracts.	(Perera et al., 2024)
Health and Safety risk issues.	PPE, accidents, training failures.	Penalties, increased costs.	(Mujtaba & A. Kaifi, 2023)
Labor and workers' issues.	Wage disputes, safety issues, union conflicts, and harassment claims.	Lawsuits, workforce dissatisfaction.	(Besaiso & Fenn, 2022)
Procurement and bidding risks.	fund mismanagement and transparency issues.	undermine trust, delay projects, increase costs, and reduce quality.	(Keeley & Scoones, 2000), & (Tesfahun, 2011).

2.6 Legal Risk Management Strategies in the Public Construction Industry

Construction legal risk management was a procedure for identifying, assessing, and controlling potential legal risks that could affect a project's performance (Endris Yadeta, 2019). One of the primary strategies involves comprehensive contract management, which includes ensuring that contracts are written in clear, precise language to avoid ambiguities that could lead to disputes (Guerra, 2019). Regular reviews of contracts help ensure compliance and address any changes in project scope or regulations (Sharma & Swain, 2011). Employees and project managers who regularly get compliance-related training can further lower these legal risks (Marcelino, Sádaba et al., 2014). As studied by Amoah & Pretorius (2020), strong communication was essential for all project stakeholders to communicate effectively. Strong communication was established through frequent updates and meetings, which guaranteed (Ghorbani & Naghdi Khanachah, 2020). Mediation, negotiations, and arbitration were examples of ADR procedures that could be used to resolve disputes more quickly (Menkel-Meadow, 2015).

Table 2: Factors of legal risk management strategies

Legal risk management	Factors for Legal Risk management strategies	ID	(Kivrak & Udan,	(Guerra, 2019)	(Tessema et al., 2022)	(Lannyati et al., 2024)	(Cheng & Darsa,	(Chemir, 2018)	(Gonfa & Dinku,	(Jitpaiboon et al.,
Contractual Risk Management	Clear drafting and negotiation of contracts.	Cm-lrs1	✓		✓		✓		✓	
	Regular review and updates of contracts.	Cm-lrs2	✓	✓		✓		✓		✓
	Effective dispute resolution mechanisms.	Cm-lrs3	✓		✓		✓		✓	
Regulatory Compliance and Legal Framework	Understanding and adherence to local regulations.	Cr-lrs1	✓			✓		✓	✓	✓
	Regular training on the legal requirements.	Cr-lrs2	✓		✓		✓			
Stakeholder Engagement and Communication	Effective communication with all stakeholders.	Se-lrs1	✓	✓			✓	✓		
	Regular updates and feedback loops.	Se-lrs2		✓			✓	✓	✓	
Insurance and Bonds	Adequate insurance coverage for risks.	Ib-lrs1	✓		✓	✓		✓		✓
	Performance bonds for a contractor.	Ib-lrs2	✓		✓	✓	✓		✓	
Risk Assessment	Conducting regular risk assessments	Ra-lrs1	✓	✓			✓		✓	
	Identifying and prioritizing legal risks	Ra-lrs2	✓		✓			✓		✓

Training and Awareness	Ongoing training programs for staff	Ta-lrs1	✓	✓		✓		✓		
	Workshops on legal risk management	Ta-lrs2		✓	✓		✓	✓		
Financial Management	Budgeting for legal risks and compliance	Fm-lrs1	✓		✓	✓			✓	✓
	Monitoring liability and financial health	Fm-lrs2	✓	✓		✓		✓		
	Assessing the impact of legal issues on financial stability	Fm-lrs3	✓		✓			✓		✓
Technology Utilization	Implementing legal technology solutions	Tu-lrs1		✓		✓		✓	✓	
	Use of software for contract management and compliance tracking	Tu-lrs2	✓		✓		✓			✓
Dispute Avoidance and Resolution Mechanisms	Dispute resolution clauses (ADR, Arbitrations, Litigations)	DARM-lrs1	✓		✓		✓	✓		✓
	Early dispute resolution mechanisms	DARM-lrs2		✓		✓	✓			✓
	Legal Advisory Support	DARM-lrs3	✓		✓		✓		✓	✓
Documentation and Record-Keeping	Legal Risk Monitoring and Reporting.	DRK-lrs1	✓	✓			✓		✓	
	Digital Contract Management Systems.	DRK-lrs2			✓			✓		✓
Procurement and Tendering	Transparent Bidding Process	PTRM-lrs1	✓	✓		✓			✓	

	Compliance with Public Procurement Laws	PTRM-lrs1	✓		✓	✓			✓	✓
	Fraud prevention mechanisms	PTRM-lrs2		✓	✓		✓		✓	
	Legal Review of Tender Documents.	PTRM-lrs1	✓			✓		✓		✓
Environmental and Social Legal Compliance	Environmental Impact Assessments (EIA)	ESLC-lrs1	✓	✓	✓		✓		✓	
	Sustainability and Green Building Laws	ESLC-lrs2		✓		✓		✓		✓
	Land Acquisition and Compensation Issues	ESLC-lrs3	✓		✓		✓		✓	
	Labor Laws and Workers' Rights Compliance	ESLC-lrs4	✓	✓		✓		✓		✓
Legal Risk Monitoring and Continuous Improvement	Regular Legal Audits and Compliance Checks	LRMCI-lrs1		✓	✓			✓	✓	
	Adaptive Legal Risk Management Policies	LRMCI-lrs2	✓	✓	✓	✓			✓	✓
	Knowledge Sharing and Training on Legal Risks	LRMCI-lrs3		✓	✓	✓	✓	✓		
	Develop legal Risk Assessment Frameworks	LRMCI-lrs4	✓	✓	✓	✓	✓			✓
Human Rights and	Worker Safety and Occupational Health Standards	HRLC-lrs1			✓	✓	✓			✓

	Fair Wages and Employment Law Compliance	HRLC-lrs2	✓	✓		✓	✓	✓	✓	
	Gender and Inclusion Legal Compliance	HRLC-lrs3		✓	✓	✓	✓	✓	✓	
	Legal Protection Against Workplace Harassment	HRLC-lrs4	✓				✓	✓	✓	✓
Stakeholder and Community Legal Management	Land Rights and Indigenous Community Laws	SCLM-lrs1		✓	✓	✓	✓			✓
	Compensation and Resettlement Legal Issues	SCLM-lrs2	✓		✓		✓	✓	✓	✓
	Public Consultation and Stakeholder Legal Obligations	SCLM-lrs3	✓		✓	✓		✓	✓	✓
	Public-Private Partnership (PPP) Legal Frameworks	SCLM-lrs4	✓			✓	✓			✓

2.7 Relationship Between Legal Risks-Related Issues, Risk Management Strategies, and Project Performance

Legal risks were major obstacles in public building construction projects (De Araujo et al., 2023). These risks might originate from contractual and financial risks, public procurement and bidding issues, labor regulations, and regulatory compliance (Fazekas & Blum, 2021). To reduce these legal risks, project managers could improve overall project performance by detecting possible legal difficulties early in the entire project life cycle and creating comprehensive legal risk management strategies (Cevikbas et al., 2024). The relationship among legal risk factors, risk management practices, and project performance was vital in construction, especially in public projects (Chileshe & Kikwasi, 2014). Legal risks-such as land acquisition disputes, contract delays, regulatory ambiguities, inflation of costs, timelines, and erode stakeholder trust (Chung, 2025). Proactive strategies like contract management,

stakeholder engagement, and compliance programs help mitigate these risks and enhance project adaptability (Ackon et al., 2025).

Table 3: Measures of success construction project performance

Project Performance	Measures Project Performance	ID	(Tilahun Deneke, 2020)	(Kibru, 2019)	(Ayoub et al., 2021)	(In et al., 2021) &	(Zemedkun, 2022)	(Misgana, 2019)	(H. Kerzner, 2022)	(Shrestha et al., 2020)
Time	Timely completion of the project.	PP1	✓			✓	✓			✓
Cost	According to the budget.	PP2		✓		✓	✓			
Quality	Meeting quality and specifications	PP3			✓	✓	✓	✓		✓
Safety	Adherence to safety standards.	PP4	✓			✓	✓			
Stakeholder Satisfaction	Meeting client and stakeholder expectations.	PP5		✓	✓				✓	✓
Legal performance	Obeying all applicable laws and regulations	PP6		✓		✓		✓	✓	
Environmental sustainability	Level of risk posed by legal uncertainties.	PP7	✓	✓			✓		✓	
Project legal risk management effectiveness	measures how well legal risks are controlled to achieve project success.	PP8	✓		✓			✓		✓

2.8 Structural Equation Modeling

Structural equation modeling was a multivariate approach to test the theoretical model among several latent and observed variables (Hair & Alamer, 2022). Recent achievements of SEM could assess both a measurement model that entails confirmatory factor analysis and a structural model via multiple statistical tests (Hair et al., 2020). There have been two distinct approaches to structural equation modeling (SEM): covariance-based structural equation modeling (CB-SEM) and partial least squares structural equation modeling (PLS-SEM), or composite-based structural equation modeling (Edeh et al., 2023).

2.8.1 The Partial Least Squares Structural Equations Modeling (PLS-SEM)

The Partial Least Squares Structural Equation Modeling was a statistical method for modeling multivariate relationships, including direct and indirect effects as well as mediating effects of latent variables and observed variables that were predicted using connective models (Lowry & Gaskin, 2014). This study focuses on the complex interrelationship between legal risk-related issues, risk management practices, and construction project performance using the Partial Least Squares Structural Equation Modeling (PLS-SEM) method. Effective legal risk management practices help to improve the overall performance of building projects by reducing the adverse impacts of legal risk-related issues (Lowry & Gaskin, 2014).

2.8.2 Covariance Based Structural Equation Modeling (CB-SEM)

The primary aim of CB-SEM was to test covariance-based established theoretical frameworks, encompassing both measurement and structural models (Mia et al., 2019). This was achieved by comparing the observed covariance matrix with the model-implied covariance matrix derived from theory (Hair & Alamer, 2022). The CB-SEM has been widely adopted, particularly involving large sample sizes, normally distributed data, and correctly specified models (Al Issa & Abdelsalam, 2021).

2.8.3 Methodological Distinctions Between PLS-SEM and CB-SEM

Partial Least Squares Structural Equation Modeling and Covariance-Based Structural Equation Modeling (CB-SEM) were two distinct approaches to structural equation modeling (Yang, 2012). PLS-SEM was a variance-based method primarily aimed at maximizing the explained variance in dependent variables (Edeh et al., 2023). It was particularly effective for predictive

research, exploratory model building, and studies involving complex models or small sample sizes (Sarstedt et al., 2020). Conversely, CB-SEM was a covariance-based method focused on theory testing and confirmation (Hair & Alamer, 2022). It also generally requires large sample sizes and assesses multivariate normality to produce valid model fit indices (Kanchanawongpaisan, 2024). Therefore, PLS-SEM was often employed when the primary goals were theory development and predictive analysis, while CB-SEM was preferred for confirmatory studies aimed at substantiating theoretical constructs (Hair et al., 2017). The CB-SEM utilizes Maximum Likelihood Estimation (MLE), necessitating multivariate normality and large sample sizes to validate theoretical models through model fit indices (Kline, 2024). In contrast, PLS-SEM employs an iterative algorithm that combines Principal Component Analysis (PCA) and Ordinary Least Squares (OLS) regression (Sarstedt et al., 2020). While CB-SEM seeks to maximize the likelihood of observed data, PLS-SEM emphasizes maximizing explained variance (R^2) and predictive accuracy, rendering it ideal for exploratory research (Hair et al., 2017). Commonly used software for CB-SEM includes AMOS, LISREL, EQS, and Mplus, all of which provide detailed model fit indices and advanced functionalities for confirmatory modeling (Becker et al., 2012). The utilized software for PLS-SEM comprises SmartPLS, PLS-Graph, ADANCO, and WarpPLS, designed for user-friendliness and visualization of complex models (Sakaria et al., 2023)

2.8.4 Measurement Model

A measurement model in SEM defines how latent constructs are measured by observed indicators and is categorized as either reflective, where the construct causes the indicators, or formative, where the indicators form the construct (Hair et al., 2020). The measurement model describes the relationships between latent variables and their observed indicators, addressing validity and reliability of the constructs.

2.8.4.1 Formative Measurement Model

Formative indicators were not interchangeable and cannot be removed from the model without altering the meaning of the construct (Hanafiah, 2020). In formative measurement models, the indicators are considered to cause the latent construct (Edeh et al., 2023). In general, these formative indicators can have positive, negative, or even no correlations with each other (Petter et al., 2007). There was no need to report the indicator reliability and validity of formative

measurement scales (Hair et al., 2019). This is because outer loading, composite reliability, and the square root of average variance extracted (AVE) were meaningless for a variable made up of uncorrelated measures (Hair & Alamer, 2022).

2.8.4.2 Reflective Measurement Model

Reflective indicators were highly correlated, interchangeable, and could be eliminated without affecting the meaning of the construct (Sarstedt et al., 2020). Reflective indicators were associated with their constructs through factor loadings, representing the bivariate correlation between each indicator and its underlying latent construct (Hair & Alamer, 2022). Indicator reliability, internal consistency reliability, and discriminant validity of these items, which were the basis of the constructs, should be carefully investigated (Kwong-Kay, 2013).

2.8.5 Higher Order Constructs (HOC)

Higher-order constructs (HOCs), referred to as hierarchical latent variable models or hierarchical component models, represent multidimensional concepts that exist at a higher level of abstraction (Becker et al., 2012). In this study, models require evaluating measurement structures at two levels: the lower-order components (LOCs) and the higher-order components (HOCs) (Anggrahito & Hutabarat, 2025). Two main approaches were commonly used for estimating hierarchical models: the repeated indicator approach and the two-stage approach (Becker et al., 2012). While this method increases the number of indicators used, which involves assigning all indicators of the first-order constructs to the second-order construct estimation using the PLS-SEM technique, provided that all constructs were reflective (Schuberth et al., 2020). On the other hand, the two-stage approach involves first assessing the validity and reliability of the lower-order constructs (Hair et al., 2020).

2.9 Theoretical Research Model

A literature review generated a theoretical model for testing the relationship between independent and dependent variables (Kassem, 2022). The developed theoretical model is presented in Figure 1 below.

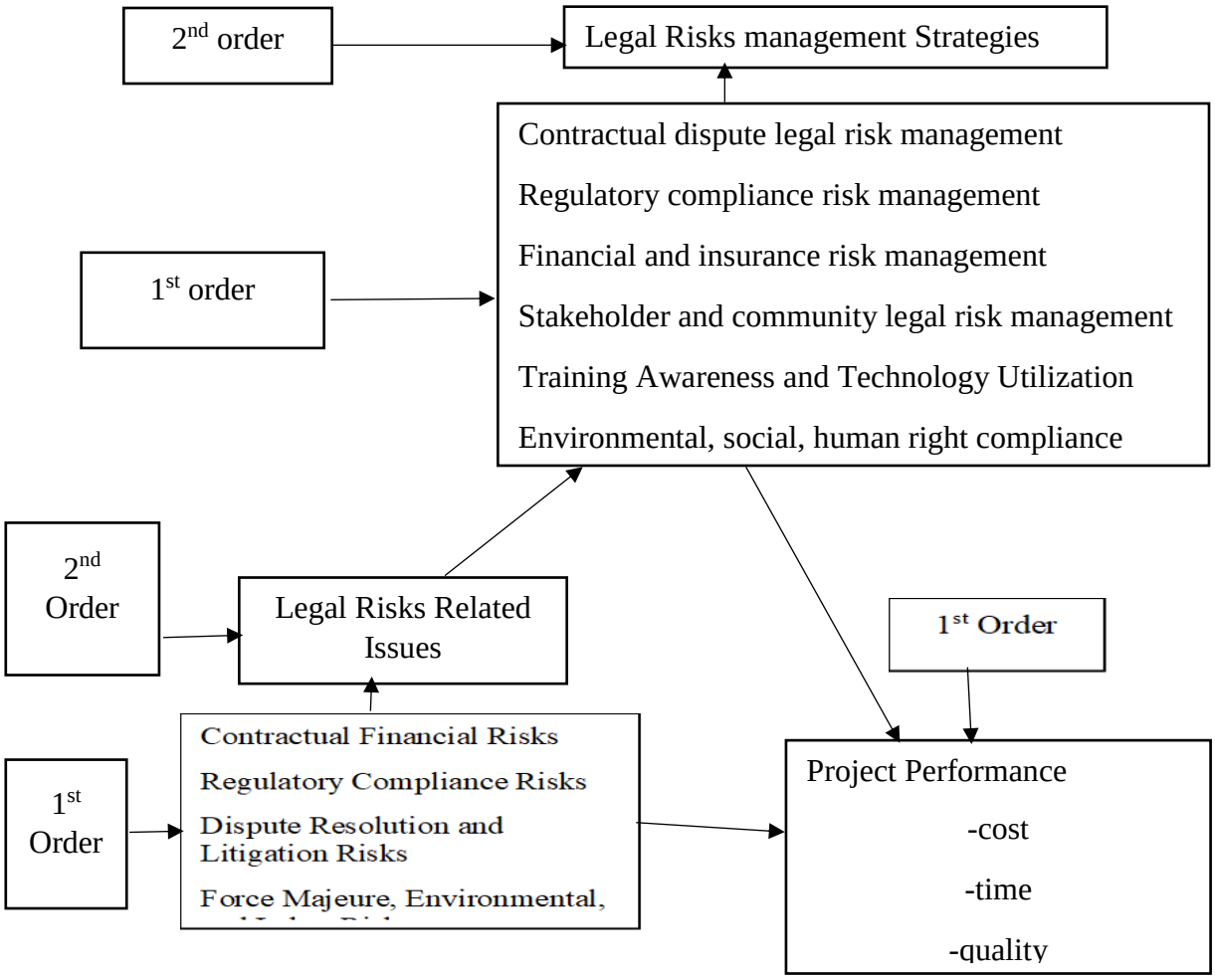

Figure 1:Theoretical Model

The theoretical model developed in this study depends on examining the interplay between legal risk-related issues, risk management strategies, and construction project performance. Legal risk-related issues were structured as a reflective-formative construct, composed of four key dimensions, such as contractual issues, regulatory compliance, dispute resolution, and force majeure issues, each measured reflectively by manifest variables (indicators). Risk management strategies were modeled as a second-order reflective–formative construct, consisting of six core components, each with its indicators or items. Project performance was modeled as a reflective construct, measured by eight key dimensions: cost, time, quality, safety, environmental sustainability, legal risks management effectiveness, legal compliance, and stakeholder satisfaction. The project performance was the dependent (endogenous) variable, influenced directly by independent (exogenous) variables of legal risk-related issues, while risk management strategies acted as a mediating variable.

2.10 Conceptual Framework for the Study

The conceptual framework for this study aims to integrate findings from existing literature on the interplay between legal risk-related issues, risk management strategies, and construction project performance in Addis Ababa, Ethiopia. This framework serves as a visual and theoretical guide for understanding the interrelationships among these variables and provides a basis for developing hypotheses from research questions.

[Legal risk-related issues]⟶[Risk Management Strategies]⟶[Project Performance]

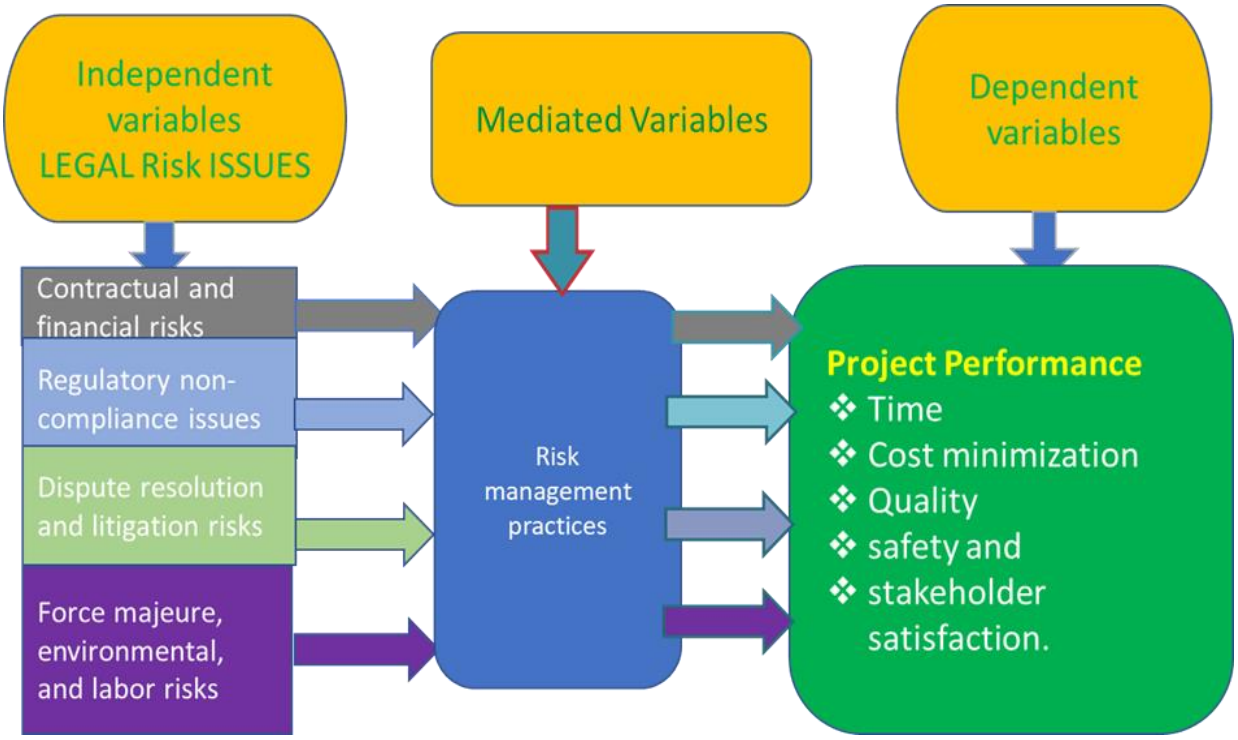

Figure 2: Conceptual Framework

2.10.1 Hypothesis of the Study

Building on this framework, the above research questions and corresponding hypotheses can be formulated: **Hypothesis 1:** Construction project legal risk-related issues influence the adoption and implementation of legal risk management strategies in the public buildings' construction projects. **Legal risk-related issues→ Legal risk management practices**

Hypothesis 2: The legal risk management strategies effectively improve construction project performance by mitigating legal risk-related issues and improving project outcomes.

Legal Risk Management practices → Construction Project Performance

Hypothesis 3: Legal risk-related issues have a direct impact on construction project performance metrics such as cost, time, safety, stakeholder satisfaction, quality, legal risk management effectiveness, legal compliance, and environmental sustainability, without mediations.

Construction Project Legal Risk-Related Issues → Construction Project Performance

Hypothesis 4: The indirect interrelationship where construction project legal risk-related issues affect project performance through the mediation of legal risk management strategies.

Legal Risk-Related Issues → Legal Risk Management Practices → Construction Project Performance

2.11 Research Gap

Despite the increasing complexity of construction projects, legal risk-related issues and their impact on project performance were not explored. Currently, many public building construction industries in Ethiopia face difficulties and challenges related to legal risk-related issues and inadequate legal risk management practices. Filling these gaps may render valuable insight about legal risk management practices and enhance the performance of publicly owned construction projects in Addis Ababa, Ethiopia. Despite the sophisticated interlinkages between legally related risks, risk management strategies, and construction project performance, there was a lack of holistic frameworks like PLS-SEM models. Overcoming these deficiencies would allow us to create a framework based on PLS-SEM that enhances the knowledge of legal risk-related issues, risk management strategies, and the performance of the public buildings construction industry.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research methodology employed to study legal risk-related issues, risk management practices, and impacts on the public building construction project performance in Addis Ababa, Ethiopia. The study area, research approach, research design, total populations, sampling techniques, sample size, data collection techniques, and data analysis were all described.

3.2 Study Area

The study was conducted in Addis Ababa, Ethiopia. This study focuses on public building construction projects in Addis Ababa due to the numerous legal risks they face, which arise from the city's rapid urbanization and ongoing development processes. Addis Ababa was specifically selected for this study due to its rapid urbanization and large-scale public building projects than others (Dash & Das, 2024). The availability of relevant data and Addis Ababa's national significance further enhance the study's potential contribution to policy reforms and improvements in Ethiopia's construction legal framework (Mohamed et al., 2020). In this study examined various 36 public buildings in Addis Ababa, which was completed above 75 percent including such like eight government offices (Research Service Delivery Building (AGORA I) Construction Project, Nefas Silk Lafto Keranio City Administration 1 Building), four educational schools (4-Kilo University Professors' Residence Building, Kolfe Keranio Public Schools Service Building Construction), nine healthcare offices (Aqaqi woreda 1 and bole woreda seven health bureau, kolfe keranio woreda 03 health center, Lideta sub-city emergency and services for maternal and child health building office) and two community centers buildings (Haile Garment agricultural products market center construction, Tirunesh Beijing 2B+G+6 building). The five hospitals (Ras Desta Hospital B+G+5 building, Kolfe General Hospital, Nefas Silk Lafto General Hospital), two cinemas (Children and Youth Theatre Phase 3, and cinema complex building), and six police stations (Aqaqi sub-city police headquarters building, Addis Ababa Main Police Headquarters building), due to their critical role in urban development

and public service provision. Based on data gathered from the Addis Ababa city administration design and construction works bureau contract management directorate director there were 36 public buildings construction projects with status completed 75 percent and above in Addis Ababa, Ethiopia. This study selected public buildings construction projects encompassing essential sectors like governance, health, education, security, and culture, which were vital for enhancing the quality of life and ensuring sustainable urban development in Addis Ababa (Worku, 2024). The public buildings projects were selected for their significant impact on urbanization and legal challenges they face, such as land acquisition disputes, contract enforcement, and regulatory compliance (Aytenew et al., 2025). The rapid modernization efforts in Addis Ababa, including large-scale demolitions and redevelopment, have led to concerns about forced evictions and legal disputes (Larsen et al., 2019).

3.3 Research Approach

This study employed a mixed-methods research approach, integrating both quantitative and qualitative approaches to provide a comprehensive understanding of the research problem. The quantitative component included descriptive statistics, correlation analysis, explanatory analysis, and Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine the interrelationships among variables. Additionally, the closed-ended structured questionnaires were a quantitative data analysis using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). In contrast, the qualitative approach involved open-ended questions that allow for more detailed, descriptive responses and document reviews, face-to-face interviews, focusing on gathering deeper insights into the public building construction industry in Addis Ababa. In the qualitative component of this study, a review of various documents was conducted. Relevant organizational reports, policy documents from the government, contractual agreements, and project performance reports were examined to enrich and confirm findings from the survey and interview results. The review of documents facilitated contextualization of the legal risk-related issues and the regulatory framework impacting public construction projects.

3.4 Research Design

The research design, which outlines the overall structure of data collection, measurement, and analysis procedures, is presented below. It clearly shows the methods and procedures used to collect and analyze data.

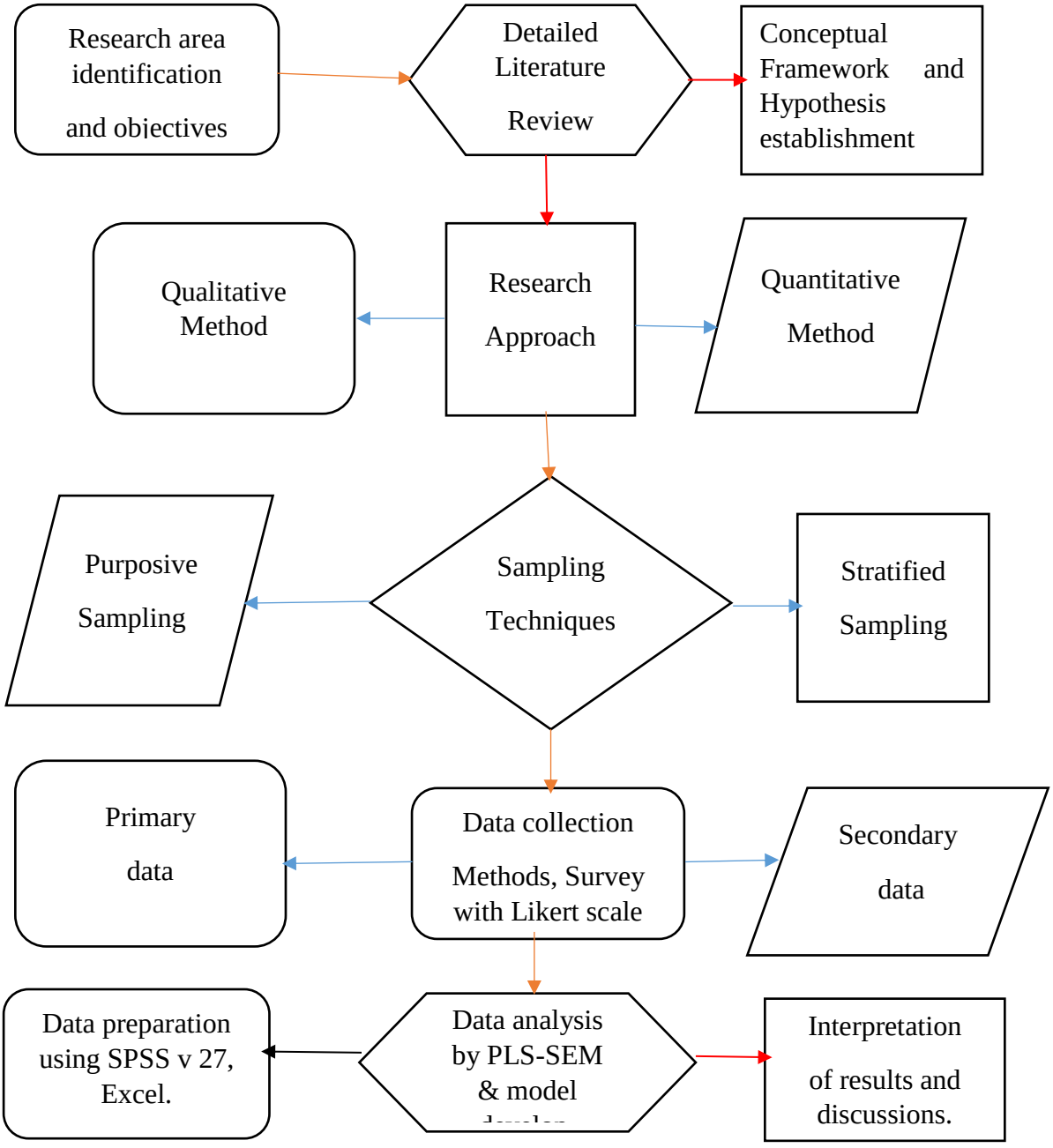

Figure 3:The general overview of the research design procedure

3.5 Populations and Sampling Technique

The population of the study consisted of all actively running large-scale public building projects in Addis Ababa (Kloosterboer, 2019). Large-scale projects were usually distinguished by their structural complexity, higher financial investment, and increased regulatory requirements (Tabejamaat et al., 2024). In total, thirty-six public buildings were included in this study, including eight government office buildings, four educational schools, nine healthcare offices, two community center buildings, five hospitals, two cinemas, and six police stations. These projects were selected because they were more likely to encounter complex legal risk-related issues, such as stricter zoning laws, more demanding permit requirements, and enhanced safety regulations. For instance, high-rise buildings in the UAE encounter significant legal challenges related to zoning compliance and building code adherence (Kerr et al., 2013). According to the Addis Ababa City Administration design and construction works bureau, 36 public building projects are currently running construction projects, with construction having been completed to more than 75 percent. Projects that were at least 75% completed were purposefully selected for this study to ensure that adequate data could be collected on legal risk-related issues and their impact on project performance. At this stage of progress, most legal challenges would have already manifested, and sufficient documentation and stakeholder insights are available to enable a comprehensive analysis. Therefore, the population of this study consisted of 36 public building construction projects. The target groups of investigation for this study were the large-scale public building projects above 75 percent completed. The sample frame was a subset of the population from 36 project records, including individuals involved in legal risk management practices and project performance within these projects. The selected offices were chosen based on their proximity, which facilitated the examination of legal risk-related issues, legal risk management strategies, and their impact on project performance. The target units of analysis for this study were 36 public building construction projects. Participants included site engineers, contract administrators, office engineers, consultants, legal advisors, clients, regulatory inspectors, end users, and construction project managers.

3.6 Sampling Method

The study used both simple random sampling and stratified sampling to ensure that the selected respondents of key stakeholders were involved in public building construction projects. The simple random sampling was when every member of the targeted population with an equal opportunity for selection, hence reducing selection bias and improving the applicability of findings (Macdonald, 2024). Stratified Sampling divides the population into various groups of strata (stakeholders) in such a way that the final selection represents the actual distribution of stakeholders (Saunders et al., 2019). The sampling frame consists of all key stakeholders actively engaged in the 36 public building construction projects. These stakeholders include professionals and decision-makers who play a crucial role in project execution, technical experts, implementers, and management (Taiwo, 2019). The primary categories' comprehensive list of stakeholders considered in the study included contract administrators, legal advisors, consultants, contract engineers, site engineers, project managers, clients, regulatory compliance officers, contractors, and facility managers who were involved in the 36 public infrastructure developments. This study used a mixed sampling approach. Purposive sampling was employed to select key informants for qualitative interviews based on their expertise in legal risk-related issues and construction project management practices. For the quantitative survey, stratified sampling was used to ensure proportional representation from different stakeholder groups.

3.6.1 Sample size

Sample size determination was the procedure of picking representative units of a construction party for a study in a research investigation (Seale et al., 2004). The sample size of the overall sampling frame was calculated to ensure the required number of representative respondents (Hasan & Kumar, 2024). Therefore, to consider the respondents as sample representatives; the following equation 3.1 and 3.2 was used to determine the sample size determination formula, likely based on Cochran's formula for a similar statistical approach for finite populations of a simple random sampling technique from the target population (Cochran, 1968).

Formula for Sample Size (n):

$$n = \frac{N Z^2 P q}{e^2 (N-1) + Z^2 P q} \qquad \text{equation (3.1)}$$

The total population (N) of stakeholders across the 36 public building construction projects, and to justify the selection of respondents use a standard sample size formula for a finite population was used. The selection of respondents was justified using Cochran's (1977) formula for determining sample size in a finite population. The total number of stakeholders across the 36 public building construction projects was 126. The appropriate sample size was calculated as follows:

$$n = \frac{N}{1+N(e)^2} \qquad \text{equations 3.2}$$

$$n = \frac{126}{1+126(0.05)^2} = 95.817 \approx \underline{96}$$

Where n is the desired sample size, N is the total population of stakeholders within the 36 public projects, and Z is the Z-score corresponding to the desired confidence level (1.96 for a 95% confidence level, and 5% is an acceptable margin of error). The P is an estimated proportion of the population with the characteristic of interest (commonly set at 0.5 or 50% for maximum variability). The q is one minus P, and e is the acceptable sample error (desired margin of error 0.05 for ±5%). This sample size ensures sufficient statistical power for representativeness while remaining feasible for data collection (Naing, 2003). The study employed simple random and stratified sampling to select 96 participants from 126 key stakeholders across 36 public building construction projects in Addis Ababa, Ethiopia. The 96-responder sample size would guarantee sufficient statistical power for this study. Cochran's method could be used to determine the sample size, which gives a valid estimate of the minimal number of respondents required to detect significant differences, given the finite population size (N = 126 stakeholders). While the sample size formula (Cochran's formula) for an infinite population would require a larger sample (around 384 respondents), the finite population correction factor reduces this requirement to 96 respondents from the key population of 126 stakeholders (Hasan & Kumar, 2024). A study by Batrawi et al. (2017), which explored critical success factors in project management, found that a sample size of approximately 100 respondents was adequate for achieving meaningful results, even when the population was small. Similarly, Asiaei et al. (2023) conducted a study on construction project performance with a sample size of 95 respondents from a relatively small population, which was proven effective for drawing valid conclusions. Furthermore, research

by Bardal (2022) on project governance and stakeholder management demonstrated that using 95 respondents provided sufficient data to understand key performance indicators in construction projects. These studies, alongside the use of Cochran's formula, reinforce that a sample size of 96 respondents from a population of 126 stakeholders was appropriate and reliable for a study, ensuring that the findings were generalizable and statistically valid. Table 4 below defines the key stakeholders involved, their roles, and their responsibilities in public building construction projects.

Table 4:Stakeholder Categories and Relevant Positions for Questionnaire Respondents

Stakeholder	Relevant Position for Respondent	Ni	n	Reason
Project Management	Project Manager	6	5	Ensure the overall project execution meets legal, contractual, and safety requirements.
Contractors	Construction Manager	13	10	Navigate legal issues during construction, address legal issues, and handle contractual disputes and claims.
Consultants	Resident engineer	22	17	Supervise construction, ensure contract compliance, and identify legal risks on-site.
Government Agencies	owner/Client	7	5	Oversee project management, including legal risks, budget constraints, liabilities, contract agreements, and regulations.
Legal Team	Legal Advisor / Contract Administrator	19	14	Manage legal documentation and legal risk mitigation strategies.
Engineering Team	Site Engineer / Contract Engineer	33	25	Address construction site compliance, safety regulations, and contractual obligations.
Regulatory Authorities	Building Inspector /Regulatory Compliance Officer / Safety Officer	10	8	Responsible for ensuring compliance with building codes, environmental laws, safety standards, and permits.

Suppliers and Vendors	Supply Chain Manager / Procurement Manager	9	7	Address legal risks related to contracts, delivery schedules, material quality, and compliance.
End Users	Facility Manager / User Representative	7	5	Provide feedback on the long-term functionality and legal risks of public buildings.
Total		**126**	**96**	

For this study, the total stakeholder population of 36 public building construction projects was 126. For representative coverage, 96 respondents were selected based on proportionate stratified random sampling. Stakeholders were categorized based on their roles in the 36 public building construction projects. The number of participants in each group was calculated using the formula of allocated sample size (Ni/N) ×n, where Ni represents the population of each group, N is the total population (126), and n is the sample size, the number of respondents (96). For instance, the project management group with 6 in population had 5 respondents distributed to it; the engineering team with the largest population of 33 had 25 respondents distributed to it. Similarly, contractors (13), consultants (22), government agencies (7), legal team (19), regulatory authorities (10), suppliers and vendors (9), and end users (7) had 10, 17, 5, 14, 8, 7, and 5 participants respectively. This stratified approach ensured proportional representation from all relevant groups based on their level of involvement in legal risk management practices within 36 public buildings construction projects, thereby enhancing the validity and reliability of the data collected.

3.7 Data Collection Tools

The study employs primary and secondary data collection methods. The primary data collection was through a 5-point Likert scale of closed-ended structured questionnaires, a survey study, and face-to-face personal interviews. The secondary data were collected from published and unpublished documents, reviews of project reports, articles, document reviews, and relevant literature to contextualize the findings.

3.7.1. Primary Data Collection

The primary data was gathered from the respondents by a closed-ended structured questionnaire survey and personal interview using items rated on the 5-point Likert scale type of strongly disagree to strongly agree. A structured questionnaire prepared based on research objectives was distributed among research participants to contract administrators, legal advisors, consultants, office engineers, site engineers, project managers, client, regulatory inspector, facility manager, end user, supplier and vendor, and contractors in the 36 public buildings projects in Addis Ababa, Ethiopia.

3.7.1.1 Questionnaire Survey

To identify systematic questionnaires as the best method for capturing information related to this study. Questionnaire development involved the identification and description of indicators from the literature available. The literature review was undertaken to determine the different legal risks present in Addis Ababa public buildings construction projects in Ethiopia, and legal risk management practices that affect their performance. The review result produces and classifies legal risk-related issues factors into four broad categories, and sub-themes like the contractual and financial Risks into five factors, regulatory, compliance, liability, insurance, and safety risks into five factors, dispute resolution and litigation risks into two factors, and finally force majeure, environmental, and labor Risks into four factors. Conversely, legal risk management practices were grouped into six broad categories, which altogether account for 13 constructs and 61 indicators or items in PLS SEM. To test and examine the study hypothesis, the survey research technique was employed in data gathering. A questionnaire was prepared by ordering and arranging the items listed as indicators into questions to be answered by respondents so that an assessment of the performance of the projects they had been involved. The items were framed in the positive direction and employed a 5-point Likert scale to quantify the combined effect of legal risk-related issues and legal risk management practices on project success. A comprehensive explanation of the questionnaire was provided in Appendix A.

3.7.2. Secondary Data Collection

Secondary data collection tools for this study included academic papers, document review, analysis of case law review, government reports, and academic publications. The secondary data concerning issues with legal risks-related issues, legal risk management practices, and project

performance was available literature, including case studies, project reports, academic articles, and official documents.

3.8 Data Analysis Method

The data was analyzed using partial least squares structural equation modeling (PLS SEM) to explore complex interrelationships among the constructs and test hypotheses. After the data were collected from the study participants, missing value analysis, identification of outliers, and descriptive data analysis were conducted using SPSS version 27 software. The PLS-SEM enables the prediction and assessment of both direct and indirect effects among constructs, supporting the development and validation of theoretical frameworks. The data analysis was carried out using the software SmartPLS4 version 4.1.1.1.

3.9 Measurements Model Reliability and Validity

In structural equation modeling (SEM), particularly when using Partial Least Squares (PLS-SEM), evaluating indicator item loadings and Average Variance Extracted (AVE), and composite reliability was crucial for assessing the reliability and validity of measurement models (Haji-Othman & Yusuff, 2022).

3.9.1 Factor Loading

Indicator loading should be greater than 0.7, and it was deemed acceptable that the construct accounts for over 50% of the indicator's volatility, leading to sufficient item dependability (Edeh et al., 2023). According to Hair et al. (2020) suggest that indicators with loadings within 0.40 and 0.70 ought to be kept if AVE is adequate, while loadings below 0.4 should be eliminated if doing so does not considerably improve composite reliability. According to Cheung et al. (2024), the AVE calculates how much variance a construct extracts from its indicators in comparison to the amount caused by measurement error. In the study by Hair et al.(2020), an acceptable AVE value was 0.50 or above, which means that the concept accounts for at least 50% of the variety of its variables. For this study, most of the results were above 0.7, and the AVE value was 0.50, considered acceptable. Indicator loadings should generally exceed 0.70, as this reflects a substantial proportion of the variance in the indicator being explained by the construct Hair et al., 2019). In this study, most of the results factor loading indicators exceed

this threshold, >0.7, thereby satisfying the reliability requirements. This was consistent with previous research, which has established that higher loading values contribute to stronger construct validity and internal consistency. For this study, almost all of the AVE values were above the threshold of 0.50, which indicates adequate convergent validity. For indicators with loadings between 0.40 and 0.70 (liquidated damages for delays, non-compliance with building Codes, Worker Safety and Occupational Health Standards (HRLC-lrs1)), results were 0.589, 0.51, and 0.432, respectively. The study by Hair et al. (2020) indicated that these indicators should not be immediately removed because the AVE value of the construct was≥ 0.50. The current study has adhered to this guideline, as the AVE values for these constructs should all be above 0.50, ensuring that the constructs maintain acceptable levels of convergent validity. This suggests that even with lower loadings, these indicators were contributing meaningfully to the construct, and their retention was justified. However, indicators with loadings below 0.40, late and dispute payments (CFR-5), knowledge sharing (LRMCI_LRS3), and environmental impact assessments (ESLC_LRS1) results of 0.398, 0.121, and 0.19, respectively were do not meet the threshold for adequate reliability and construct validity. In this study, indicators such as late payment and payment dispute issue (loading 0.398), ESLC_lrs1(item loading 0.190), and LRMCI_LRS3 (loading 0.121) were clear indicators for removal based on these established criteria. You may view all of the factor loading results in Appendix 1, Table 14 below.

3.9.2 Internal Consistency Reliability

Internal consistency reliability was commonly evaluated using Cronbach's alpha and composite reliability coefficients (Khurshid et al., 2022). Internal consistency reliability is a value of 0.7, and exceeding 0.8 was preferable for most studies as a threshold estimate for both composite reliability and Cronbach’s alpha to reflect good construct reliability measures (Cheung et al., 2024). As presented in Appendix 2, Table 15, below, the values of Cronbach’s alpha were between 0.824 and 0.973, whereas composite reliability was found between 0.873 and 0.977; both of them values were found to be within the range of good reliability. The study by Hair et al. (2020) emphasized that Cronbach’s alpha values between 0.7 and 0.95 indicate good reliability, while values above 0.95 suggest excellent reliability. In this study, Cronbach's alpha values ranging from 0.824 to 0.973 and composite reliability values ranging from 0.873 to 0.977 satisfy these required thresholds. These results indicate high internal consistency, which further

attests to the reliability of the measurement instrument applied in the research. Hence, internal consistency reliability has been established (Hajjar, 2018).

3.10 Construct Validity

In partial least squares structural equation modelling, the validity of a model was established using both discriminant and convergent validity (Chan & Lay, 2018).

3.10.1 Convergent Validity

As a general rule, the values of average variance extracted (AVE) were 0.50 or higher shows that the construct has convergent validity (Cheah et al., 2018). The Average Variance Extracted (AVE) values for this study ranged from 0.554 to 0.906, satisfying the recommended threshold and thus confirming the establishment of convergent validity. The values of AVE are presented in Table 15, Appendix 2, below.

3.10.2 Discriminant Validity

Discriminant validity was established through the Fornell and Larcker criterion, heterotrait-monotrait (HTMT) ratio, and cross-loading (Ab Hamid et al., 2017). Ensuring discriminant validity was crucial in partial least squares structural equation modeling to confirm that constructs were distinct and measured different concepts (Henseler et al., 2015). This indicates that a construct shares more variance with its indicators than with other constructs, supporting discriminant validity.

3.10.2.1 Fornell-Larcker Criterion

According to Henseler et al. (2015), the Heterotrait-Monotrait (HTMT) ratio of correlations is considered a more reliable method for assessing discriminant validity. According to the Fornell-Larcker (1981), discriminant validity was established for this study, since the square root of AVE, which is indicated in bold in Appendix 3, Table 16 below, was found to be greater than that of the correlation with the other underlying inner constructs (Cheung et al., 2024). The table presents the correlations between different constructs, with the square roots of AVE values indicated in bold. The findings this study results indicated that the constructs contractual dispute management (CDM), (0.811), dispute resolution risks (DRR) (0.952), ESLC-HRC (0.744), FIRM (0.946), FMR (0.846), PP (0.786), RCR (0.800), TaTu (0.835), CFR (0.774), RCM

(0.756), and SCM (0.945) all meet the Fornell-Larcker criterion, confirming discriminant validity. Based on the analysis, the Fornell-Larcker criterion confirms that constructs in this study demonstrate discriminant validity.

3.10.2.2 Cross Loading

Cross-loading of the study indicates that the items were correlated with their parent constructs and did not load well onto other constructs of the study, which means that they were not correlated with other constructs (Fornell & Larcker, David, 1981). This study demonstrated that the item ambiguities in contracts demonstrated a high loading of 0.906 on the CFR construct, but very low loadings on other constructs such as RCR (0.042) and FMR (0.096), ensuring that it was appropriately associated with the intended factor. Similarly, the item breach of contracts had a strong loading of 0.904 on the CFR construct, and a weak loading of -0.023 on cross-border disputes, mediation failures, arbitration issues, and litigation risks (0.967), showing that it does not significantly correlate with unrelated constructs. This aligns with the guidelines for establishing discriminant validity, where constructs were expected to be distinctly separate from each other (Hair, 2016). Additionally, indicators such as cost (0.832), quality (0.763), and sustainability (0.860) demonstrated strong correlations with their respective constructs while showing weak or no cross-loadings on other factors. This further confirms that these constructs were distinct and contribute uniquely to the study (Fornell & Larcker, David, 1981). Indicators or items such as disputes and lawsuits related to construction defects, claims from subcontractors, also clearly loaded on their parent constructs, with values of 0.967 and 0.936, respectively, while not loading significantly onto other constructs, reinforcing the model's discriminant validity. The result was presented in Table 17, Appendix 4 below.

3.10.2.3 Heterotrait-Monotrait Ratio (HTMT)

According to Yusoff et al. (2020), a cutoff value of less than 0.85 was set for the heterotrait-monotrait (HTMT) ratio. Considering the conceptual similarity of the indicators, a more lenient HTMT criterion of 0.90 was employed (Henseler et al., 2015); all values were found to be below this threshold, thereby confirming discriminant validity. However, to accomplish this indicator of legal risk-related issues, four constructs were used: force majeure, environmental, labor risks (FMELR), contractual and financial risks (CFR), regulatory compliance risks (RCR), and dispute resolution and litigation risks (DRLR). The values more than 0.9 were eliminated from

the model (Chen et al., 2024). Thus, discriminant validity through the heterotrait-monotrait ratio was established (Hair, 2016). Legal risk-related issues, including force majeure, environmental, labor risks (FMELR), contractual and financial risks (CFR), regulatory compliance risks (RCR), and dispute resolution and litigation risks (DRLR), significantly impact project performance. This study employs HTMT inference with bootstrapping for rigorous validity assessment. In this study, the HTMT results indicate good discriminant validity for most construct pairs, with values below the 0.90 threshold. However, the pair ESLC-HRC and RCM (0.433) suggests potential concerns regarding their distinctiveness. The results were presented in Table 5 below.

Table 5:Heterotrait-Monotrait Ratio (HTMT)

	CDM	DRLR	ESLC-HRC	FIM	FMER	LRMS	LRRI	PP	RCR	TaTu	CFR	RCM
CDM												
DRLR	0.078											
ESLC-HRC	0.14	0.136										
FIM	0.133	0.025	0.092									
FMELR	0.219	0.263	0.153	0.111								
LRMS	0.253	0.079	0.072	0.137	0.061							
LRRI	0.077	0.248	0.087	0.095	0.182	0.208						
PP	0.178	0.217	0.18	0.238	0.212	0.087	0.104					
RCR	0.156	0.112	0.142	0.139	0.129	0.109	0.117	0.189				
TaTu	0.114	0.156	0.073	0.161	0.084	0.068	0.097	0.236	0.067			
CFR	0.123	0.107	0.106	0.082	0.111	0.064	0.113	0.276	0.113	0.04		
RCM	0.138	0.158	0.433	0.172	0.119	0.127	0.066	0.23	0.147	0.128	0.231	
SCM	0.11	0.189	0.179	0.166	0.15	0.16	0.354	0.221	0.136	0.075	0.264	0.2

3.11 Ethical Consideration

Ethical considerations for this study include ensuring informed consent from all survey and interview participants, maintaining confidentiality and anonymity to protect respondents' identities, and using data solely for research purposes. The study would uphold honesty and integrity in data collection, analysis, and reporting, avoiding misrepresentation or bias. The ethical considerations in this research were to responsibly cite and acknowledge the professionals whose works were used and reviewed in the literature to avoid plagiarism. To properly obtain and analyze data without manipulation and fabrication to avoid an incorrect presentation of the result. Additionally, the research would comply with relevant ethical guidelines and institutional regulations, ensuring that findings contribute to improving legal risk management practices and project performance in the public construction industry in Addis Ababa, Ethiopia. The data obtained would be used for academic purposes only.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents data analysis methods and findings. Data were prepared using SPSS and analyzed with SmartPLS (v4.1.1.1) through Partial Least Squares Structural Equation Modeling (PLS-SEM). A measurement model is used to assess the validity and reliability of constructs, while a structural model is used to test hypothesized relationships between constructs.

4.2 Demographic Characteristics of the Respondents

4.2.1 Response Rate

The study questionnaire included demographic questions to determine the general profile of respondents. The primary element analyzed was a response rate, in which for this particular study of 130 questionnaires were distributed to respondents on construction sites and contractors' offices, out of which 110 questionnaires were returned. Then 95 of the questionnaire items were dimmed to be valid. According to (Fincham & Draugalis, 2013), a response rate of 70% or more can help draw a very good analysis. This study response rate was 85%, which means that the response rate was sufficient to draw a very good analysis. The response rate of the questionnaire is shown in Table 6 below.

Table 6:Response rate

Category	**Sub-Category**	**Frequency**	**Percentage**
Survey Distribution	Number of Questionnaires Distributed	130	100%
	Number of Questionnaires Returned	110	84.6%
	Number of accepted questionnaires	95	73.1%
	Number of rejected questionnaires	15	11.5%
	Percentage of Survey Response Rate	110	**85%**
	Project Manager	5	5.3%

Position in Organization	Office Engineer/Contract Engineer	12	12.6%
	Contractor	10	10.5%
	Legal Advisor	5	5.3%
	Client/Owner	5	5.3%
	Consultant	13	13.7%
	Contract Administrator	18	18.9%
	Site Engineer	12	12.6%
	regulatory authorities	6	6.3%
	suppliers and vendors	5	5.3%
	End user's representative/facility managers	4	4.2%
Education Level	Bachelor's Degree	56	58.9%
	Master's Degree	28	29.5%
	PhD	5	5.3%
	Others	6	6.3%
Experience	Less than 5 Years	44	46.3%
	5 - 10 Years	26	27.4%
	11 - 15 Years	15	15.8%
	More than 15 Years	10	10.5%
Total Respondents		**95**	**100%**

From the above table 7, a response rate was calculated as (110/130) ×100=84.61%, which rounds to 85%. The accepted response rate (valid responses out of total distributed) was also (95/130) ×100=73.08%, rounding to 73%. The acceptance rate (valid responses among returned questionnaires) was (95/110) ×100=86.4%, rounding to 86%.

4.2.2 General Profile of Respondent

This section provides the general information of participants, which includes respondents' job position, educational status, field of specialization, and years of experience. The educational level of the study participants showed that 29.5% held a second degree (MSc), 58.9% a first

degree (BSc), 5.3% a PhD, and 6.3% fell into other categories. The educational level of the participants indicates they were literate, with a good understanding of the topic and research subject, making them suitable for achieving the study's objectives. Figure 3 below illustrates the educational level of the respondents of the study.

Statistics		
Education level of respondents		
N	Valid	95
	Missing	0

Education level of respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor's Degree	56	58.9	58.9	58.9
	Master's Degree	28	29.5	29.5	88.4
	PhD	5	5.3	5.3	93.7
	Others	6	6.3	6.3	100.0
	Total	95	100.0	100.0	

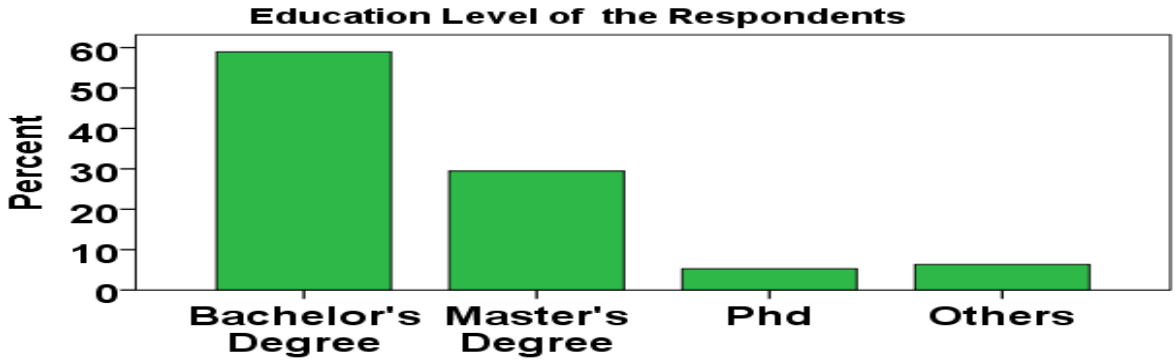

Figure 4: Educational level of respondents

The total grouping of respondents' fields of specialization, which is important to determine their association with the subject matter of the questionnaire, has been estimated. Through this, 31.6%

were found to be civil engineers, 27.4% from construction management, 15.8% from architecture, 20% from project management, and 5.3% from construction laws which were all in great association with the subject matter of the study, legal risks-related issues, legal risks management strategies, and impacts on project success. The results of respondents' fields of specialization are presented in Figure 4 below.

Field of study					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Civil engineering	30	31.6	31.6	31.6
	Construction management	26	27.4	27.4	58.9
	Architecture	15	15.8	15.8	74.7
	project management	19	20.0	20.0	94.7
	Law	5	5.3	5.3	100.0
	Total	**95**	**100.0**	**100.0**	

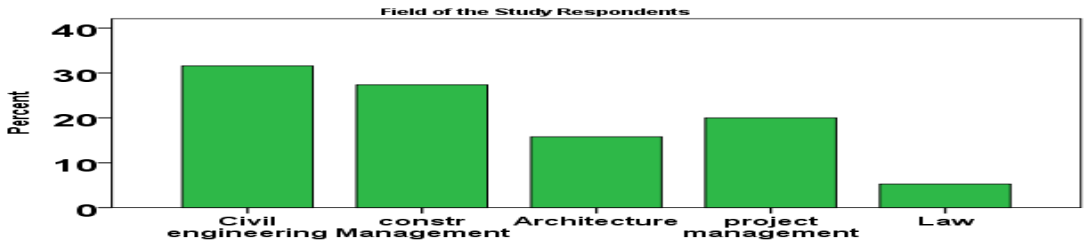

Figure 5: Field specialization of the respondents

The working experience of the participants of the study, expressed in percentage, was <5 Years of experience (46.3%), 6-10 years of experience (27.4%), 11-15 years of experience (15.8%), and more than 15 years (10.5%). The majority of the participants have a good experience rate, and it is believed by the study that respondents had sufficient knowledge and understanding of the topic, which makes them dependable and credible sources of information. The work experience of the respondents is presented in Figure 5 below.

Experience the respondent					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<5 Years	44	46.3	46.3	46.3
	5-10 Years	26	27.4	27.4	73.7
	11-15 Years	15	15.8	15.8	89.5
	>15 Years	10	10.5	10.5	100.0
	Total	95	100.0	100.0	

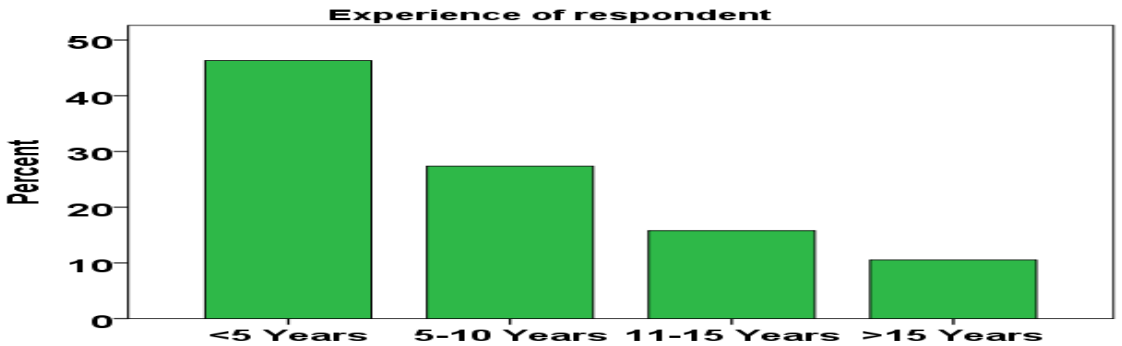

Figure 6: Experience of the respondents

The overall groupings of respondents working positions in percentiles resulted in site engineers and office engineers at 12.6%, consultants 13.7% contract administrators at 18.9%, which comprised the majority of the positions, and others like technical managers, project managers, Legal team, owner/clients, and facility managers covering the rest of the percentiles. This shows that the respondents are selected from a wide range of professions, which is beneficial for getting information on various positions. The results of the respondent's position are presented in Figure 6 below.

Position in organizations					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	project manager	5	5.3	5.3	5.3

	Office engineer/contract engineer	12	12.6	12.6	17.9
	contractor	10	10.5	10.5	28.4
	legal team	5	5.3	5.3	33.7
	client/owner	5	5.3	5.3	38.9
	consultant	13	13.7	13.7	52.6
	contract administrator	18	18.9	18.9	71.6
	site engineer	12	12.6	12.6	84.2
	Regulatory authorities	6	6.3	6.3	90.5
	suppliers and vendors	5	5.3	5.3	95.8
	End user's representative/facility managers	4	4.2	4.2	100.0
	Total	**95**	**100.0**	**100.0**	

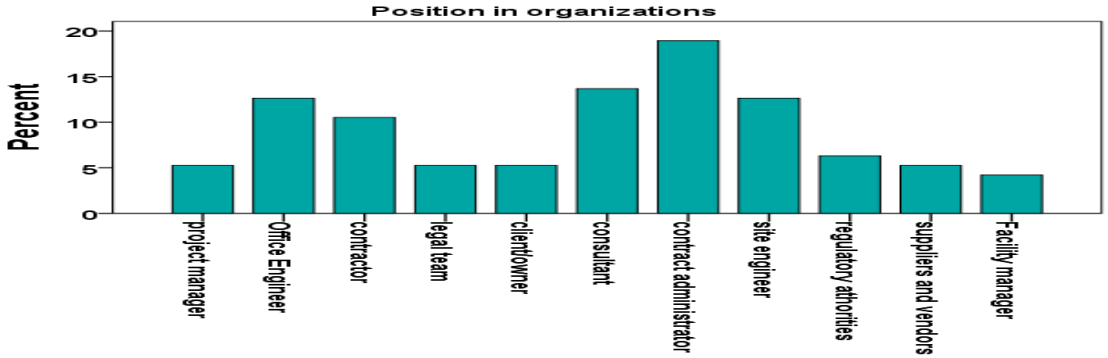

Figure 7:The position of the respondent in percent

4.3 Significance and Relevance of Indicator Weights

In this stage, the significance and relevance of indicators weight has been established. Indicator weights are normally considered statistically significant at a $P < 0.05$ and $T > 1.96$. It should be noted that the larger the weights, the greater the relevance of the indicator to the construct. The study found all the values of the constructs to be significant at except $P < 0.068$ of liquidated damage for delays, and (CFR_4), $p<0.108$ of the late payments, payment disputes, budget overruns, bond issues, and fraud(CFR_5) an indicator of legal risks related issues, the contractual and financial risks construct and non-compliance with building codes(RCR_1) of regulatory compliance, liability, insurance and safety risks which had a collective value of $P = 0.16$ which is greater than, $p < 0.05$, and an outer weight of 1.406 which is also lower than $T > 1.96$ which indicates that the construct has an insignificant value which does not meet the criteria. From the environmental, social, labor, and human rights compliance (ESLC_lrs1) which was $p<0.121$ and (ESLC_lrs2) had a $p<0.074$ of the legal risk management strategies of (ESLC-HRC) and an outer weight of T value was 1.55,1.788 respectively were also lower than $T > 1.96$ which indicates that the construct has an insignificant value which does not meet the criteria. If zero was included within the confidence interval bias, the parameter does not meet the requirements for statistical significance Hair et al., 2019). Additionally, the path coefficient β, which determines the impact of the independent variable on the dependent variable, was met since all the values were> 0.1. Table 7 below shows the results.

Table 7:Significance and Relevance of Indicator Weights

	Path	**Path β**	**mean**	**Error**	**T (Path β /error)**	**P values**
CFR_1 <- Contractual and Financial Risks (CFR)	item-1st	0.906	0.780	0.275	3.301	0.001
CFR_2 <- Contractual and Financial Risks (CFR)	item-1st	0.922	0.797	0.270	3.409	0.001
CFR_3 <- Contractual and Financial Risks (CFR)	item-1st	0.904	0.793	0.246	3.676	0.000

CFR_4 <- Contractual and Financial Risks (CFR)	item-1st	0.589	0.580	0.323	1.823	0.068
CFR_5 <- Contractual and Financial Risks (CFR)	item-1st	0.398	0.385	0.248	1.606	0.108
Cm_lrs1 <- Contractual Dispute Management	item-1st	0.642	0.630	0.109	5.894	0.000
Cm_lrs2 <- Contractual Dispute Management	item-1st	0.923	0.906	0.096	9.570	0.000
Cm_lrs3 <- Contractual Dispute Management	item-1st	0.769	0.754	0.125	6.158	0.000
Cr_lrs1 <- Regulatory Compliance Management	item-1st	0.710	0.608	0.233	3.043	0.002
Cr_lrs2 <- Regulatory Compliance Management	item-1st	0.876	0.758	0.238	3.689	0.000
DARM_lrs1 <- Contractual Dispute Management	item-1st	0.920	0.911	0.094	9.810	0.000
DARM_lrs2 <- Contractual Dispute Management	item-1st	0.789	0.782	0.111	7.136	0.000
DARM_lrs3 <- Contractual Dispute Management	item-1st	0.787	0.779	0.134	5.887	0.000
DRK_lrs2 <- Training, Awareness, and Technology Utilization	item-1st	-0.649	0.084	0.571	1.137	0.255
DRLR_1 <- Dispute Resolution and Litigation Risks (DRLR)	item-1st	0.967	0.964	0.072	13.400	0.000
DRLR_2 <- Dispute Resolution and Litigation Risks (DRLR)	item-1st	0.936	0.916	0.090	10.408	0.000
ESLC_lrs1 <- Environmental, Social, Labor, and Human Rights Compliance	item-1st	0.463	0.547	0.299	1.550	0.121

ESLC_lrs2 <- Environmental, Social, Labor, and Human Rights Compliance	item-1st	0.541	0.603	0.302	1.788	0.074
ESLC_lrs3 <- Environmental, Social, Labor, and Human Rights Compliance	item-1st	0.835	0.700	0.277	3.011	0.003
ESLC_lrs4 <- Environmental, Social, Labor, and Human Rights Compliance	item-1st	0.946	0.748	0.327	2.895	0.004
Fm_lrs1 <- Financial and Insurance Risk Management	item-1st	0.977	0.939	0.137	7.105	0.000
Fm_lrs3 <- Financial and Insurance Risk Management	item-1st	0.988	0.952	0.138	7.155	0.000
Fm_rs2 <- Financial and Insurance Risk Management	item-1st	0.957	0.920	0.140	6.841	0.000
FMELR_1 <- Force Majeure, Environmental, and Labor Risks (FMELR)	item-1st	0.899	0.852	0.188	4.785	0.000
FMELR_2 <- Force Majeure, Environmental, and Labor Risks (FMELR)	item-1st	0.860	0.794	0.185	4.662	0.000
FMELR_3 <- Force Majeure, Environmental, and Labor Risks (FMELR)	item-1st	0.830	0.761	0.201	4.134	0.000
FMELR_4 <- Force Majeure, Environmental, and Labor Risks (FMELR)	item-1st	0.791	0.715	0.226	3.503	0.000
HRLC_lrs1 <- Environmental, Social, Labor, and Human Rights Compliance	item-1st	0.432	0.549	0.314	1.375	0.169
HRLC_lrs2 <- Environmental, Social, Labor, and Human Rights Compliance	item-1st	0.930	0.753	0.312	2.986	0.003

HRLC_lrs3 <- Environmental, Social, Labor, and Human Rights Compliance	item-1st	0.886	0.654	0.366	2.420	0.016
HRLC_lrs4 <- Environmental, Social, Labor, and Human Rights Compliance	item-1st	0.703	0.605	0.307	2.292	0.022
Ib_lrs1 <- Financial and Insurance Risk Management	item-1st	0.994	0.959	0.138	7.202	0.000
Ib_lrs2 <- Financial and Insurance Risk Management	item-1st	0.801	0.761	0.204	3.930	0.000
LRMCI_lrs1 <- Regulatory Compliance Management	item-1st	0.690	0.617	0.246	2.809	0.005
LRMCI_lrs2 <- Regulatory Compliance Management	item-1st	0.576	0.519	0.256	2.253	0.024
LRMCI_lrs3 <- Training, Awareness, and Technology Utilization	item-1st	0.733	0.612	0.460	1.593	0.111
LRMCI_lrs4<-Regulatory Compliance Management	item-1st	0.725	0.626	0.237	3.062	0.002
PP1 <- Project Performance	item-1st	0.617	0.404	0.298	2.069	0.039
PP2 <- Project Performance	item-1st	0.836	0.706	0.213	3.929	0.000
PP3 <- Project Performance	item-1st	0.765	0.726	0.251	3.050	0.002
PP4 <- Project Performance	item-1st	0.427	0.392	0.233	1.835	0.067
PP5 <- Project Performance	item-1st	0.599	0.624	0.288	2.078	0.038
PP6 <- Project Performance	item-1st	0.798	0.713	0.211	3.786	0.000
PP7 <- Project Performance	item-1st	0.864	0.789	0.235	3.681	0.000
PP8 <- Project Performance	item-1st	0.820	0.745	0.227	3.605	0.000
PTRM_lrs2 <-Regulatory Compliance Management	item-1st	0.848	0.737	0.242	3.504	0.000

PTRM_rs1 <- Regulatory Compliance Management	item-1st	0.768	0.669	0.255	3.015	0.003
Ra_lrs1 <- Regulatory Compliance Management	item-1st	0.726	0.634	0.244	2.974	0.003
Ra_lrs2 <- Regulatory Compliance Management	item-1st	0.858	0.746	0.228	3.771	0.000
RCR_1 <- Regulatory, Compliance, Liability, Insurance, and Safety Risks (RCR)	item-1st	0.510	0.483	0.363	1.406	0.160
RCR_2 <- Regulatory, Compliance, Liability, Insurance, and Safety Risks (RCR)	item-1st	0.752	0.670	0.310	2.422	0.015
RCR_3 <- Regulatory, Compliance, Liability, Insurance, and Safety Risks (RCR)	item-1st	0.896	0.735	0.269	3.335	0.001
RCR_4 <- Regulatory, Compliance, Liability, Insurance, and Safety Risks (RCR)	item-1st	0.880	0.706	0.337	2.611	0.009
RCR_5 <- Regulatory, Compliance, Liability, Insurance, and Safety Risks (RCR)	item-1st	0.774	0.684	0.290	2.669	0.008
SCLM_lrs1 <- Stakeholder and Community Management	item-1st	0.933	0.889	0.136	6.868	0.000
SCLM_lrs2 <- Stakeholder and Community Management	item-1st	0.954	0.915	0.132	7.227	0.000
SCLM_lrs3 <- Stakeholder and Community Management	item-1st	0.925	0.881	0.143	6.466	0.000
SCLM_lrs4 <- Stakeholder and Community Management	item-1st	0.968	0.933	0.135	7.145	0.000
Se_lrs1 <- Stakeholder and Community Management	item-1st	0.814	0.779	0.149	5.480	0.000
Se_lrs2 <- Stakeholder and Community Management	item-1st	0.952	0.915	0.137	6.968	0.000

Ta_lrs1 <- Training, Awareness, and Technology Utilization	item-1st	0.679	0.639	0.414	1.641	0.101
Ta_lrs2 <- Training, Awareness, and Technology Utilization	item-1st	0.724	0.650	0.442	1.637	0.102
Tu_lrs1 <- Training, Awareness, and Technology Utilization	item-1st	0.777	0.608	0.479	1.622	0.105
Tu_lrs2 <- Training, Awareness, and Technology Utilization	item-1st	0.737	0.597	0.453	1.628	0.104

4.3.1 Initial of measurement model

In Partial Least Squares Structural Equation Modeling (PLS-SEM), the initial measurement model, known as the outer model, focuses on evaluating the relationships between latent constructs and their corresponding observed indicators (Hair & Alamer, 2022). This phase involves assessing the reliability and validity of the constructs before proceeding to the structural model (Sarstedt et al., 2022). The major components were the indicator reliability, internal consistency reliability evaluated by Cronbach's alpha, and composite reliability, convergent validity calculated by Average Variance Extracted (AVE), and discriminant validity typically examined through the use of the Fornell-Larcker criterion, cross-loadings, and the HTMT ratio (Hossan et al., 2020). Defining each construct as reflective-formative was crucial because it determines the evaluation criteria (Cheah et al., 2019).

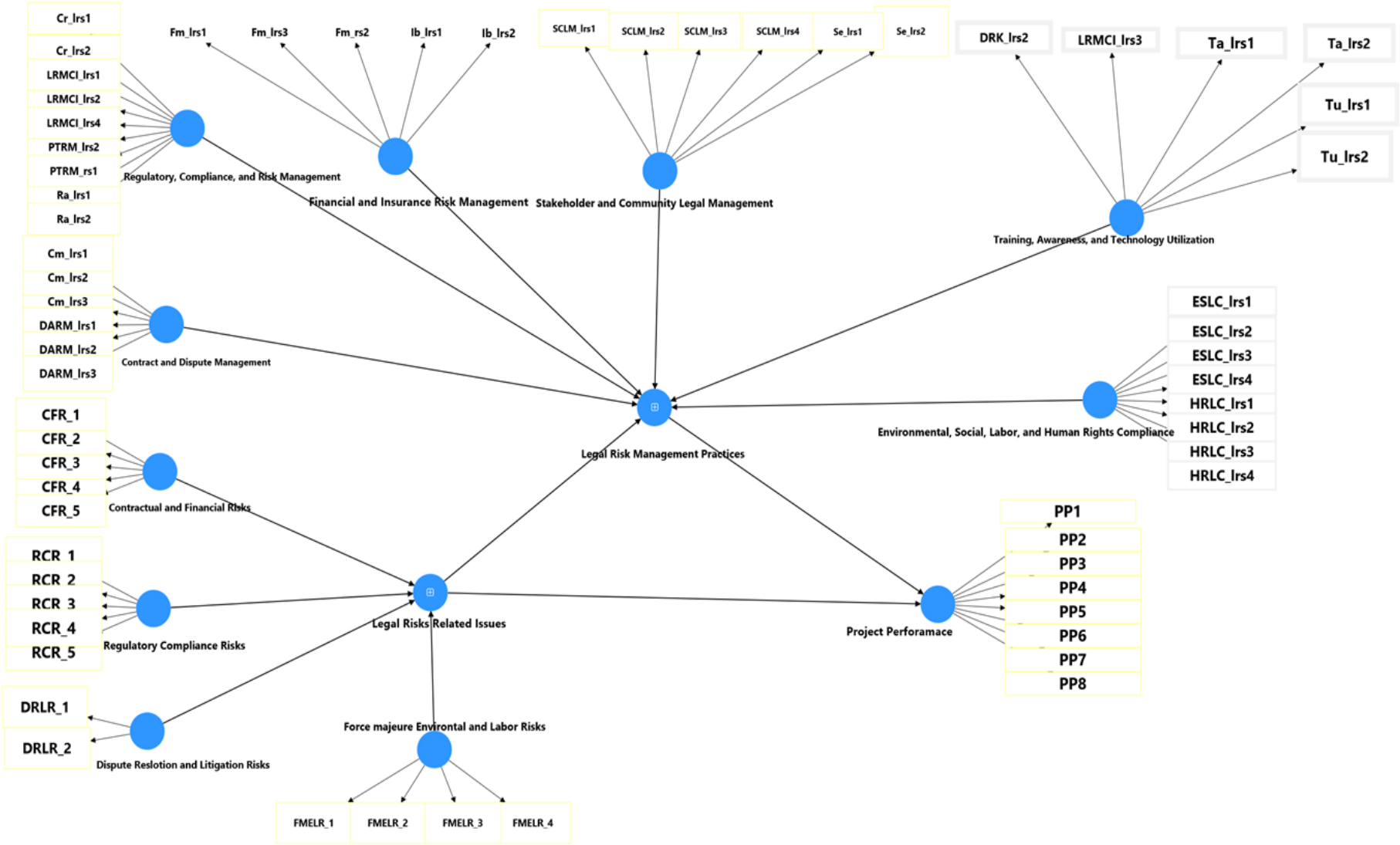

Figure 8: Initial of measurement model.

Table 8: Item Coding and Full Descriptions of the Model in PLS SEM

Item Code	**Full Description**	**Item Code**	**Full Description**
Legal risk-related issues		**Regulatory, Compliance, and Risk Management**	
CFR	**Contractual and Financial Risks**	Cr-lrs1	Understanding and adherence to local regulations
CFR_1	Ambiguities in Contracts	Cr-lrs2	Regular training on legal requirements
CFR_2	Change Order Disputes	PTRM-lrs1	Compliance with Public Procurement Laws
CFR_3	Breach of Contract	PTRM-lrs2	Fraud Prevention Mechanisms
CFR_4	Liquidated Damages for Delays	Ra-lrs1	Conducting regular risk assessments
CFR_5	Late Payments, Payment Disputes	Ra-lrs2	Identifying and prioritizing legal risks
RCR	**Regulatory, Compliance, Liability, Insurance, and Safety Risks**	LRMCI-lrs1	Regular Legal Audits and Compliance Checks
RCR_1	Non-compliance with Building Codes.	LRMCI-lrs2	Adaptive Legal Risk Management Policies
RCR_2	Environmental Regulation Violations, Tax Compliance, Permitting and Licensing.	LRMCI-lrs4	Develop legal Risk Assessment Frameworks
RCR_3	Zoning Laws and Land Use Breaches.	**Stakeholder and Community Legal Management (SCLM)**	
RCR_4	Workplace Injuries, Design Error, Loss of Data, Non-compliant Design.	Se-lrs1	Effective communication with all stakeholders
RCR_5	Defective Workmanship	Se-lrs2	Regular updates and feedback loops
DRLR	**Dispute Resolution and Litigation Risks**	SCLM-lrs3	Public Consultation and Stakeholder Legal Obligations
DRLR_1	Disputes leading to Mediation Failures, Arbitration Issues, and Litigation Risks with the client	SCLM-lrs4	Public-Private Partnership (PPP) Legal Frameworks

DRLR_2	Lawsuits related to construction defects, claims from subcontractors	SCLM-lrs1	Land Rights and Indigenous Community Laws
FMELR	**Force Majeure, Environmental, and Labor Risks**	SCLM-lrs2	Compensation and Resettlement Legal Issues
FMELR_1	Natural Disasters, Pandemics, and Labor Strikes.	**Training awareness (Ta), and Technology Utilization (Tu)**	
FMELR_2	Pollution, Hazardous Waste, Impact Failures	Ta-lrs1	Ongoing training programs for staff
FMELR_3	Wage Disputes, Safety Issues, Union Conflicts, Harassment Claims	Ta-lrs2	Workshops on legal and risk management
FMELR_4	Bid Issues, Fund Mismanagement, Corruption, or Transparency Issues	LRMCI-lrs3	Knowledge Sharing and Training on Legal Risks
Contract and Dispute Management		Tu-lrs1	Implementing legal technology solutions for risk management
Cm-lrs1	Clear drafting and negotiation of contracts	Tu-lrs2	Use of software for contract management and compliance tracking
Cm-lrs2	Regular review and updates of contracts	DRK-lrs2	Digital Contract Management Systems
Cm-lrs3	Effective dispute resolution mechanisms	**Environmental, Social, Labor, and Human Rights Compliance (ESLC), (HRLC)**	
DARM-lrs1	Dispute Resolution Clauses (ADR, Arbitration, Litigation)	ESLC-lrs1	Environmental Impact Assessments (EIA)
DARM-lrs2	Early Dispute Resolution Mechanisms	ESLC-lrs2	Sustainability and Green Building Laws
DARM-lrs3	Legal Advisory Support	ESLC-lrs3	Land Acquisition and Compensation Issues
Financial and Insurance Risk Management (Fm), and (Ib)		ESLC-lrs4	Labor Laws and Workers' Rights Compliance
Ib-lrs1	Adequate insurance coverage for risks	HRLC-lrs1	Worker Safety and Occupational Health Standards
Ib-lrs2	Performance bonds for contractors	HRLC-lrs2	Fair Wages and Employment Law Compliance

Fm-lrs1	Budgeting for legal risks and compliance costs	HRLC-lrs3	Gender and Inclusion Legal Compliance
Fm-lrs2	Monitoring financial health and liabilities	HRLC-lrs4	Legal Protection Against Workplace Harassment and Discrimination
Fm-lrs3	Assessing the impact of legal issues on financial stability	lrs	Legal Risks Strategies
PP	**Project performance**	Ib	Insurance Bonds
Pp1	Project Schedule (time)Performance	Pp5	Stakeholder and Client Satisfaction
Pp2	Cost Performance	Pp6	Legal and Compliance Performance
Pp3	Quality of Work performance	Pp7	Environmental Sustainability
Pp4	Safety Performance	Pp8	Project Risk Management Effectiveness
Se	Stakeholder engagement	DRK	Documentation and Record Keeping
Cm	Contract Management		
Ra	Risk Assessment	Cr	Regulatory compliance
PTRM	Procurement and Tendering Risk Management	SCLM	Stakeholder Community Legal Management
LRMCI	Legal Risk Monitoring and Continuous Improvement	DARM	Dispute Avoidance and Resolution Mechanism

The study examined legal risk-related issues through four formative constructs: contractual and financial risks, regulatory compliance risks, dispute resolution and litigation risks, and force majeure environmental labor risks, each measured reflectively Hair & Alamer, (2022). Legal risk management strategies were modeled as a formative second higher-order construct with six latent constructs: contractual dispute management, regulatory compliance management, financial and insurance risk management, stakeholder management, training awareness and technology utilization, and environmental, social, labor, and human rights compliance, each assessed via reflective indicators Diamantopoulos & Winklhofer, (2001). Each of these first-

order constructs was measured using reflective indicators, the following reflective-formative modeling principles established by Becker et al. (2012).

4.3.2 Legal Risks Management Practices Influence of the Project Performance

This research was to contribute to the adoption and implementation of legal risk management strategies that mitigate the critical impact of legal risk-related issues affecting project performance in public building construction projects. This study indicated that assessing the impact of legal risk issues on the financial stability indicator from the financial and insurance risk Management strategies construct was the primary factor affecting project performance, with an impact value of path coefficients(β) = 0.988. The result indicated that very strong significance: Fm_lrs1 (β = 0.977), Fm_lrs3 (β = 0.988), Ib_lrs1 (β = 0.994), all p = 0.000. This finding aligns with previous studies highlighting the pivotal role of financial and legal risk integration in ensuring successful project delivery (Shibani et al., 2022). Specifically, factors such as delayed payments, inadequate insurance coverage, and financial mismanagement led to cost overruns and delays (Kapenulo, 2024). These risks were more significant in Ethiopia, where risk transfer procedures and construction finance systems were still developing. These financial and insurance risk management, with the legal risk's interconnections, should therefore need special attention to protect project outcomes in public building construction. Therefore, specific and proactive measures must be taken to manage these risks effectively, as their impact spans all key performance indicators: time, cost, quality, safety, stakeholder satisfaction, and environmental sustainability, which ultimately determine the overall success of public construction projects. The significance was high, as unmanaged financial and insurance risks can critically disrupt timelines, inflate costs, compromise quality, endanger safety, reduce stakeholder satisfaction, and cause environmental harm, ultimately threatening the success and sustainability of public building projects.

Public-Private Partnership (PPP) legal frameworks indicators of stakeholder and community legal management construct were found to have the second highest impact on project performance from legal risk management strategies factors at β = 0.968. The results indicated all values were highly significant, from the lowest to the highest path coefficient (β = 0.814–0.968). Recent studies underscore the significant impact of Public-Private Partnership (PPP) legal frameworks on project performance, particularly within the stakeholder and community

legal management construct. A study highlights that effective policy implementation, encompassing stakeholder involvement, positively influences the sustainability of PPP projects. Results show that robust governance and stakeholder management are critical to the success of PPP-based sustainable projects. Stakeholder and community legal management, encompassing effective communication with all stakeholders, regular feedback, public consultation, PPP legal frameworks, land rights, and resettlement laws, has a highly significant impact on the success of public building construction projects. These factors influence key performance indicators such as quality, time, cost, safety, stakeholder satisfaction, and legal risk management effectiveness, making them critical to project outcomes. Therefore, strengthening stakeholder and community legal management within PPPs is essential to enhance project performance and ensure the successful delivery of public infrastructure projects in Ethiopia. Regular review and updates of contracts indicator in the contractual dispute management construct were the third most influential factor on the project performance, with a path coefficient of $\beta = 0.923$, indicating a strong positive relationship with project performance. The results indicated that all paths were significant with strong values ($\beta = 0.642–0.923$). These findings are consistent with recent research by Barnado & Karim (2022), which emphasized the role of effective contract administration and dispute resolution mechanisms in enhancing performance outcomes in public infrastructure projects. Similarly, Zailani et al. (2016) highlighted that legal compliance and early dispute prevention strategies significantly reduce delays and cost overruns in government-funded construction projects. Additionally, Saad Alotaibi et al.(2024) demonstrated that proactive legal risk planning, particularly involving contractual clarity and dispute resolution frameworks, has a direct and substantial impact on the timely delivery and quality performance of public construction projects. The contractual dispute management factor indicators such as clear drafting and negotiation of contracts, regular review and updates of contracts, effective dispute resolution mechanisms, dispute resolution clauses (ADR, arbitration, litigation), early dispute resolution mechanisms, and legal advisory support were mitigated the highest influence of legal risks on project performance cost, time, quality, safety, client and stakeholder satisfaction, legal and compliance performance, and environmental sustainability out of all the other factors. Contractual dispute management was identified as the most influential legal risk mitigation strategy affecting project performance in Ethiopia's public building construction sector. Key practices, including clear contract drafting, periodic reviews, and structured dispute

resolution mechanisms (e.g., ADR, arbitration), effectively reduced legal uncertainties. Due to the sector's challenges with contractual ambiguities and weak legal enforcement, early dispute resolution and legal advisory support significantly improved outcomes related to cost, time, quality, safety, compliance, and stakeholder satisfaction. These findings align with ongoing reforms aimed at strengthening legal governance and sustainability within Ethiopia's construction industry. Because of this, special attention must be given to managing contractual disputes. This was important since legal risks-related issues could impose a great influence on project performance, especially in cost, time, quality, stakeholder satisfaction, environmental sustainability, and legal compliance were significantly high.

Regular training on legal requirements, indicators factors was found to have the highest impact from regulatory, compliance, and risk management constructs, with $\beta = 0.876$, and their overall impact has been rated fourth. In the Regulatory Compliance Management construct, Cr_lrs2 ($\beta = 0.876$, $p = 0.000$) and LRMCI_lrs1 ($\beta = 0.690$, $p = 0.005$) were found to have strong and statistically significant impacts on project performance, indicating their critical importance. In contrast, LRMCI_lrs2 ($\beta = 0.576$, $p = 0.024$) showed a moderate but statistically significant impact on project performance, indicating that while its influence was not as strong as others, it still plays a meaningful role in enhancing regulatory compliance and overall project success. Regular training on legal requirements has been identified as a critical factor in enhancing regulatory compliance and overall project performance in Ethiopia's public buildings construction sector. A recent study by Bekele & Mahesh (2024) highlighted that Contractor Development Programs (CDPs), which include legal and regulatory training components, significantly influence the competency of small and medium contractors. Moreover, according to the (Afework et al., 2024) emphasized that lack of training and awareness were the key health and safety barriers in Ethiopian construction sites and that it is essential to enhance training programs to increase compliance and safety levels. The results of this study emphasize the need for the establishment of comprehensive and systematically designed training programs on legal requirements to enhance regulatory compliance and project performance in the Ethiopian public construction sector. As indicated by the results of the study, the absence of regular training on legal requirements factors was a major issue that larger public building construction projects face every day. Studies have identified that a lack of awareness and enforcement of health and

safety regulations leads to high accident rates and non-compliance on construction sites (Tadesse, 2020). Furthermore, inadequate legal training among project stakeholders results in poor contract management and delays in addressing legal issues, exacerbating time and cost overruns. Therefore, implementing regular legal training was crucial to enhance compliance, reduce legal risks, and improve overall project performance in the public buildings construction sector in Addis Ababa, Ethiopia.

On the other hand, the impact of labor laws and workers' rights compliance, ESLC_lrs4, from the environmental, social, labor, and human rights compliance at $\beta = 0.946$, fair wages and employment law compliance, HRLC_lrs2 at $\beta = 0.930$, and gender and inclusion legal compliance, HRLC_lrs3, at $\beta = 0.886$ have also been reported to have a significant impact by the study, and several researches support the finding. Adherence to labor legislation and safeguarding the rights of workers considerably affect project results within the Ethiopian public construction industry. Labor law and workers' rights compliance ($\beta = 0.946$), fair wages and employment law compliance ($\beta = 0.930$), and gender and inclusion legal compliance ($\beta = 0.886$) have shown strong positive effects. Similarly, these findings are supported by international studies. According to the study of Syed (2023) found that strong enforcement of labor laws improved compliance and worker conditions in Bangladesh's construction sector. The study of (Jordan, 2021) better work program in Cambodia showed that fair wage practices led to higher compliance and project efficiency. Additionally, the findings of Elouardighi & Oubejja (2023) reported that inclusive labor laws enhance women's economic participation, which was key to better development outcomes. These findings highlight the importance of legal compliance for ethical and effective project delivery in Ethiopia. But the results of the study state a lower impact of legal risk factors, and this might be because of the type of construction projects selected for the study. Finally, training, awareness, and technology utilization were found to have the least impact; the contribution was found to be significant, but compared to others, it would be the least, with $\beta = 0.679$. Thus, it can mean that the impact of training, awareness, and technology utilization on legal risk-related issues, such as ongoing training programs for staff and workshops on legal risk management practices, was negligible compared to other legal risk management strategies. This was also confirmed by recent findings, in which training, awareness, and technology utilization strategies factors were ranked among the least significant

factors. A study by (Mengistu et al., 2023) identified the major obstacles to technology and innovation development in the Ethiopian construction industry as the nature of the industry, unawareness, low capacity of firms and regulatory mechanisms, inadequate tender duration, and lack of effective monitoring and controlling systems. The study shows that coordination, awareness creation, and stimulating technology and innovation in procurement systems are the major areas for improvement. Furthermore, a study by Purushothaman et al. (2025) on health and safety issues in New Zealand building construction projects discovered that one of the major barriers to health and safety was a lack of awareness and training, which also had an impact on project outcomes. These studies offer important new perspectives on the issues facing Ethiopia's public building construction industry today, especially concerning awareness, training, and technology use. They underscore the need for enhanced efforts in these areas to improve legal risk management and overall project outcomes. The overall results of the study indicate that all of the indicators of legal risk management strategies (financial and insurance risk Management, stakeholder and community legal management, contractual dispute management, regulatory, compliance, and risk management, environmental, social, labor, and human rights compliance and training, awareness, and technology utilization) have a significant impact on project performance cost, time, quality, stakeholder satisfaction, safety, environmental sustainability, Legal and Compliance Performance, and project legal risk management effectiveness. This was justified with an impact value of $\beta > 0.1$ for all. On the other hand, training, awareness, and technology utilization factors, which hold use of software for contract management and compliance tracking, were found to have an insignificant impact on the performance of a project. This may be attributed to the limited adoption and utilization of such technologies within the Ethiopian public building construction sector in Addis Ababa. Due to infrastructural constraints, low levels of digital literacy, and limited access to modern project management tools, the potential benefits of technology remain largely untapped. Consequently, these risk factors are not currently perceived as significant concerns in influencing the performance of public construction projects in Addis Ababa, Ethiopia. The findings can be seen in Figure 8 below.

Figure 9:The influences of legal risk management practices on project performance

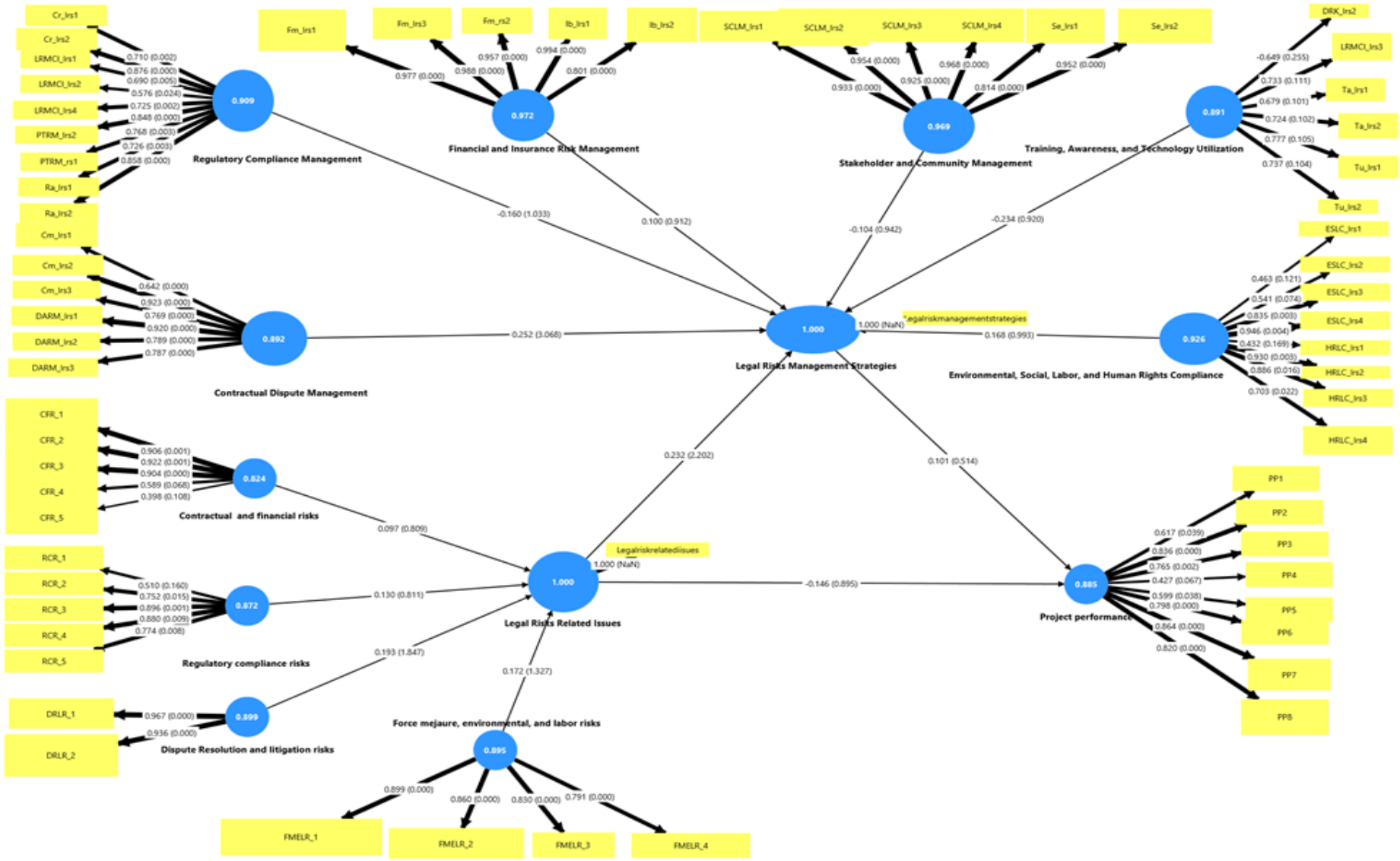

Figure 10:Measurement model

4.4 Significance and Relevance of Path Relationships

By dividing the path coefficient β by the standard error, the T-test reveals if certain parameter estimations are statistically distinct from zero. T-test results show whether or not the null hypothesis was rejected. The t-statistic value was deemed significant if it was higher than 1.96 at a 95% confidence interval (Winship & Zhuo, 2020). Further, the analysis also resulted in the path coefficient β, which represents the impact of independent variables on dependent variables. The results of the study indicate a significant value of the T-statistic and p-value. It also shows the impact value beta for the three hypotheses H1, H2, and H3, which are all supported for this study. The results are presented in Table 9 below.

Table 9:Significance of the structural model relationship

Hypothesis	Path	Path β	Error	T-statistics	P-values
H1	Legal Risk-Related Issues> Legal Risk Management Practices	0.232	0.080	2.90	0.000
H2	Legal Risk Management practices > Project performance	0.101	0.018	5.611	0.000
H3	Legal Risk-Related issues > Project performance	-0.146	0.046	3.174	0.005

Based on the structural model analysis of the above tables, the variables show strong interrelationships. Issues of legal risk have a positive effect on risk management practices ($\beta = 0.232$, $p < 0.001$), meaning that greater legal risks are encountered with more stringent management practices by organizations. These management practices have a positive effect on project performance ($\beta = 0.101$, $p < 0.001$), which suggests that effective management leads to greater outcomes. It has been shown that the presence of legal risks directly and negatively impacts project performance (-0.146, $p = 0.005$).

4.4.1 Coefficient of Determination (R^2)

The coefficient of determination (R^2) indicates how much change in the dependent variable can be accounted for by one or more independent variables (Sarstedt et al., 2014). According to Suleiman & Abdulkadir (2022), an R^2 value of 0.26 is considered high, 0.13 is moderate, and

0.02 is stated to be weak. For the dependent (endogenous) variables' legal risk-related issues, legal risk management practices, and project performance, the R2 value was found to be 0.191, 0.274, and 0.351, respectively. This indicates that 19.1% of the change in legal risk-related issues is explained by 27.4% of legal risk management strategies. The R2 value of the dependent variable, project performance, states that 35.1% change in project performance cost, time, quality, satisfaction, legal risk management effectiveness, and safety was explained by legal risk-related issues and risk management practices.

Table 10:Coefficient of Determination

	R^2	T statistics	P values
Legal risk management practices	0.274	8.130	0.000
Legal risk-related issues	0.191	4.297	0.000
project performance	0.351	9.883	0.000

4.4.2 Predictive Relevance Q2

The value of predictive relevance Q^2 0.02 is deemed to be a weak, 0.15 moderate, and 0.35 strong degree of predictive relevance (Akter et al., 2011). The results of the study for Q2 were substantial in that the Q2 value for the endogenous variable legal risks related issues was 0.364, and that of project performance is 0.432, which are both greater than the maximum value; hence, the model has high predictive relevance. These results were displayed in Table 12 below.

Table 11:Explanatory power and prediction relevance

	Q^2predict	RMSE	MAE
Legal risk management practices	0.438	0.876	0.731
Legal risk-related issues	0.364	0.923	0.708
project performance	0.432	0.878	0.723

4.4.3 Mediation Analysis

Mediation analysis shows a change in the exogenous (independent) construct causing a change in the mediator variable, which then affects the endogenous (dependent) construct. The first step is to establish whether the mediator is or is not mediating the indirect relationship between the

two variables. This is justified by the significance of the indirect relationship. The second step would be to determine whether the mediator construct can completely (full mediation) or partially (partial mediation) explain the relationship between the two constructs, and this was justified by VAF calculations. Mediation analysis has been performed to test the mediating effect of construction legal risk management strategies between legal risk-related issues and project performance, and hypothesis H4 states exactly that. In which the indirect effect (legal risks-related issues > risk management strategies > Project performance) was found to be (β = 0.155, T= 2.207, P < 0.007), the total effect values were also positive and significant at (β = 0.342, T =3.810, P = 0.000) and the direct effect (β = 0.187, T = 3.232, P = 0.001) which was also positive and significant. Since all the values are positive, this shows a complementary mediation. Table 12 below shows the findings.

Table 12:Mediation effect

Indirect effect	**Path β**	**Error**	**T Statistics**	**P Values**
Legal risk-related issues > Legal risk management strategies > Project performance	0.155	0.025	2.207	0.007
Direct effect relationship				
Legal risk-related issues > Project performance	0.187	0.089	3.232	0.001
Total effect				
Legal risk-related issues > Project performance	0.342	0.09	3.810	0.000

To determine whether the mediation is partial or full, VAF calculation, which is the ratio of the indirect effect to the total effect, has been performed. The Variance Accounted for (VAF) measures the extent to which a mediator explains the relationship between an independent and dependent variable in mediation analysis. According to a study (Balu & Rathnasabapathy, 2025), the (Indirect Effect / Total Effect) × 100, and if the VAF < 20% indicates no mediation,

20%-80% indicates partial mediation, and >80% indicates full mediation. The VAF was utilized to determine the size of mediation effects in structural models. According to the study of Nitzl et al. (2016) stated that if a VAF value between 20% and 80% indicates partial mediation. Table 13 shows below the VAF calculation results, which show a VAF value of 45%, supporting legal risks management strategies and complementary partial mediation between legal risks-related issues and project performance.

Table 13:VAF calculations

Hypothesis	Direct Effect	Indirect effect	Total effect	VAF
Legal risk-related issues > Legal risk management strategies > Project performance	0.187	0.155	0.342	0.45

4.5.2 The critical legal risks-related issues that affect the construction project performance.

Legal risk-related issues have a significant effect on the construction projects in various public building construction industries with different sectors in Addis Ababa, Ethiopia. In the public buildings' construction projects, legally related risks include issues such as contractual and financial risks, regulatory compliance, liability, insurance, safety risks, dispute resolution and litigation risks, and force majeure, environmental, and labor risks were critical risks. The finding indicates that "risk of lawsuit and dispute settlement" is the most influential factor among all the constructs affecting construction project performance, with a standardized path coefficient (β) of 0.967. Change orders have the potential to generate disagreements about the scope of work and related expenses (Keane et al., 2010). Excessive change orders have been linked to project cost overruns, according to the literature(Wang et al., 2023). These findings also revealed that conflict resolution and lawsuit risks significantly affect project performance.

The second impact of legal risk-related issues was contractual and financial risks, with values of path coefficient (β)= 0.922, a very significant influence on the public building construction projects in Addis Ababa, Ethiopia. Previous research has shown that contractual risk hurts

project performance (Hongdong Zhang, 2022). Failure to adhere to contractual terms can lead to litigation and financial fines (Adetoyese Latilo, Ngozi Samuel Uzougbo, et al., 2024). The contract breach impacts project success greatly (Osifo et al., 2025). A study by Yadeta (2019) identified poor contract administration and incomplete contract documents as critical risks adversely affecting construction project performance. According to the findings by Melaku Belay et al. (2021), poor supervision and contract management are among the top factors leading to cost overruns of the public buildings project in Addis Ababa, Ethiopia. The third major legal risk factor affecting public projects in Addis Ababa, with a path coefficient (β) of 0.899, involves force majeure, environmental, and labor risks. Studies have shown that force majeure events like natural disasters and pandemics can lead to serious project delays or terminations (Jayathilaka & Waidyasekara, 2023). Environmental risks, including unforeseen site conditions and poor design, were identified as critical issues in Ethiopian projects (Gadisa & Zhou, 2020). Additionally, labor-related risks such as safety hazards and inadequate protective measures remain moderate but impactful issues (Mathews, 2024). These risks significantly affect project timelines, costs, quality, safety, environmental sustainability, legal risks compliance, and overall performance, which requires proactive risk mitigation strategies. The fourth and final value of legal risk-related issues was regulatory, compliance, liability, insurance, and safety risks (RCLIS-risks) at $\beta = 0.896$ impact on the project success. Many studies have shown that regulatory risks have an impact on the project's efficiency, supporting that it is the most significant duty that should be completed in public building projects (Jagannathan & Delhi, 2019). Disobedience of the rules can lead to penalties, termination, and loss of reputation. Non-compliance with environmental regulations is highly related to economic losses (Ibrahim Adedeji Adeniran et al., 2024). Safety risks have a direct influence on project performance (Forteza et al., 2022). This classification provides an overview of legal risk-related issues that affect public buildings construction project performance, necessitating active legal risk management practices. The path coefficients (β values) reflect varying degrees of the impact that various legal risks exert on project success, validating the applicability of effective risk mitigation measures. In general, these studies contribute to the significance of legal risk-related issues' impacts on project performance. The impact of legal risk-related issues on the project performance is shown in Figure 10 below.

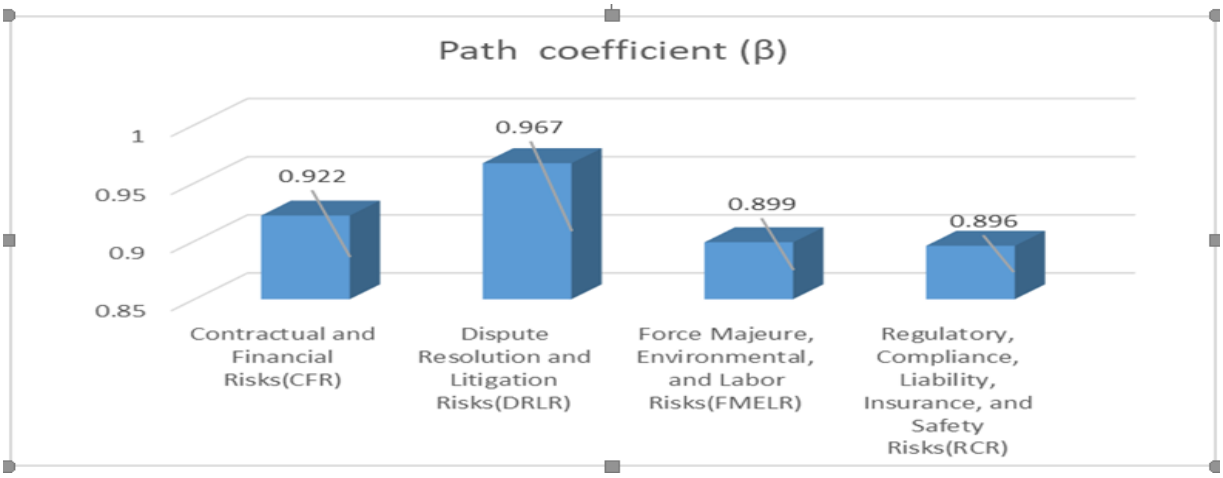

Figure 11:The impact of legal risk-related issues on the project performance

4.5.3 The Relationship between Legal Risk Management Practices and Project Performance

The study's third goal is to examine the relationship between legal risk-related issues and project performance, using legal risk management practices as a mediator. The study's first hypothesis, H1, assesses whether legal risk-related issues and project performance were significantly correlated. According to the findings, the null hypothesis at T = 0 was rejected because the hypothesis was supported at T = 2.619, P = 0.009. However, the path coefficient β = 0.265 shows that there was a considerable impact of legal risk-related issues on project performance.

The first hypothesis (H1) examines whether there is any significant relationship between legal risk-related issues and project performance. The result indicates that this hypothesis is accepted with a T-value of 2.619 and a P-value of 0.009, which is statistically significant at the 0.05 level. The path coefficient (β = -0.265) presents a negative relationship between legal risk-related problems and project performance. However, if T = 0, then it would imply that the path coefficient (β) is also 0, and there is no measurable effect of legal risk issues on project performance. This scenario would confirm the null hypothesis (H_0), which assumes no notable correlation, and as the T-value (2.619) was greater than 1.96 (95% confidence level) and P = 0.009 was less than 0.05, the null hypothesis is rejected. The findings thus confirm that project performance is significantly influenced by legal risk-related issues. The research concluded that legal risks negatively impact project performance, emphasizing the importance of addressing

legally related issues to ensure project success. The results of this investigation were in line with the existing literature, in which all the values indicate that there lies a significant relationship between legal risks-related issues and project performance through the practice of contractual and financial risks, regulatory, compliance, liability, insurance, and safety risks, dispute resolution and litigation risks, and force majeure, environmental, and labor Risks impacting on the success of public buildings construction project through cost, time, quality, safety, stakeholder and client satisfaction, legal and compliance, and mitigate by mediation of legal risk management strategies.

The second hypothesis of the study, H2, evaluates whether there is a significant relationship between legal risk-related issues and risk management strategies. This hypothesis was supported at (T = 2.428, P = 0.015). On the other hand, the path coefficient, which was in the value in model, indicates an impact at $\beta = 0.120$. The results have been supported by previous studies, emphasizing the importance of effective legal risk management strategies to mitigate legal risks in construction projects (Lannyati et al., 2024). The proactive Legal risk assessment and management are crucial in addressing legal challenges, thereby enhancing project performance. The study (Aung et al., 2023) suggests that effective risk management practices, such as risk identification, risk assessment, risk mitigation, and risk monitoring, can reduce potential losses and enhance project performance. The H3 evaluates whether there is a significant relationship between legal risk management strategies and project performance. The hypothesis was supported with (T = 5.166, P = 0.000). On the other hand, the path coefficient $\beta = 0.462$ indicates the positive impact of legal risk management practices on the project performance.

The third hypothesis (H3) examines whether there was a significant interrelationship between legal risk management strategies and project performance. The results confirm that the hypothesis was supported with a T-value of 5.166 and a P-value of 0.000, indicating strong statistical significance at the 0.01 level. The path coefficient ($\beta = 0.462$) denotes a substantial positive impact, revealing that the use of legal risk management practices contributes significantly to enhancing project performance by reducing legal risk-related issues. This was a strong relationship in this model and reveals the critical function of proactive legal risk management strategies in mitigating legal risk-related issues and increasing overall project performance. Several studies have confirmed this relationship. Recent studies confirm that

effective legal risk management strategies enhance project performance. Nahid & Dasgupta's (2024) study demonstrates how proactive legal risk management techniques enable compliance and project delivery in terms of timeliness, quality, cost, and safety. Finally, the result of the mediation analysis shows the mediating effect of legal risk management strategies between legal risk-related issues and project performance.

The fourth hypothesis (H_4) tests the mediating effect of legal risk management strategies on the association between legal risk-related issues and project performance. The findings affirm this hypothesis, as shown by an indirect effect T-value of 2.185 and a P-value of 0.029, demonstrating statistical significance at the 0.05 level. Further, the path coefficient for the indirect effect ($\beta = 0.055$) also demonstrates a statistically significant effect. The results indicate that legal risk management strategies assist in alleviating the adverse impacts of legal risk-related problems, thereby improving project performance indirectly. Therefore, legal risk management is a significant intermediary that enhances outcomes through improved solving of legal problems. The second evaluation was the total effect, which is the effect of legal risk-related issues on project performance through risk management strategies, which was also significant with ($T = 3.209$, $P = 0.001$) and the path coefficient $\beta = 0.320$. The total effect analysis confirms that legal risk-related issues impact project performance through legal risk management strategies, showing strong significance ($T = 3.209$, $P = 0.001$, $\beta = 0.320$). This indicates that effective risk management practices reduce the negative impact of legal risks, ultimately enhancing project performance. Lastly, the direct effect of legal risk-related issues on project performance. Which showed ($T = 2.619$, $P = 0.009$) and a beta value of 0.265, which was a statistically significant and, indicating that legal risk-related issues directly impact project performance. However, the mediation analysis suggests that legal risk management strategies play a crucial role in mitigating this effect, further enhancing project outcomes**.** So, these results indicate that both the direct and indirect effects of legal risk-related issues and construction legal risk management practices on project performance were significant. This underscores the importance of proactive legal risk management in minimizing legal risk-related issues and improving project outcomes. Generally, these values indicated that there exists a significant mediation effect of legal risk management strategies between legal risks-related issues and project performance in which both the direct effect from legal risk management strategies to

project performance and the indirect effect between legal related issues and project performance through risk management strategies was significant and the impact is in both directions. This indicates that there was a definite mediation effect of legal risk management strategies, which can be expressed as the impact of legal-related issues on the project through cost, time, quality, stakeholder satisfaction, safety, regulatory compliance, and legal risk management effectiveness to be managed. The results can be seen in Figure 12 below.

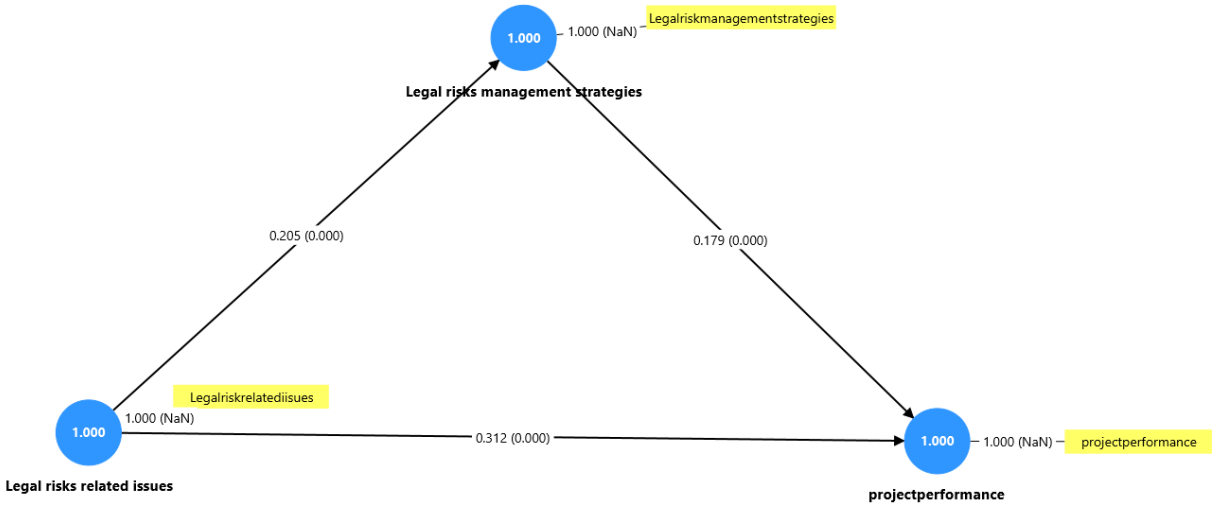

Figure 12:Structural model

The findings of this study indicated that there exists a significant relationship between legal risk-related issues and project performance. The mediating effect of legal risk management strategies was also supported by the results of the study. Generally, as can be seen from the model, the impact of legal risk-related issues on construction project performance was significant as compared to the other interrelationships. If legal risk-related issues are not properly managed, they can lead to severe consequences for project performance. Unaddressed legal risks- related issues could result in contract disputes, delays, cost overruns, and even project cancellations. Ineffective legal risk management can raise the possibility of legal-related issues, non-compliance with regulations, and reputational harm, all of which have a detrimental impact on stakeholder trust and project outcomes. Unmanaged legal risk-related problems can also result in resource misallocation, project execution inefficiencies, and possible financial losses. Thus, to guarantee seamless completion of the project, reduce uncertainty, and improve overall project success, proactive legal risk management was crucial. Contract disputes, regulatory fines, delays, financial losses, and organizational harm result from improper legal risk management.

Overall, these results indicate that both the direct and indirect effects of legal risk-related issues and risk management strategies on project performance were significant. This underscores the importance of proactive legal risk management in minimizing legal uncertainties and improving project outcomes. The final output model of the study, which includes both the measurement model and structural model, can be seen in Figure 13 below.

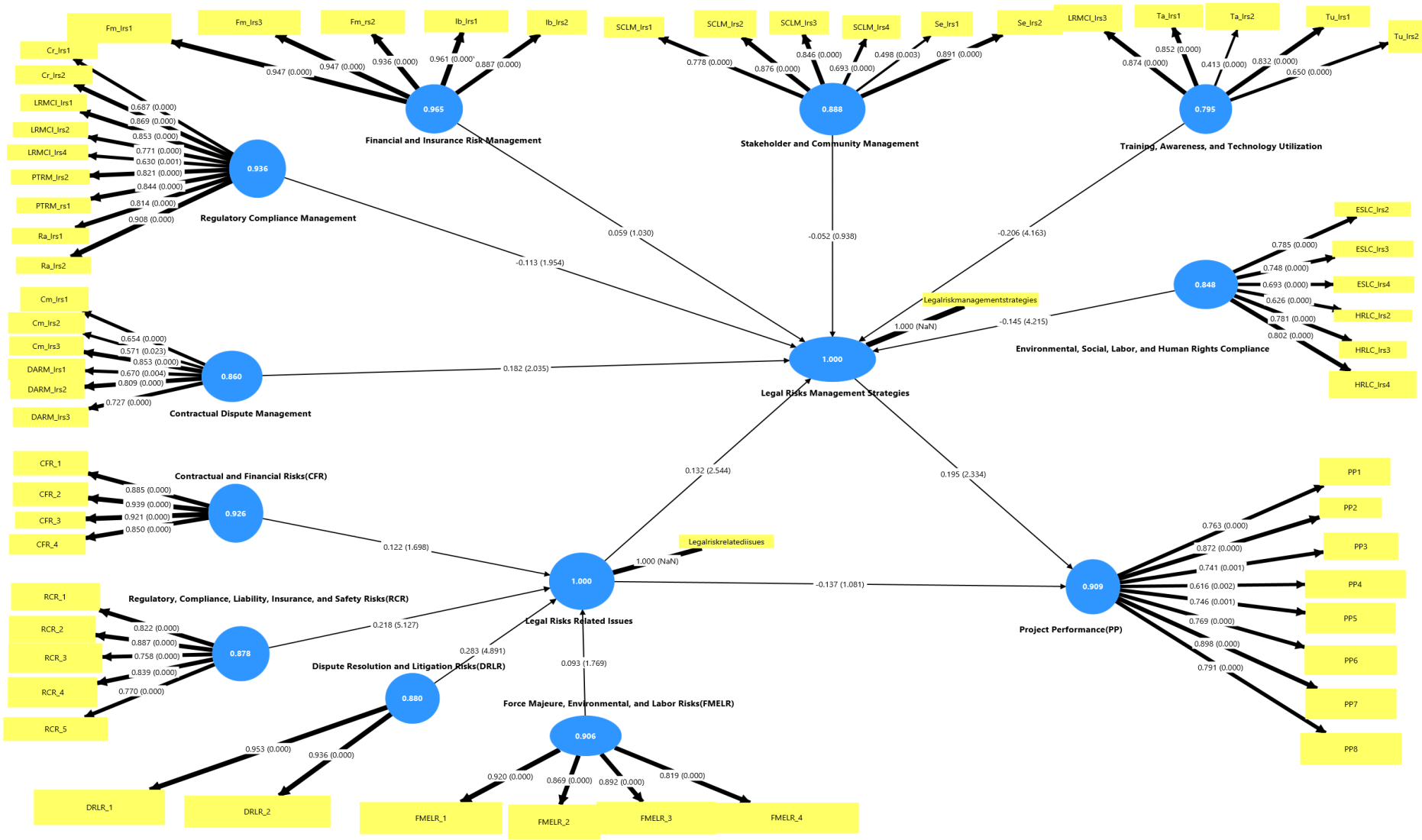

Figure 13: PLS-SEM structural and measurement model

Based on the Partial Least Squares Structural Equation Modeling (PLS-SEM) results depicted in the figure above, the study explores the complex interrelationships among legal risk-related issues, legal risk management practices, and project performance in public construction projects. The model incorporates first and second-order constructs, with robust measurement indicators and structural paths. The R^2 values indicate a strong explanatory power, particularly for Project Performance (PP) ($R^2 = 0.909$), Legal Risk Management practices (LRMS) ($R^2 = 1.000$), and Legal Risks Related Issues (LRRI) ($R^2 = 1.000$), suggesting that the proposed constructs and indicators explain a substantial proportion of the variance in these dependent variables. The latent construct Legal Risks Related Issues (LRRI) was significantly influenced by Dispute Resolution and Litigation Risks (DRLR) with a path coefficient of 0.283 and a T-value of 4.891, indicating a strong and statistically significant relationship (Hair et al., 2019). However, the relationships between Legal Risks Related Issues and both Contractual and Financial Risks (CFR) ($\beta = 0.122$, $T = 1.698$) and Force Majeure, Environmental, and Labor Risks (FMELR) ($\beta = 0.093$, $T = 1.769$) were not statistically significant at the 5% level. This suggests that litigation and dispute resolution risks play a more dominant role in shaping perceived legal risk-related issues than other legal risks. The construct Legal Risk Management Strategies (LRMS) is significantly and positively influenced by Contractual Dispute Management (CDM) ($\beta = 0.182$, $t = 2.035$), suggesting that effective handling of contract-related disputes enhances legal risk management practices (Kerzner et al., 2019). Conversely, Training, Awareness, and Technology Utilization (TATU) ($\beta = -0.206$, $t = 4.163$) and Environmental, Social, Labor, and Human Rights Compliance (ESLHR) ($\beta = -0.145$, $T= 4.215$) show statistically significant but negative relationships with LRMS. These negative associations could imply that, while training and compliance efforts are vital, they may not be effectively aligned with or integrated into the overall legal risk management frameworks in practice, possibly due to poor implementation, resistance to change, or lack of institutional support (PMI, 2021). Other predictors, such as Regulatory Compliance Management (RCM) ($\beta = 0.059$, $T = 1.030$), Financial and Insurance Risk Management (FIRM) ($\beta = -0.113$, $T = 1.954$), and Stakeholder and Community Management (SCM) ($\beta = -0.052$, $T = 0.938$), did not show statistically significant effects. Furthermore, Legal Risk Management practices significantly impact Project Performance (PP) ($\beta = 0.195$, $T = 3.334$), as the critical role that comprehensive legal risk management plays in enhancing the outcomes of construction projects (Zou et al., 2007). This result is consistent with

existing literature emphasizing the value of proactive risk mitigation and legal foresight in improving cost, time, and quality performance in construction projects (Sarstedt et al., 2020). The outer loadings of the indicators on their respective constructs are mostly above the threshold of 0.7, ensuring good indicator reliability and convergent validity (Edeh et al., 2023). Notably, the project performance construct shows particularly strong measurement properties, with all indicators (PP1–PP8) loading above 0.7, several even above 0.8 or 0.9. In conclusion, this PLS-SEM analysis underlines that while multiple components influence legal risk practices, only select factors, namely, contractual dispute management, positively and significantly contribute. Additionally, legal risk management practices are confirmed as a strong determinant of project success, reinforcing the necessity for targeted legal frameworks and practices in public construction projects. These findings offer valuable insights for policymakers and construction managers aiming to enhance project performance through improved legal risk governance.

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSION

This study examined the interplay among legal risk-related issues in public buildings construction project performance in Addis Ababa, Ethiopia, and the mediating effect of legal risk management measures. The PLS SEM was conceptualized and validated based on 61 indicators and 13 constructs, and several hypotheses were supported by data gathered. The findings validated a significant negative relationship between legal risks and project performance, and problems related to disputes, particularly those resulting from change orders, contractual conflicts, and litigation, were identified as having the most significant impact. Contractual and financial risks followed next, where poor contract administration and unclear financial commitments negatively impacted project outcomes. For legal risk management practices, this study identified that aspects of contractual risk management, financial and insurance risk management, stakeholder and community involvement, legal compliance training, and the application of technology play a significant role in contributing to project success. Among these aspects, financial/insurance and stakeholder/community legal management were identified to contribute the most, indicating how great a contributory factor they are to project success. The research also validated the mediating role of legal risk management strategies in reducing the adverse effects of legal risks on project performance. Inadequately managed legal risks were associated with project delay, cost escalation, quality problems, safety, stakeholder satisfaction, environmental sustainability, and legal risk management effectiveness. The study established the requirement for proactive risk identification, in-depth analysis, strategic planning for mitigation, and ongoing monitoring. The model developed in this study by PLS SEM contributes valuable insight into the impact of legal risks on project performance and serves as a helpful tool for identifying and prioritizing major legal risks in construction planning and implementation in Ethiopia.

5.2. RECOMMENDATION

Based on the research findings, the following recommendations are made to improve project performance and the overall process of legal risk management practices in Addis Ababa, Public building construction projects in Ethiopia.

- Strengthen Legal Risk Identification: Throughout the project lifetime, evaluate possible legal risks-related issues regularly, paying particular attention to disagreements, the clarity of contracts, and compliance concerns.
- Priorities Legal Risk Management Practices: Since they have the most influence on project success, pay close attention to stakeholder and legal community participation, as well as financial and insurance risk management.
- Provide Training and Capacity Building: To mitigate project risk, educate project stakeholders on legal matters, risk management techniques, and compliance needs.
- Encourage Continuous Monitoring: To guarantee prompt interventions and modifications, do frequent legal risk assessments during the project.
- Strengthen Institutional Frameworks: To enhance legal risk governance in public building projects, promote institutional support, and policy reform.
- As can be seen from the findings, the main problems regarding the legal risk management practices were due to a lack of sufficient knowledge. Companies should facilitate ongoing development, education, and exchange practices for managing legal risk-related issues for their employees, and it should also be among the main focuses of the education curriculum.
- The study also shows that the problems caused by to lack of legal risk management strategies were detrimental to construction projects. Project managers should have a strategy at hand to evaluate, track, and respond to these legal risks for which they are accountable.
- Implementing regular legal training was crucial to enhance compliance, reduce legal risks, and improve overall project performance.

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APPENDIX

To: …….,

Subject: Request for Participation in Research Study

Dear Sir/Madam,

My name is Lami Fufa student at Adama Science and Technology University (ASTU), College of Civil Engineering and Architecture, Department of Civil Engineering, with a specialization in Construction Engineering and Management. I am writing to kindly request your participation in a research study titled "Examining the Interplay Between Legal-Related Issues(risks), Risk Management Strategies, and Construction Project Performance in Addis Ababa, Ethiopia." The primary objective of this research is to investigate the relationship between legal-related issues, risk management strategies, and their impact on the performance of public construction projects in Addis Ababa, Ethiopia. The findings of this study will contribute to a better understanding of how legal and risk management practices can be improved to enhance project performance in the construction industry. Your expertise and experience in the construction industry are invaluable to this study. I kindly request you to complete the attached questionnaire, which will take approximately 30–40 minutes of your time. Please take the time to carefully read each statement or question before answering it, and do your best to provide accurate information. Please note that your responses will be kept confidential and will remain strictly confidential will be used solely for academic purposes. Please complete the questionnaire and return it to me via [email/online link/physical submission] by [25 ⁄ 02 ⁄ 2025]. If you have any questions or require further clarification, feel free to contact me at [lamifufa37@gmail.com] or [phone .no +251910283634].

Yours sincerely,

Lami Fufa Hunde

Postgraduate Student, (Construction Engineering and Management)

College of Civil Engineering and Architecture,

Adama Science and Technology University (ASTU).

Adama, Ethiopia

February, 2025

Section 1: Demographic Information

General Profile of Respondents

1. Please, choose & circle the multiple-choice questions

No.	Demographic Factor	Response Options
1	Respondent Name	
4	Organization Type	☐ Government ☐ Private ☐ Both ☐ Other (Specify: _____)
5	Years of Experience in Construction	☐ <5 Years ☐ 5-10 Years ☐ 11-15 Years ☐ >15 Years
6	Position in the Organization	☐ Project Manager ☐ office Engineer ☐ Contractor ☐ Legal Advisor ☐ client/ owner ☐ consultant ☐ Contract Administrator ☐ site engineer ☐ Other (Specify: _____)
7	Higher Educational Qualification	☐ Diploma ☐ Bachelor's Degree ☐ Master's Degree ☐ PhD ☐ Other (Specify: _____)

Section II: Construction Project Legal Risk-Related Issues

Please respond to the following questions based on your experience with a specific construction project. Your responses will remain confidential and will be used solely for research purposes. For each statement, indicate the extent to which you agree or disagree by selecting, checking, or indicating your chosen response by placing a mark (☑) inside the provided box (☐). *Please*

rate your level of agreement with the following legal risk-related issues significantly affecting the successful performance of construction projects.

Legal Risk-Related Issues	**Risk Description**	**Issues significantly affecting the successful performance of construction projects**				
		1-Strongly Disagree	2- Disagree	3-Neutral	4-Agree	5-Strongly Agree
Contractual and Financial Risks						
Ambiguities in Contracts	Unclear terms can lead to disputes over scope, design errors, timelines, and payment.	☐	☐	☐	☐	☐
Change Order Disputes	Conflicts regarding the scope of work and associated costs can arise from change orders.	☐	☐	☐	☐	☐
Breach of Contract, Terminations of Project	Failure to fulfill contractual obligations can lead to legal action and financial penalties.	☐	☐	☐	☐	☐
Liquidated Damages for Delays	Inconsistent application of liquidated damages can lead to disputes.	☐	☐	☐	☐	☐
Late Payments, Payment Disputes, Budget Overruns, Bond Issues, and Fraud	Project halts, legal claims.	☐	☐	☐	☐	☐
Regulatory, Compliance, Liability, Insurance, and Safety Risks						
Non-compliance with Building Codes	Failure to adhere to local building codes can result in project cancellations and legal penalties.	☐	☐	☐	☐	☐
Environmental Regulation Violations, Tax Compliance, Permitting and Licensing	Non-compliance with environmental laws can lead to fines, termination, and reputational damage.	☐	☐	☐	☐	☐

Legal Risk-Related Issues	**Risk Description**	**Issues significantly affecting the successful performance of construction projects**				
		1-Strongly Disagree	2- Disagree	3-Neutral	4-Agree	5-Strongly Agree
Zoning Laws and Land Use Breaches	Project suspensions, redesign costs, and potential legal disputes.	☐	☐	☐	☐	☐
Workplace Injuries, Design Error, Loss of Data, Non-compliant Design	Liability for injuries on-site can lead to litigation and increased insurance costs.	☐	☐	☐	☐	☐
Defective Workmanship	Claims related to poor quality of work can result in financial losses and legal risks.	☐	☐	☐	☐	☐
Dispute Resolution and Litigation Risks						
Disputes leading to Mediation Failures, Arbitration Issues, and Litigation Risks with client	High legal costs, disruptions, contract cancellations, and loss of trust.	☐	☐	☐	☐	☐
Lawsuits related to construction defects, claims from subcontractors	Lead to financial losses, project delays, reputational damage, and increased operational costs for organizations.	☐	☐	☐	☐	☐
Force Majeure, Environmental, and Labor Risks						
Natural Disasters, Pandemics, Labor Strikes, Political Instability, Supply Chain Disruptions, Cybersecurity Threats, Legal or Regulatory Changes, Technological Failures	Delays, potential disputes, additional costs, termination of contracts.	☐	☐	☐	☐	☐

Legal Risk-Related Issues	**Risk Description**	**Issues significantly affecting the successful performance of construction projects**				
		1-Strongly Disagree	2- Disagree	3-Neutral	4-Agree	5-Strongly Agree
Pollution, Hazardous Waste, Impact Failures	Fines, reputational harm.	☐	☐	☐	☐	☐
Wage Disputes, Safety Issues, Union Conflicts, Harassment Claims	Lawsuits, workforce dissatisfaction.	☐	☐	☐	☐	☐
Bid Issues, Fund Mismanagement, Corruption or Transparency Issues	Undermines trust, delays project, increases costs, and compromises project quality.	☐	☐	☐	☐	☐

Section III: Legal Risk Management Strategies

Please rate your level of agreement with the following legal risk management strategies in significantly influence the successful performance of construction projects:

Legal Risk Management Strategies	**Significantly influence the successful performance of construction projects**				
	1-Strongly Disagree	2-Disagree	3-Neutral	4-Agree	5-Strongly Agree
Contract and Dispute Management					
Clear drafting and negotiation of contracts	☐	☐	☐	☐	☐
Regular review and updates of contracts	☐	☐	☐	☐	☐
Effective dispute resolution mechanisms	☐	☐	☐	☐	☐
Dispute Resolution Clauses (ADR, Arbitration, Litigation)	☐	☐	☐	☐	☐
Early Dispute Resolution Mechanisms	☐	☐	☐	☐	☐

Legal Risk Management Strategies	**Significantly influence the successful performance of construction projects**				
	1- Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree
Regulatory, Compliance, and Risk Management					
Understanding and adherence to local regulations	☐	☐	☐	☐	☐
Regular training on legal requirements	☐	☐	☐	☐	☐
Compliance with Public Procurement Laws	☐	☐	☐	☐	☐
Fraud Prevention Mechanisms	☐	☐	☐	☐	☐
Conducting regular risk assessments	☐	☐	☐	☐	☐
Identifying and prioritizing legal risks	☐	☐	☐	☐	☐
Regular Legal Audits and Compliance Checks	☐	☐	☐	☐	☐
Adaptive Legal Risk Management Policies	☐	☐	☐	☐	☐
Develop legal Risk Assessment Frameworks	☐	☐	☐	☐	☐
Financial and Insurance Risk Management					
Adequate insurance coverage for risks	☐	☐	☐	☐	☐
Performance bonds for contractors	☐	☐	☐	☐	☐
Budgeting for legal risks and compliance costs	☐	☐	☐	☐	☐
Monitoring financial health and liabilities	☐	☐	☐	☐	☐
Assessing impact of legal issues on financial stability	☐	☐	☐	☐	☐
Stakeholder and Community Legal Management					

Legal Risk Management Strategies	**Significantly influence the successful performance of construction projects**				
	1- Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree
Effective communication with all stakeholders	☐	☐	☐	☐	☐
Regular updates and feedback loops	☐	☐	☐	☐	☐
Public Consultation and Stakeholder Legal Obligations	☐	☐	☐	☐	☐
Public-Private Partnership (PPP) Legal Frameworks	☐	☐	☐	☐	☐
Land Rights and Indigenous Community Laws	☐	☐	☐	☐	☐
Compensation and Resettlement Legal Issues	☐	☐	☐	☐	☐
Training, Awareness, and Technology Utilization					
Ongoing training programs for staff	☐	☐	☐	☐	☐
Workshops on legal and risk management	☐	☐	☐	☐	☐
Knowledge Sharing and Training on Legal Risks	☐	☐	☐	☐	☐
Implementing legal technology solutions for risk management	☐	☐	☐	☐	☐
Use of software for contract management and compliance tracking	☐	☐	☐	☐	☐
Digital Contract Management Systems	☐	☐	☐	☐	☐
Environmental, Social, Labor, and Human Rights Compliance					
Environmental Impact Assessments (EIA)	☐	☐	☐	☐	☐
Sustainability and Green Building Laws	☐	☐	☐	☐	☐

Legal Risk Management Strategies	**Significantly influence the successful performance of construction projects**				
	1- Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree
Land Acquisition and Compensation Issues	☐	☐	☐	☐	☐
Labor Laws and Workers' Rights Compliance	☐	☐	☐	☐	☐
Worker Safety and Occupational Health Standards	☐	☐	☐	☐	☐
Fair Wages and Employment Law Compliance	☐	☐	☐	☐	☐
Gender and Inclusion Legal Compliance	☐	☐	☐	☐	☐
Legal Protection Against Workplace Harassment and Discrimination	☐	☐	☐	☐	☐

Section IV: Construction Project Performance

Please rate your level of agreement with the following aspect of project performance influenced by legal risk and legal risk management strategies in your project in contributing a significant influence on the overall performance of projects.

	Contributes a significant influence on the overall performance of the project from the legal risk and legal risk management strategies				
Project performance aspect (indicators)	**1**	**2**	**3**	**4**	**5**
Project Schedule (time)Performance	1- Strongly Disagree	2- Disagree	3- Neutral	4- Agree	5- Strongly Agree
Cost Performance	☐	☐	☐	☐	☐
Quality of Work performance	☐	☐	☐	☐	☐

Safety Performance	☐	☐	☐	☐	☐
Stakeholder and Client Satisfaction	☐	☐	☐	☐	☐
Legal and Compliance Performance	☐	☐	☐	☐	☐
Environmental Sustainability	☐	☐	☐	☐	☐
Project Risk Management Effectiveness	☐	☐	☐	☐	☐

Appendix: 1

Table 14:Factor loading

	CFR	RCR	DRR	FMR	CDM	RCRM	FIRM	SCM	TATU	ESLC-HRC	PP
CFR_1	0.906										
CFR_2	0.922										
CFR_3	0.904										
CFR_4	0.589										
CFR_5	0.398										
RCR_1		0.51									
RCR_2		0.752									
RCR_3		0.896									
RCR_4		0.88									
RCR_5		0.774									
DRLR_1			0.967								
DRLR_2			0.936								

FMELR_1				0.899							
FMELR_2				0.86							
FMELR_3				0.83							
FMELR_4				0.791							
CM_LRS1					0.642						
CM_RS2					0.923						
CM_RS3					0.769						
DARM_LRS1					0.92						
DARM_LRS2					0.789						
DARM_LRS3					0.787						
CR_LRS1						0.71					
CR_LRS2						0.876					
PTRM_RS1						0.768					
PTRM_LRS2						0.848					
RA_LRS1						0.726					
RA_LRS2						0.858					
LRMCI_LRS1						0.69					
LRMCI_LRS3						0.121					
LRMCI_LRS4						0.725					

IB_LRS1							0.994				
IB_LRS2							0.801				
FM_LRS1							0.977				
FM_RS2							0.957				
FM_LRS3							0.988				
ESLC_LRS1								0.19			
ESLC_LRS2								0.189			
SE_LRS2								0.966			
SCLM_LRS1								0.926			
SCLM_LRS2								0.943			
SCLM_LRS3								0.915			
SCLM_LRS4								0.974			
TA_LRS1									0.905		
TA_LRS2									0.947		
TU_LRS1									0.945		
TU_LRS2									0.95		
ESLC_LRS3										0.835	

ESLC_LRS4										0.946	
HRLC_LRS1										0.432	
HRLC_LRS2										0.93	
HRLC_LRS3										0.886	
HRLC_LRS4										0.703	
PP1											0.634
PP2											0.832
PP3											0.763
PP4											0.765
PP5											0.603
PP6											0.796
PP7											0.86
PP8											0.813

Appendix 2

Table 15:Internal consistency reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CDM	0.892	0.903	0.919	0.657
DRR	0.899	0.969	0.951	0.906
ESLC-HRC	0.926	0.791	0.902	0.554
FIM	0.972	1.012	0.977	0.896
FMR	0.895	1.068	0.910	0.716
PP	0.899	0.777	0.906	0.582
RCR	0.872	0.903	0.879	0.600
TaTu	0.973	0.844	0.972	0.874
CFR	0.824	0.936	0.873	0.599
RCM	0.909	0.965	0.923	0.575
SCM	0.973	1.089	0.977	0.893

Appendix 3

Table 16: Fornell-Larcker discriminant validity

	CDM	DRR	ESLC-HRC	FIRM	FMR	LRMS	LRRI	PP	RCR	TaTu	CFR	RCM	SCM
CDM	0.811												
DRR	0.02	0.952											
ESLC-HRC	-0.031	0.136	0.744										
FIRM	0.109	0.009	-0.029	0.946									
FMR	-0.121	0.25	0.097	-0.014	0.846								
LRMS	0.242	-0.07	0.131	0.152	-0.062	1							
LRRI	-0.07	0.241	-0.06	0.103	0.243	0.208	1						
PP	-0.019	-0.203	-0.017	-0.215	0.063	0.072	-0.126	0.763					
RCR	0.089	0.012	-0.097	-0.12	0.097	0.101	0.148	0.003	0.775				
TaTu	0.031	-0.134	-0.084	0.122	0.021	-0.117	0.115	-0.209	-0.009	0.935			
CFR	-0.028	0.037	0.065	0.067	0.106	-0.025	0.121	-0.221	-0.009	0.014	0.774		
RCM	-0.07	0.142	0.417	-0.153	-0.034	-0.138	-0.04	-0.134	0.069	0.139	0.004	0.758	
SCM	0.036	-0.193	0.096	-0.193	-0.221	-0.189	-0.358	0.235	-0.127	0.092	-0.242	0.062	0.945

Appendix 4

Table 17: Indicators or items of cross-loadings

	CFR	RCR	DRR	FMR	CDM	RCRM	FIRM	SCM	TATU	ESLC-HRC	PP
CFR_1	0.906	0.042	0.078	0.096	-0.042	-0.032	0.052	-0.194	0.007	0.091	-0.223
CFR_2	0.922	-0.02	0.072	0.107	-0.014	-0.025	0.054	-0.202	0.004	0.097	-0.243
CFR_3	0.904	-0.058	0.012	0.093	-0.025	-0.046	0.088	-0.235	0.003	-0.002	-0.157
CFR_4	0.589	0.052	-0.063	0.057	-0.003	0.215	0.009	-0.186	0.056	0.058	-0.133
CFR_5	0.398	-0.085	-0.065	-0.051	-0.163	0.178	-0.062	0.058	0.037	0.137	0.171
RCR_1	0.011	0.51	0.18	-0.012	0.083	0.14	-0.01	0.018	0.08	0.071	-0.144
RCR_2	-0.084	0.752	0.054	0.141	0.129	0.121	-0.154	-0.113	0.002	0.002	-0.069
RCR_3	0.014	0.896	0.078	0.13	0.04	0.03	-0.146	-0.137	-0.031	-0.091	0.11
RCR_4	0.043	0.88	0.003	0.102	0.118	0.04	-0.011	-0.101	-0.004	-0.121	-0.001
RCR_5	-0.081	0.774	-0.068	-0.065	0.024	0.112	-0.162	-0.063	0.028	-0.03	-0.126
DRLR_1	-0.023	0.002	0.967	0.229	0.023	0.135	0.002	-0.206	-0.185	0.112	-0.177
DRLR_2	0.117	0.024	0.936	0.252	0.014	0.137	0.018	-0.155	-0.047	0.153	-0.218
FMELR_1	0.15	0.181	0.287	0.899	-0.077	0.006	0.073	-0.348	-0.022	0.03	0.019
FMELR_2	0.002	0.004	0.167	0.86	-0.193	-0.083	-0.021	-0.057	0.017	0.191	0.092
FMELR_3	0.086	-0.016	0.116	0.83	-0.058	-0.048	-0.195	-0.04	0.12	0.04	0.079
FMELR_4	0.039	-0.025	0.245	0.791	-0.081	0.002	-0.056	-0.006	-0.008	0.223	0.108

CM_LRS1	-0.146	-0.021	-0.058	0.034	0.642	-0.088	-0.006	0.272	0.2	0.077	0.163
CM_RS2	0.002	0.137	0.002	-0.141	0.923	-0.056	0.102	0.017	0.006	-0.108	-0.026
CM_RS3	0.01	-0.04	0.058	-0.073	0.769	0.014	0.154	-0.089	-0.026	0.078	-0.045
DARM_LRS1	0.002	0.162	0.002	-0.147	0.92	-0.088	0.102	-0.035	-0.033	-0.112	-0.091
DARM_LRS2	-0.071	0.199	0	-0.123	0.789	-0.036	0.006	0.042	-0.036	-0.091	0.05
DARM_LRS3	0.076	-0.025	0.119	-0.141	0.787	-0.068	0.182	-0.054	0.029	0.025	-0.145
CR_LRS1	0.013	-0.057	0.137	0.143	-0.124	0.71	-0.057	-0.021	0.181	0.301	-0.058
CR_LRS2	-0.02	0.067	0.122	-0.063	-0.099	0.876	-0.174	-0.032	0.129	0.293	-0.045
PTRM_RS1	-0.051	0.111	0.024	-0.045	0.015	0.768	-0.172	0.227	0.069	0.425	-0.073
PTRM_LRS2	-0.046	0.044	0.123	-0.049	-0.017	0.848	-0.143	0.152	0.094	0.442	-0.105
RA_LRS1	-0.067	0.041	-0.035	0.016	-0.082	0.726	-0.217	0.362	0.125	0.416	0.019
RA_LRS2	-0.082	0.089	0.145	-0.091	0.055	0.858	-0.103	0.103	0.181	0.324	-0.072
LRMCI_LRS1	0.128	0.029	0.141	-0.025	-0.097	0.69	-0.081	-0.08	0.037	0.269	-0.24
LRMCI_LRS3	0.006	-0.051	-0.109	0.099	0.107	0.121	0.194	0.081	0.926	-0.081	-0.234
LRMCI_LRS4	0.253	0.008	0.166	0.019	-0.128	0.725	-0.077	-0.164	0.043	0.272	-0.217
IB_LRS1	0.079	-0.121	0.014	-0.019	0.123	-0.148	0.994	-0.226	0.105	-0.025	-0.226
IB_LRS2	-0.02	0.004	-0.05	-0.047	0.123	-0.131	0.801	-0.017	0.079	-0.17	0.017
FM_LRS1	0.029	-0.148	-0.004	-0.031	0.083	-0.141	0.977	-0.145	0.16	-0.047	-0.228
FM_RS2	0.12	-0.088	0.023	0.007	0.104	-0.175	0.957	-0.216	0.091	0.012	-0.198
FM_LRS3	0.047	-0.14	0.014	-0.006	0.106	-0.132	0.988	-0.192	0.131	-0.025	-0.233

ESLC_LRS1	0.028	0.098	0.153	0.043	0.051	0.266	-0.025	0.19	-0.036	0.463	0.161
ESLC_LRS2	-0.077	0.073	0.045	0.03	-0.064	0.318	-0.062	0.189	0.051	0.541	0.111
SE_LRS2	-0.277	-0.065	-0.234	-0.178	0.009	0.034	-0.194	0.966	0.117	0.036	0.199
SCLM_LRS1	-0.162	-0.181	-0.144	-0.269	0.079	0.075	-0.177	0.926	0.05	0.158	0.246
SCLM_LRS2	-0.223	-0.155	-0.134	-0.174	0.049	0.047	-0.142	0.943	0.053	0.133	0.224
SCLM_LRS3	-0.242	-0.126	-0.152	-0.212	-0.003	0.036	-0.147	0.915	0.009	0.164	0.228
SCLM_LRS4	-0.222	-0.125	-0.194	-0.231	0.038	0.087	-0.211	0.974	0.118	0.07	0.236
TA_LRS1	0.04	-0.027	-0.193	-0.109	0.085	0.098	0.169	0.081	0.905	-0.044	-0.179
TA_LRS2	-0.001	-0.044	-0.178	-0.043	0.085	0.11	0.194	0.093	0.947	-0.044	-0.215
TU_LRS1	0.014	-0.069	-0.127	-0.01	0.094	0.109	0.128	0.063	0.945	-0.097	-0.178
TU_LRS2	0.025	0.054	-0.149	-0.033	-0.049	0.146	0.069	0.106	0.95	-0.06	-0.184
ESLC_LRS3	0.056	-0.074	0.012	0.053	-0.017	0.372	-0.064	0.193	-0.011	0.835	0.1
ESLC_LRS4	0.061	-0.075	0.162	0.109	-0.084	0.427	-0.02	0.101	-0.057	0.946	-0.002
HRLC_LRS1	-0.08	0.173	0.012	0.058	-0.006	0.264	-0.115	0.183	0.061	0.432	0.076
HRLC_LRS2	0.052	-0.038	0.135	0.145	-0.068	0.39	-0.036	0.091	-0.077	0.93	0.018
HRLC_LRS3	0.018	-0.052	0.129	0.045	0.049	0.369	-0.042	0.087	-0.083	0.886	-0.066
HRLC_LRS4	0.027	-0.141	0.086	0.141	-0.12	0.222	0.057	0.006	-0.097	0.703	-0.054
PP1	-0.155	-0.026	-0.101	-0.107	0.058	-0.116	-0.12	0.16	-0.174	-0.054	0.634
PP2	-0.149	0.186	-0.08	0.17	-0.045	-0.042	-0.143	0.24	-0.163	0.012	0.832
PP3	-0.185	-0.01	-0.072	0.241	-0.095	-0.282	-0.166	0.125	-0.248	-0.16	0.763

PP4	0.146	0.017	-0.119	-0.077	-0.217	-0.018	-0.121	0.16	0.043	-0.315	0.765
PP5	-0.192	-0.134	-0.1	0.22	-0.055	-0.181	-0.104	0.134	-0.166	-0.074	0.603
PP6	-0.159	-0.01	-0.241	0.052	-0.097	-0.088	-0.286	0.174	-0.134	0.018	0.796
PP7	-0.205	-0.077	-0.164	0.131	-0.02	-0.179	-0.151	0.145	-0.209	0.024	0.86
PP8	-0.184	-0.052	-0.298	0.03	-0.018	-0.138	-0.197	0.171	-0.102	-0.192	0.813