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DEPARTMENT OF CIVIL ENGINEERING

OPTION: QUANTITY SURVEYING

PROJECT REPORT

ASSESSMENT OF CAUSES AND IMPACT OF CONSTRUCTION PROJECT DELAY IN RWANDA

(CASE STUDY: GASABO DISTRICT)

Submitted in partial fulfilment of the requirements for the grades of advanced diploma in civil engineering, quantity surveying in Rwanda Polytechnic IPRC Huye

Prepared by:

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Eng. NEZERWA Bienvenu

Done at: Huye-October/2023

DECLARATION

We declare that the project entitled "**assessment of causes and impact of construction project delay in Rwanda,** case study: GASABO district, is the original work and has never been submitted to any university or other higher learning institutions. It is our own work, where other scholar's writing was cited and references provided. We thus declare that this work is our owner's work and were completed successfully under the supervisors.

Eng. NEZERWA Bienvenu

Signature: …… **Signature:** ……

MUNYURANGABO Origine **MUGABE** Robert

CERTIFICATE

This is to certify that the project work entitled "**assessment of causes and impact of construction project delay in Rwanda,** case study: GASABO district, is the original work done by **Robert MUGABE (Reg No: 20rp07424)** and **MUNYURANGABO Origine (Reg No: 20rp13626)** submitted in partial fulfillment of the requirement of a ward of the advanced diploma certificate in civil engineering at RWANDA POLYTECHNIC-IPRC HUYE in the academic year 2022-2023.

Supervisor	**Head of department**
Eng. NEZERWA Bienvenu	**Eng. NEZERWA** Bienvenu
……..	…….
Date: …/10/2023	Date: …/10/2023

DEDICATION

This dissertation is dedicated to our families and friends for their immeasurable love, support, encouragement and understanding throughout the period of the study. We also dedicate this project to our supervisor Eng. NEZERWA Bienvenu for perfect supervision about the project for us.

ACKNOWLEDGEMENT

Above all, we thank the Almighty God for his love, guidance and protection in each and every step of our lives. We are thankful to the Rwanda Polytechnique College of technology IPRC Huye, especially we would like to thank the department of Civil engineering for continuous supports and fruitful guidance. Many thanks to the staff, students and key specialists who participated in our study through questionnaires, and discussions; you helped us to make this study a success.

We would like to express our sincere gratitude to our supervisor during our study Eng. NEZERWA Bienvenu for accepting to tirelessly guide us in our work with valuable comments, assistance. It is a privilege for us to have been tutored by him.

We want to recognize all people and companies who have been willingly helping us to gather information and tremendous guidance they have provided freely.

Many thank to our families who supported us entirely throughout our study, with lots of love and encouragement.

God bless you.

Finally, we are grateful for anyone who supported us directly and indirectly to make our study successful.

ABSTRACT

Construction delays pose a global challenge that profoundly affects community well-being, local development, and the efficacy of development programs. This comprehensive study explores the multifaceted issue of construction project delays, with a specific focus on the context of GASABO District in Rwanda. It delves into the causes, impacts, mitigation strategies, and innovative practices that can enhance project management within the construction industry. The main objective of this study is to assess the causes and impacts of construction project delays in Rwanda, with GASABO District as the primary case study. The specific objectives encompass identifying the root causes of construction project delays, evaluating their impacts, and suggesting effective mitigation strategies and best practices for future projects.

The study employs a mixed-methods approach, combining quantitative and qualitative methods to comprehensively assess construction project delays and their impacts. Data was collected through questionnaires administered to various stakeholders within the construction industry and through desk studies of existing literature, reports, documents, and databases.

The findings shed light on the critical factors contributing to construction project delays. "Lack of funds (funding delay)" emerged as the most significant issue, followed closely by "delays in obtaining regulatory approvals and permits from governmental authorities," Furthermore; the research reveals the far-reaching impacts of construction project delays. They include the extension of project timelines, potential project abandonment, design revisions and modifications, disagreements and disputes among stakeholders, increased project costs, and the need to stipulate financial penalties for delays. This highlights the urgency of tackling construction delays to ensure project success and efficiency. To mitigate construction project delays, the study emphasizes several strategies and best practices. Compliance with local regulations and codes, effective communication practices, workforce education, skills development, clear contractual arrangements and effective risk management are among the favored strategies. Notably, project management tools and advanced scheduling techniques are highly regarded for their effectiveness in preventing delays. The study provides insights into the construction industry's readiness to embrace innovative approaches. "Advanced construction methods," "project management tools," etc."

This study offers valuable guidance for construction project management in Rwanda. By addressing the identified causes of construction project delays, implementing effective mitigation strategies, and embracing innovative practices, Rwanda can improve infrastructure development, enhance stakeholder relationships, and contribute to the nation's overall economic growth.

Key words: Construction sector, Construction delays, Funding delay, Project abandonment, Regulatory approvals,

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LIST OF ABREVIATIONS

RP: Rwanda Polytechnic

RPPA: Rwanda public procurement authority

SPSS: Statistical package for social sciences

QUS: Quantity surveying

PM: Project manager

IPRC: Integrated Polytechnic Regional College

CST: Construction

PM: Project manager

RDB: Rwanda development board

Rwf: Rwandan Franc

Eng: Engineer

%: Percentage

N.B: Take notice

N: Number

Etc.: and so on

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CHAPTER ONE: INTRODUCTION

1.0 BACKGROUND

On a global scale, the construction industry is recognized as a dynamic sector that significantly bolsters the economic advancement of nations. It fulfills fundamental developmental objectives such as job creation, income generation, and output expansion. Projections indicate that the global construction output is poised to increase by a substantial 85% to reach $15 trillion by the year 2030. (Oladinrin, 2012)

Construction projects play a pivotal role in the economic development and infrastructure enhancement of any nation. In Rwanda, a rapidly growing economy in East Africa, the construction sector has experienced significant expansion and investment in recent years (Etensa et al., 2022).

Infrastructure development is vital for Rwanda's socio-economic progress, attracting both domestic and foreign investments, and promoting sustainable growth. However, like many countries, Rwanda faces challenges in the timely completion of construction projects, which has raised concerns about cost overruns, stakeholder dissatisfaction, and delayed economic benefits. The causes of construction project delays are multifaceted and can vary from one project to another. Common factors contributing to delays include issues related to project management, regulatory approvals, funding constraints, labor shortages, weather conditions, and unexpected site conditions, among others. To address these challenges effectively, it is essential to understand the specific causes and their impacts on construction projects in Rwanda.(Nagata et al., 2017)

This research seeks to bridge this gap by conducting a thorough assessment of the causes and impacts of construction project delays in Rwanda. By gaining insights into these issues, stakeholders in the construction industry, including government agencies, contractors, investors, and project managers, can make informed decisions to improve project planning, execution, and risk management. Ultimately, addressing the challenges of construction project delays can contribute to the continued growth and development of Rwanda's infrastructure and economy.

The findings of this study will provide valuable information to policymakers, industry professionals, and researchers interested in the Rwandan construction sector. It is hoped that the results will inform the development of strategies and policies aimed at reducing construction project delays and enhancing the efficiency and effectiveness of construction projects in Rwanda.

1.1 PROBLEM STATEMENT

Construction delay is a global issue across construction industries that mostly affect the improvement of the well-being of communities and development programs, successful and sustainable of daily work of local communities, therefore many researches were conducted around the globe to tackle this problem (Cheng, 2021).

Construction delays are a pervasive issue globally, impacting community well-being, local development, and project stakeholders. Key contributors to these delays include poor planning, inadequate control, material shipping delays, cost increases, unrealistic project duration estimates, change orders, and a shortage of skilled labor. As a result, delays lead to disputes among stakeholders, disrupt residents' lives, and have environmental impacts. This study conducts a comprehensive analysis of factors causing construction delays in Rwanda, quantifying their impact. It aims to provide insights to empower government agencies, construction firms, investors, and policymakers with strategies to improve project management and ensure timely project execution in Rwanda.

1.2 PROJECT OBJECTIVES

This study has both main and specific objectives.

1.2.1 Main objective of the study

The main objective of this study is to assess the causes and impact of construction projects delay in Rwanda using GASABO district as a case study.

1.2.2 Specific objectives of the study

This study has the following specific objectives:

1. Assess the causes that have led to the construction project delays in Rwanda

2. Evaluate the impacts of construction project delays in Rwanda

3. Suggest effective mitigation strategies and best practices in future projects.

1.3 HYPOTHESIS OF STUDY

H1: There is a significant correlation between inadequate project planning and construction project delays in Rwanda.

H2: Construction project delays in Rwanda have a significant impact on project budgets, leading to increased costs and having a significant adverse impact on stakeholder satisfaction and perceptions of project quality**.**

H3: Implementing comprehensive mitigation strategies and best practices can significantly reduce the occurrence and severity of construction project delays in Rwanda**.**

1.4 SCOPE AND LIMITATION OF THE STUDY

This study, conducted from June to October 2023 in Rwanda's GASABO district, focuses on understanding the causes and impacts of construction project delays in Rwanda. It provides context-specific insights and recommendations for future projects within GASABO, The study's short duration might not capture long-term trends, and it excludes the financial and accounting aspects of projects

1.5 ORGANIZATION OF THE STUDY

This paper consists of five chapters.

Chapter 1 called **"Introduction"** includes the background of construction delays in GASABO district as a case study, statement of the problem, objectives, scope, the research questions and significance of the study.

Chapter 2 **"literature review"** discusses the previous studies that were conducted around the globe. It contains concepts, Ideas, Opinions from Authors regarding of the causes and impact of construction delays in Rwanda. This will help to relate and compare this study's findings and existing findings.

Chapter 3 **"Research methodology"** describes Research Design and research population that include sample size and sampling procedures. It details source of data used, research instrument that shows how those data were collected.

Chapter 4 **"presentation, and analysis of the results"** discusses practical implications of the findings with consideration on the results of similar previous studies. Include also the findings of other investigators both in agreement or in disagreement with the findings of this study.

Chapter 5**"conclusion and recommendations"** which describe the strategies rendered to different entities and individuals from basing on this study's findings.

"References and appendix"

1.6 SIGNIFICANCE OF THE STUDY

The research findings of this study of assessment of causes and impact of construction project delays in Rwanda will be useful to different bodies such as government institutions, personal, public and academicians.

1. **government benefits**

The study's outcomes will provide the Rwandan government with data-driven insights to develop policies and regulations that mitigate construction project delays, lower costs, and enhance public infrastructure efficiency. Addressing delays can expedite the delivery of essential infrastructure, improving citizens' quality of life, boosting economic growth, and attracting more investment.

2. **academic benefits**

Study findings can enrich academic curricula for future professionals in construction management and related fields, offering a valuable resource for scholars and researchers interested in construction project delays in Rwanda.

3. **personal benefits**

Construction industry professionals, including project managers, contractors, and investors, can gain valuable insights into the challenges and solutions regarding project delays in Rwanda. This knowledge may lead to improved project management practices, benefiting various stakeholders, including subcontractors and suppliers, potentially enhancing efficiency and profitability.

4. **public benefits**

Efficient construction projects contribute to economic growth by creating jobs, increasing trade, and attracting investment, benefiting the public through improved employment opportunities and economic stability.

Infrastructure projects, such as healthcare facilities and schools, are essential for providing public services. Minimizing delays means faster access to improved healthcare, education, and other vital services.

1.7 WORK PLAN

Table1 1: work plan of activities

Tasks performed	Dates to be completed	Personnel assigned to task	Person days required.
Project Proposal preparation	Week 1-4 2 june-2 July	MUGABE Robert & MUNYURANGABO Origine	2 persons × 30 days= 60 days
Interaction with our supervisor	Week 5-8 2 July -31July	MUGABE Robert & MUNYURANGABO Origine	2 persons × 29days= 58 days
Ethical clearance and permission to do the work	Week 9 31 July-7Aug	NEZERWA Bienvenue	1 persons × 7days= 7 days
Interaction with our supervisor	Week 10-16 7Aug-25 Sept	MUGABE Robert & MUNYURANGABO Origine	2 persons × 18days= 36days
Data Collection (Fieldwork)	Week 17-19 25 Sept-6Oct	MUGABE Robert & MUNYURANGABO Origine	2 persons × 17days= 34days
Data coding, and entry into Computer and Analyzing data collected	Week 20-21 6 Oct- 13Oct	MUGABE Robert & MUNYURANGABO Origine	2 persons × 7days= 14 days
Report Writing (Final draft)	Week 22-23 13Oct -23 Oct	MUGABE Robert & MUNYURANGABO Origine	2 persons × 10days= 20 days
Submission of Final Report	Week 24 24,Oct	MUGABE Robert & MUNYURANGABO Origine	2 persons × 1day= 2days

1.8 GANTT CHART

Tasks performed	Year				
	June	July	Aug	Sept	Oct
Project Proposal preparation					
interaction with our supervisor					
Ethical clearance and permission to do the work					
Interaction with our supervisor					
Data Collection (Fieldwork)					
Data coding, and entry into Computer and Analysing data collected					
Report Writing (Final draft)					
Submission of Final Report					

Figure1 1: sequences of activities

1.9 STUDY BUDGET

The project consumed us 145,000Frw from the topic formulation up to final dissertation submission.

Table1 2: study budget

SN	ACTIVITIES	AMOUNT (frw)
1	Transport activities	50000
2	Accommodation and other accordingly	50000
3	Research facilities such as questionnaires, pens, computer, and other accessories	30000
4	Finalizing report documentation activities(printing)	15000
5	**Total amount**	**145000**

CHAPTER TWO: LITERATURE REVIEW

2.0 INTRODUCTION

This chapter delves into a comprehensive review of existing scholarly discussions on the causes and impacts of construction delays in both developed and developing countries, highlighting limitations in previous research. It encompasses a wide range of studies, reference materials, and reports related to this topic. Construction project delays can lead to late completion, disputes, damage to the organization's reputation, missed future opportunities, profit margin loss, insolvency, and contract termination.

Studies like the one by (Lakmal, 2017)identify key causes, including insufficient funding, poor project planning, material cost increases, selecting low-bid contractors, and a shortage of skilled labor, often resulting in cost escalations and owner-contractor conflicts. Despite extensive research, delays persist worldwide, necessitating a fresh perspective and proactive measures to mitigate factors and ensure timely, on-budget project delivery.

2.1 DEFINITION OF KEY TERMS

It is better if we look in details the definition of key terms used in construction delays since it is widely used and have different meaning accordingly.

The following are the definitions of terms related to construction delays of construction project

Construction work: is defined as any work carried out in connection with the construction, alteration, conversion, fitting-out, commissioning, renovation, repair, maintenance, refurbishment, demolition, decommissioning or dismantling of a structure (Sears et al., 2010)

Construction delays: are situations where project events occur later than expected due to causes related to the client, consultant, contractor, etc.

In residential and light construction, delays primarily stem from communication issues, often addressed through comprehensive critical path schedules, and these delays can lead to significant costs due to construction loan interest, time-sensitive management expenses, and escalating labor and material prices (Trauner, 2009).

A project plan: is one of the key formal documents created before starting any project. The document usually consists of approved cost, schedule, and project scope. It guides the execution of a project from initiation to project closure. The project plan also lays the foundation for all kinds of communication among the stakeholders.

Project Management: is the practice of planning, executing, controlling, closing a project to achieve specific goals and meet success criteria.

Project Manager: the person responsible for handling every aspect of a project from the day it starts until it closes is called a project manager. The responsibilities of a project manager typically entail powerful planning, smart resource utilization, and managing the scope of the project.

Project Stakeholder: any individual that has a direct or indirect interest in a project is known as a project stakeholder. They usually affect or are affected by the project decisions being taken over the course of the project lifecycle. A stakeholder can be anyone from the project team, executives, sponsors, customers, or the end-users.

Engineer: A professional who applies scientific and mathematical principles to design, build, and maintain structures, systems, and processes

Project budget: is a formally approved document featuring a comprehensive list of financial resources, including project expenses, required to complete a project

Quality Concerns: Quality concerns involve issues related to the overall quality of construction work, including materials, workmanship, and adherence to design specifications. Delays may lead to rushed work and reduced construction quality, posing long-term durability and safety risks.

2.2 CONSTRCUTION INDUSTRY IN RWANDA

The construction industry plays a pivotal role in Rwanda's economy, contributing to infrastructure development and overall quality of life for its citizens. It encompasses diverse players, including property builders, developers, material suppliers, investors, and contractors. Well-designed infrastructure investments have long-term economic benefits, fostering growth, productivity, and property values. The sector provides jobs for millions, bolstering economic growth and the country's balance of trade through material exports and engineering services.(*Statistical Reports | National Institute of Statistics Rwanda*, n.d.)

Political stability and sound economic policies have enhanced Rwanda's construction industry, attracting both national and foreign companies. Recent statistics demonstrate consistent growth, with a 5% increase in 2022, following a remarkable 15% surge in 2021. Non-metallic mineral production, including cement, rose by 21% in 2022. The sector's contribution to the Gross Domestic Product was 7% in 2021-2022, and 6% in 2022-2023.

However, despite its economic significance, the construction industry faces challenges, as government projects have been delayed or abandoned, as revealed in the 2022 Auditor General's report.

2.3 CONSTRUCTION PROJECT LIFE CYCLE

Every project passes through different stages during its life cycle. Each project started from the owner's idea and after generating idea, the owner develops an idea and passes through different stages until creating final product. (Britain), 1995)said that construction project life cycle has the same features as other projects and any mistake which can be made in early stage, it is difficult to improve or correct it and even it may be impossible to make correction due to complexity of construction project.

(*Jammaz. 2010*)identified and explained six stages by which each project idea should pass through in order to become final product and our concern will be the first five stages because is where project delays can occur.

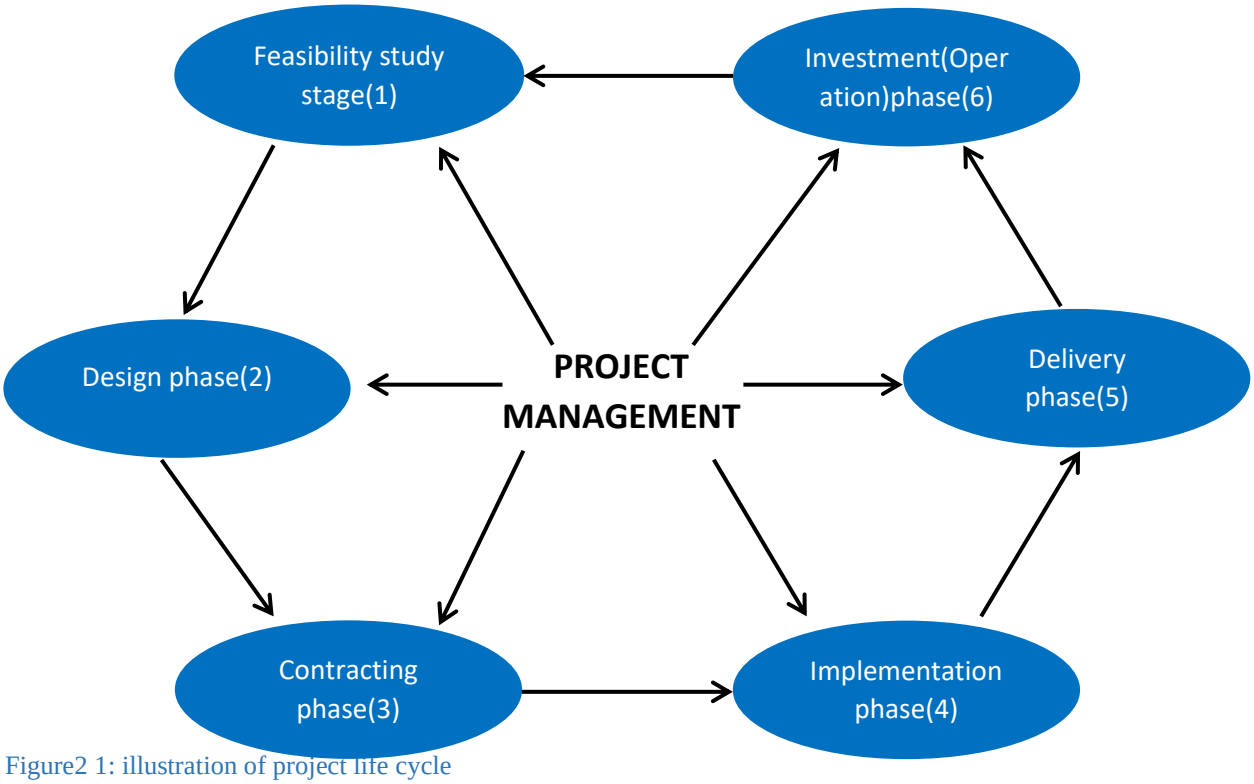


Figure2 1: illustration of project life cycle

2.4 CONSTRUCTION DELAY

(Assaf & Al-hazmi, 2006) define delays as the instances where the project's completion date exceeds the planned or expected time outlined in the contract or the agreed timeframe between project stakeholders. These delays can be attributed to various factors, including the complex nature of construction processes, contractor performance, material procurement, site conditions, project management, stakeholder coordination, and financial capabilities of project owners.

2.4.1 Main types of delay

The primary objectives in project management revolve around successfully finishing the project within the allocated budget, adhering to the specified timeline, and ensuring the planned quality of work. Project delays have negative consequences for both the contractor and the project owner, as any delay incurs additional costs (*Jammaz. 2010*). Delays in construction projects can be categorized into the following:

- Excusable and non–excusable delays
- Compensable- non compensable delays
- Critical and non-critical delays
- Concurrent delays and non–concurrent delays

The chart in Figure 1 illustrates the broad categories of excusable and non-excusable delays in a typical construction contract. The classification of delays can vary based on the contract's specifics. Analysts must assess a delay's criticality and concurrency with other delays, categorizing them as excusable or non-excusable. Excusable delays can further be classified as compensable or non-compensable. Concurrent delays are discussed in a later chapter, emphasizing the importance of clear definitions in construction contract terminology.

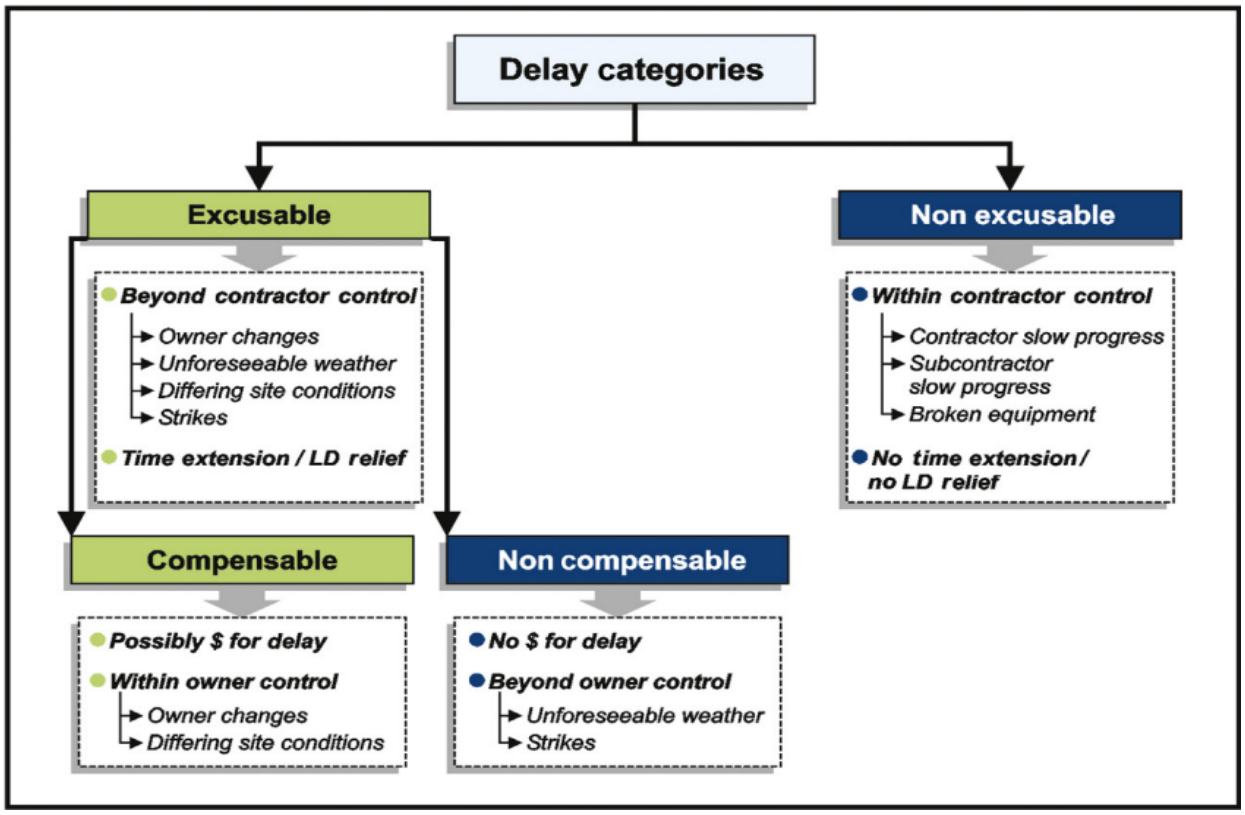


Figure2 2: categories types of delay

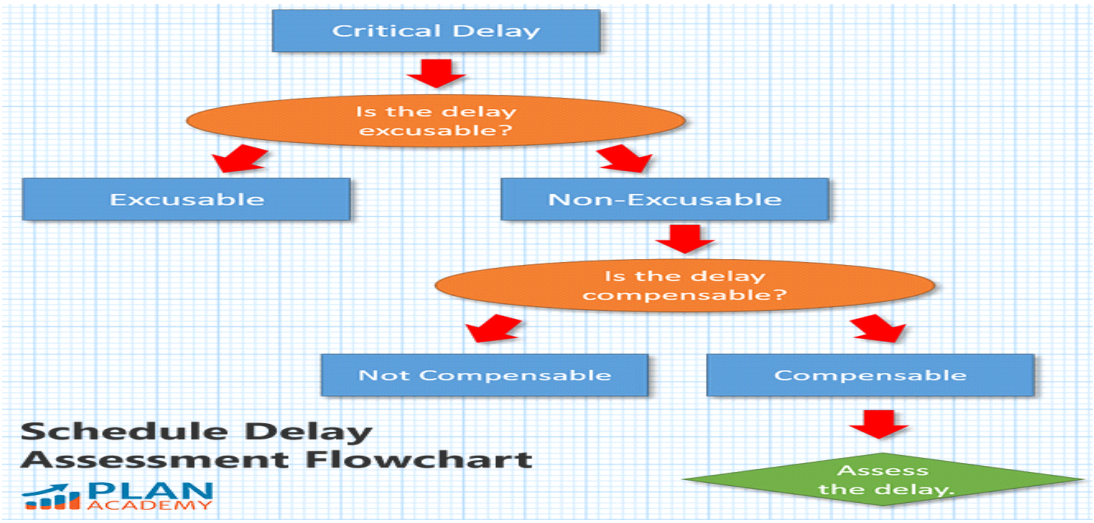


Figure2 3: types of construction schedule delay flow chart

All these types of delays are the effects of both internal and external factors that are surrounding the project, the internal sources of delay take place from the designers, contractors and the owner of the project while the external sources of delay comes from the government, labor unions, climate change and law and regulations of the country (Tawfek, 2018)

1. **Excusable and non- excusable delays**

Excusable delays

These are delays which are beyond the control of the contractors. This means that when delay is excusable, the contractors will not be liable. When delay is excusable, contractor can get extension of the period which may be fully paid or not based on the basis of contract between both contractor and the owner of the project.

Non- excusable delays

Delays resulting from poor contractor management make the contractor liable. The primary source is the contractor and their suppliers. Compensation and time extensions can be granted, but the cost is deducted from the contractor's dues. In the case of inexcusable delays, poor planning by the project manager is the primary cause. It results from mismanagement of materials, improper construction methods, inadequate communication, and an unskilled workforce(Tawfek, 2018)

2. **Compensable and non- compensable delays**

Non- compensable delays

(Tawfek, 2018) said that non compensable delay is delay which is beyond the control of both owner of the project and its contractor, this delay occurs due to the force majeure such as climate change (heavy or snow rain depends on project), earth quake, war, etc

Compensable delays

(Samarah & Bekr, 2016) said that this is delay caused by the owner of the project or his representative. The most common of compensable delay in construction project is insufficient specifications and drawings. When delays are caused by the owner of the project or his agent, contractor is allowed to claim for compensation of both financial and time.

3. **Critical and non- critical delays**

Critical delay

This is the one which affects the progress of the project, the time of project implementation and the compensation of the project contractor. The study conducted by Henry (Samarah & Bekr, 2016) to investigate the causes of delays and cost overruns in Uganda’s public sector construction projects have proved that delays on payment to the contractors has affected the completion period of the project.

Non- critical delay

This is the one which does not affect the completion of the project. This affects the succession of the activities which are not on the critical path of the scheduled activities (Tawfek, 2018). The study conducted by (Sweis et al., 2008)to investigate the causes of delay in U.S. construction projects, the study revealed that financial difficulties with the designer does not affect the period of project completion.

4. **Concurrent delays and non- concurrent delay**

Concurrent delays

This delay occurs when two or more either independent or parallel delays occur at the same time (Trauner, 2009). Each party in construction project should prepare a document showing its daily construction activities in order to determine the party which has caused delay so that he will take responsibility of such delay.

Solo Delays or non- concurrent delay

This delay happens when one of construction activities need additional time to what planned to be completed. To evaluate the delay time, the cost of such delay, its impacts to the other activities, the project personnel uses critical path model. After the assessment and the identification of the party caused delay, the party will take the responsibility and cost of such delay.

2.5 IDENTIFICATION OF CAUSES OF DELAY IN CONSTRUCTION PROJECTS

(Samarah & Bekr, 2016)Construction project delays are a persistent challenge in the construction industry, affecting project timelines, budgets, and stakeholder satisfaction. The causes of delays are multifaceted, often stemming from a combination of internal and external factors. In the context of the GASABO District, Rwanda, where construction plays a pivotal role in economic development, it is crucial to understand these causes comprehensively.

1. INADEQUATE PROJECT PLANNING

When projects are not meticulously planned, including clear timelines, resource allocation, and risk assessment, it can lead to disruptions and inefficiencies in the construction process. This lack of comprehensive planning can result in delays due to unforeseen issues, changing project requirements, or resource shortages, all of which impact project timelines.

2. DESIGN CHANGES AND REVISIONS

Design changes and revisions are a common cause of construction project delays, typically resulting from evolving project requirements or unforeseen challenges. Effective communication and coordination among project stakeholders are essential to manage design changes efficiently and minimize their impact on project timelines.

3. RESOURCE SHORTAGES

Resource shortages, including a lack of skilled labor, materials, or equipment, can significantly contribute to construction project delays. These shortages often lead to inefficiencies, bottlenecks, and disruptions in the construction process. Addressing resource shortages through proper planning and resource allocation is crucial to mitigate delays.

4. CONTRACTUAL ISSUES

Contract-related problems can lead to construction project delays when disputes, disagreements, or changes in contractual terms occur. Clear and comprehensive contracts, along with effective contract management, are essential to prevent and resolve such issues.

5. EXTERNAL FACTORS

External factors like economic conditions, regulatory changes, or unforeseen events can disrupt construction projects. These factors are often beyond the control of project stakeholders and may require adaptive strategies to minimize their impact.

6. ENVIRONMENTAL FACTORS

Environmental issues, such as adverse weather conditions, natural disasters, or ecological concerns, can impede construction progress. Incorporating environmental risk assessments and mitigation plans is essential to address these challenges.

7. HEALTH AND SAFETY CONCERNS

Safety-related incidents and health issues on construction sites can lead to project delays. Prioritizing and enforcing robust safety protocols are vital to ensure worker well-being and project continuity.

8. MATERIAL SHORTAGES AND PRICE FLUCTUATIONS

Fluctuations in material availability and costs can disrupt construction schedules. Monitoring material supply chains and having contingency plans for price fluctuations are crucial to address this issue.

9. INFRASTRUCTURE AND TRANSPORTATION CHALLENGES

Inadequate infrastructure and transportation difficulties can hinder material delivery and site accessibility. Improving infrastructure and logistics planning can help mitigate these challenges.

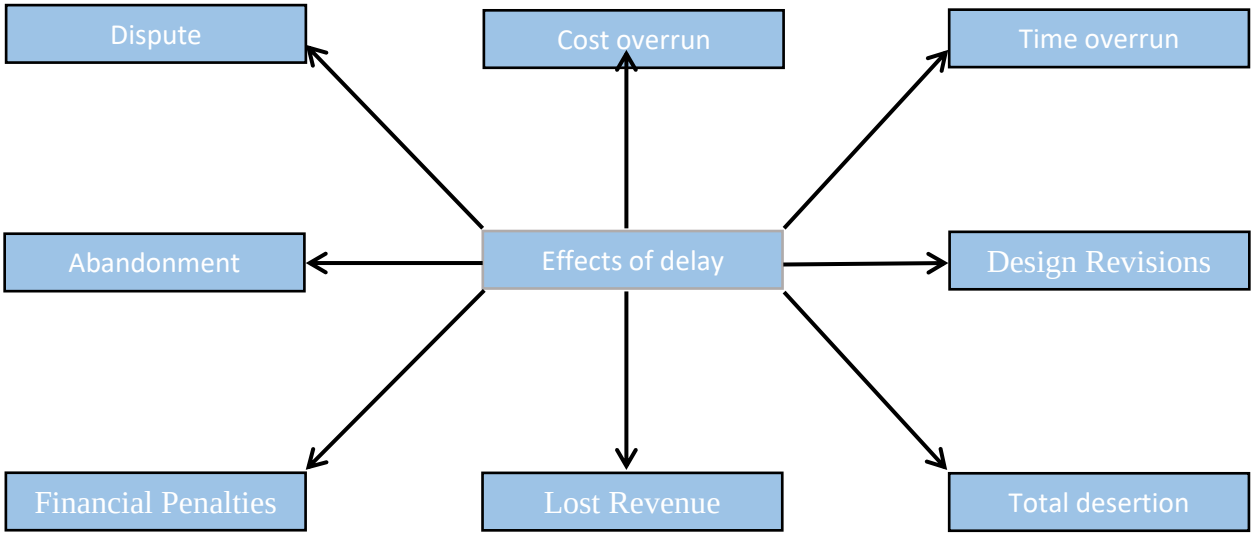
10. UTILITY SERVICES INTERRUPTIONS

Disruptions in utility services, such as water, electricity, or telecommunications, can stall construction projects. Collaborating with utility providers and planning for potential interruptions is necessary to minimize delays.

2.6 EFFECTS OF CONSTRUCTION DELAYS

There are numerous elements bringing about deferment few of them are: some are inside the contractual worker's obligation and some are inside proprietor's risk. It is difficult to explain them due to the overlapping nature of the events of which the project participants are responsible. It is found that delay problems are cause due to the disputes, cost overrun, time overrun, Design Revisions, total desertion, Lost Revenue, Financial Penalties, abandonment etc.(Hussain et al., 2023)

Figure2 4: effects of construction delays



Disputes: Delays can lead to disagreements and disputes among project stakeholders, including contractors, subcontractors, and project owners. These disputes may revolve around responsibility for the delay, compensation, and how to proceed. Resolving disputes can consume time and resources, further contributing to project delays.

Design Revisions: Delays can trigger design revisions and modifications, which may not undergo proper review or testing. These changes can introduce design errors and affect the project's structural integrity, functionality, and aesthetic appeal.

Abandonment: Delays may lead to the abandonment of construction projects. This occurs when the project becomes financially unviable or when stakeholders decide not to proceed due to ongoing challenges. Abandoned projects can leave behind incomplete structures and wasted resources.

Cost Overrun: Construction project delays often translate into increased project costs. The longer a project takes to complete, the more money is required for labor, materials, equipment, and other resources. Cost overruns can strain project budgets and financial viability.

Lost Revenue: For projects intended for commercial purposes, such as retail spaces or rental properties, delays can lead to lost revenue opportunities due to postponed occupancy or rent commencement.

Financial Penalties: Many construction contracts include liquidated damages clauses, which stipulate financial penalties for delays. Failure to meet project milestones can lead to financial penalties imposed by the client, further impacting the project's budget.

Time Overrun: Time overrun is the direct result of construction project delays. It signifies that the project has taken longer to complete than originally planned. Time overrun can have cascading effects on project schedules and associated activities.

Total Desertion (Abandonment): In extreme cases, particularly when delays are prolonged and insurmountable, some project stakeholders may choose to abandon the project entirely. This can result in significant financial losses and the abandonment of partially completed structures or infrastructure.

substantial consequences underscore the importance of proactive delay management and effective dispute resolution mechanisms to mitigate these negative outcomes.(Koirala et al., 2017)

2.7 MITIGATING STRATEGIES AND BEST PRACTICES IN FUTURE PROJECTS

Construction project delays pose significant challenges to project stakeholders, including financial burdens, timeline disruptions, and stakeholder dissatisfaction.

1. Best Practices in Construction Project Management

Successful construction project management is a cornerstone for minimizing delays. Research by (Gilbert, 2013)emphasizes the importance of effective project planning and scheduling, emphasizing the need for detailed project schedules, clear milestones, and contingency plans. Such practices enhance project control and minimize delays.

2. Risk Management and Contingency Planning:

Proactive risk management is crucial for mitigating delays. Comprehensive risk assessment and mitigation strategies, as discussed by (Chileshe et al., 2016), enable project teams to identify potential risks and develop strategies to address them, reducing the likelihood of delays.

3. Technology and Innovation:

Incorporating innovative technologies can improve project efficiency and reduce delays. Building Information Modeling (BIM), explored in research by (Smith & Tardif, 2012), facilitates better project coordination, visualization, and clash detection, ultimately minimizing construction delays.

4. Stakeholder Collaboration and Communication:

Effective collaboration among project stakeholders is crucial. Studies by (Emuze & Smallwood, 2020) stress the importance of open communication and collaborative relationships between clients, contractors, and subcontractors.

5. Regulatory Compliance and Permits:

Ensuring compliance with regulatory requirements and obtaining necessary permits and approvals are vital for avoiding delays. Research by (Gilbert, 2013) highlights the significance of proactive planning and engagement with regulatory authorities to streamline approval processes.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 INTRODUCTION

This chapter on research methodology details the approach and strategy for studying the causes and impacts of construction project delays in Rwanda's context of GASABO District. It covers the research method, approach, data collection methods, sample selection, the research process, data analysis, ethical considerations, and research limitations. The study aims to identify the factors behind project delays and assess their effects in the GASABO District, considering how these delays can impact budgets, stakeholder satisfaction, and infrastructure delivery.

3.1 STUDY DESIGN

(Heppner et al., 2008) describe a research design as a plan or a structure for an investigation or a list of specifications and a procedure for conducting and controlling a research project. In other words, is the conceptual structure within which research is conducted which constitutes the blueprint for the collection, measurement, and analysis of data?

The study utilized a case study research design focusing on building construction companies operating in Gasabo, Kigali, Rwanda (as stated by RPPA, 2023). It employs a mixed-methods approach, combining quantitative and qualitative methods to comprehensively assess construction project delay and their impacts. Qualitative data collection captures opinions and thoughts of project managers and project managing teams, while quantitative analysis emphasizes percentage-based assessment.

3.2 STUDY AREA

The study area, GASABO district in Kigali, Rwanda, presents a diverse landscape encompassing urban and suburban regions. This location hosts a wide range of construction projects, from infrastructure development to residential and commercial construction. GASABO serves as an ideal locale for a focused investigation into construction project delays in the specific Rwandan context.

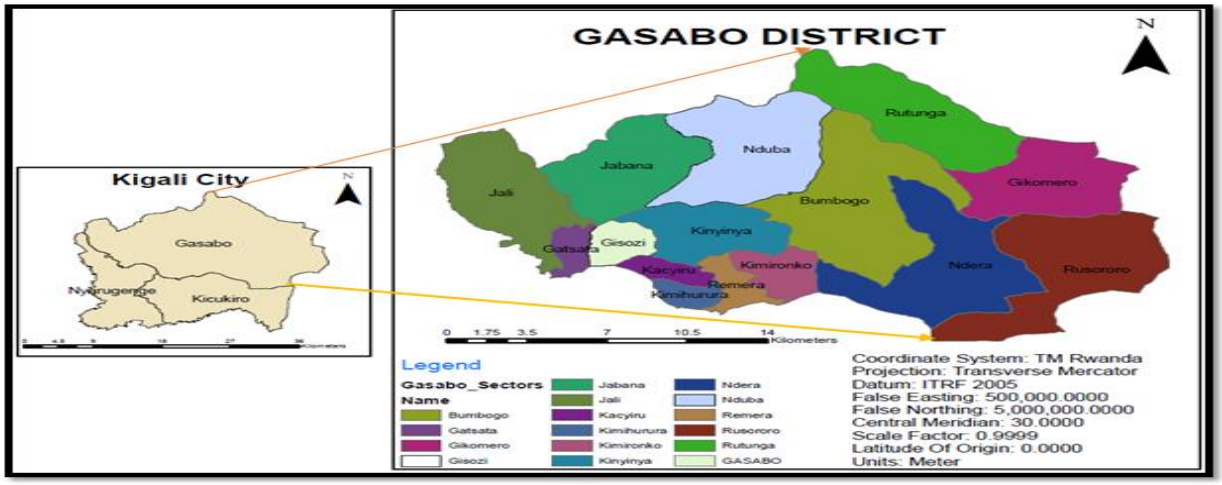


Figure3 1: study area location

3.3 DATA COLLECTION METHODS

Both primary and secondary data collection tools were utilized, with the researcher conducting administering questionnaires and desk study.

3.3.1 Questionnaires

Questionnaires, which included closed questions with Likert scale methods, were employed to gather data for the study. These questionnaires were distributed to construction companies and targeted architects, quantity surveyors, and site engineers.

A. Closed Question

Closed questions structured responses into predetermined categories, limiting answers to fit within specific options. These questions aimed to collect quantitative data, seeking precise and measurable responses. The collected data can be categorized as nominal or ordinal data, the latter being data that can be ranked (Bhandari, 2021)

B. Likert scale methods

Likert Scale Questions These questions use a scale (e.g., from "Strongly disagree" to "Strongly Agree") to measure attitudes or opinions. Example: "Please indicate your level of agreement with the statement: 'Inadequate project planning is a significant cause of delays.'

Therefore, questionnaires were given to the respondents randomly to respond.

The answers for the structured part of the questionnaire will be Ensure that questions are clear, concise, and free from bias.

Likert's-scale is important to know respondents' feelings or attitudes about something. The respondents must indicate how closely their feelings match with the question or statement on a rating scale.

After the delays in construction projects ware identified, respondents was asked about their agreement on these causes of construction project delays. Accordingly, the respondents choose one of the following based on their feeling

1- Strongly disagree

2- Disagree

3- Average agree

4- Agree

5- Strongly agree

After, data was gathered on causes and impact of construction project delays, the responsible party from stakeholders in the construction industry has to be identified for the cause and impact of construction project delays; the questionnaires are prepared in such a way that detailed information can be gathered in a systematically prepared matrix table.

3.3.2 Desk study

A desk study is the collation and review of information already available about a site, and is carried out at an early stage of site appraisal to inform and guide the remainder of the site investigation (Society & Britain), 2004). Data will be collected by studying and analyzing existing literature, report, documents, database, and any other available sources of information relevant to the research project.

3.4 STUDY POPULATION

Population is known as well-defined collection of individuals or objects known to have similar characteristics. All individuals or objects within a certain population usually have a common, binding characteristic or trait. Usually the description of the population and the common binding characteristic of its members are the same. "Government officials" is a well-defined group of

individuals which can be considered as a population and all the members of this population are indeed officials of the government. (McCombes, 2022)

In other words, the study focused on organizations registered for building construction projects in the GASABO District, involving a wide group of stakeholders like project managers, contractors, subcontractors, government bodies, and investors. The questionnaires were administered to the project management team, which included architects, quantity surveyors, and site engineers. This team played a key role in achieving project objectives, handling specific tasks, and providing expertise, collaborating with users to meet project requirements, and documenting the project process.

The study focused on specific Rwandan building construction companies categorized as "Category A," comprising the largest firms qualified for tenders exceeding 2 billion Rwandan francs, and "Category F," encompassing the smallest companies eligible for tenders valued at less than 100 million Rwandan francs as listed by the Rwanda Public Procurement Authority (RPPA) in October 2023. Eight companies were purposefully selected for the study, considering the location of the case study projects. This approach aimed to gather diverse insights from companies of different sizes, capturing a range of perspectives on the causes and impacts of construction project delays and strategies to mitigate them. The study's comprehensive analysis incorporated viewpoints from both large and small firms, providing a well-rounded understanding of construction project delays in the Rwandan context, Gasabo district.

3.5 STUDY SAMPLE

The study sample represents the subset of the population from which data were collected. In this case, it consists of individuals and projects associated with construction activities in the GASABO District.

3.5.1 Sampling frame

The sample frame defines the source from which the sample was drawn. It's a comprehensive list or database from which potential participants or projects can be selected. In this study, the sample frame may include:

Project Registries: the ongoing and construction projects in the GASABO District obtained from government agencies or construction industry associations.

Building construction Companies: construction companies operating within GASABO, including contact details and project portfolios.

Government Records: Records of permits, licenses, and approvals granted for construction projects in the district.

3.5.2 Sampling techniques

Good sampling techniques allow the researcher to get data at greater accuracy with low cost and greater speed of data collection depending on the availability of the population elements and determine how the study sample will be selected from the sample frame.(Cochran, 1977)

3.5.3 Sample size

Sample size is defined as the count of the individual samples or observations in any statistical setting, such as a scientific experiment or a public opinion survey. It measures the number of individual samples measured or observations used in a survey or experiment. (Cochran, 1977)

The sample size was calculated by using the Sloven's formula

Sloven's formula state that: $n = N / (1+Ne^2)$.

$8/ (1+8*0.05^2) = 8$

N= 8, n=8

n is the sample size,

N is the population size and

e: margin of error or the probability of committing an error in selecting a small representative of the population

3.6 SAMPLE STRATEGY

(United Nations & United Nations, 2008), the strategy is the plan you set forth to be sure that the sample you use in your research study represents the population from which you drew your sample. The major groups of sample designs are probability sampling and non-probability sampling:

PROBABILITY SAMPLING: Includes some form of random selection in choosing the elements. Greater confidence can be placed in the representativeness of probability samples. This type of sampling involves a selection process in which each element in the population has an equal and independent chance of being selected Moreover, it will use in this study in selecting the respondents

randomly, there are some important for probability sampling like: reduces the chance of system error, minimize the chance of sampling bias and a better representative sample is produced using probability sampling technique

NON-PROBABILITY SAMPLING: the elements that make up the sample are selected by nonrandom methods. This type of sampling is less likely than probability sampling to produce representative samples. Even though this is true, researcher can and do use non-probability samples. furthermore, the non-probability sampling techniques are those based on straightforward sampling, judgment sampling and quota sampling techniques where a sample of participants or cases does not need to be representative, or random, but a clear rationale is needed for the inclusion of some cases or individuals rather than others. However, Purposive samplings will the type of non-probability sampling technique used. In the study, non-probability sampling will be introduced to avoid favoritism and to accumulate the accurate information accordingly

3.7 DATA ANALYSIS

The research data were collected and analyzed basing on research objectives and by descriptive research design. The data were analyzed by using Statistical Package for Social Sciences (SPSS) version 20 for survey data and the results obtained will be presented in form of tables, and evaluation of mean to examine the factors causing construction project delay and their impacts in Rwanda.

- **Quantitative Analysis:** Data collected through questionnaires were subjected to statistical analysis, including descriptive statistics. This analysis was identifying trends, correlations, and statistical significance among variables related to causes and impacts of delays.
- **Qualitative Analysis:** Qualitative data from interviews were undergoing thematic analysis to identify recurring themes and patterns related to the causes and impacts of construction project delays. Document analysis will complement this qualitative analysis.

The data were summarized and presented in form of frequency tables, percentages, and figures (bar charts and pie charts). After preliminary analysis, descriptive analysis will be used under this research

3.8 SCOPE AND LIMITATIONS OF THE PROJECT

The primary problem under investigation is the prevalence of construction project delays in GASABO district and their consequences, including financial implications, timeline disruptions, and stakeholder satisfaction. Limitations of the study may include data availability, response bias, and constraints in accessing certain project documents.

3.9 ETHICAL CONSIDERATIONS

The study were adhere to ethical guidelines, including obtaining informed approval from participants, ensuring data privacy and confidentiality, and treating all stakeholders with respect and fairness throughout the research process.

The aim of this study is to assess the causes and impact of construction project delays in Rwanda and researchers has selected Gasabo district as case study. Researcher used questionnaire as a method of collecting data and after data collection and data analysis, researchers drawn conclusion based on the findings of his study. Researchers treated the findings of their research with high level of confidentiality.

The aim of this chapter was to determine the research design and researcher were used descriptive research design to describe the major causes of construction project delay and qualitative data have been collected by using questionnaire and data have been analyzed by using different statistical methods and simple random sampling was the methodology used, after the analysis of the findings, conclusion and recommendations have been given

CHAPTER FOUR: PRESENTATION AND ANALYSIS OF RESULTS

4.0 INTRODUCTION

Data analysis has been defined as the process of bringing order, structure and meaning to the collected mass data (G.B. Rossman, 1990). The aim of data analysis and interpretation is to obtain the useful information from collected data.

The previous chapters have outlined the objectives, methodologies, and literature review of this research project, focusing on the causes and impact of construction project delay in Gasabo, Rwanda. This chapter concentrates on the analysis of data collected from the building construction industry in Gasabo, Rwanda, with a focus on the causes and their impact on building construction projects. The key objectives are to assess the causes of construction project delays, evaluate their impacts, and propose effective mitigation strategies and best practices for future projects.

4.1 GENERAL RESPONDENT RATES

The response rate is a key aspect of the study, indicating how effectively data was collected from the selected sample of building construction companies. While the study aimed to gather responses from 24 professionals across 8 companies, achieving a 100% response rate wasn't possible due to some non-response incidents, which prevented access to all personnel within these companies. The response rate achieved provides insights into the level of data collection success in this research.

Table4 1: responses rate

Response rate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Return	20	83.3	83.3	83.3
	Non return	4	16.7	16.7	100.0
	Total	24	100.0	100.0	

Source: primary data 2023

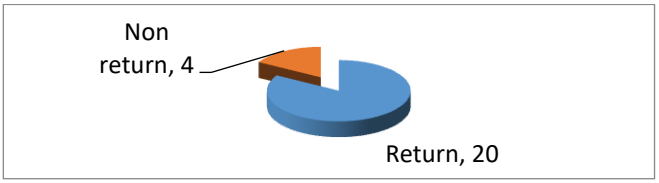


Figure4 1: Responses rate

Table 4.1 displays the number of questionnaires, both returned and unreturned. Remarkably, 83.3% of the distributed questionnaires received responses, indicating a notably high response rate. This suggests a strong willingness among recipients to engage and provide their input. Conversely, 16.7% of the distributed questionnaires went unanswered, indicating that a significant minority of recipients did not participate or decided not to respond.

4.2 GENERAL RESPONDENT DEMOGRAPHIC CHARACTERISTICS

In this section, we offer a thorough overview of the demographic details furnished by the participating respondents in our survey. This dataset offers valuable insights into the characteristics and backgrounds of the individuals who have contributed to our study, enabling us to place their responses into context and recognize patterns within the respondent profiles.

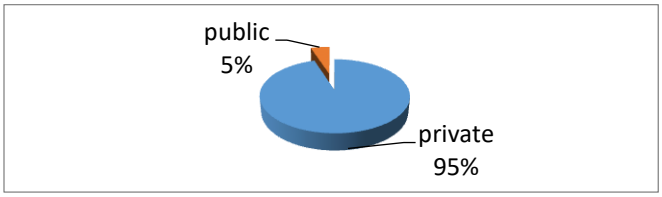
4.2.1 Respondents' sector of organization

In this part, the respondents were requested to specify the sector their organizations were based on between private and public.

Table4 2: organization sector

Organisation sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	public sector	1	5.0	5.0	5.0
	private sector	19	95.0	95.0	100.0
	Total	20	100.0	100.0	



Source: primary data 2023

Figure4 2: organization sector

In this instance, the survey mostly involved respondents from the private sector, with 19(95.5%) participants representing private organizations and only 1(5.0%) from the public sector. The limited representation of public sector professionals may result in a potential bias, as the study might not fully encompass the perspectives and experiences related to public sector construction projects.

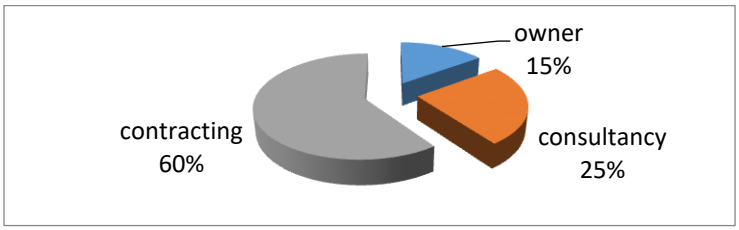
4.2.2 Distribution of respondents by project implementation

The data presented in Figure 4.3 indicates that a majority of the respondents were contractors, with consultants and owners representing smaller portions of the participants.

Table4 3: Respondents present project implementation

nature of respondents present project implementation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	owner	3	15.0	15.0	15.0
	consultancy	5	25.0	25.0	40.0
	contracting	12	60.0	60.0	100.0
	Total	20	100.0	100.0	



Source: primary data 2023

Figure4 3: Respondents present project implementation

Table 4.3 and Figure 4.3 display the distribution of respondents by their project implementation roles, indicating that 15% were owners, 25% were consultants, and 60% were contractors. This demonstrates that a substantial majority (83.3%) of construction companies were included in the

study. This finding show that all parties of building construction project were represented and this gives validity of data collected from respondents because all parties have been involved in research. It would be a problem if one party misses during data collection because the findings would become incomplete.

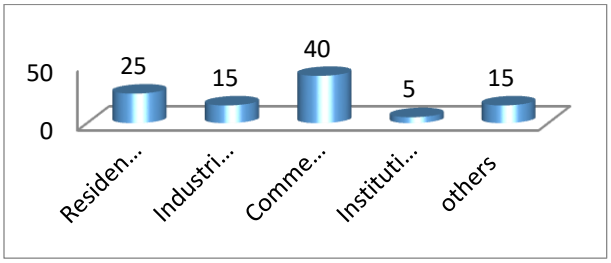
4.2.3 Type of projects handled by respondent

The survey results, as described in Figure 4.4, show that among the respondents in the building construction, 15.0% (n=3) handle residential projects, 40.0% (n=2) handle commercial projects, 5.0% (n=1) are involved in institutional projects, and none of the companies manage road projects

Table4 4: Types of project handled

Types of project handled

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	residential project	5	25.0	25.0	25.0
	industrial project	3	15.0	15.0	40.0
	commercial project	8	40.0	40.0	80.0
	institutional project	1	5.0	5.0	85.0
	other(specify)	3	15.0	15.0	100.0
	Total	20	100.0	100.0	



Source: primary data 2023

Figure4 4: Type of project handled

The data indicates that commercial projects are the most frequent, accounting for 40.0% of the projects, followed by residential projects at 25.0%. Industrial projects represent 15.0% of the total, while institutional projects make up 5.0%. Additionally, 15.0% of the projects are categorized as "other specified." This diverse distribution underscores the adaptability and range of projects undertaken by the construction companies surveyed, enabling them to meet a variety of project demands and objectives within the industry.

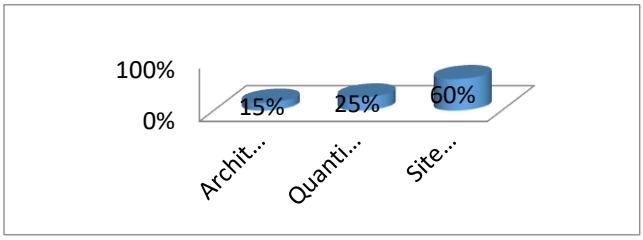
4.2.4 Results of profession of respondents

This contains the respondent's professions in construction and consultant companies. As indicated in the table below.

Table4 5: Profession of respondents

Profession of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	architecture	3	15.0	15.0	15.0
	quantity surveying	5	25.0	25.0	40.0
	site engineer	12	60.0	60.0	100.0
	Total	20	100.0	100.0	



Source: primary data 2023

Figure4 5: Profession of respondents

The majority of respondents, 60.0%, are site engineers, emphasizing their vital role in preventing construction project delays. Project management team members, site engineers, and project managers collectively represent diverse professional expertise essential for effective project management. Quantity surveyors make up 25.0% of the sample, while architects comprise 15.0%. This diversity underscores the collaborative approach necessary to effectively address and mitigate construction project delays.

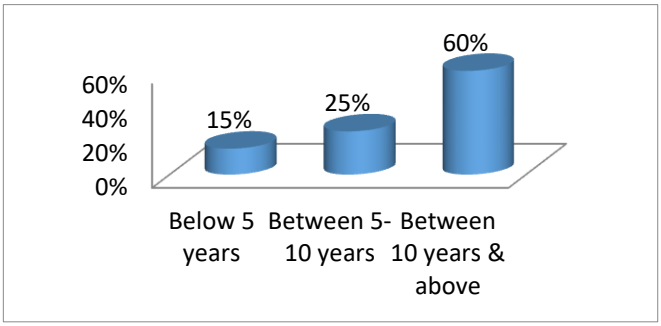
4.2.5 years of experience of respondents

The respondents' years of experience in construction project management range from less than 1 year and above. The following are the distribution of experience among the respondents.

Table4 6: Years of experience

Years of experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	below 5 years	3	15.0	15.0	15.0
	between 5-10 years	5	25.0	25.0	40.0
	between 10 years and above	12	60.0	60.0	100.0
	Total	20	100.0	100.0	



Source: primary data 2023

Figure4 6: Years of experience

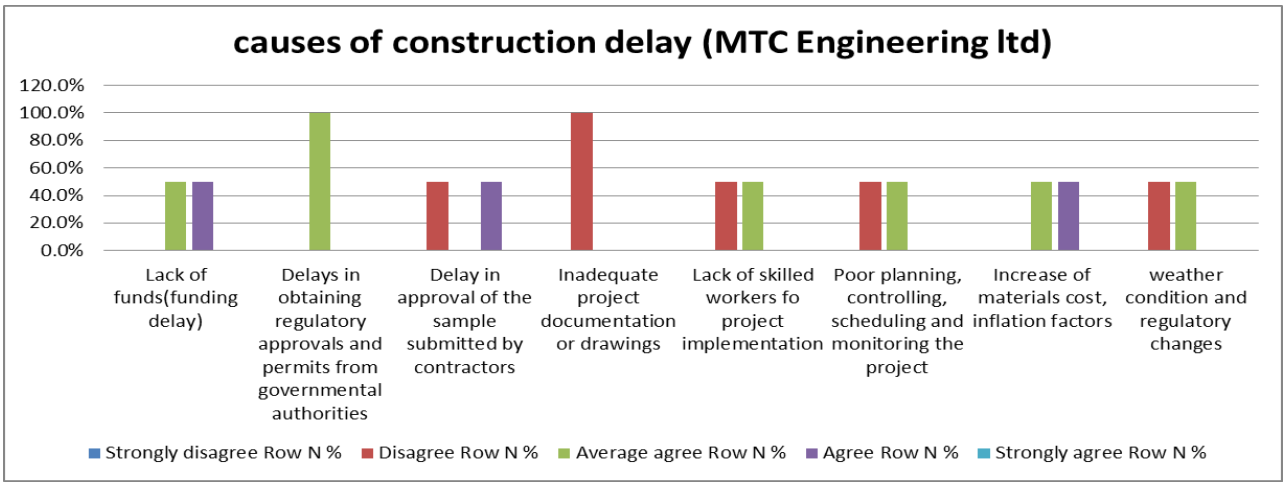
Figure 4.6 reveals that the distribution of respondents' years of experience plays a crucial role in avoiding delays in construction projects. It demonstrates that the majority of respondents (60%) possess significant experience, ranging from 10 years and above. This wealth of experience within the sample group is valuable for providing diverse perspectives, insights and assurance, contributing to effective project management and trusted information on project delays.

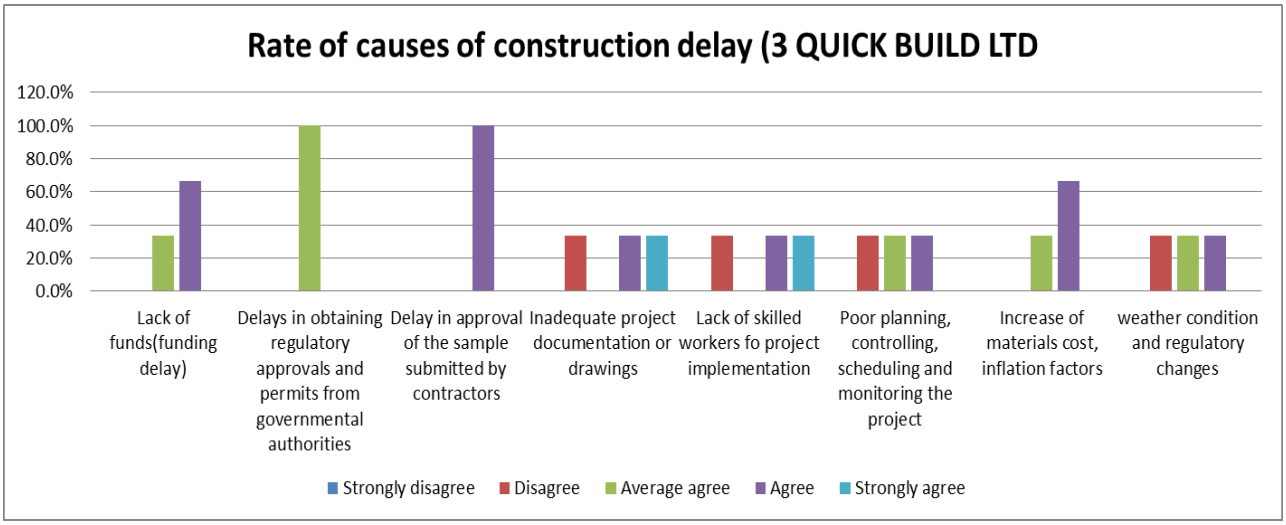
4.3 CAUSES AND IMPACT OF CONSTRUCTION PROJECT DELAY

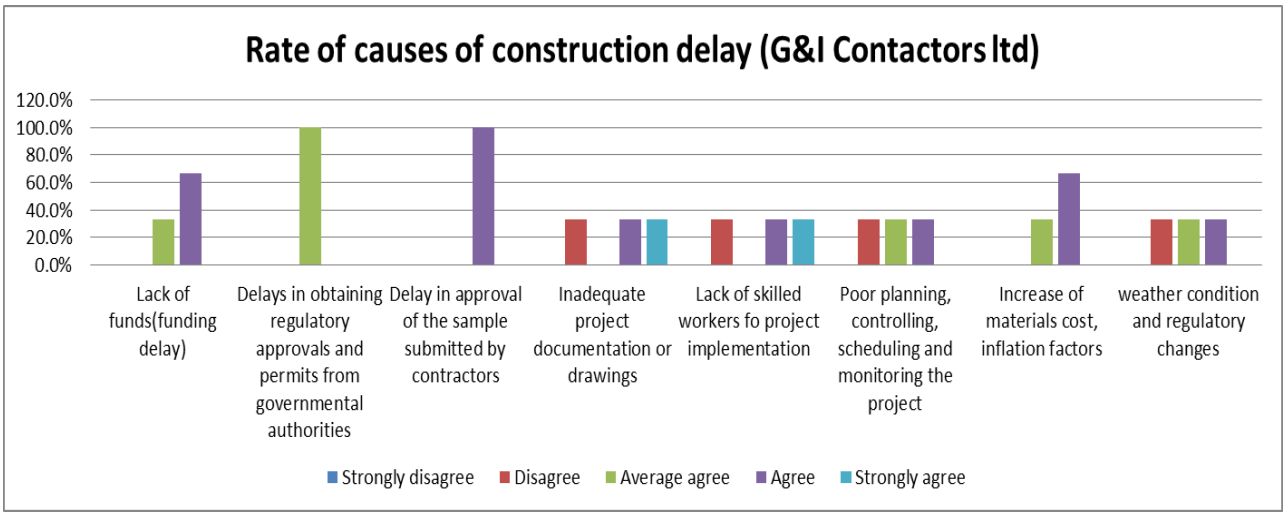
In this section, we present the findings related to our first objective: assessing the causes that have contributed to construction project delays in Rwanda. The responses from our survey participants provide insights into the factors responsible for these delays, evaluate their impacts, and offer suggestions for effective mitigation strategies and best practices in future projects.

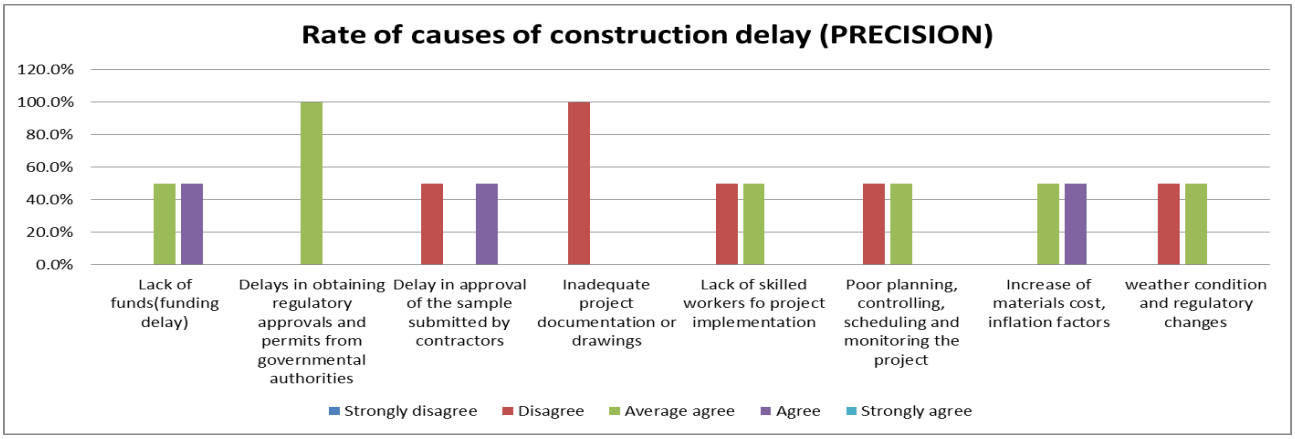
4.3.1 Frequency distribution on causes of construction project delay

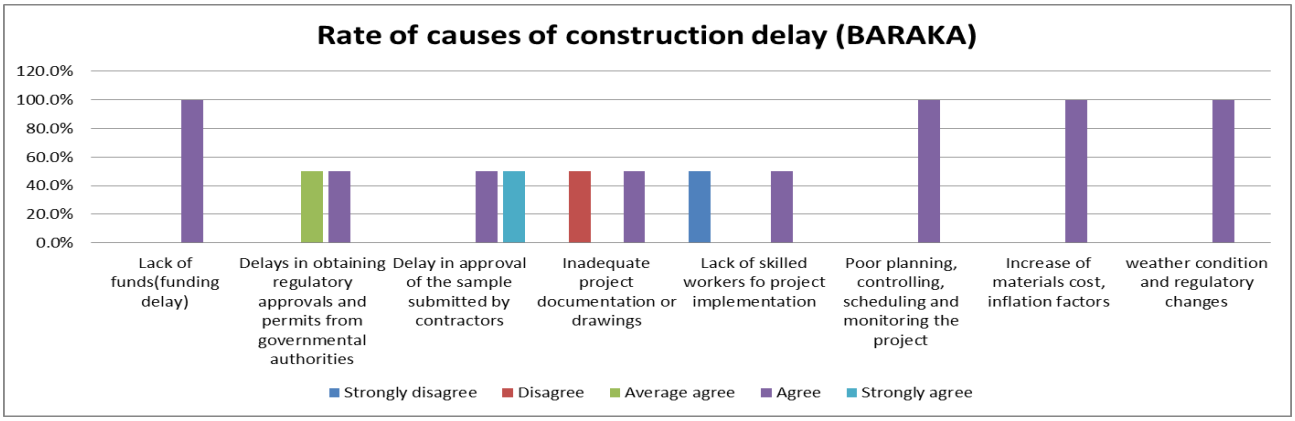
The following are the graph that confirms the causes of construction delay as agreed upon by respondents companies.

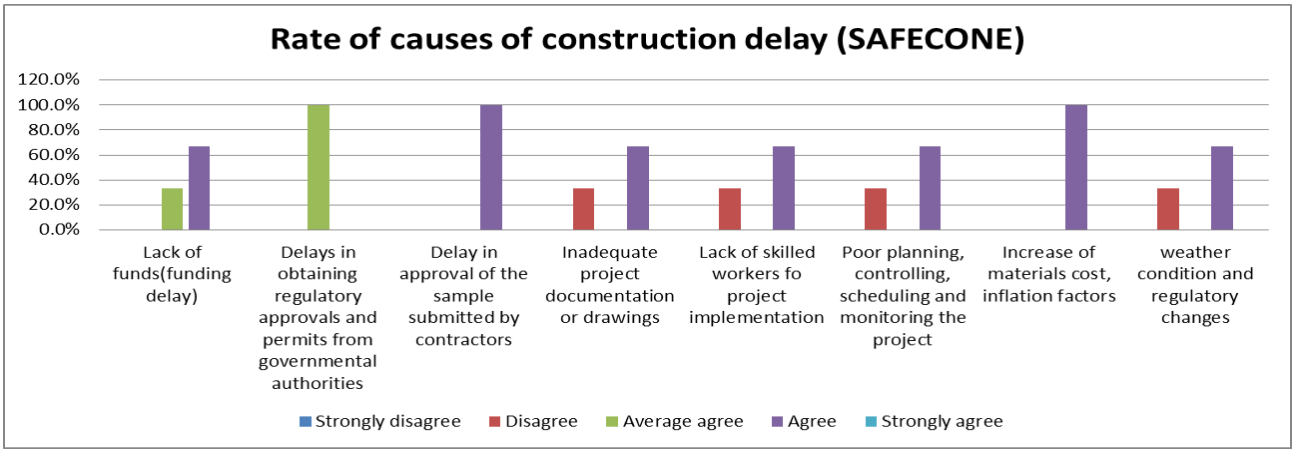


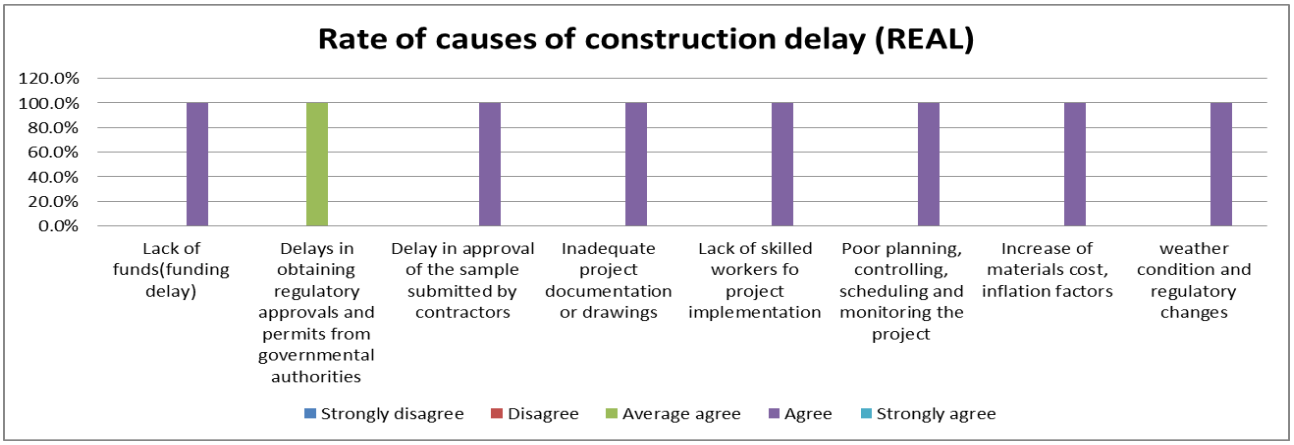





Rate of causes of construction delay (PRECISION)
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
Lack of funds(funding delay)
Delays in obtaining regulatory approvals and permits from governmental authorities
Delay in approval of the sample submitted by contractors
Inadequate project documentation or drawings
Lack of skilled workers fo project implementation
Poor planning, controlling, scheduling and monitoring the project
Increase of materials cost, inflation factors
weather condition and regulatory changes
Strongly disagree
Disagree
Average agree
Agree
Strongly agree


Rate of causes of construction delay (BARAKA)
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
Lack of funds(funding delay)
Delays in obtaining regulatory approvals and permits from governmental authorities
Delay in approval of the sample submitted by contractors
Inadequate project documentation or drawings
Lack of skilled workers fo project implementation
Poor planning, controlling, scheduling and monitoring the project
Increase of materials cost, inflation factors
weather condition and regulatory changes
Strongly disagree
Disagree
Average agree
Agree
Strongly agree


Rate of causes of construction delay (SAFECONE)
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
Lack of funds(funding delay)
Delays in obtaining regulatory approvals and permits from governmental authorities
Delay in approval of the sample submitted by contractors
Inadequate project documentation or drawings
Lack of skilled workers fo project implementation
Poor planning, controlling, scheduling and monitoring the project
Increase of materials cost, inflation factors
weather condition and regulatory changes
Strongly disagree
Disagree
Average agree
Agree
Strongly agree


Rate of causes of construction delay (REAL)
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
Lack of funds(funding delay)
Delays in obtaining regulatory approvals and permits from governmental authorities
Delay in approval of the sample submitted by contractors
Inadequate project documentation or drawings
Lack of skilled workers fo project implementation
Poor planning, controlling, scheduling and monitoring the project
Increase of materials cost, inflation factors
weather condition and regulatory changes
Strongly disagree
Disagree
Average agree
Agree
Strongly agree

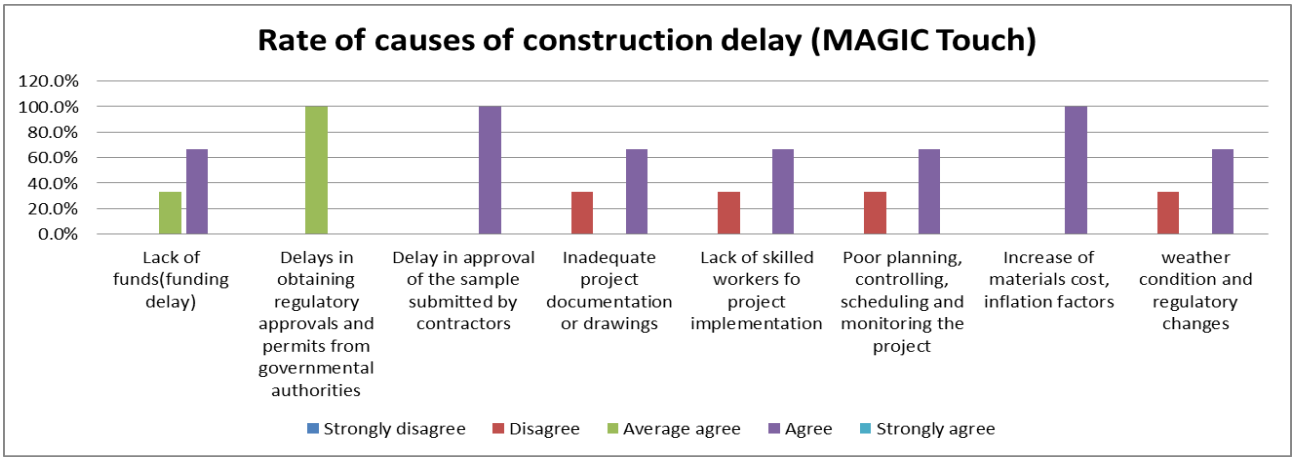


Figure4 7: 8(Eight) graph that show the rates of agreement of the companies

Figure 4.7 serves to separate the responses of the companies, individually highlighting their assessments of the causes of construction project delay, encompassing elements such as funding delays, regulatory approval delays, insufficient project documentation, and climatic factors, among others.

The results in Table 4.7 combine the opinions of respondents, bringing together the various figures that reflect their agreement on the causes of construction project delays. These causes include funding delays, regulatory approval delays, inadequate project documentation, and weather conditions, among others.

Table4 7: Causes of construction project delay

	Strongly disagree		Disagree		Average agree		Agree		Strongly agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Lack of funds(funding delay)	0	0.0%	0	0.0%	4	20.0%	16	80.0%	0	0.0%
Delays in obtaining regulatory approvals and permits from governmental authorities	0	0.0%	0	0.0%	18	90.0%	2	10.0%	0	0.0%
Delay in approval of the sample submitted by contractors	0	0.0%	2	10.0%	2	10.0%	16	80.0%	0	0.0%
Inadequate project documentation or drawings	0	0.0%	6	30.0%	0	0.0%	12	60.0%	2	10.0%
Lack of skilled workers fo project implementation	0	0.0%	4	20.0%	2	10.0%	10	50.0%	4	20.0%
Poor planning, controlling, scheduling and monitoring the project	0	0.0%	4	20.0%	4	20.0%	10	50.0%	2	10.0%
Increase of materials cost, inflation factors	0	0.0%	0	0.0%	6	30.0%	14	70.0%	0	0.0%
weather condition and regulatory changes	0	0.0%	4	20.0%	6	30.0%	10	50.0%	0	0.0%

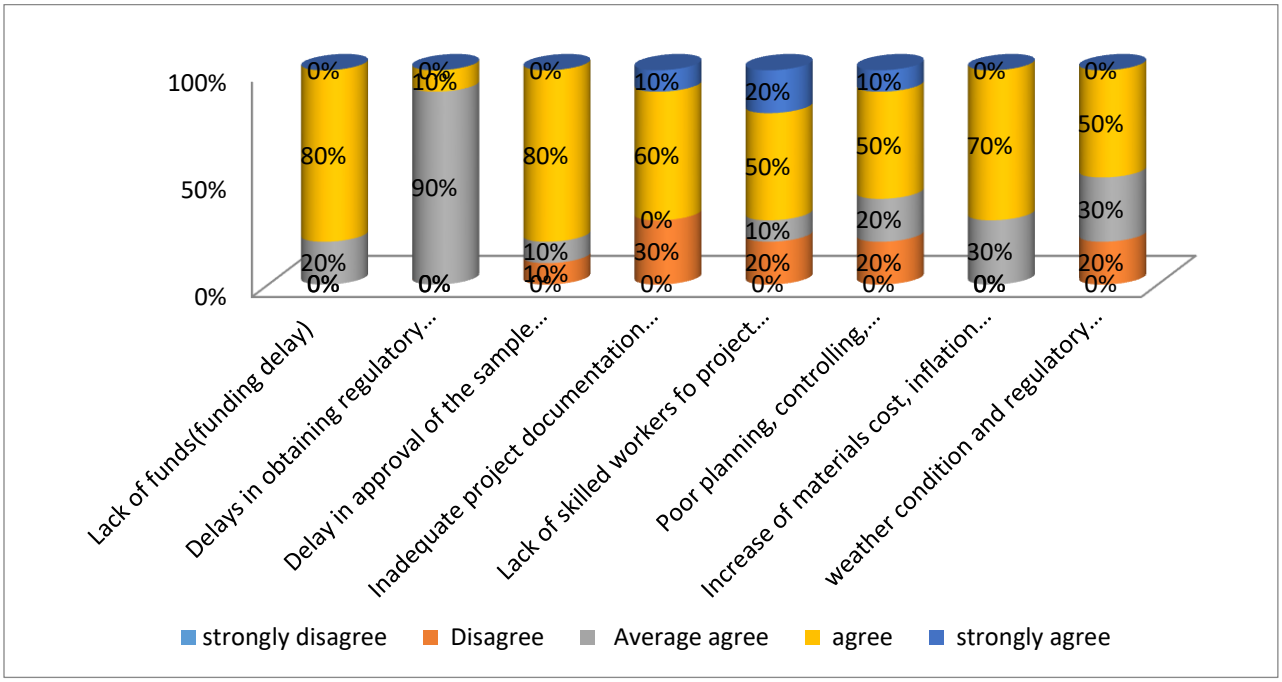


Figure4 8: Causes of construction project delay

The data in Table 4.7 and figure 4.8 provides insights into respondent ratings regarding various causes of construction project delays

Lack of funds (funding delay), none of respondents strongly disagreed or disagreed, with 80.0% in agree, and 20% in average agree, indicating a compromise on the significance of funding-related delays.

Delays in obtaining regulatory approvals and permits from governmental authorities the majority (90.0%) of respondent's average agreed that this is a significant cause, while 10.0% agreed.

Delay in approval of the sample submitted by contractors Similar to regulatory delays, 80.0% agreed that this is a significant cause, with 10% average agree and 10.0% in disagreement.

Inadequate project documentation or drawings, total of 60.0% agreed, 30.0% disagreed, and 10.0% strongly disagreed, indicating mixed perceptions.

Lack of skilled workers for project implementation balanced view, with 50.0% in agreement, 10.0% in average agreement, and 20.0% disagreeing.

Poor planning, controlling, scheduling, and monitoring the project, 50.0% agreed, 20.0% average agreed, and 20.0% disagreed.

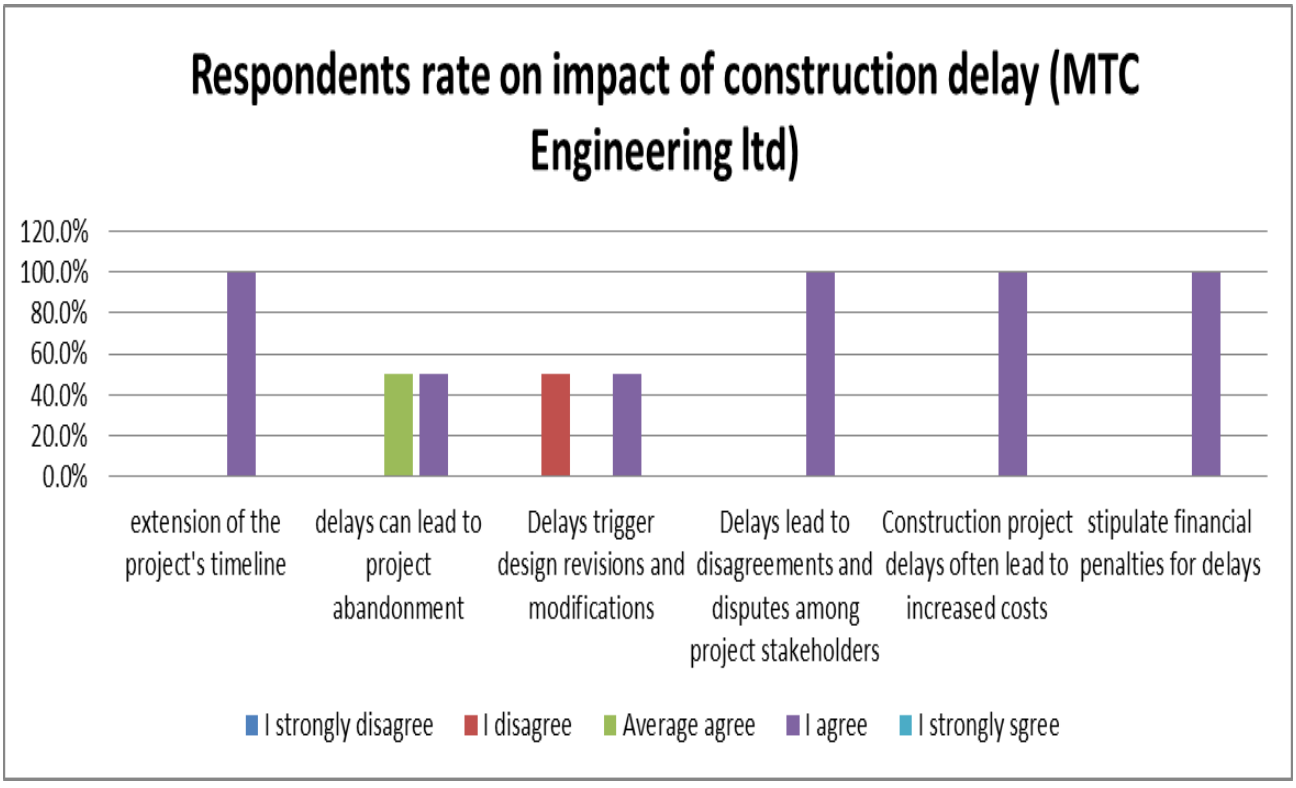
Increase of materials cost and inflation factors, total of 70.0% agreed, while 30.0% average agreed.

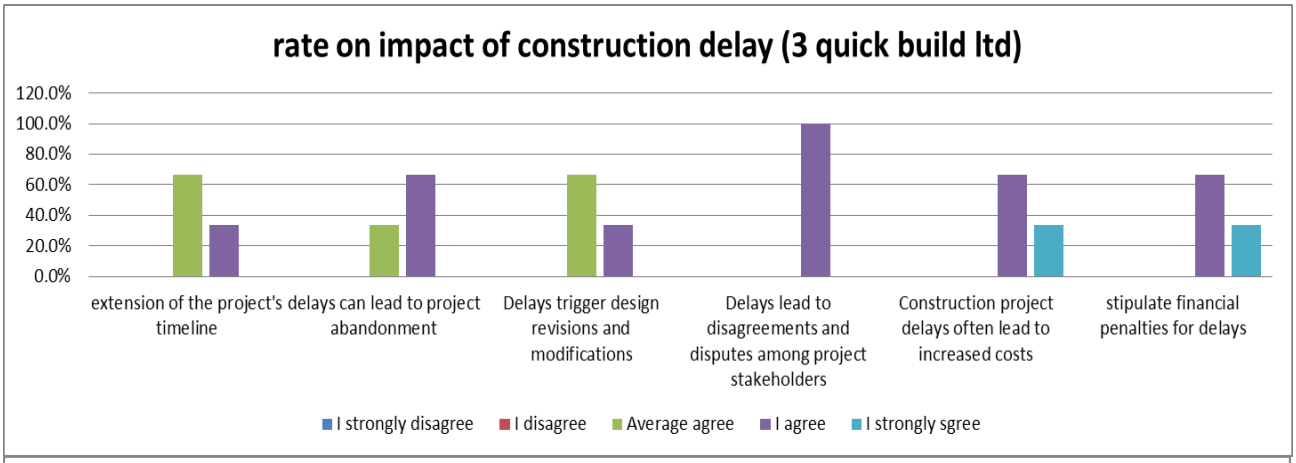
Weather conditions and regulatory changes, 50.0% agreed, 30% averages agree and 20.0% disagreed.

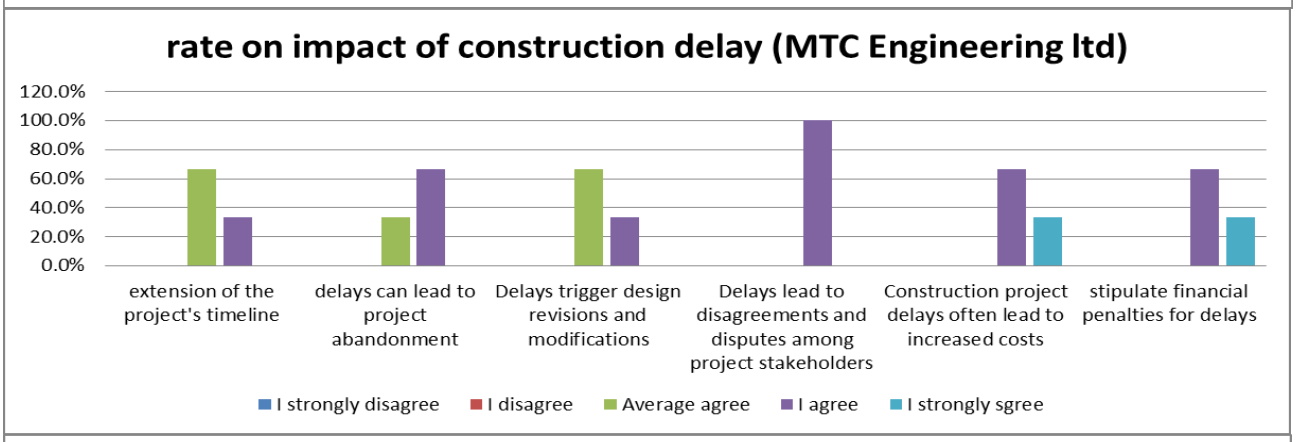
In conclusion, the causes of construction project delays, as ranked by the percentage of respondents who either "agree" or "strongly agree," reveal some crucial insights. "Lack of funds (funding delay)" takes the top spot, signifying a widely acknowledged issue that can significantly delay project progress instead of emphasizing the critical role of financial stability in timely project delivery. Following closely behind are "delays in obtaining regulatory approvals and permits from governmental authorities," "lack of skilled workers for project implementation," and "delay in approval of the sample submitted by contractors." these factors, when not addressed adequately, can lead to significant problems and delays in construction projects. Other factors, such as "increase of materials cost, inflation factors," "poor planning, controlling, scheduling, and monitoring the project," and "weather condition and regulatory changes," are also important contributors to delays and should not be ignored by project stakeholders. it is imperative for project teams to proactively address these issues to ensure smoother and more efficient project execution.

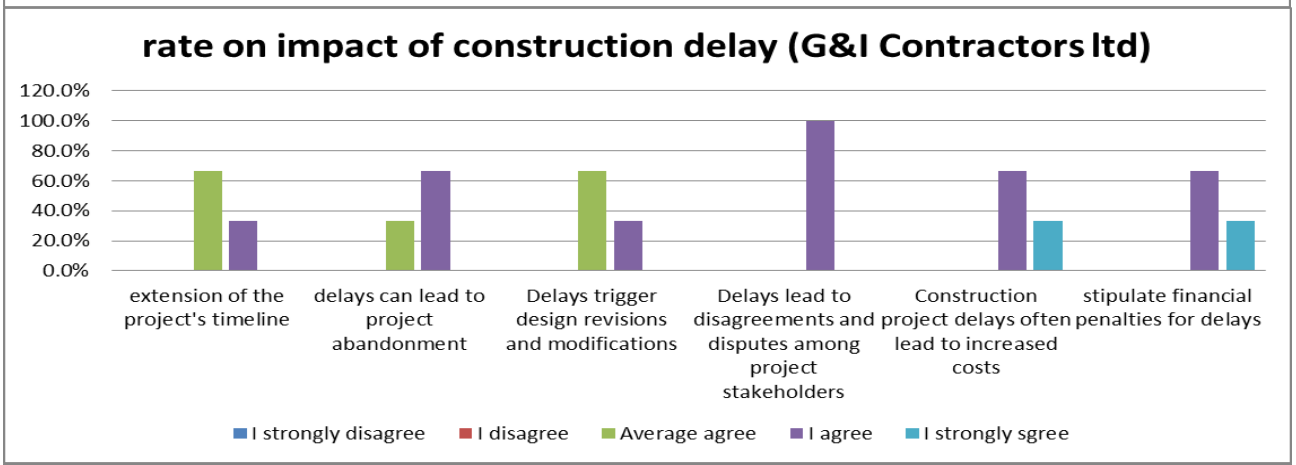
4.3.2 Frequency distribution on impact of construction project delay

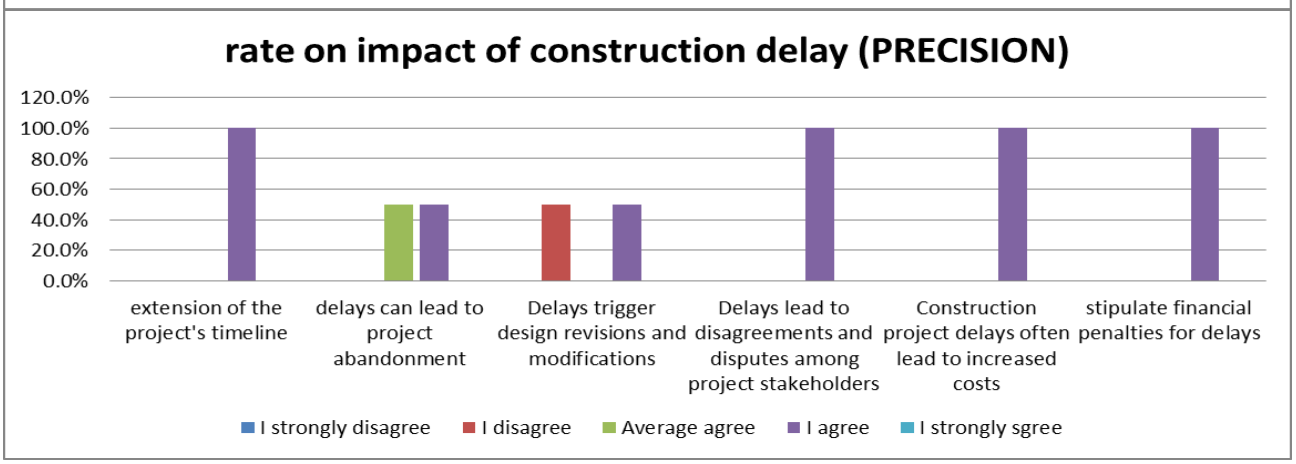
Here are the graphs that confirm the impact of construction delays, as agreed upon by the respondent companies:




rate on impact of construction delay (3 quick build ltd)
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
extension of the project's timeline
delays can lead to project abandonment
Delays trigger design revisions and modifications
Delays lead to disagreements and disputes among project stakeholders
Construction project delays often lead to increased costs
stipulate financial penalties for delays
I strongly disagree
I disagree
Average agree
I agree
I strongly sgree


rate on impact of construction delay (MTC Engineering ltd)
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
extension of the project's timeline
delays can lead to project abandonment
Delays trigger design revisions and modifications
Delays lead to disagreements and disputes among project stakeholders
Construction project delays often lead to increased costs
stipulate financial penalties for delays
I strongly disagree
I disagree
Average agree
I agree
I strongly sgree


rate on impact of construction delay (G&I Contractors ltd)
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
extension of the project's timeline
delays can lead to project abandonment
Delays trigger design revisions and modifications
Delays lead to disagreements and disputes among project stakeholders
Construction project delays often lead to increased costs
stipulate financial penalties for delays
I strongly disagree
I disagree
Average agree
I agree
I strongly sgree


rate on impact of construction delay (PRECISION)
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
extension of the project's timeline
delays can lead to project abandonment
Delays trigger design revisions and modifications
Delays lead to disagreements and disputes among project stakeholders
Construction project delays often lead to increased costs
stipulate financial penalties for delays
I strongly disagree
I disagree
Average agree
I agree
I strongly sgree

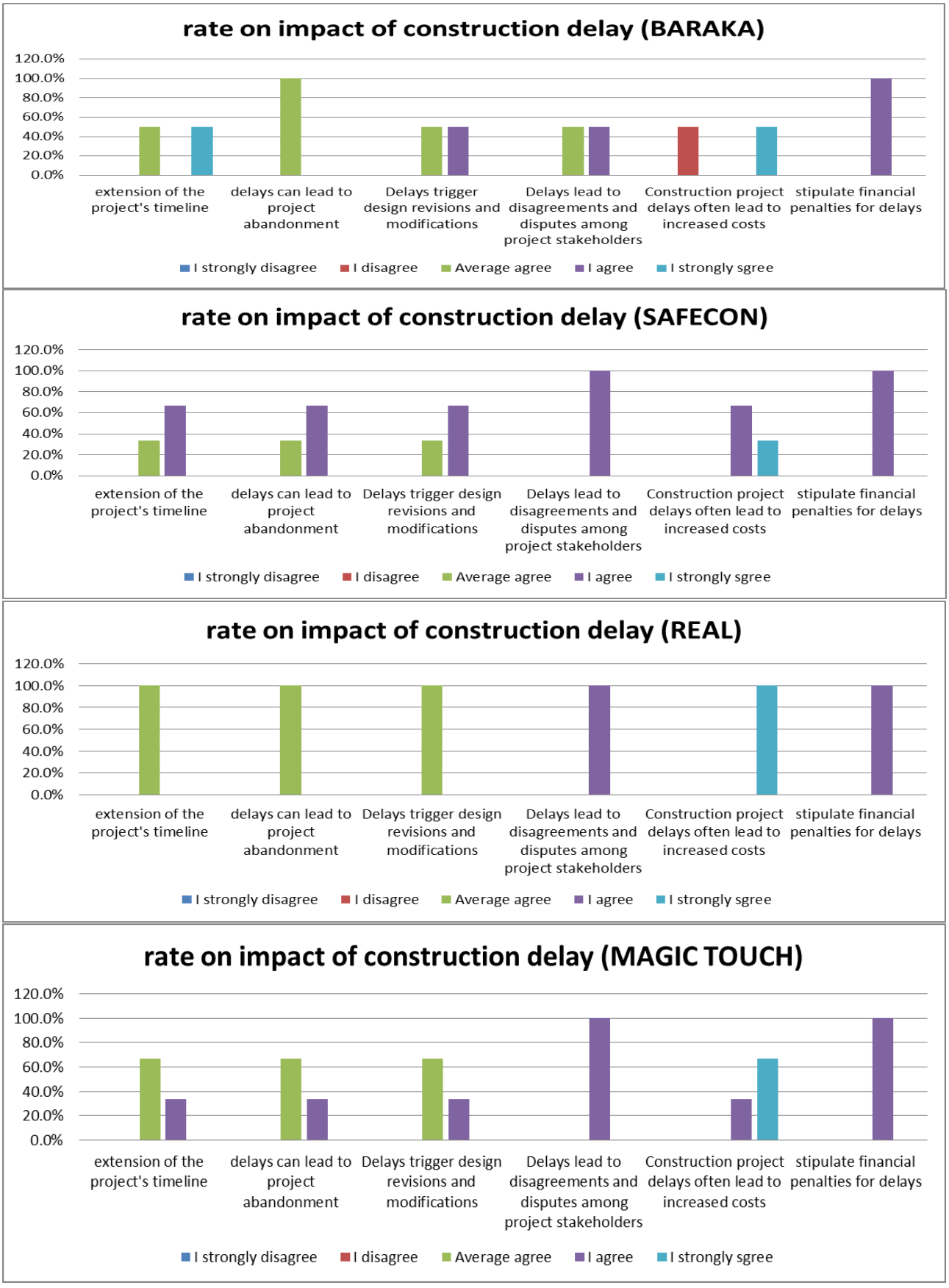


Figure4 9: 8(eight) graphs show the rates of agreement among the respondent companies

These figures provide insights into how the respondent companies observe the various impacts of construction delays, including extensions of the project's timeline, project abandonment, design revisions and modifications, disagreements and disputes among project stakeholders, increased project costs, and stipulating financial penalties for delays.

The results in Table 4.8 combine the opinions of respondents, summarizing their collective agreement on the impact of construction project delays.

Table4 8: Impact of construction project delay

	I strongly disagree		I disagree		Average agree		I agree		I strongly sgree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
extension of the project's timeline	0	0.0%	0	0.0%	11	55.0%	7	35.0%	2	10.0%
delays can lead to project abandonment	0	0.0%	0	0.0%	13	65.0%	7	35.0%	0	0.0%
Delays trigger design revisions and modifications	0	0.0%	2	10.0%	11	55.0%	7	35.0%	0	0.0%
Delays lead to disagreements and disputes among project stakeholders	0	0.0%	0	0.0%	2	10.0%	18	90.0%	0	0.0%
Construction project delays often lead to increased costs	0	0.0%	2	10.0%	0	0.0%	9	45.0%	9	45.0%
stipulate financial penalties for delays	0	0.0%	0	0.0%	0	0.0%	18	90.0%	2	10.0%

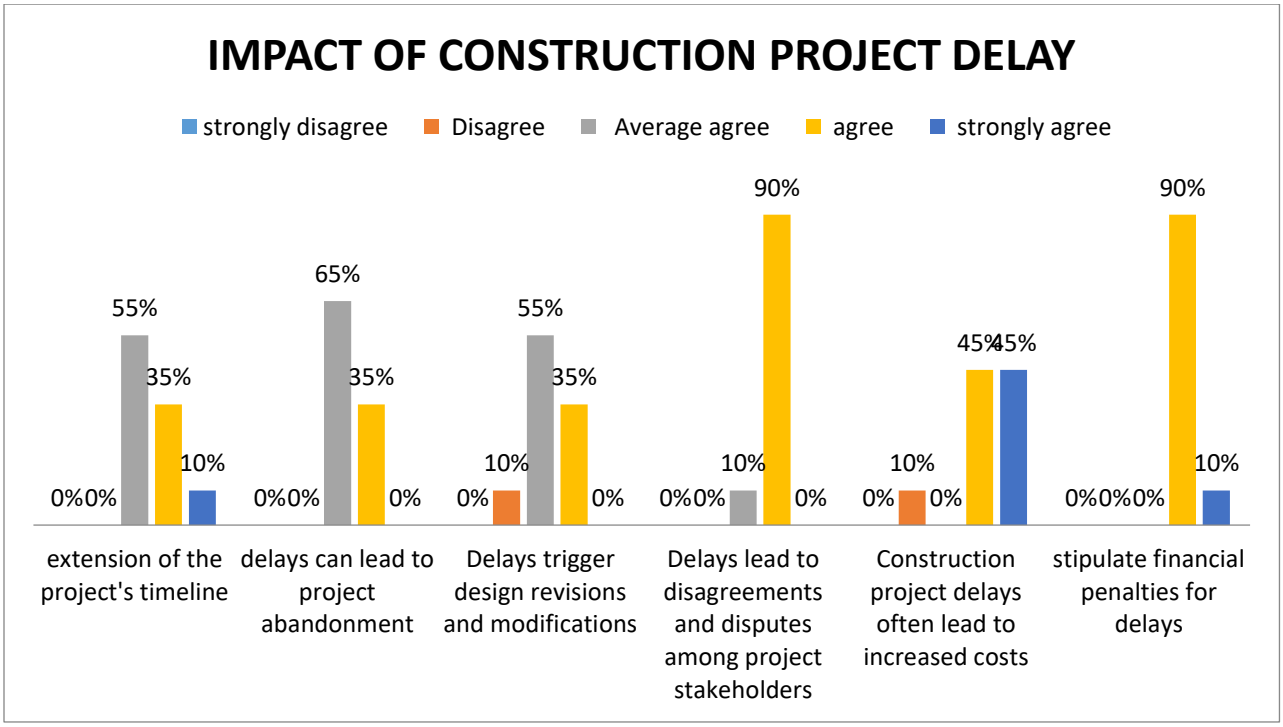


Figure4 10: Impact of construction project delay

The data in Table 4.8 and Figure 4.10 offers a comprehensive overview of respondent ratings on impact of construction project delays.

In Extension of the project's timeline none of the respondents strongly disagreed or disagreed with the idea that project delays might extend the project timeline. Instead, 55.0% were in average agree, 35.0% in agree, and 10.0% strongly agreed that this was a possibility.

Delays can lead to project abandonment; similarly, no respondents strongly disagreed or disagreed with the notion that project delays could lead to project abandonment. A significant 65.0% were in average agree, 35.0% in agree.

Delays trigger design revisions and modifications no respondents strongly disagreed, and only 10.0% disagreed with the idea that delays could lead to design revisions and modifications. A majority (55.0%) were in average agreement, 35.0% in agree.

Delays lead to disagreements and disputes among project stakeholders none strongly disagreed or disagreed, and only 10.0% had an average agree with the statement that delays lead to disagreements and disputes. A large 90.0% were in agreeing.

Construction project delays often lead to increased costs none strongly disagreed, but 10.0% disagreed with the opinion that delays lead to increased costs. A large 45.0% were in agreeing, and another 45.0% strongly agreed.

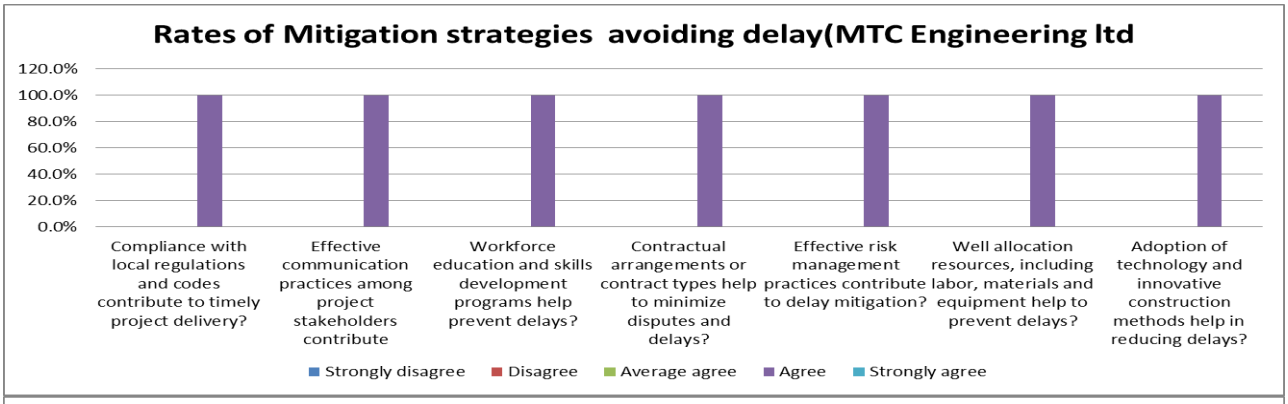
Stipulate financial penalties for delays, none strongly disagreed or disagreed, and none were in average agreement. A significant 90.0% were in agreeing, and 10.0% strongly agreed with the idea of stipulating financial penalties for delays.

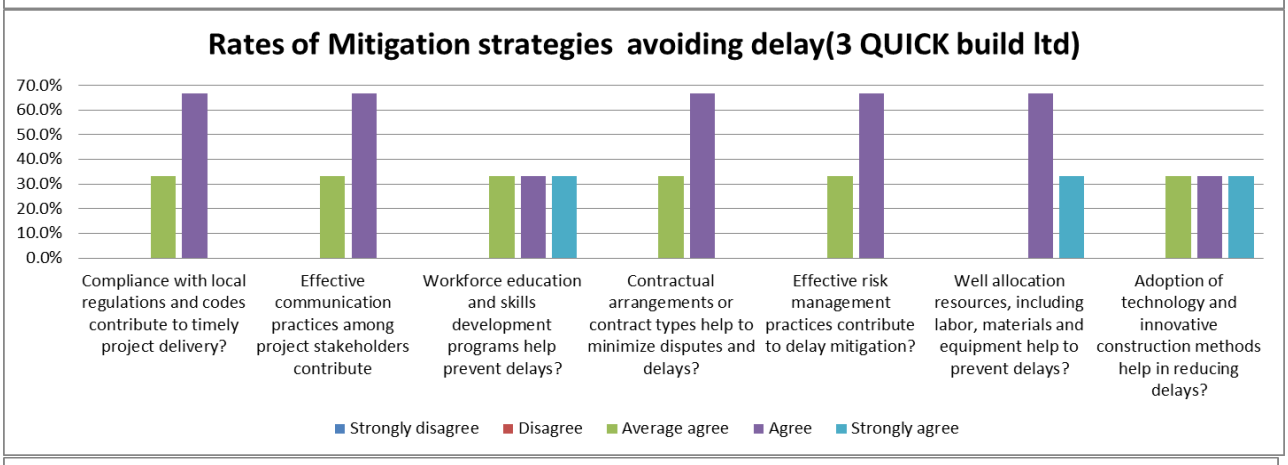
The data collectively highlights the general concern regarding construction project delays and the range of adverse effects they can trigger, from timeline extensions to financial effects. The high rate of agreement on stipulating financial penalties demonstrates an agreement on the need for positive measures to manage and mitigate these challenges. These findings are valuable for construction project management, as they emphasize the importance of addressing and preventing delays to ensure project success and efficiency.

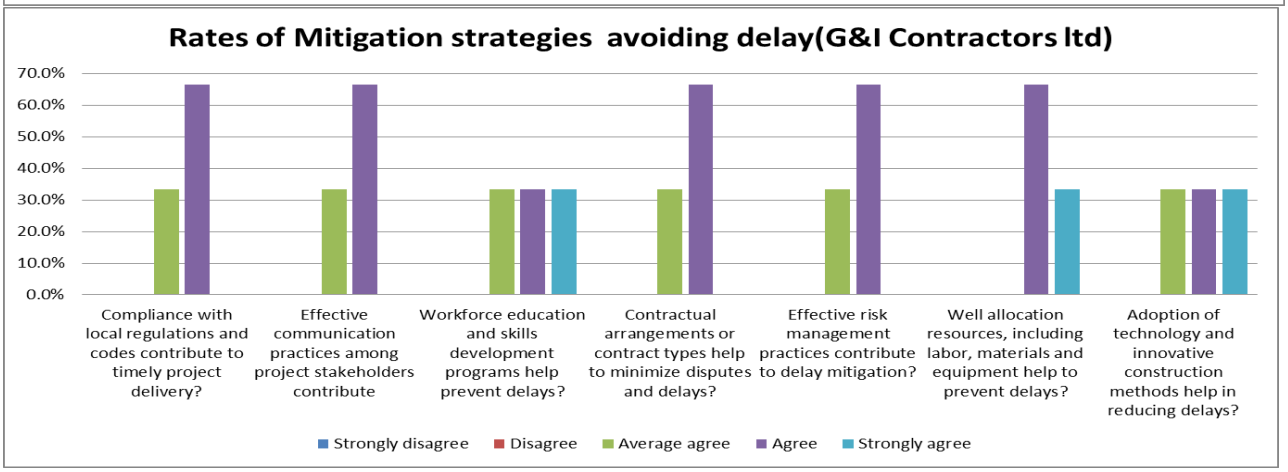
4.4 MITIGATION STRATEGIES AND BEST PRACTICES IN FUTURE PROJECTS TO PREVENT CONSTRUCTION PROJECT DELAYS

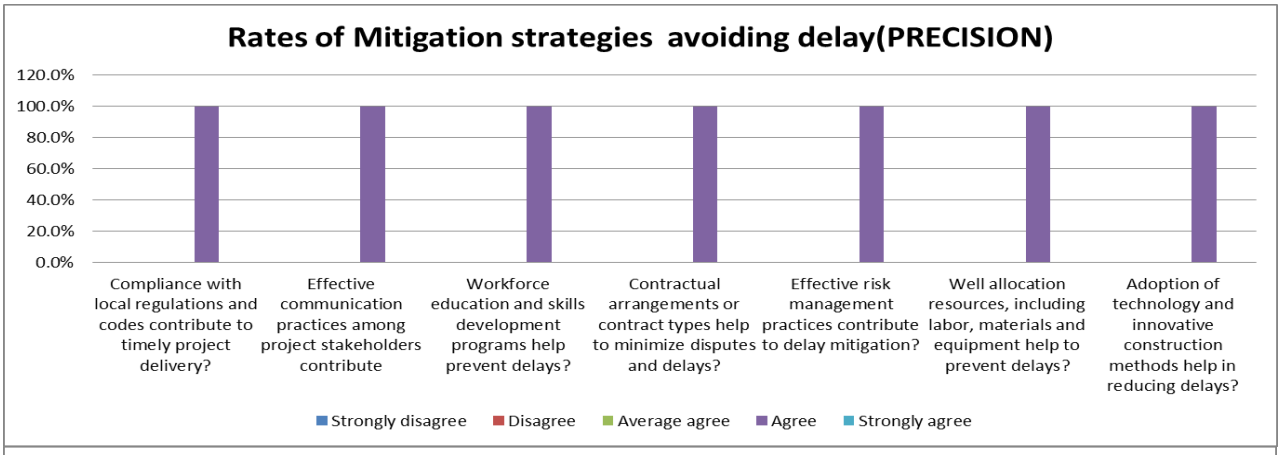
The following analysis will delve into their responses, categorizing them based on the level of agreement, which ranges from "Strongly Disagree" to "Strongly Agree." This exploration of their perspectives will shed light on the critical factors involved in mitigating construction project delays, offering valuable insights for the industry.

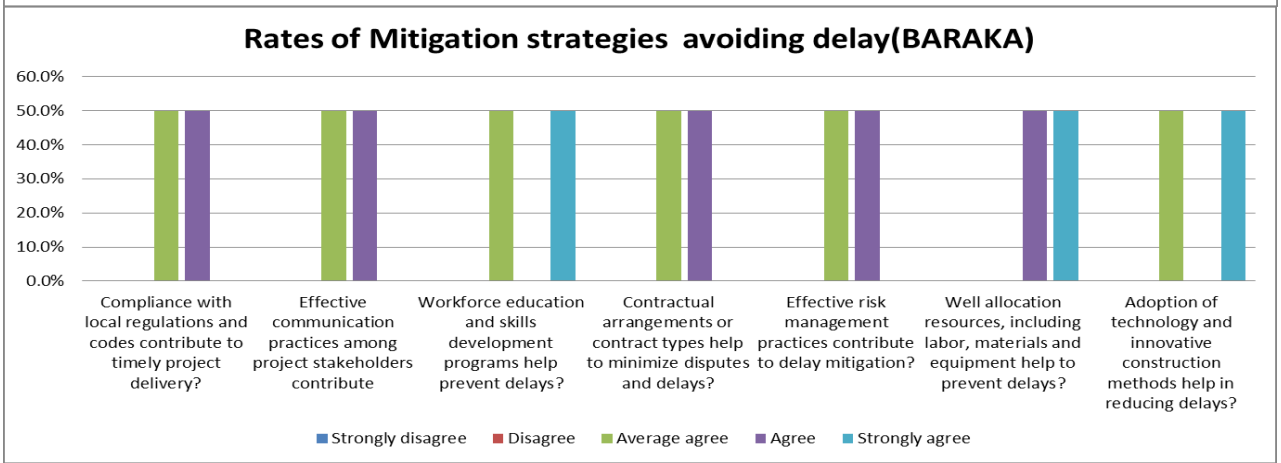
Here are the graphs that confirm the mitigation strategies and best practices in future project to prevent construction delays, as agreed upon by the respondent companies:

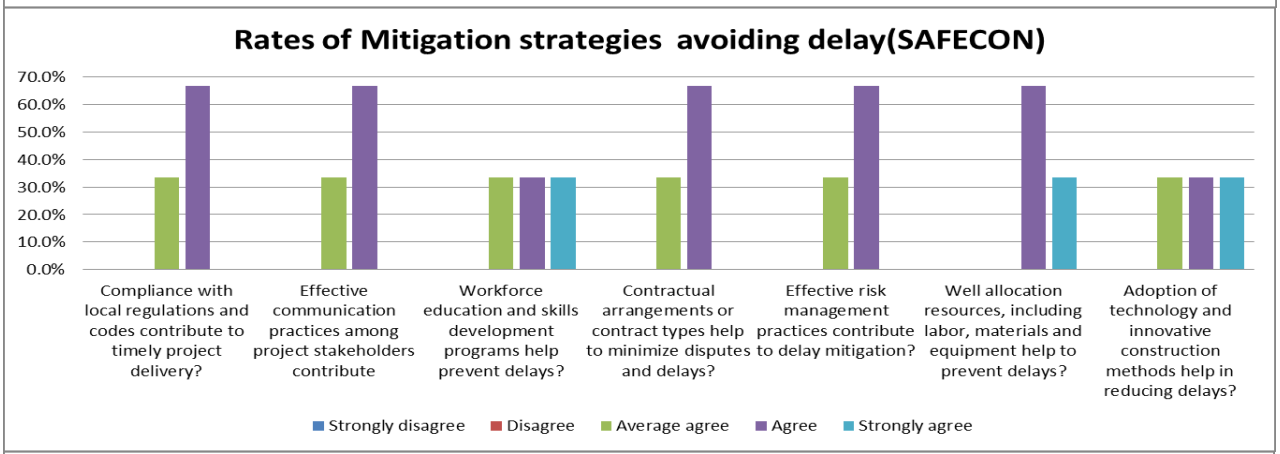


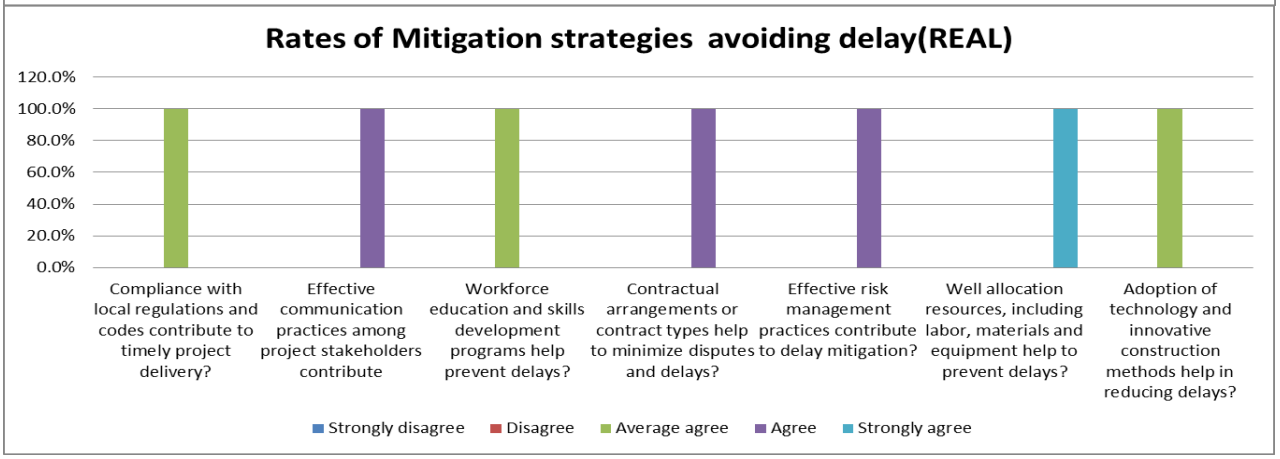





Rates of Mitigation strategies avoiding delay(PRECISION)
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
Compliance with local regulations and codes contribute to timely project delivery?
Effective communication practices among project stakeholders contribute
Workforce education and skills development programs help prevent delays?
Contractual arrangements or contract types help to minimize disputes and delays?
Effective risk management practices contribute to delay mitigation?
Well allocation resources, including labor, materials and equipment help to prevent delays?
Adoption of technology and innovative construction methods help in reducing delays?
Strongly disagree
Disagree
Average agree
Agree
Strongly agree


Rates of Mitigation strategies avoiding delay(BARAKA)
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Compliance with local regulations and codes contribute to timely project delivery?
Effective communication practices among project stakeholders contribute
Workforce education and skills development programs help prevent delays?
Contractual arrangements or contract types help to minimize disputes and delays?
Effective risk management practices contribute to delay mitigation?
Well allocation resources, including labor, materials and equipment help to prevent delays?
Adoption of technology and innovative construction methods help in reducing delays?
Strongly disagree
Disagree
Average agree
Agree
Strongly agree


Rates of Mitigation strategies avoiding delay(SAFECON)
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Compliance with local regulations and codes contribute to timely project delivery?
Effective communication practices among project stakeholders contribute
Workforce education and skills development programs help prevent delays?
Contractual arrangements or contract types help to minimize disputes and delays?
Effective risk management practices contribute to delay mitigation?
Well allocation resources, including labor, materials and equipment help to prevent delays?
Adoption of technology and innovative construction methods help in reducing delays?
Strongly disagree
Disagree
Average agree
Agree
Strongly agree


Rates of Mitigation strategies avoiding delay(REAL)
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
Compliance with local regulations and codes contribute to timely project delivery?
Effective communication practices among project stakeholders contribute
Workforce education and skills development programs help prevent delays?
Contractual arrangements or contract types help to minimize disputes and delays?
Effective risk management practices contribute to delay mitigation?
Well allocation resources, including labor, materials and equipment help to prevent delays?
Adoption of technology and innovative construction methods help in reducing delays?
Strongly disagree
Disagree
Average agree
Agree
Strongly agree

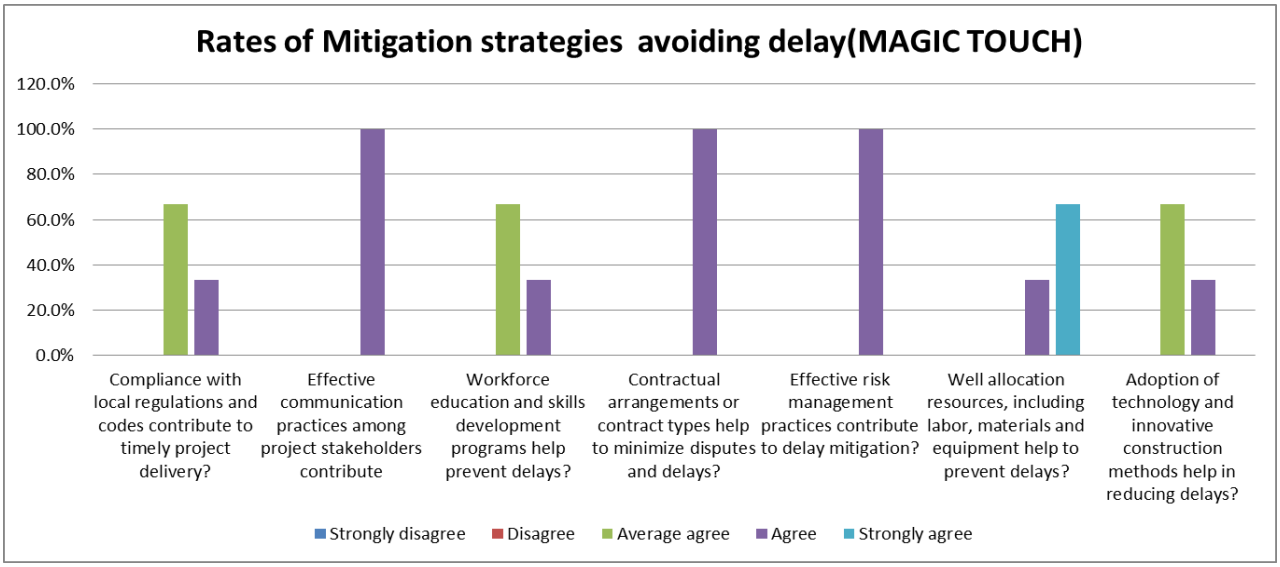


Figure4 11: 8(eight) graphs show the rates of agreement among the respondent companies on mitigation strategies

These figures compromise insights into how the respondent companies observe the effectiveness of various mitigation strategies for preventing construction delays, including compliance with local regulations and codes contribute to timely project delivery, effective communication practices among project stakeholders contribution, workforce education and skills development programs, Contractual arrangements or contract types, Effective risk management practices, Well allocation resources, including labor and materials and equipment, Adoption of technology and innovative construction methods.

Table4 9: mitigation strategies and best practice

	Strongly disagree		Disagree		Average agree		Agree		Strongly agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Compliance with local regulations and codes contribute to timely project delivery?	0	0.0%	0	0.0%	9	45.0%	11	55.0%	0	0.0%
Effective communication practices among project stakeholders contribute	0	0.0%	0	0.0%	5	25.0%	15	75.0%	0	0.0%
Workforce education and skills development programs help prevent delays?	0	0.0%	0	0.0%	9	45.0%	6	30.0%	5	25.0%
Contractual arrangements or contract types help to minimize disputes and delays?	0	0.0%	0	0.0%	5	25.0%	15	75.0%	0	0.0%
Effective risk management practices contribute to delay mitigation?	0	0.0%	0	0.0%	5	25.0%	15	75.0%	0	0.0%
Well allocation resources, including labor, materials and equipment help to prevent delays?	0	0.0%	0	0.0%	0	0.0%	11	55.0%	9	45.0%
Adoption of technology and innovative construction methods help in reducing delays?	0	0.0%	0	0.0%	9	45.0%	6	30.0%	5	25.0%

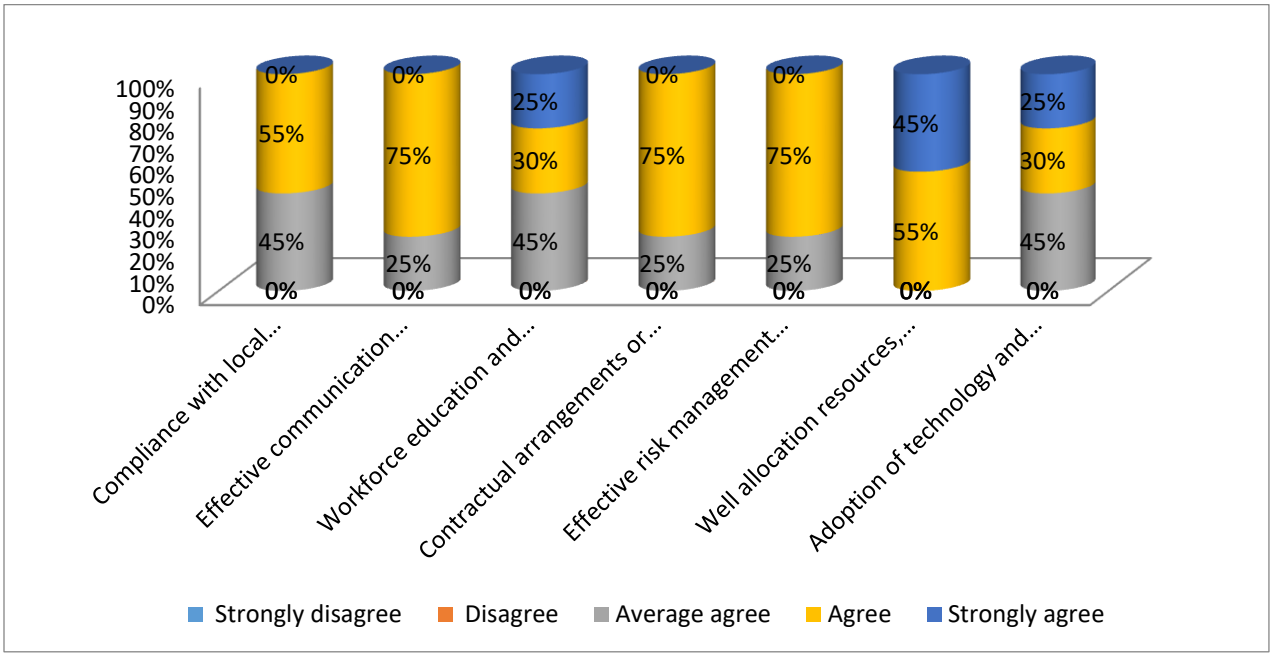


Figure4 12: mitigation strategies and best practice

The data in Table 4.9 and Figure 4.12 offers a comprehensive overview of respondent ratings on strategies to prevent construction project delays.

Compliance with local regulations and codes was notably favoured, with 45.0% of respondents in the "Average agree" category and an impressive 55.0% in the "Strongly agree" category, indicating its role in ensuring timely project delivery.

Effective communication practices among project stakeholders also garnered support, with 25.0% in the "Average agree" category and a substantial 75.0% strongly agreeing on their effectiveness in mitigating delays.

Workforce education and skills development programs showed mixed responses, with 45.0% in "Average agreement," 30.0% in "Agreement," and 25.0% strongly agreeing.

Contractual arrangements and contract types yielded results similar to effective communication practices, with 25.0% "Average agree" and 75.0% "Agree" regarding their role in reducing disputes and delays.

Similarly, effective risk management practices followed the same pattern, with 25.0% "Average agrees" and 75.0% "Agree" concerning their contribution to delay mitigation.

Well allocation of resources, including labour, materials, and equipment, received positive feedback, as 55.0% "Average agree" and 45.0% strongly agreed that it helps prevent delays.

However, the adoption of technology and innovative construction methods displayed mixed results, with 45.0% "Average agree," 30.0% "Agree," and 25.0% "Strongly agree" regarding their effectiveness in reducing delays.

The data highlights the importance of compliance with regulations, effective communication, and the adoption of innovative methods in reducing construction delays as majority. Building construction companies that implement these strategies and best practices can potentially prevent future construction delays, ensuring smoother project outcomes.

4.5 FREQUENCY DISTRIBUTION ON SPECIFIC TECHNOLOGIES OR INNOVATIONS THAT CAN BE IMPLEMENTED IN FUTURE PROJECTS FOR DELAY PREVENTION

The study evaluates various innovative approaches to address construction project delays, with a focus on advanced construction methods and advanced scheduling techniques emerging as particularly effective strategies. This research offers valuable insights for enhancing project management in the construction industry and improving timely project completion.

Table4 10: innovation technologies

	Not at all effective		Slightly effective		Moderately effective		Very effective		Extremely effective	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
advanced construction methods	2	10.0%	0	0.0%	3	15.0%	10	50.0%	5	25.0%
project management tools	1	5.0%	0	0.0%	19	95.0%	0	0.0%	0	0.0%
Advanced Scheduling Techniques	1	5.0%	0	0.0%	14	70.0%	5	25.0%	0	0.0%
Project Management Apps	1	5.0%	12	60.0%	2	10.0%	5	25.0%	0	0.0%
Lean Construction Practices	0	0.0%	0	0.0%	8	40.0%	12	60.0%	0	0.0%

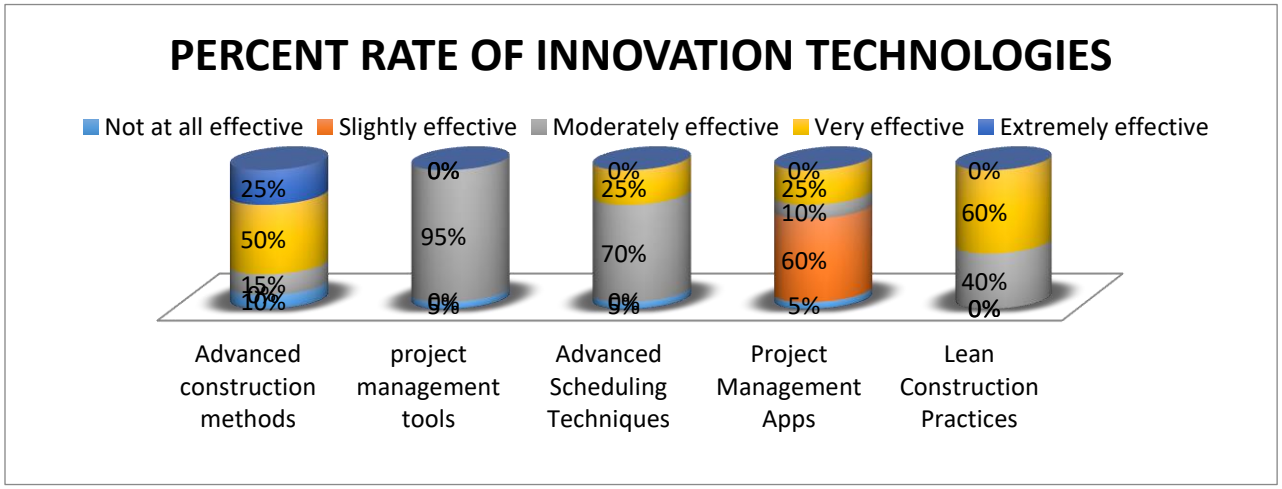


Figure4 13: innovation technologies

The data in table4.10 and figure4.13 analysis reveals varying opinions among respondents regarding the effectiveness of different specific innovation tools in preventing construction project delays. When it comes to advanced construction methods, only 10.0% considered them "Very effective," while 25.0% believed they were "Extremely effective." However, 15.0% found them "Moderately effective," and 10.0% rated them as "Not at all effective," demonstrating a division of views within the sample.

In contrast, project management tools received a resounding confirmation, with 95.0% of respondents viewing them as "Moderately effective" in mitigating construction delays. Notably, none of the participants considered them "Very effective" or "Extremely effective," reflecting an agreement on their overall helpfulness.

Advanced scheduling techniques saved approval from 70.0% of respondents, who rated them as "Moderately effective." A quarter of participants (25.0%) believed they were "Very effective," with a minority (5.0%) deeming them "Slightly effective." None of the respondents considered these techniques as "Not at all effective" or "Extremely effective," signifying a generally positive perception of their efficacy.

Project management apps produced mixed responses, with 10.0% of participants finding them "Moderately effective" and 25.0% regarding them as "Very effective." A small portion (60.0%) considered them "Slightly effective," while (5.0%) rated them as "Not at all effective" and none of rated them as "Extremely effective," indicating a varied range of opinions.

Regarding learn construction practices, 40.0% of respondents viewed them as "Moderately effective," while 60.0% saw them as "Very effective" in preventing construction project delays. None of the participants supposed them as "Slightly effective," "Not at all effective," or "Extremely effective." This data suggests that learn construction practices are generally well-regarded among respondents.

This study's findings highlight the importance of selecting and implementing effective specific innovation tools to prevent construction project delays, among the project management tools, learn construction practices, advanced construction methods, Project management apps and advance scheduling techniques were considered permanent popular effective but project management tools and advanced scheduling techniques being highly favored by respondents. To enhance project outcomes, it is recommended that construction teams consider incorporating these well-regarded approaches, supported by a strong agreement among industry professionals.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.0 INTRODUCTION

This chapter of the study aims at providing a summary of the study findings by making conclusions and recommendations. The study conclusions and recommendations done are based on the findings from the study objectives.

5.1 CONCLUSION

This research, conducted in Rwanda, has been instrumental in unraveling the complex web of causes, impacts, and mitigation strategies related to construction project delays. It successfully addressed the objectives, shedding light on the challenges faced by the construction industry in Rwanda.

This study revealed several underlying causes contributing to construction project delays in Rwanda. The most prevalent cause, as reported by survey participants, was the lack of funds (funding delay), with 50% of respondents acknowledging its significance. Delays in obtaining regulatory approvals and permits from governmental authorities and an increase in materials costs followed closely at 45%. The delay in the approval of samples submitted by contractors and inadequate project documentation were also recognized as critical factors, each garnering 40% and 30% of agreement, respectively. Weather conditions, regulatory changes, and poor project planning and control were additional contributors, further emphasizing the multifaceted nature of the problem. The multifaceted nature of the issue implies that both financial stability and regulatory efficiency play essential roles in timely project delivery.

This study delved into the impacts of construction project delays, clarifying the challenges and consequences faced by stakeholders. The study showed that delays always lead to the extension of project timelines (45%), with respondents recognizing this as a major concern. Project abandonment (40%) was another significant impact, underlining the risk associated with delays. Design revisions and modifications (35%), disagreements and disputes among project stakeholders (45%), increased project costs (45%), and the need to stipulate financial penalties for delays (50%) further accentuated the substantial ramifications of construction delays. These findings emphasize the broad spectrum of challenges that affect both projects and stakeholders, underscoring the importance of timely project delivery.

To address the challenges posed by construction project delays, our study recommended several mitigation strategies and innovative best practices. Effective communication practices (75%) were highly favored by respondents, emphasizing their roles in ensuring timely project delivery. Project management tools and advanced scheduling techniques (75%) emerged as highly regarded in this context, signifying their importance in preventing delays. The adoption of technology and innovative construction methods (60%) received varied responses, indicating the need for further assessment. Compliance with local regulations and codes (55%), Clear contractual arrangements and the allocation of resources (45%) received recognition as essential components of delay mitigation and Workforce education and skills development programs, although showing mixed responses, were deemed important by 25% of respondents. Clear contractual arrangements and the allocation of resources (45%) received recognition as essential components of delay mitigation.

By focusing on these objectives and taking proactive measures to address the identified causes and impacts, Rwanda's construction industry can try towards enhanced project management, reduced delays, and overall economic growth. Collaboration among stakeholders, including the government, construction companies, and academic institutions, will be pivotal in the successful implementation of these recommendations, ultimately leading to smoother project outcomes and an improved construction sector in Rwanda.

5.2 RECOMMENDATION OF THE STUDY

Based on the findings of the study, construction industry in Rwanda is still facing the problem of delay and to minimize the causes of delays, the efforts of each party of construction project is needed. By looking to the findings of research, to avoid causes of construction projects delays are impossible but to minimize the causes of delays and their impacts are possible, because it is impossible to avoid external factors of delays and their effects but it is possible to minimize the causes of delays and their effects of construction projects on the side of parties of the projects (owners, consultants and contractors) and also in collaboration with government.

To minimize the causes of delays and their impacts in Rwandan construction projects, there should be complete planning and controlling of building construction projects by owners, there should be complete methodology of selecting parties of construction projects and the owners should be planned based on the funds available to avoid irregular cash flows and delays of payments. As inflation and materials cost increase are out of control of parties of the projects, during planning and in contracts documents, embrace modern project management practices and tools to enhance

planning, scheduling, and monitoring. Use project management apps and software for better project control and they should include clause of how parties will deal with this situation when happened during implementation process.

5.3 SUGGETIONS FOR FURTHER STUDY

Basing on research findings and problems and limitations encountered in this research, the following should be considered for future research:

1. Assessment of the innovation strategies and techniques for avoiding delay in Rwanda
2. Critical success factors of construction projects in Rwanda

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APPENDICES A: RESEARCH QUESTIONNAIRE

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To : Respondents

Dear respondents,

RE: Request to respond to our Questionnaire

We are writing to request for your responses to the Questionnaire attached to this letter.

In fact, we are in partial fulfilment of the requirement of Advanced Diploma in **DEPARTMENT OF CIVIL ENGINEERING, OPTION OF QUANTITY SURVEYING** in Rwanda Polytechnic-IPRC HUYE with approval research in academic year 2022-2023. We are conducting research **TO ASSESS THE CAUSES AND IMPACT OF CONSTRUCTION PROJECT DELAY IN RWANDA in context of GASABO district as CASE STUDY.** As partial fulfilment for award of advanced diploma in quantity surveying, we have done a request for your assistance in responding to this questionnaire and assure you that data collected here which will be specially used for academic purpose and will be kept confidential for any clarification you can contact our phone on**.**

Your assistance in answering this questionnaire and obligation replying is highly appreciated.

Yours faithfully,

Robert MUGABE,

MUNYURAGABO Origine

DEFINITION OF KEY TERMS

Here are some key terms from the questionnaire along with their definitions to help respondents understand them.

1. **Construction Project Delay**: Construction project delay refers to any situation where the planned timeline for a construction project is extended or delayed beyond the initially established schedule.
2. **Scope Changes**: Scope changes in construction refer to alterations or additions to the project's original design or objectives that can impact the project's timeline and budget.
3. **Design Modifications**: Design modifications involve changes made to the architectural or engineering plans of a construction project, which may affect the project's progress.
4. **Unforeseen Conditions**: Unforeseen conditions are unexpected circumstances or issues that arise during construction, such as discovering hidden structural problems or encountering hazardous materials.
5. **Market Fluctuations**: Market fluctuations pertain to changes in the costs of construction materials and labor due to economic factors, which can influence a project's budget and timeline.
6. **Cost-Saving Measures:** Cost-saving measures are strategies or actions taken to reduce construction expenses, potentially mitigating budget increases and delays.
7. **Value Engineering Initiatives**: Value engineering initiatives involve efforts to optimize the project's design, materials, and processes to achieve cost savings without compromising quality.

RESPONSE BIBLIOGRAPHY

- Respondents' name:
- Position/Job Title:
- Company/Organization name:

SECTION A: GENERAL RESPONDENT INFORMATION

1. Tick with (√) to the correct option selected among the options provided for each question below.

I. Which sector is your organization based in?

a. Public sector ☐

b. Private sector ☐

II. What is the nature of your present job?

a. Owner ☐

b. Consultancy ☐

c. Contracting ☐

III. What type of projects do you handle?

a. Residential project ☐

b. Road project ☐

c. Industrial project ☐

d. Commercial project ☐

e. Institutional project ☐

IV. Which best describes your profession?

a. Architecture ☐

b. Quantity surveying ☐

c. Site engineer ☐

V. What are the academic qualification

a. Advanced diploma holder ☐

b. Bachelor degree holder ☐

c. master degree holder ☐

VI. How long have you worked in construction industry? (Years of professional experience)

a. Below 5 years ☐

b. Between 5-10 years ☐

c. between 10 years and above ☐

VII. What are the gender of respondents

a. male ☐

b. female ☐

SECTION B: SURVEY QUESTION

Topic: assessment of causes and impact of construction project delays in Rwanda.(case study: GASABO District)

1. Regarding your career experiences, please select the option that best describes your encounters with construction delay problems:

   Frequently ☐

   Occasionally ☐

   Rarely ☐

   Never ☐

2. According to your experience the following are causes of construction project delays?

   You are required to answer by using:

   1) strongly disagree
   2) Disagree
   3) Average agree
   4) agree
   5) strongly agree

   a. Lack of funds(funding delay) ☐

   b. Delays in obtaining regulatory approvals and permits from governmental authorities ☐

   c. Delay in approval of the sample submitted by contractors ☐

   d. Inadequate project documentation or drawings ☐

   e. Lack of skilled workers fo project implementation ☐

   f. Poor planning, controlling, scheduling and monitoring the project ☐

   g. Increase of materials cost, inflation factors ☐

h. weather condition and regulatory changes ☐

3. According to your experience the following are impact of construction project delays

NB: answer by choosing one of the following based on your experience

1) Strongly disagree
2) Disagree
3) Average agree
4) Agree
5) Strongly agree

a. extension of the project's timeline ☐
b. delays can lead to project abandonment ☐
c. Delays trigger design revisions and modifications ☐
d. Delays lead to disagreements and disputes among project stakeholders ☐
e. Construction project delays often lead to increased costs ☐
f. stipulate financial penalties for delays ☐

4. According to your experience, what are the mitigation strategies and best practices in future projects to prevent construction project delays

NB: answer by choosing one of the following based on your experience

1. Strongly disagree
2. Disagree
3. Average agree
4. Agree
5. Strongly agree

a. Compliance with local regulations and codes contribute to timely project delivery? ☐
b. Effective communication practices among project stakeholders contribute ☐
c. Workforce education and skills development programs help prevent delays? ☐
d. Contractual arrangements or contract types help to minimize disputes and delays? ☐
e. Effective risk management practices contribute to delay mitigation? ☐
f. Well allocation resources, including labor, materials and equipment help to prevent delays? ☐
g. Adoption of technology and innovative construction methods help in reducing delays ☐

5. What do you propose as specific technologies or innovations that you suggest implementing in future projects for delay prevention in GASABO district?

   NB: answer by choosing one of the following based on your experience

   1. Not at all effective
   2. Slightly effective
   3. Moderately effective
   4. Very effective
   5. Extremely effective

      a. advanced construction methods ☐
      b. , project management tools ☐
      c. Advanced Scheduling Techniques ☐
      d. Project Management Apps ☐
      e. Learn Construction Practices ☐

Thanks for your cooperation and support!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!