AN INVESTIGATION OF MAJOR FACTORS LEADING TO TIME AND COST OVERRUNS OF PUBLIC SECTOR DEVELOPMENT PROJECTS IN PAKISTAN

By

IQRA TARIQ

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF
MASTER OF PHILOSOPHY IN GOVERNANCE AND PUBLIC POLICY

TO

DEPARTMENT OF GOVERNANCE AND PUBLIC POLICY
FACULTY OF SOCIAL SCIENCES

NATIONAL UNIVERSITY OF MODERN LANGUAGES, ISLAMABAD

_____ 2025

NATIONAL UNIVERSITY OF MODERN LANGUAGES

FACULTY OF SOCIAL SCIENCES

THESIS AND DEFENCE APPROVAL FORM

The undersigned certifies that he has read the following thesis, examined the defense, is satisfied with the overall exam performance, and recommends the thesis to the Faculty of Management Sciences for acceptance:

Thesis/ Dissertation Title:

AN INVESTIGATION OF MAJOR FACTORS LEADING TO TIME AND COST OVERRUNS OF PUBLIC SECTOR DEVELOPMENT PROJECTS IN PAKISTAN

Submitted By: **IQRA TARIQ** Registration No: **10Mphil/GPP/F22**

Name of Student

Masters of Philosophy
Degree name in full

Governance and Public Policy
Name of Discipline

Dr. Shahid Habib _____
Name of research supervisor Signature of Research Supervisor

Prof. Dr. Muhammad Raiz Shad _____
Name of Dean (FSS) Signature of Dean FSS

Date: _____

NATIONAL UNIVERSITY OF MODERN LANGUAGES

FACULTY OF SOCIAL SCIENCES

CANDIDATE DECLARATION FORM

I, **IQRA TARIQ**

Daughter of **MUHAMMAD TARIQ**

Registration No. **10Mphil/GPP/F22**

Discipline of **Governance and Public Policy**

Candidate of **Master of Philosophy** at the National University of Modern Languages, do hereby declare that the thesis "An Investigation of Major Factors Leading to Time and Cost Overruns of Public Sector Development Projects in Pakistan" submitted by me in partial fulfillment of M.Phil degree, is my original work, and has not been submitted or published earlier. I also solemnly declare that it shall not, in future, be submitted by me for obtaining any other degree from this or any other university or institution. I am also aware that if evidence of plagiarism is found in my dissertation at any stage, even after the award of a degree, the work may be cancelled and the degree revoked.

Name of Candidate: Iqra Tariq

Signature of Candidate: _____

Date: _____

NATIONAL UNIVERSITY OF MODERN LANGUAGES

FACULTY OF SOCIAL SCIENCES

THESIS SUBMISSION APPROVAL FORM

(Supervisor)

A Thesis" An Investigation of Major Factors Leading to Time and Cost Overruns of Public Sector Development Projects in Pakistan".

Submitted By: **IQRA TARIQ**

Registration No. **10Mphil/GPP/F22**

Discipline of **Governance and Public Policy**

Candidate of **Master of Philosophy** at **National University of Modern Languages**

This thesis has been read by me and has been found to be satisfactory regarding content, English usage, format, citations, bibliography style ,consistency, thus the fulfill of qualitative requirement of the study. It is ready for submission to the department of Governance and Public Policy, Faculty of Management sciences for internal and external evaluation.

Dr. Shahid Habib _____

Name of research supervisor Signature of Research Supervisor

Date: _____

NATIONAL UNIVERSITY OF MODERN LANGUAGES

FACULTY OF SOCIAL SCIENCES

CERTIFICATE

It is certified that the research work contained in this thesis titled: "An Investigation of Major Factors Leading to Time and Cost Overruns of Public Sector Development Projects in Pakistan", has been carried out and completed by _Iqra Tariq___ under my supervision during this Mphil in Governance and Public Policy at the department of Governance and Public Policy, Faculty of Management Sciences National University of Modern Languages Islamabad.

Dr. Shahid Habib _____

Name of research supervisor Signature of Research Supervisor

Date: _____

ACKNOWLEDGEMENT

All praise is due to Allah, the Most Gracious, the Most Merciful, whose countless blessings and guidance have enabled me to successfully complete this research work. I am grateful to my research supervisor, Dr. Shahid Habib, for his guidance and encouragement throughout this journey. His insightful feedback has been instrumental in shaping direction & quality of this thesis. My sincere thanks to Dr. Zain Rafique for his thoughtful suggestions and readiness to provide guidance, during the critical stages of my thesis. His valuable advice not only enhanced the clarity of my work but also enriched overall quality. I am profoundly thankful to my family, friends and colleagues for their encouragement and moral support. This achievement would not have been possible without their support. May Allah bless all those who contributed to the successful completion of this journey.

ABSTRACT

Public sector infrastructure projects in Pakistan often suffer from time & cost overruns which undermine their development impact. This study explores the primary factors, which contribute to overruns within Pakistan's Public Sector's infrastructure projects. It provides localized insights into the challenges that impede timely & cost-effective project implementation, which addresses a notable research gap. Using a qualitative approach, the data was collected through in-depth semi-structured interviews with stakeholders involved in PSDP project planning, implementation, and monitoring. Thematic analysis reveals several factors including improper financial planning, gaps in physical planning, human resource limitations, governance inefficiencies and external factors such as security risks and natural disasters. The findings highlight a cyclical relationship that delays results in cost escalation, which in turn further delay project completion. To mitigate these issues, the study recommends detailed project feasibility, proper financial planning, risk management frameworks, improved governance mechanism and capacity building of project staff. It also emphasizes the need for stakeholders' engagement, policy alignment and digitization of project management processes. Through localized insights, the aim to enhance the efficiency of public investments in Pakistan's infrastructure sector.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

CDWP	Central Development Working Party
DDWP	Departmental Development Working Party
ECNEC	Executive Committee of National Economic Cycle
FATA	Federally Administered Trabal Area
FEC	Foreign Economic Component
FY	Financial Year
HRM	Human Resource Management
NHA	National Highway Authority
NOC	No Objection Certificate
PAO	Principle Accounting Officer
PMES	Project Monitoring and evaluation system
PPP	Public Private Partnership
PSDP	Public Sector Development Programme
TORs	Terms of Reference
ADP	Annual Development Program
CSR	Composite Schedule of Rates
HRM	Human Resource Management
M&E	Monitoring and Evaluation
MoWR	Ministry of Water Resources
PD	Project Director
PC-I	Planning Commission Form-I
PC-II	Planning Commission Form-II
PFM	Public Financial Management
PMU	Project Management Unit

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

Infrastructure development is the backbone of economic progress and it plays a crucial role in enhancing connectivity, improving welfare and accelerating economic growth. It is widely recognized that public sector is primarily responsible for building large infrastructure. The governments spend public funds to develop roads, railways, dams, hospitals, schools and other public assets (Sarmento & Renneboog, 2016). Public sector investments in these sectors have a significant and positive impact on economic growth. As it positively influences private investment, output and employment. (Qazi & Ammad, 2021).

In Pakistan, the Public Sector Development Program (PSDP) is a mechanism for financing infrastructure projects that aim to bridge developmental gaps and improve quality of life for citizens. Despite their importance, PSDP projects in Pakistan face challenges that hinder their timely completion within specified budget. Cost and time overruns are among the most critical issues which not only delay the completion of infrastructure but also escalate financial burdens and strain public resources. These are frequently cited issues during the implementation of public sector projects in developing countries, including Pakistan (Idrees & Shafiq, 2021).

Delays and cost escalation effect the efficiency of investments by the government. The investments are not only important for development of infrastructure but also have multifaceted effect on the economy. Canh & Phong (2018) have argued that it is essential for the government to ensure the efficiency of public investments. These directly affect aggregate demand through government spending and also has spillover effects by stimulating private investment (Canh & Phong, 2018). Government invests on building infrastructure & developing human capital by initiating projects. A huge sum of public money is spent, on projects Therefore, the concerns are raised on effectiveness of those public sector projects (Sarmento & Renneboog, 2016).

Project are the instruments used by the governments to convert development plans and investments into actual benefits and outputs. These are designed to achieve economic, institutional or social development objectives by using limited resources (Shiferaw & Klakegg, 2012). Therefore, it is important that public sector projects are completed on time and within specified

budget. Traditionally, the basic parameters to measure project's performance include: time, budget and quality (Osman & Mohamud, 2022). These criteria primarily evaluate the performance of the project, particularly construction projects, within the immediate or short-term timeframe (Asiedu & Adaku, 2019). Therefore, attainment of objectives of project within specified time and budget is important ensure efficiency of public investments.

Project experience cost overrun, when the actual costs incurred during the project implementation exceed the budgeted costs. It is also called cost escalation or budget overrun (Olupitan, Ajator, & Nzeneri, 2021). A delay means the project is taking longer than initially planned or agreed upon completion date among parties. It's basically when project is running behind schedule (Osman & Mohamud, 2022). Delayed completion and cost deviation are interconnected as delays in implementation contribute to cost overrun, and cost overrun, in turn, can lead to further delays in the project's completion.

The phenomena of cost overrun are prevalent in both developed and developing nations. It negatively impacts both physical and economic development. Hence, it is crucial to ensure that projects are completed within the estimated budget (Rahman, 2014). Even though profitability may not be a primary consideration for public sector projects, delays can have detrimental effects, including the inability to deliver public amenities on time, damaged reputations and a decline in the public's trust in the government (Salman Riazi, 2018). Various studies have been conducted to discuss contributing factors of overruns in different countries.

Study by Al-Hazim et.al. analyzed 40 public sector infrastructure projects in Jordan and found most of projects were marked by delays and cost overruns. Research indicates that the significant contributing factors include terrain conditions, weather conditions, variation orders, and labor unavailability (Al-Hazim, Abu Salem, & Ahmed, 2017). In a study conducted by Park (2021), the schedule delays were examined in the construction of 113 major public procurements in U.S. and U.K. from 1999 to 2018. It shows that out of 113 projects, 85 were behind schedule.

Public sector projects experience severe far-reaching consequences when time and cost exceed then expected, it impacts development outcomes and economic efficiency. Gbahabo & Ajuwon (2017) explained that economic consequences of project budget increase and delays, has two substantial risks which are, loss of economic viability of projects and increased pressure on funding capacity. The public trust in government institutions decreases when overruns occur because they

demonstrate poor execution of projects. Therefore, proper understanding of time and cost overruns at various phases of project, acts as an essential step to identify measures to reduce its effect (Johnson & Babu, 2020).

This study examines the factors behind time & cost overrun issues, within infrastructure projects in Pakistan. The analysis centers on discovering, systematic and planning related factors which result in PSDP project cost and time overruns. The study aims to provide, insights and recommendations, which can enhance planning and also improve public sector project's management in Pakistan.

1.1.1 Pakistan's Context

The Public Sector Development Program (PSDP) is the mechanism to finance development projects, in Pakistan. It aims is to provide for, the developmental needs and to promote socio economic progress. Through these projects' in PSDP, government finances, development initiatives such as roads, schools, hospitals, dams and other public assets (PC, 2024). The issues of cost escalation and time overruns have significantly hampered the effectiveness of PSDP projects. Recent public sector projects in Pakistan have experienced significant delays and substantial cost overruns. There are limited number of studies examining the factors contributing to the poor performance of these projects (Idrees & Shafiq, 2021).

These overruns strain available public resources and also adversely impact the economic development of the country. A number of public sector projects are revised due to cost or/and time overrun as well as due to change in scope. This multiple times revisions of projects lead to wastage of public money. According to Shah (2018), out of total 829 projects in PSDP 2018-19, 399 projects experienced delays. Among these, 39 projects were delayed by more than ten years. Furthermore, 55 projects incurred a cost increase of more than 100%, 17 projects experienced a cost increase between 60-100% (Shah, 2018). This raises concerns about the efficiency of public investments on these projects.

The causes of delay & cost overrun can occur at multiple stages of project life cycle. Project life cycle consists of various stages including identification & formulation, appraisal & approval and then implementation & monitoring, closure and evaluation (PC, 2024). The Figure:1 provides a structured view of project life cycle which is aligns with different PC proformas. It also visualizes,

how different stages of project are interconnected with each other, as project preparation is dependent on the feasibility study conducted during identification stage. While project implementation is connected with the project planning stage. Each stage, if poorly executed, can lead to risks that contribute to time and cost overruns. At every stage the overrun factors are interconnected and interrelated. The project planning stage is the most critical of all which starts from identification till approval. Poor initial planning can lead to various issues such as design errors, unrealistic or inaccurate estimates which causes delays and cost overrun (Idrees & Shafiq, 2021).

Figure 1: Project Life Cycle Stages and Project Proformas

Source: Manual for Development Projects, 2024

This study is focused on understanding the factors contributing to cost and time overruns in Public Sector Development Programme (PSDP) infrastructure projects in Pakistan. The main focus are the project executed by National Highway Authority and Water Resources. These two departments are focused because the analysis PSDP 2023-24 shows that highest number of projects are being implemented by these departmnet. These two entities are also experiencing highest number of cost & time overrun projects. The study also aim to offer valuable insights that can inform more effective planning and implementation of public sector projects in Pakistan.

1.2 Problem Statement

The persistent issue of cost overruns and schedule delays, in the public sector infrastructure development projects in Pakistan, poses the substantial challenges, to efficient allocation of resource and also to the timely delivery of critical services. The significant public investment, in the infrastructure is done by the government, yet, these overruns, remain a pressing concerns

(Shah, 2018), which result into wastage of resource and also the failure to achieve project targets on time.

The academic literature has highlighted some of the factors, that leads to delays and increase of costs in infrastructure projects. There are, however, very limited number of research studies that delves into the specific dynamics, of Pakistan's public sector. This gap in literature, is significant because of the causes of delays and cost escalations, in Pakistan's Public Sector Development Programme (PSDP) are influenced, by the unique contextual nature factors, like, governance & institutional structures as well as socioeconomic conditions. It has become a difficult task to take effective mitigation measures, without a localized understanding, of these challenges.

It is recognized that the project planning phase is a crucial stage, in the whole project lifecycle, the foundational decisions which significantly influence overall outcomes are taken at this stage. The researchers also stressed the significance of establishment of efficient planning & scheduling protocols in order to avoid cost & time overruns (Adam & Lindahl, 2017; Gupta & Kumar, 2020; Memon et al., 2011). The exploration of the discrepancies, between established project planning procedures and actual practices, is essential to address these challenges, in context of Pakistan's public sector.

This study would explore, the primary factors which contribute, to schedule delays and cost overruns in public sector development projects in Pakistan, in order to bridge this research gap. This study seeks, to identify mitigation measures as well to ensure effective planning & scheduling of the projects. The recommendations would be proposed, aimed at minimization of delays and cost overrun, which would contribute to more efficient implementation of public sector projects.

1.3 Research Question:

I. Why do delays occur in the implementation of public sector infrastructure projects in Pakistan?

II. How do various factors, contribute to cost overruns in public sector infrastructure projects in Pakistan?

III. How could time and cost overruns, be avoided or minimized, during the project planning stage?

1.4 Research Objectives:

I. To explore major factors leading to delays in public sector infrastructure projects in Pakistan.

II. To explore major factors, leading to cost overruns, in public sector infrastructure projects in Pakistan.

III. To propose recommendations, for mitigating delays and cost overruns, in public sector infrastructure projects in Pakistan.

1.5 Research Gap

This research aims to address, the existing knowledge gap, concerning the factors contributing to cost and time overruns, in public sector infrastructure projects in Pakistan. Specifically, it seeks to provide, a deeper understanding of the discrepancies between prescribed procedures and actual practices, in project planning processes, along with potential solutions which are tailored to Pakistan's unique context.

1.5.1 Contextual Gap

Most of the existing literature, focus on cost and time overrun, in construction projects of private sector. The researchers across different countries, have analyzed these challenges, within the economic, political and social environment of their countries. These studies offer valuable insights, however, these do not adequately, discuss the unique challenges, faced by Pakistan's public sector. This study bridges this knowledge gap, through focusing on systemic and contextual nature factors, which affect, public sector infrastructure projects in Pakistan.

1.5.2 Planning stage specific Gap

Moreover, this study emphasizes the significance of project planning stage. As the outcomes of projects are, linked with the key decisions, taken at project planning stage. Various studies have also emphasized, the crucial nature of this stage. As noted by, Adam & Lindahl (2017), most critical decision which impact time and cost, are taken, during the initial planning of projects. Accordingly, Gupta and Kumar (2020) have also stressed that consideration of factors, contributing to overruns, is of vital importance, during the project planning phase, in order to mitigate their adverse effects.

This study attempts to use, enriched insights about the contextual nature of factors of overruns, which is drawn through in-depth interviews, with practitioners, involved in planning and execution of PSDP projects. By addressing, this critical gap in the literature, this research not only contributes to the academic understanding of cost and time overruns, in public sector projects, but also offers useful recommendations for planning experts and policymakers in Pakistan.

1.6 Significance of the Study

This study holds substantial significance, as PSDP projects receive a large share of the annual public funds and many of them, experience delay in implementation, and surpass the budgeted cost. To ensure, timely delivery of development benefits, optimal use of resources and to enhance public trust in government initiatives, it is important, to understand the factors that lead to cost overrun and delays.

The study provides, the contextual understanding of gaps, between prescribed planning procedures and practices at the field, with objective to enhance, project planning and management procedures in Pakistan. This thesis, specifically, aims at identifying the factors, that cause delay and cost overrun of road and water resources projects, given their significant share of public investments. The analysis of projects, of PSDP 2023-24, has been made to observe, their adherence to the budgetary allocation and scheduled timelines. In order to achieve a deeper understanding of the challenges, in-depth interviews of professionals, who are involved in these projects has been conducted, to discover the main reasons of overruns.

It is essential to address these challenges, in order to improve efficiency of project implementation and to achieve development outcomes. Infrastructure projects play crucial role, in realization of national development objectives and economic growth. Therefore, timely project implementation, within budgetary constraints, is important to ensure that planned benefits, reach the public.

The findings of the research can guide, government decisions, by highlighting the ways for improvement in project planning and implementation practices. The recommendations can also assist, to mitigate the risks, associated with cost and time overruns. Therefore, this study has a practical significance, as it provides, insights to improve, the public sector projects planning & implementation in Pakistan.

1.7 Scope of the Study

This research focusses on delay and cost overruns challenges, in the infrastructure projects, under PSDP 2023-24. It examines, two key infrastructure sectors including roads and water resources. It is highlighted that these sectors consume, a huge share of development budget and are of great significance to national infrastructure development.

The study also aims to have deeper insights of project planning procedures and actual practices. The research focuses on finding recommendations to reduce cost and time overruns by identifying gaps between prescribed planning approaches and actual practices. Therefore, this study holds practical significance, in addition to academic importance, with regard to cost and time overrun factors in Pakistan's public sector. These recommendations are to be used in improving the project implementation and finally, to improve the efficiency of public sector project in Pakistan.

1.8 Structure of the Thesis

This thesis is organized in five chapters. Chapter-One introduces the study, by presenting research questions, objectives, significance and scope of this research. Chapter-Two provides review of relevant literature and conceptual framework. Chapter-Three outlines the methodology part, including research design, data collection methods and analysis approach. Chapter-Four presents, in-depth discussion and analysis, to address the research questions. Finally, Chapter-Five offers, the concluding remarks and recommendations, which summarizes the key insights, for public sector project planning and implementation.

CHAPTER 2: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Introduction

Cost and time overruns are critical challenges, for successful implementation of infrastructure projects, particularly for public sector. These inefficiencies undermine, the effectiveness of public investments, delay the delivery of services and also strain the national resources. The significant amount of public resources allocated for infrastructure projects, raises the apprehensions, regarding their overall effectiveness. (Sarmento & Renneboog, 2016). The first reason why these overruns are of concerns, is that they indicate inefficiency in the allocation and utilization of public resources. Secondly, these are a reflection of underestimating the initial cost of a project (Sarmento & Renneboog, 2016).

Public sector projects, worldwide, often face delays and budget escalations, due to various systemic, financial, institutional and environmental factors. For Pakistan, the issue is particularly of great concern, due to substantial amount of resources, allocated under Public Sector Development Projects (PSDP), for building infrastructure (Shah, 2018). Delayed implementation as well as cost overruns, remain persistent in public sector construction projects in Pakistan (Idrees & Shafiq, 2021). It is therefore, essential to address these challenges, in order to to optimize resource utilization and to ensure that public sector projects, achieve their objectives, within stipulated timeline and budget.

A comprehensive review of relevant literature is presented in this literature review, to establish understanding of contributory factors of cost and time overruns. It also presents literature discussing possible approaches to mitigate these overruns in infrastructure projects. The review highlights the relevance of these factors in Pakistan's socio-political and economic context based on the insights of international and local studies. The conceptual framework has been developed, to guide this study, on time & cost overrun in PSDP infrastructure projects in Pakistan. The literature review together with conceptual framework, provide a foundation for addressing the research questions and achieving the research objectives.

2.2 Time and Cost Overrun and efficiency of Public Investment

The primary goals of development projects are to alleviate poverty, address specific societal needs, and stimulate overall growth (Shiferaw & Klakegg, 2012). The challenges of time and cost overruns in public sector projects negatively impact the efficiency of public investments

and hurdle the achievement of these goals. Sarmento & Renneboog (2016) have argued that overruns are a significant source of concern for two primary reasons: they either indicate inefficiency in the allocation public resources, or they reflect an underestimation of the project's initial costs (Sarmento & Renneboog, 2016). Similarly, delay is important challenges that influence the success of projects because it directly results in project cost escalation (Rashid Kamran, 2022).

Projects consists of a sequence of interconnected activities, aimed at achieving a specific goal. It operates & completes within a defined timeline, within an approved budget and according to the required specification (Zid, Kasim, & Soomro, 2020). The significant allocation of public resources to infrastructure projects increases apprehensions regarding their overall effectiveness. (Sarmento & Renneboog, 2016). Shiferaw & Klakegg (2012) has argued, in the context of public sector projects, the profitability is not the primary focus, however efficient utilization of resources is crucial, as developing countries face limited resource availability, and much of these scarce resources are allocated to development projects. As a result, it is essential to implement efficient processes to optimize the use of time, money, and human resources to ensure efficient utilization of public money and achievement of desired developmental goals.

2.3 Causes of Time and Cost Overrun, Insights from International and Local Contexts

A wide range of contributing factors of cost and time overruns in public sector projects have been identified in research studies. These challenges have been observed by the researchers in their respective socio-political, institutional and economic environments.

2.3.1 Global Perspectives on Overruns

Globally, the prominent issue observed are related to financial constraints, inadequate planning, design errors and inaccurate cost estimation. As the study conducted by Johnson and Babu (2020), to examines the causes of time and cost overruns in the UAE, have observed key contributors to time overrun such as design variations, inaccurate time estimation and delays in permits. While cost overruns are primarily driven by poor cost estimation, financial issues and inefficient procurement strategies. Other challenges like delays in government approvals, unrealistic project schedules and cultural complexities are region-specific challenges.

Similar results were observed by Gupta and Kumar (2020), the authors highlighted that time overruns are primarily caused by material selection & frequent changes in specifications during construction, poor maintenance of equipment, shortages of materials & labor, financial mismanagement between stakeholders and shortage of labor. While cost overruns stem from inflation & material price escalation, design changes by owners, high transportation costs, frequent equipment breakdowns and rework due to errors (Gupta & Kumar, 2020).

2.3.2 Environmental and Physical Conditions

Terrain and weather conditions were found to be a significant cause of cost and time overrun in infrastructure projects in Jordan in a study conducted by Al-Hazim et al. (2017). The terrain conditions encompass; difficulties in reaching the work site, difficulties of work type, land acquisition issues, delay in relocating utilities and the lack of civil services near the work site. Weather conditions emerged as the second most critical contributing factor. This study emphasizes that larger efforts should be exerted during projects planning stage on scheduling and cost evaluation.

Factors influencing cost & time overruns, may differ depending on the specific project, location and country (Raykar & Ghadge, 2016). The finding of research studies by Assaf and Al-Hejji (2006), Sambasivan and Soon (2007) and Raykar and Ghadge (2016) depicts similar primary contributors of delays including poor site management, inadequate planning, material procurement issues and weak stakeholder coordination.

2.3.3 Socio-Political and Economic Conditions

The interplay between socio-political conditions and project outcomes has been underscored by Enshassi, Al-Najjar and Kumaraswamy (2009), study of projects in Gaza strip. They have highlighted, unique contextual factor for overruns in this region which is characterized by unique economic and political constraints. Their study identifies strikes, border closures and material shortages as the most critical factors contributing to project delays. The cost overruns were attributed to price fluctuations of construction materials, contractor delays and inflation. These findings align with earlier research that both external and internal factors significantly influence project outcomes. The economic instability and monopolistic practices exacerbate

material shortages, leading to delays and inflated costs. The finding highlights the need for tailored strategies in conflict-affected regions.

2.3.4 Financial, Managerial and Governance Challenges

Financial and managerial challenges have been observed as critical contributor to time overruns in Malaysia, in a study conducted by Shehu et al. (2014). In the public sector, the primary delay factors were related to contractor as highlighted, cash flow issues, delayed payments from contractors to sub-contractors, difficulties in financing the project by the contractor and ineffective planning and scheduling of the project by contractors. In study of time overruns in building projects in Sri Lanka, Dolage and Rathnamali (2013) have revealed, most critical causes of time overrun include delays in client payments, inaccurate planning & scheduling, rainy weather, poor contractor liquidity and a shortage of skilled labor. The study highlights the varying perceptions of clients, consultants and contractors, as the contractors emphasize external factors like weather & labor shortages are primary contributors, while clients & consultants identify contractor-related issues as the primary contributors.

Similarly, Adam and Lindahl (2017) have emphasized management-related factors as primary contributors such as poor site management, inadequate managerial skills, weak monitoring & control, slow decision-making, client-initiated change orders, insufficient design specifications, rework and ineffective labor planning. To provides structured framework for understanding these inefficiencies, they have categorized causes of cost overruns and delays into communication, financial, material, organizational, project-specific, psychological, weather and management domains. This categorization may have oversimplified the complex interdependencies between factors. For instance, communication issues often underlie management and organizational inefficiencies.

Khan, et. al (2021) have argued that governance mechanism and stakeholder engagement plays a crucial role for the achievement of planned targets and desired outcomes of project through mitigating threats of conflicts & risks. The study identifies key challenges in Pakistan's public sector infrastructure projects i.e. bureaucratic inefficiencies, inadequate stakeholder engagement and mismanagement of resources, which contribute to cost and time overruns. In line with findings from other developing countries. Olupitan et al (2021), in his study of key factors contributing to cost overruns in public sector projects in Nigeria have emphasized inadequate planning, design

changes and lack of coordination among stakeholders as significant causes. The research highlights the major impact of cost overrun as time delays, disputes and wastage of public funds.

2.3.5 Interdependence of Overrun Factors

Memon et al. (2011) have argued that time overrun factors are interrelated and they cause and affect each other. Apart from financial challenges and poor site management, limited contractor experience, shortage of site workers and poor planning & scheduling have been highlighted as critical causes of delays. Osman and Mohamud (2022) have also observed the issue of poor site management, in addition, the authors have also mentioned other critical factors such as communication gaps, material shortages, labor productivity problem and fluctuation in price of material.

Large infrastructure projects are more complex and require expertise within public administration to accurately predict required investments and effectively manage such large projects (Sarmento & Renneboog, 2016). In a study of 243 infrastructure projects, in public sector of Portugal, Sarmento and Renneboog's (2016) revealed that large projects exhibit, a higher probability of cost overrun, due to their complexity. The study also identified that political decisions also play, role in cost deviations, as election years increase the likelihood of cost overrun. The governments expedite the infrastructure development projects to gain political popularity. The results highlight the significance of improving governance and reducing the degree of political influence to minimize, the cost deviations.

2.3.6 Developing vs developed Countries Perspective

The issue of low accountability within the public sector systems of developing countries, have been emphasized by Asiedu and Adaku (2019), in their study of causes of cost overruns in Ghana. The low accountability has led to inadequate contract planning & supervision as key contributors of cost overrun. Other contributing factors are highlighted such as changes in project specifications, weak institutional & economic environments and poor coordination among contracting parties. To mitigate this, they recommended national legislation mandating regular evaluations of public sector construction projects. These finding are also relevant to public sector projects in Pakistan. A comparison of major causes of time overrun in different countries has been given in the table below;

Table 1: Comparison of causes of Time Overruns in various Countries

	Major Causes				
	Rank 1	**Rank 2**	**Rank 3**	**Rank 4**	**Rank 5**
This Study (2011) – Malaysia	Cash flow and financial difficulties faced by contractors	Contractor's poor site management	Inadequate contractor experience	Shortage of site workers	Ineffective planning and scheduling by contractors
Le-Hoai (2008) Vietnam	Poor site management and supervision	Poor project management assistance	Financial difficulties of owner	Financial difficulties of contractor	Design changes
El-Razek et al. (2008) Egypt	Financing by contractor during construction	Non-utilization of professional construction/ contractual management	Delays in contractor's payment by owner	Preparation of shop drawings and material samples	Difficulty of coordination between various Parties
Assaf and Al-Hejji (2006) Saudi Arabia	Type of project bidding and award	Shortage of labour	Delay in progress payments by owner	Ineffective planning and scheduling of project by contractor	Change orders by owner during construction
Fong et al. (2006) Hong Kong	Poor site management and Supervision	Qualification and experience of project staff	Insufficient project staff	Insufficient labour	Improper E&M coordination and management
Frimpong et al. (2003) Ghana	Monthly payment difficulties	Poor contract management	Contractors' financial difficulties	Planning and scheduling deficiencies	Cash flow during construction

Source: (Memon, Rahman, abdullah, & Aziz, 2011)

Overrun in public sector projects is not only an issue specific to developing countries but developed countries also face this challenge. Park (2021) highlights that over the last two decades, 77% of large-scale projects in the U.S. and U.K. could not meet their baseline schedules. The study finding has highlighted that optimism bias, influences schedule estimations. The study also demonstrates that traditional procurement methods and private finance initiatives (PFI/PPP) show

similar risk of delays. This study has suggested to develop more realistic and reliable schedule estimates to minimize the challenge of delays.

2.3.7 Pakistan's Context

Public sector construction projects in developing countries, particularly Pakistan, frequently experience significant delays and cost overruns, which undermine the project efficiency. The researchers have observed poor initial planning, governance, legal & land acquisition issues and weak project management as prominent contributing factors (Shah, 2018; Idrees & Shafiq, 2021; Khan et al., 2018). Most of infrastructure in Pakistan is built through public investments, hence Public Sector Development Program in Pakistan plays a vital role in socio-economic growth. In Pakistan, it is responsibility of the Planning Commission to formulate proper cost and physical standards in order to facilitate an efficient implementation of projects (Tahir, 2005).

In research studies conducted in Pakistan specific context, the researchers have observed various challenges, which affect efficiency and cause time & cost overrun in public sector projects. Key contributing factors of delays highlighted by Shah (2018) include delays in fund releases, weak project management, land acquisition issues, insufficient knowledge of Public Procurement Rules and insufficient HR. The study revealed that, in 2018-19, 65% of PSDP ongoing projects were delayed. The study is based on aggregated data, collected from the monitoring reports. It may not supply context specific details, and also may not account for the region-specific details of the challenges.

It was observed by Idrees and Shafiq (2021) that stay orders, land acquisition disputes as well as the relocation of public facilities, were the main factors causing delay. Further technical issues, including poor initial planning & rework due to design errors and bidding stage issues have also been pointed out as significant contributory factor in delay. For their study, the relative importance index (RII) has been utilized, to prioritize the delay factors. However, certain dimensions in the study, like the role of political influence, in land acquisition and decision-making process, have not been considered.

According to Khan et al. (2013) “one size fits all” solutions are not adequate for public sector project of developing nations such as Pakistan, therefore contextualized public sector project strategies are essential. The empirical evidence provided in this study to support the development of project management that is specific to developing countries. It offers insights, that are valuable for improvement of project planning and execution under Pakistan’s PSDP.

The critical role of project governance has been highlighted, by the study of Khan et al. (2018), in order to address the inefficiencies such as delays and cost overruns, in the public sector infrastructure projects in Pakistan. The study also recognizes misdirected investments, tribal & political influence and inadequate supervision as substantial governance challenges that contribute to project delays as well as project cost increases. In order to foster improved allocation of resources, as well as the coordination among stakeholders, an effective governance framework is a prerequisite. This study highlights the need to have the governance mechanism, match the objectives of the projects. However, the data used to inform the study is secondary data that cannot entirely capture the realities on the ground in implementing the projects.

2.4 Consequences of Cost and Time Overruns

The consequences of cost and time overruns extend beyond the immediate scope of individual projects. The primary impacts of cost overruns include delays in project completion, increased project cost resulting from time extensions, conflicts between project owners and contractors, bankruptcy and these are causing wastage of taxpayers' money (Olupitan, Ajator, & Nzeneri, 2021). The delays also prolong the waiting period for the public for provision of public goods & services, also result in additional interest charges on loans acquired for the project (Raykar & Ghadge, 2016). Therefore, these overruns place an additional financial burden on governments, often require reallocations from other developmental initiatives, thereby cause disruption of national growth plans.

Osman & Mohamud (2022) have observed imapcts of delays on cost overrun in construction projects of Mogadishu, with significant implications. The study identifies delays, disrupts schedules, increase costs and also diminish project quality. Moreover, legal disputes and strained stakeholder relationships are also included in its impacts. Similarly, Sambasivan & Soon (2006) have identified six main effects of delays such as time overrun, cost overrun, disputes, arbitration, litigation and total abandonment. The authors have concluded that the delay can result

into complete closure of project. Riazi & Nawi (2018) has argued that in addition to extra costs arising due to overruns, there is also missed opportunity costs as capital remains tied up in incomplete work and potential revenue loss are faced, particularly in commercial projects.

In Pakistan, the impact is particularly obvious given the resource-constrained nature of the economy. Shah (2018) highlighted that delays result in inflated project costs, reduced per capita benefits and slower economic growth. These also results in increase in the capital-output ratio and limit the government's capacity to invest in new initiatives.

2.5 Mitigation Measures and lesson Learned

The literature emphasizes the importance of proactive measures to mitigate time and cost overruns in projects. Effective project planning, stakeholder coordination and governance reforms are commonly cited as critical interventions (Johnson & Babu, 2020; Gupta & Kumar 2020). Globally, countries have implemented measures such as digitization of project monitoring processes, enhanced feasibility studies and improved financial management systems to address delays and cost escalations.

To minimize cost overruns in public sector construction projects Olupitan et al (2021), have recommended measures included engaging experienced contractors, ensuring proper project planning, appointing highly experienced design teams, implementing effective strategic planning and adopting proper project scheduling practices. (Olupitan, Ajator, & Nzeneri, 2021). Similarly, hiring experienced personnel, employing effective communication channels, monitoring using technology tools and ensuring sufficient project funding are also crucial mitigation strategies for overruns (Osman & Mohamud, 2022).

Gupta & Kumar (2020) have suggested to strengthen the project management units, in order to ensure, continuous monitoring, planning & scheduling of activities as a continuous process, allocation of skilled labor, enhancement of material procurement and maintenance of equipment efficiently. Al-Hazim et al. (2017) has recommended detailed planning, scheduling & cost evaluations and careful management processes. The authors have also stressed the need, to adopt contingency plans, to reduce the effects of problems, as and when they occurred. The development of mechanism aimed at active stakeholder coordination and risk management, to deal with uncertainty, have also been emphasized (Khan, Waris, Ullah, & Bokhari, 2021).

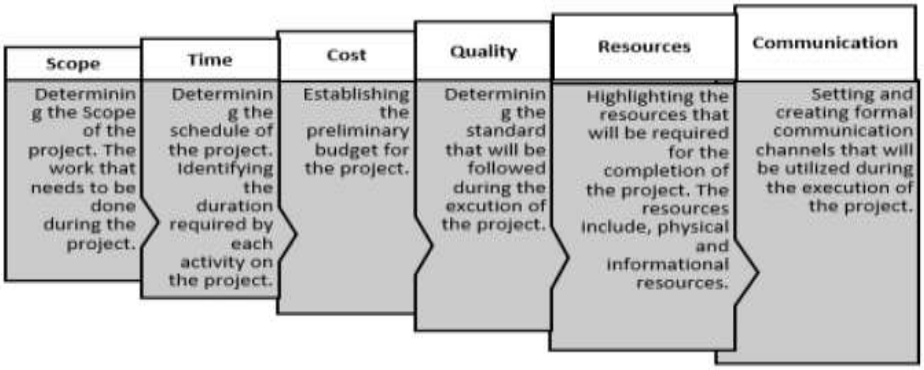
Likewise, Johnson & Babu (2020) has also emphasized, improved planning, stakeholder coordination and advanced contractual frameworks to improve project management. These observations are particularly, relevant to Pakistan's PSDP projects, as the similar factors influence project performance. Therefore, tailored interventions are required to effectively address cost and time overruns. It is essential to address the gaps between prescribed planning procedures and actual practices in Pakistan. The recommendations such as improving planning & feasibility, developing the technical capacity of project directors and adopting modern project management tools have been suggested by various researchers (Irfan, et al., 2023).

The researchers have emphasized to complete land acquisition before tendering and to address the legal disputes promptly, in order to ensure efficiency and timely completion of public sector infrastructure projects. Furthermore, capacity building for project management staff is also crucial to improve efficiency. Additionally, transitioning from traditional document-based management to digital systems can ensure better oversight (Idrees & Shafiq, 2021). This research seeks to build on these recommendations by providing targeted recommendations for PSDP projects, focusing on the planning phase as a critical stage for mitigating overruns.

2.6 Significance of Project Planning

Many research studies have concluded that project planning stage is crucial that impact the cost & time overrun aspects. The researchers such as Adam and Lindahl (2017) have emphasized the importance of planning stage and observed that the key decision that impact cost and time aspects are taken at planning stage. The project planning stage has been explained by many researchers. Project Planning stage is crucial of all, it encompasses decisions about various components of project. Irfan, et al. (2023) have explained six components of project management planning such as determination of scope, time, cost, quality, resource requirement and communication channels among stakeholders.

Figure 2: Project Management Planning



Source: (Irfan, et al., 2023)

Considering the importance of project planning stage, various researchers have discussed; how project planning can be improved to ensure a smooth implementation and attainment of goals of project. Memon et al. (2011) in their study, stressed the need for establishing efficient planning and scheduling protocols, and recruiting proficient personnel to facilitate effective project management. Gupta & Kumar (2020) have emphasized that with prior knowledge of anticipated deviations, planners can formulate the project schedule to accommodate such variations during implementation. Raykar & Ghadge (2016) has observed that project cannot be executed successfully without proper planning and adherence to the schedule. Effective scheduling ensures that resources such as labor, materials, and equipment are utilized efficiently. In this way, two critical factors including time and money, can be optimized.

The study by Irfan et al. (2023) has also similarly, emphasized the critical role of project planning and project manager's competencies, in the success of public sector projects. Structural equation model is used, in the study, to show that effective planning is linked to project success. It has highlighted that planning, project manager skills & leadership abilities, play an important role, in the timely & within budget completion of projects. This study does not examine, in depth, the role of external factors like policy frameworks and socio-political influences that could affect cost, budget and outcomes of projects.

2.7 Methodological Gaps in Existing Literature

Studies on time & cost overruns in Pakistan, such as Khan et al. (2018), Shah (2018) and Khan et al. (2021), rely heavily on secondary data sources, such as PC-I, project reports and

literature. These studies provide valuable statistical trends, as well as literature finding however, these studies lack understanding of institutional and contextual realities behind these overruns. For instance, secondary data rarely capture the issues like frequent transfer of PDs as well as unrealistic rationalization of cost issue. Moreover, the structured survey does not elaborate the issues like unrestricted inclusion of project in the PSDP, which causes thin spread of available resources. Keeping it in view, this study adopts a qualitative approach, using semi-structured interviews with key practitioners, to generate contextual insights and explore the underlying factors of time and cost overruns in PSDP projects.

2.8 Related Theories for the Study

2.8.1 Optimism Bias

Optimism bias is a cognitive phenomenon, where planners, decision-makers and stakeholders underestimate the costs, timelines and risks associated with a project further, they overestimate its benefits or success. This bias is prevalent, in the large-scale infrastructure projects, which are undertaken in the Public Sector. According to Flyvbjerg (2007), optimism bias means, the tendency to provide overly favorable project estimates, which results in substantial differences between planned and actual outcomes. This concept is widely, recognized as a key contributor, to cost & time overruns, in public sector projects.

- **Relevance to PSDP Infrastructure Projects**

In the context of PSDP projects, project feasibility studies conducted during the planning phase generally fail to include risks like delays in land acquisition or other external disruptions. The budgets and timelines are estimated, on the basis of overly optimistic assumptions, instead of a true estimation. The studies from Adam and Lindahl (2017) and Flyvbjerg (2007), have argued that public infrastructure projects face overruns and resources are misaligned, due to optimism bias.

Optimism bias is also amplified by political pressures as the decision-makers may deliberately, favor optimistic projections, to get approval of project, as highlighted by Flyvbjerg et al. (2007). It produces unrealistic expectations during planning stage which result in delay & cost escalation. This study is also aligned, with these observations, as project practitioner have frequently, cited inaccurate cost estimates and impractical timelines. as major contributors to PSDP project overruns.

2.8.2 Triple Constraint, Time-Cost-Scope

It's a very fundamental framework of project management, known as the Triple Constraint that shows a dependent relationship between three crucial dimensions of success of a project that is cost, time, and scope (or quality). This emphasizes that any change in one dimension, must affect all the others. A change in project costs, for instance, cause change in timelines, or compromise quality. Likewise, change in timelines, often results in costs changes or impacts quality. Galagali, (2017) and Senses & Kumral, (2024) have discussed the trade off between the time, cost and quality in projects. Galagali, (2017) have argued that Trade-off among Time-Cost-Quality is unique, to each project and project managers need to carefully understand it.

- **Relevance to PSDP Infrastructure Projects**

Triple constraints, provide a valuable lens to analyze, ongoing problems of cost and time overruns in public sector projects. These are large-scale & complex projects, which require detailed planning, resource allocation as well as coordination, among multiple stakeholders. If critical project activities are delayed such as release of funds and acquisition of land, it escalates costs and compromise the quality of project. Because of the financial constraints in PSDP, project's budget are often prioritized, which ultimately, results in a trade-off of time and quality, which shows clearly the relation of these dimensions.

2.9 Literature Summary and Research Gap

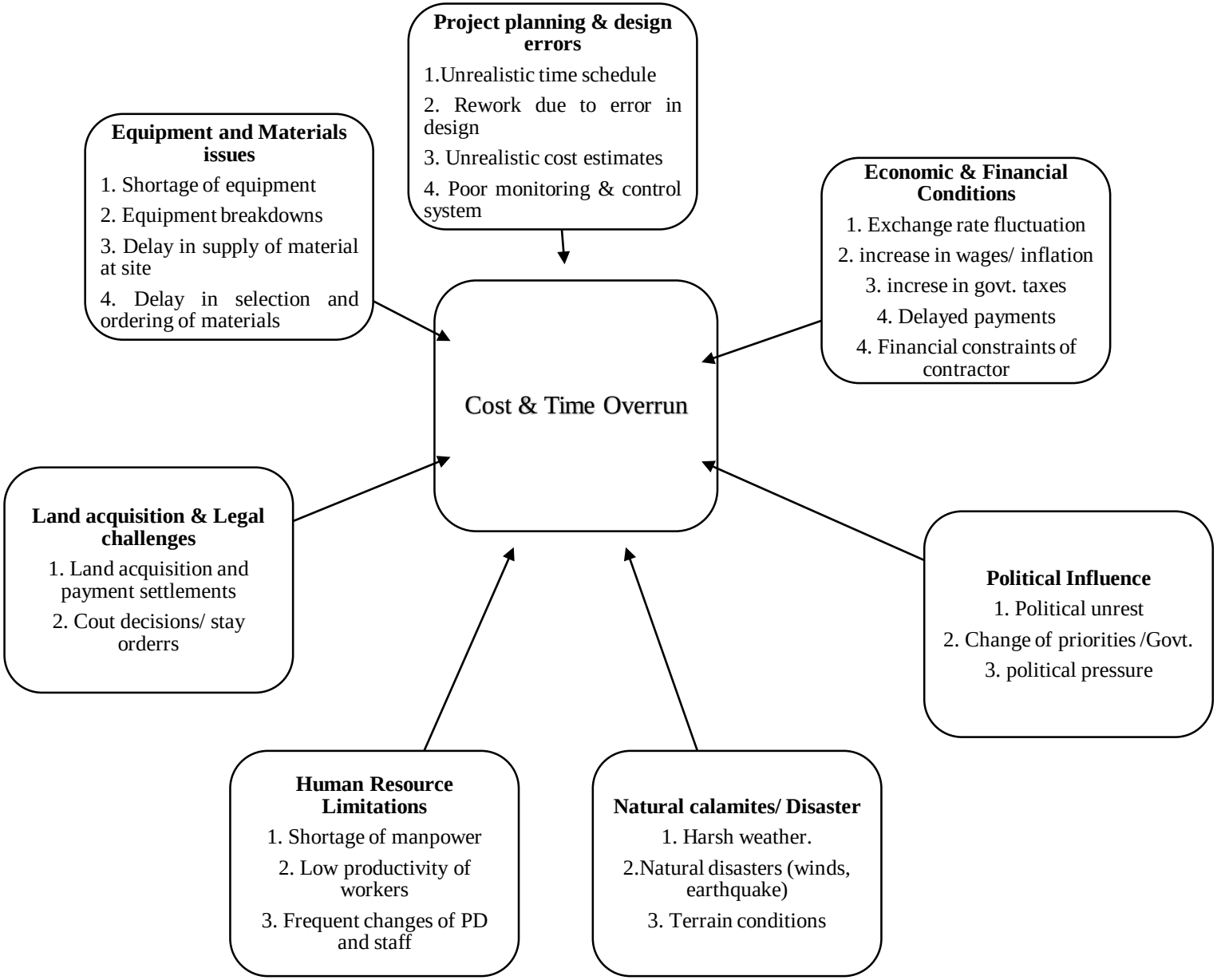
The above discussion, aligns with the study's objectives, by addressing the contributing factors and mitigation measures which are related to cost and time overruns in public sector projects. By analyzing international and local perspectives, it provides a foundation for exploring the unique challenges faced by PSDP infrastructure projects in Pakistan. Additionally, it highlights the critical role of the planning stage in ensuring project efficiency. While these studies offer valuable insights, but they do not adequately address the distinct challenges faced by Pakistan's public sector. This study bridges that gap by focusing on the systemic and contextual factors affecting public sector infrastructure projects in Pakistan.

2.10 Conceptual Framework

The figure below outlines the overall conceptual framework, based on the identified concepts, sourced from literature, address the research questions for this study. The framework depicts that how different factors contribute to delays and cost overruns in infrastructure projects in Pakistan.

Overruns in public sector projects are caused by various factors; these have been divided into categories for better understanding. Inadequate planning and design errors are one of the major factors contributing to overruns (Johnson & Babu, 2020; Dolage & Rathnamali, 2013; Adam & Lindahl, 2017). The planning and design errors catagor encompass rework due to error in design, unrealistic time schedule, unrealistic cost estimates and poor monitoring & control. Land acquisition and legal challenges/court stay orders leads to delays and cost overrun (Shah, 2018). Weather and terrain conditions at the project site cause overruns (Al-Hazim, et al., 2017). Within the economic and financial realm, factors such as fluctuations in exchange rates, rising wages, government tax increases, delayed payments and financial constraints are identified as contributors to project overruns (Shehu, Endut, & Akintoye, 2014; (Asiedu & Adaku, 2019). Human resource limitation include shortages in manpower, low productivity and frequent changes in project directors and staff members are observed as contributing factors of overruns (Osman & Mohamud, 2022; Gupta & Kumar, 2020). Political landscape also plays a crucial role, as political unrest or changes in government and undue political pressure can result in delays and increased project costs (Sarmento & Renneboog, 2016). Equipment and material availability issues at project site, such as equipment shortages, breakdowns, delays in material supply, and delays in the supply of materials, are highlighted as contributors to cost and time overrun (Gupta & Kumar, 2020). The challenges related to administrative & governance mechanism such as slow decision making, poor supervision and bureaucratic behaviors are also observed as contributing factors of overruns (Adam & Lindahl, 2017; Khan, Waris, Ullah, & Bokhari, 2021). All above factors are combined in the fiqure below to visually represent the conceptual framework for this study.

Figure 3: Conceptual Framework



CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter explains the methodological framework that have been adopted for this study. The research paradigm, design, sampling techniques, data collection methods, units of data collection and data analysis approach are discussed. The qualitative approach of study has been adopted to explore the factors leading to cost & time overruns in public sector infrastructure development projects in Pakistan.

3.2 Research Paradigm

A paradigm is a social scientist way of describing a world view. It is shaped by philosophical assumptions about the nature of social truth and reality. It comprises of three components: ontology, epistemology, and methodology. These components collectively guide how researchers perceive, approach and address a research problem or social phenomenon (Ganiyu, Ebohon, & Ajayi, 2021). The selection of a research paradigm is crucial in defining the methodology and it influence the outcomes of a study (William, 2024).

The research paradigm for this study is constructivist approach. The constructivism emphasizes that reality is shaped through social interactions, shared meanings and collective interpretations. The fundamental characteristic of constructivism is its emphasis on the social construction of reality, where knowledge emerges through interactions between individuals and social context (William, 2024). This paradigm aligns with the study's objective to explore contributing factors and mitigation measures for cost and time overruns in public sector development projects in Pakistan, through stakeholder's perspectives and systemic challenges. In context of PSDP projects, stakeholders i.e. project directors, government officials, consultants and contractors interact within an institutional environment, where their experiences, interactions and interpretations collectively shape the reality of project management.

These are not just technical issues, the delays and cost overruns are often, influenced by bureaucratic inefficiencies, institutional mechanism, gaps in governance and stakeholder conflicts, which are socially constructed, through interactions and institutional practices. The study is therefore, carried out through a constructivist paradigm, as an attempt to explore, such socially

constructed realities and give a more profound understanding of the dynamics of the stakeholders who influence cost and time overruns. Qualitative method are supported by the constructivist paradigm, to gain an understanding of the interrelated problems, faced by stakeholder groups, project directors, consultants, and government officials.

3.3 Research Design

A research design is a framework or guideline that outlines the methods & procedures, that can be used, in the collection as well as analysis of data, concerning variables, of a specific research problem (Ranganathan & Aggarwal, 2018). It involves the process of, formulation of a structured approach to address, the research questions well. Two primary research designs, are used by a researcher, namely qualitative and quantitative design (Adebiyi, 2016). The Qualitative exploratory approach has been adopted, for this study. It is suitable, in accordance to the prime objective of this study, to explore the factors as well as mitigation measures, for cost and time overruns in public sector projects in Pakistan.

These factors are multifaceted and involve, a combination of technical, institutional and stakeholders related challenges. These are also deeply rooted, in the unique socio-political, economic and institutional context of Pakistan. Therefore, exploratory research approach is suitable which allows, the researcher to identify and examine the underlying, causes of overruns, such as systematic issues, bureaucratic inefficiencies, governance gaps and stakeholder conflicts. This research design is suited due to the contextual nature of the research problem and gaps existing in defined procedures and actual practices.

Exploratory research is especially suited to study, the overruns challenges, as it would allow the emergence of new themes and go into unexpected connections. It ensures that, the study encompasses, all the factors responsible for cost and time overrun and it also provides an avenue for proposing context specific mitigation measures. This research design, guarantees that the multifaced nature of the factors, are captured effectively, and valuable insights are gathered that can be used for improvement.

3.4 Qualitative Approach

To get a deeper, understanding of the issue of cost and time overruns, in public sector projects in Pakistan, qualitative approach has been adopted for this study. This approach has been

found to be suitable, due to the contextual and complex nature of the problem. It offers a rich understanding of factors contributing to overruns, interconnections between various contributing factors and systemic challenges. Islam & Aldaihani, (2022) have argued that qualitative research is appropriate when there is a need to explore the context in which participants, respondents or objects interact with specific issue. Further, this approach provides valuable insights, to uncover new perspectives and potentially identify practical solutions to the problem under investigation. (Islam & Aldaihani, 2022). This study not only explores the reasons behind delays and cost escalations but also aims to identify mitigation measures from the perspective of individuals directly involved in public sector project management in Pakistan. Therefore, qualitative approach is suitable to answer the research questions in more contextual way.

3.4.1 Justification for Qualitative Approach

Multiple stakeholders are involved at different stages of the project lifecycle in public sector projects, including consultants, project directors, contractors, government officials and policy makers. Understanding the challenges from their perspectives will bring forth the unique dynamics of the issue. As the factors leading to overruns, are interconnected in nature therefore, deeper insights, into the root causes of delays and cost escalations would be attained, by examination of the interactions among stakeholders. A qualitative approach, for this purpose, by utilization of in-depth interviews is found to be most appropriate, as it facilitates, comprehensive exploration of the problem.

Most of the factors of overruns, are of systemic nature, such as bureaucratic delays, governance inefficiencies, limited digitization and frequent change of project directors. The study of these issues requires, an understanding of institutional practices & processes, which is allowed by qualitative methods through thematic analysis. In addition, the qualitative approach also offers, the flexibility for emerging themes, which would be specific to the context of project management practices of Pakistan's public sector.

The considering of the context, systemic challenges and stakeholder perspectives, through qualitative approach, provides a comprehensive understanding of the factors of cost and time overruns. It is the most suitable approach, as it captures all relevant dimensions, of the problem, including their connections and systematic challenges. This approach is well-suited, due to the

study's objective, to identify, the solutions to mitigate overruns within the context of Pakistan's public sector projects.

3.4.2 Justification for Selecting Roads and Water Resources Projects

For this study, Public Sector Development Program (PSDP) infrastructure projects, have been chosen, due to their significant economic, social and developmental implications. These are high-budget initiatives, therefore, delays or cost overruns, in their execution, result in substantial wastage of public resources. These inefficiencies, hinder the timely realization, of intended socio-economic benefits, which underscore the importance of their analysis.

The infrastructure, projects under PSDP, also face complex, technical and managerial challenges. These projects, typically, span on multiple years, which makes the coordination among various stakeholders very necessary. The large projects, under these two sectors, are more prone to external factors such as inflation and political instability. Due to the nature of projects, the issue of cost & time overruns, are more prevalent in these sectors, which make them a critical area of investigation.

Table 2: Cost & Time Overrun Projects: Water Resources and NHA- PSDP 2023-24

(Rs million)

Ministry/Department	Total Projects	Total Allocation 2023-24	Ongoing Projects	Cost Over Run	Time Over Run	Time & Cost Overrun
Infrastructure						
National Highway Authority	122	157,500.0	71	17	49	15
Water Resources	84	97,347.5	75	20	40	17

In this study, large infrastructure projects, in road and water resources sectors, within PSDP has been focused. A total number of 1,262 projects were funded, under PSDP 2023-24, across multiple sectors. As shown in the table above: Out of these, 206 projects were implemented under two major entities: National Highway Authority (NHA) and Ministry of Water Resources. The NHA was responsible, for 122 projects, out of which 77 were ongoing, while the Ministry of Water Resources was managing 84 projects, including 75 ongoing schemes.

Table 3: Time Overrun: Water Resources and NHA- PSDP 2023-24

Ministry/Department	Time overrun projects	Time overrun in years		
		More than 10 years	Between 5-10 years	Less than 5 years
Infrastructure				
National Highway Authority	49	5	14	30
Water Resources	40	7	9	24

The highest number of delays and cost overruns has been observed, under these two entities. As shown in table above, a total number of, 89 projects, across these sectors are delayed, and 37 projects have incurred, cost overruns. The examination of the data of PSDP 2023-24, highlights that more than 60% of the ongoing highways and water resources projects are behind their schedule. Among these, 12 projects have been delayed, by more than ten years, 23 projects have faced delay which are ranging from five to ten years and 54 schemes are delayed for, one to five years.

Table 4: Cost Overrun Water Resources and NHA-PSDP 2023-24

Ministry/Department	Cost overrun project	cost overrun in Percentage		
		More then 100%	between 50-100	Less then 50
Infrastructure				
National Highway Authority	17	5	4	8
Water Resources	20	12	5	3

In the same way, the cost overruns are found to be equally significant, in the road sector. A total of 17 schemes, out of 71 ongoing projects, have experienced cost escalations. For the water resources sector, 20 development initiatives, out of 75 ongoing projects, have reported cost increases.

The serious concerns are raised, regarding effectiveness of existing project planning & execution practices, on account of prevalence of delays & cost overruns. Therefore, to address these challenges, it is crucial to understand, the underlying reasons of overruns. It would enable, an improvement in project planning and management practices. The resource wastage would be

minimized, which would enhance the efficiency of public sector investments, in the development of infrastructure in Pakistan.

3.4.3 Unit of data collection

The various sources utilized, to gather information, to address, the research questions, refers to the Units of Data Collection (UDCs). These may include individuals, policy documents, records, photographs or videos, etc. For this study, data has been collected from both primary and secondary sources to provide a comprehensive understanding of the issue. Primary data was obtained from key stakeholders, designated as UDC1, while secondary data has been sourced from PSDP documents and development manuals, categorized as UDC2.

Population of the study: The study focuses specifically on large-scale infrastructure projects in the sectors of roads and water resources development. The population of projects for this study includes all ongoing infrastructure projects included in the PSDP 2023–24, under the National Highway Authority (122 projects) and the Ministry of Water Resources (84 projects), which form the total project population considered for this research. The specific units of data collection include:

UDC1: Government officers/professionals involved in planning & implementation of PSDP funded infrastructure projects for their deep insight about factor contributing to cost overrun and delays in projects and actual practices of project planning & implementation. The participants of research include government officers from relevant ministry/departments, project directors, officers from Planning Commission of Pakistan.

UDC2: Published statements by the Planning Commission of Pakistan regarding Public Sector Development Programmes (PSDP) encompass details about the allocation, release and utilization of public funds. The Manual for Development Projects (2024) serves as an important resource, which outlines standardized rules and procedures for managing the project' s entire life cycle.

3.4.4 Sampling Technique

In this study, the target respondents are professionals and government officers, involved in PSDP projects preparation, appraisal, approval and implementation. These were the main source of information for this study.

The purposive sampling technique has been used, which is the nonrandom sampling technique. The people who were, well-informed with the phenomena of interest, and they are willing to participate has been interviewed. The relatively small sample enhances, the depth and richness of understanding, in qualitative research. The participants, who are most likely, to provide relevant & meaningful information, aligned with the study's objectives are selected in purposive sampling technique (Campbell, et al., 2020). The purposive sampling technique has found to be suitable, to collect, the views of the practitioners, involved in the project planning & implementation.

3.4.4.1 Selection of Participants

The selection of participants, to conduct this study, was based their responsibilities, experience and the level of involvement in planning, implementation and monitoring of PSDP-funded infrastructure projects. This was made to guarantee that the individuals, who were being interviewed, had experience & expertise regarding the PSDP projects. The criteria for selection included:

- **Roles**: Participants were selected from key stakeholder groups involved in PSDP projects, including, Project Directors who are responsible for overseeing the execution of PSDP projects., Government Officials from relevant departments; such as the Ministry of Water Resources and the Ministry of Communication. The official of Planning Commission, who are directly involved, in appraisal, approval and monitoring of PSDP projects, which include chiefs, deputy chiefs and assistant chiefs and consultants and monitoring Officers: who were involved in PSDP infrastructure projects.
- **Experience**: For the sake of conducting this study, participants were expected to have extensive experience, in the PSDP projects, so that informed insights could be attained regarding the factors of cost and time overruns. This involved people with at least five years of experience, in public sector project management.

- **Involvement**: Participants were selected based on their active involvement in various stages of the project lifecycle, including planning, implementation and monitoring. This ensured that the data collected reflected a comprehensive understanding of the challenges and dynamics of PSDP projects.

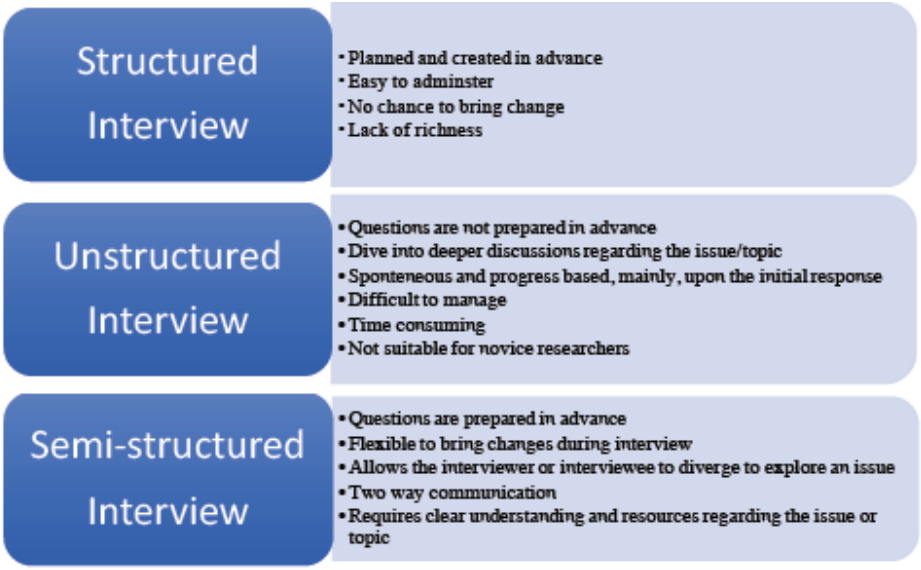
3.4.5 Method of Data Collection

In qualitative research, a variety of data collection methods are available to researchers, including interviews, observations, focus group discussions (FGDs) and textual or visual analysis. Among these, interviews and focus group discussions are the most widely used methods, particularly in social sciences research (Islam & Aldaihani, 2022). For this study, face to face interviews has been conducted as these have the ability to provide in-depth insights into participants, experiences and social realities. The method of data collection is described below.

3.4.5.1 Primary Data Collection

This study adopts a qualitative approach, with primary data collected through face-to-face interviews of practitioner to attain an in-depth understanding of the research questions. According to slam & Aldaihani, (2022), there are majorly three types of interviews which are used in qualitative research. These are structured, semi-structured, and unstructured.

Figure 4: Various Types of Interviews



Source: Islam & Aldaihani, (2022)

Semi-structured interviews were conducted for this study, where a covering letter and the key questions were shared with participants prior to the interview. This approach allowed interviewees the flexibility to express their insights regarding the research problem. An interview guide comprising open-ended questions was designed to ensure that discussions remained focused and aligned with the study objectives.

3.4.5.2 **Development of the Interview Guide**

The interview guide was designed through review of relevant literature. A review of academic articles other relevant sources was conducted to understand the current state of knowledge on the topic. The comprehensive review of literature helped identify key concepts related to the research questions which were then used to structure the interview guide. These concepts served as the foundation for drafting the interview questions. These questions in interview guide were designed to allow participants to share their insights in depth. Three modules were developed for interview guide, each corresponding to one research question. The main question was divided in follow-up question and then specifying questions. This approach was utilized, to ensure that collected data, would be relevant for the broader understanding of the topic. The details interview guide is attached at Appendix-B.

3.4.5.3 **Face-to-face interviews**

Thirteen face-to-face interviews were conducted with key practitioner involved in various stages of the project lifecycle of PSDP infrastructure projects. The purposive sampling was used to ensure that the participants had relevant knowledges & experience. The data collection continues, until the thematic saturation was achieved, in qualitative research, it means that no new themes would emerge from additional interviews. This saturation point is aligned with the research study by Guest, Bunce, and Johnson (2006), which has argued that saturation, often, occurs with the 12 number of interviews.

According to Campbell, et al., (2020), purposive sampling selects participants, who are likely to provide the meaningful information which is aligned with the study objectives. The 13 selected participants have met this criterion, as they possess extensive knowledge as well as experience regarding the PSDP projects. These participants of research, included; two project

directors, two officers from the m/o water resources and the m/o communication, two monitoring officers, one consultant and one section officer. Another five practitioner, from the Planning Commission were interviewed, which comprised of two chiefs, two deputy chiefs, one assistant chief and a section officer. These key informant interviews have provided the valuable insights, regarding the factors of cost and time overruns, these has also offered practical recommendations to address these challenges.

The study involved relatively homogenous participant group as the PSDP projects involve small group of key stakeholders. The homogeneity of roles their roles allowed saturation to be reached efficiently within this sample size. Therefore, the sample size of 13 participants has been found sufficient, to capture the range of perspectives and experiences, related to PSDP projects.

3.4.5.4 **Secondary Data Collection**

The secondary data was also reviewed, in addition, to the primary data, which included the published statements from the Planning Commission, found relevant to the research questions. This approach has ensured, a well-rounded understanding of these issue, integrated both stakeholder perspectives as well as documented evidence.

3.4.5.5 **Operationalization of Variables**

The operationalization of key concepts used in this study has been presented in Table below, which indicates how each concept has been defined and explored through qualitative data collection for the study.

Table 5: Operationalization of Concepts

Concept	Definition	Sub-concept/themes	Method
Time Overrun	Delay in completion of project beyond its planned schedule	Delay in approval, late fund releases, procedural delays	Semi-structured interviews; PSDP 2023-24
Cost Overrun	Increase in actual cost as compared to budgeted cost	High cost of material, inflation, design changes	Semi-structured interviews, review of PSDP data

Financial Planning Issues	Inadequacy in financial planning and cost estimation and inadequate releases.	Inaccurate cost estimates, Inflation impact miscalculation, Cost rationalization, Delayed budget releases	Semi-structured interviews; PSDP financial data
Planning & Design Deficiencies	Gaps in initial project planning or design leading to rework at later stages	Improper feasibility, Poor site assessment, lack of stakeholder consultation in planning, Lack of baseline data, land acquisition issues	Interviews with professionals involve in planning & monitoring
Human Resource Challenges	Human resource in skills issues, lack of training, leadership gaps	Frequent transfer of Project directors, lack of technical staff for complex projects.	Semi structure Interviews with professionals
Governance & Institutional Issues	Bureaucratic delays, poor monitoring, lack of coordination and digitization	Delayed decisions making, weak monitoring mechanism, lack of digitization	Interviews with professionals
External challenges	Security challenges, political instability, environmental & natural disasters	Delays due to law & order situation, floods and environmental hazard	Key informant interviews

3.4.6 Data Analysis

The collected data, for this study, by in-depth interviews, has been analyzed, through the thematic analysis. For this purpose, the data of conducted interviews was transcribed. The interview transcripts were very carefully, reviewed in order to ensure, the accuracy and consistency. This data was analyzed, in details, to gain a deep understanding of the content. This process was followed to allow for immersion in the data and it helped to identify initial codes, patterns and potential themes. The initial set of codes was developed, on the basis of the conceptual framework. These codes were derived from the key concepts, which were identified in the existing

literature. The process of coding and identification of themes, for this study was conducted in order to ensure a rigorous and transparent analysis of the qualitative data. The interview data was examined in details, to capture, new insight and to identify emergent themes.

Later on, the initial codes were reviewed and merged in order to ensure, the clarity and consistency. The codes which found to be similar, were grouped into broader categories and these categories were analyzed to identify themes so that the essence of the data could be captured. The themes, for this study, were developed on the basis of their relevance and significance, in relation to the research questions. The final themes were rechecked and refined in order to ensure that they were distinct, meaningful and were also linked to the research objectives. These themes were then utilized to structure the findings and discussion chapters of this thesis.

The identified themes have been discussed and interpreted, with the support of the transcribed data of interviews. This approach of thematic analysis, has provided a very rich understanding of the data in order to answer the research questions of this study. The thematic analysis, in qualitative research, serves as a useful & effective tool, because of its theoretical flexibility. It is capable to produce, a rich and detailed understanding of complex data. (Braun & Clarke, 2006)

3.5 Methodological Limitations

The qualitative design and purposive sampling provided, in-depth insights into contextual factors however this study is subject to certain methodological limitations. The study relies on self-reported data obtained through semi-structured interviews. The participants were experienced professionals who are involved in project planning and implementation, however, the responses may be influenced by personal or institutional bias or selective memory, to mitigate this, the study ensured confidentiality, encouraged candid responses and cross checking through other practitioners at Planning Commission.

The purposive sampling was used which may have the risk of selection bias. Participants were chosen based on their involvement to PSDP projects and their availability, which may exclude potentially critical perspectives, particularly from third-party evaluators. Efforts were made to include a diverse range of participants e.g., project directors, ministry officers, monitoring officer, and Planning Commission officers to enhance representativeness. Further, due to time and

access constraints**,** the study focuses only on federal-level key stakeholders and does not include perspectives from provincial departments/stakeholders. This limits the scope of the findings and may not capture the broader challenges across Pakistan.

3.6 Ethical Consideration

This section has outlined the ethical measures which were taken throughout this research process, particularly these were focused for obtaining informed consent and these also ensure confidentiality. These measures were critical, to maintain the integrity of the study, and also to foster trust with participants. For this study, the data has been collected, through face-to-face interviews. The process was designed in the way, to ensure that participants were fully aware of the research objectives, their rights as well as procedures. A detailed information sheet was given to the participants, that outlined the purpose of the study, the nature of their involvement and how their data would be used. This sheet also indicated that their participation was voluntary. They were asked to sign a written consent form in order to confirm, their agreement to participate. The verbal confirmation was also obtained at the beginning of each interview, to ensure participants were comfortable and willing to proceed.

Due to the nature of this study and the potential for participants, to share confidential or politically sensitive information, they were assured that their responses would not be shared with third parties, including their employers or colleagues. They were also assured that the information will only be used for the research purpose of this study. Further the participants were assured that the audio recording of the interview will be destroyed after its use in this study. Extra care was taken to ensure that their responses were not traceable back to them. Any potentially identifying details were omitted or generalized in the final reporting. These measures were taken to uphold the standards of ethical research and to ensure the integrity of the research process.

3.7 Summary of the Chapter

This chapter outlines the qualitative research approach adopted for this study. It begins with a discussion of the research paradigm and design, followed by the explanation of the units of data collection, sampling techniques, data collection methods and the data analysis approach employed, accompanied by its rationale, and relevance for the research objectives. Afterwards, the chapter concludes by presenting the ethical considerations observed throughout the research process.

CHAPTER 4: DATA COLLECTION, FINDINGS AND DISCUSSION

4.1 INTRODUCTION

This chapter is divided into three sections aligned with the research objectives. The first section addresses the research question: identifying the factors contributing to delays in implementation of public sector infrastructure projects in Pakistan. The section two is focused on addressing the second research question: identifying the factors contributing to cost overruns, specifically within the context of federal PSDP infrastructure projects in Pakistan. These questions are closely linked, as many of the factors contributing to cost and time overruns are similar. Delays in project implementation often leads to increased costs and vice versa. The third section will focus on measures at project planning phase to mitigate these delays and cost overruns.

4.2 DATA COLLECTION

Qualitative data has been collected through semi-structured interviews to answer the three research questions of this study. These participants included projects directors, professionals responsible for monitoring & evaluation of PSDP infrastructure projects, government officers from the Ministry of PD&SI, Ministry of Water Resources, Ministry of Communication as well as project officials.

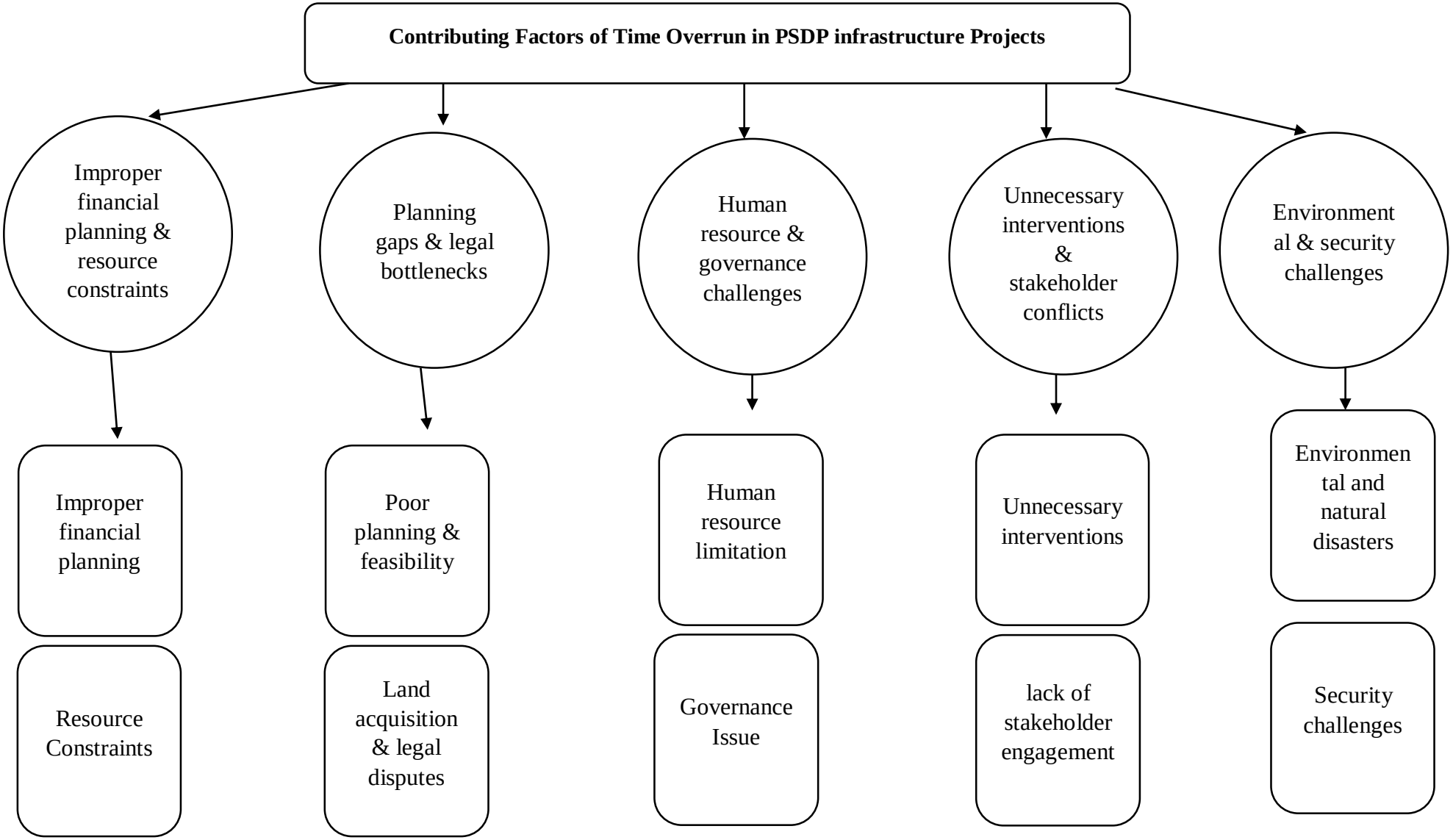
For purpose of collection of data from research participants, interview modules were developed, each module corresponded to one research question. Such as module 1 for addressing the RQ1 Contributing Factors of Delay in infrastructure projects in Pakistan, Module 2 for RQ 2 Factors leading to cost overruns in infrastructure projects in Pakistan and module 3 for RQ 3 Mitigation measures to reduce Overruns. For analysis of qualitative data collected through interviews, thematic analysis has been used to attain deeper understanding of data. Each theme focusses on the key factors of cost & time overrun, to directly address this study's research questions. In identification of these themes, priority was given to repeated arguments, which have been highlighted during interviews. Thematic Map has been developed for each research question depicting the main themes and subthemes.

4.3 FINDINGS RELATED TO RESEARCH QUESTION 1

Contributing Factors of Delays in PSDP infrastructure projects

To address the research question on why do delays occur in the implementation of public sector infrastructure projects in Pakistan, the discussions were conducted with stakeholders. From these discussions, five key themes emerged i.e. Improper financial planning & resource constraints, planning gaps & legal bottlenecks, human resource & governance challenges, unnecessary interventions & stakeholder conflicts and environmental & security challenges. These themes were further categorized into sub-themes which include improper financial planning, resource constraints, poor physical planning & feasibility, land acquisition & legal disputes, human resource limitations, governance issues, unnecessary interventions, lack of stakeholder's engagement, environmental & natural disasters and security challenges. A pictorial representation of these themes and sub-themes is provided below.

Figure 5: Thematic Map 1



Research Question:1 Thematic Analysis

4.3.1 Theme-1: Improper financial planning and resource Constraints

The first theme is improper financial planning and resource constraints which was repeatedly identified as one of the significant factors contributing to delays in infrastructure projects. Projects under PSDP predominantly rely on accurate financial planning in PC-I as well as timely availability of resources to complete activities within defined timelines. However, these recurring challenges, disrupt timelines of critical project activities and extend implementation periods beyond the approved schedule.

During the planning stage, inaccurate financial planning and unrealistic rationalization of costs, coupled with poor forecasting of future economic indicators such as inflation, exchange rate fluctuations and contingency needs, creates a gap between planned and actual requirements, which negatively impact project timelines performance. The subthemes, patterns and codes under theme 1 are summarized in the table below

Table 6: RQ 1: Theme 1, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Improper financial planning & resource constraints	Improper financial planning	Financial mismanagement, Cost estimation errors, Unplanned inflation impact, Exchange rate fluctuations, Unrealistic cost rationalization	Inaccurate cost estimates, Unrealistic budgeting, Inflation impact miscalculation, Overestimated financial projections, Unaccounted contingencies, Exchange rate miscalculations, Project revision due to cost issues, Cost rationalization issues, Incorrect funding phasing, Poor cash flow forecasting, Inconsistent cost benchmarks, Weak financial oversight, Lack of adaptive financial planning.
	Resource Constraints	Budgetary constraints, Delayed fund releases, Inadequate resource allocation, Thin resource spread, Cash flow issues	Delayed budget releases, Cash flow issue, less allocation spread over timeline, Financial bottlenecks, Project halts due to fund shortages, Thin fund distribution, Unrealistic financial commitment, Yearly

	budget constraints, Delay due to underfunding, Unstructured quarterly disbursements, Government budget deficits

The findings of Theme 1 are presented under two sub-themes (i) improper financial planning (ii) resource constraints which are discussed below;

4.3.1.1 Improper financial planning

In project planning, financial phasing in the PC-I is a crucial element, it requires precise cost estimations for planned activities as well as accurate forecasting of potential future changes, such as inflation, contingencies, exchange rate fluctuations. When financial estimations and projections are inaccurate, critical activities like procurement, construction and hiring are delayed, disrupting the entire project schedule. Deputy Chief Planning Commission noted, *"Phasing of financial resources in PC-Is is not done accurately, which causes delay and project revision"*. The Chief Planning Commission highlighted: "*Incorrect Detailed engineering design, cause inaccurate cost estimate. If on wrong DED, a part of construction is completed, it is wastage of time and resources*". Likewise, the issue of inaccurate financial planning is also linked with unrealistic rationalization of cost. The Monitoring officer during in-depth interview stated that: *"Unrealistic rationalization of cost also affects project performance. Usually rationalization is done for vehicles, executing agency charges, PMU, etc. even if the vehicles are project requirement."*.

4.3.1.2 Resource Constraints

Inadequate financial allocation and delayed fund releases are key contributors to delays in implementation as emphasized by participants interviewed. The Director General M/o WR stated that: *"PC-I phasing commitments are not fulfilled. Projects approved with implementation period of 3-5 years, are not completed even in 10-12 years, as the allocation is very small. The spread of resources is getting thin"*. Chief Planning Commission identified unrestricted project inclusion as a primary reason for inadequate allocation, explaining that: *"There is no limit on number of projects for any sector in PSDP. For example, in water resource sector, resources are not enough for ongoing projects, still new projects are being included. Throw forward is increasing every year."*

Furthermore, due to cash flow issues, quarterly releases are delayed. The executing departments are forced to halt the project activities. The Section officer M/o PD&SI pointed out*: "Quarterly releases of funds are delayed. Finances are not released as per PC-I phasing, rather released as per availability of funds and allocation from Finance Division"*.

From previous findings, it is evident that the interrelation between improper financial planning and resource constraints creates a compounding effect on project delays. Poor initial financial planning characterized by inaccurate cost estimations, unrealistic rationalization, and inadequate forecasting of future financial needs, results in repeated revisions. Simultaneously, resource shortages and delayed fund releases exacerbate the issue, as executing departments are unable to maintain the timeline of project activities. Moreover, the inclusion of large number of projects in the PSDP without adequate resource prioritization leads to thin spreads available finances, which further delay the projects.

4.3.2 Theme-2: Planning Gaps and Legal Bottlenecks

Planning gaps and legal bottlenecks emerged as critical contributing factors that delay the implementation of public sector infrastructure projects. Effective physical planning is vital for successful project implementation, yet deficiencies in preparation of feasibility studies, unclear project scope and legal bottlenecks undermine the project's adherence to defined timelines. Poor project physical planning often results from a lack of clarity in defining the project objectives & scope, inadequate technical parameters and insufficient consultation with key stakeholders. This leads to improper assessments of project feasibility, resources and risks analysis which leads to delays during the implementation phase. Furthermore, the legal complexities particularly surrounding land acquisition related disputes also prolong project timelines. The subthemes, patterns and codes under theme 2 are summarized in the table below

Table 7: RQ 1: Theme 2, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Planning gaps & legal bottlenecks	Poor physical planning and feasibility	Unclear Scope, Feasibility inaccuracy, Overambitious objectives, Lack of technical assessment,	Unrealistic project timelines, improper feasibility, Undefined project scope, Poor site assessment, Lack of stakeholder consultation in planning, Political influence in scope setting, Unclear ToRs of consultants,

	Undefined ToRs for consultants	Haphazard feasibility studies, Lack of baseline data, Poor spatial planning, Lack of comparative project evaluation, Rushed project clearance
Land acquisition and legal disputes	Legal issues, Land ownership disputes, Political interference, Stay orders, Delayed compensation settlements	Slow land acquisition, Inconsistent compensation rates, Conflicting ownership claims, Court stay orders, Land act rigidity, Lack of community engagement, Bureaucratic red tape, Lack of land records digitization, Inadequate land dispute resolution mechanisms, Political influence in land acquisition.

The findings of Theme 2 are presented under two sub-themes (i) Poor physical planning and feasibility (ii) Land acquisition and legal disputes, which are discussed as follows;

4.3.2.1 Poor physical planning and feasibility

Improper physical planning of project activities is a significant factor of delay which arises from poorly defined project scope & design parameters, improper or outdated feasibility study, and unclear ToRs for consultants. Projects launched with over ambitious objectives frequently suffer from broad targets and unrealistic timelines. Assistant Chief Planning Commission emphasized this issue, stating, *"Sometimes the objective of projects is not doable. There are many reasons like political interference, haphazardly deciding objectives & scope, without proper homework and consultation with primary stakeholders is not undertaken due to time deficiency"*.

One predominantly critical factor of delays is inadequate feasibility studies. The majority of experts interviewed identified outdated or poor feasibility studies as a major issue causing delay. Chief Planning Commission *"Feasibility is required to ascertain site selection, differences in structures, resources requirements, etc. Improper feasibility study affects the decision-making process"*. Another Chief from Planning Commission added that "*Improper feasibility study and Project Planning Report (PPR) are main reasons of cost and time overrun. On the basis of technical design in feasibility, cost estimation, risk analysis and sensitivity analysis are undertaken. Due to improper feasibility studies, these are not 100% accurate"*.

The issue of poorly defined design parameters and feasibility is often rooted in unclear ToRs for consultants and other key personnels. As highlighted by the Chief from Planning Commission during an in-depth interview, "*The ToRs of consultants and other staff are not made*

with clarity at feasibility stage. That affect the quality of feasibility report by the consultants. At later stage it causes delay and cost increases."

4.3.2.2 Land acquisition and legal disputes

Land acquisition is one of the major factors contributing to delays in project implementation. When land is not acquired prior to the commencement of work, disputes among stakeholders can arise. Delays may be caused by the provincial governments, which are responsible for acquiring land for infrastructure projects. Further, outdated land acquisition rates also lead to disputes among the parties, potentially delaying the project for an extended period of time. Monitoring officer Planning Commission emphasized this issue noting that: *"*Land acquisition act (1894) does not allow to apply market value. *Acquisition rate, time, political pressure, court stay orders, litigation, conflict of interest all are part of land acquisition issue. Land acquisition is linked with both cost & time overrun".*

Land acquisition problems are also linked with legal disputes, which significantly delay project implementation. Disagreements over land ownership, outdated acquisition rates and boundary demarcations lead to stay orders and lengthy legal disputes, hindering project implementation. "Land acquisition implementation is responsibility of District Administration. They also deal with stay orders, litigation for land".

From above discussion, it is evident that planning gaps at PC-I preparation stage and legal bottlenecks are significant contributors to delays in public sector infrastructure projects. Poor physical planning, characterized by unclear project scope, inadequate feasibility studies and insufficient consultation with stakeholders, results in unrealistic project timelines. These deficiencies often necessitate revisions of projects. Similarly, legal issues particularly in land acquisition, exacerbate delays due to disputes over compensation rates and court stay orders. These challenges are interrelated as planning deficiencies amplify legal disputes and vice versa.

4.3.3 Theme-3: Human resource and governance challenges

Effective human resource management and governance is the backbone of successful project execution. However, human resource capacity issues, in public sector projects, is a critical challenge. This includes the issues like, lack of skilled personnel, unclear Terms of Reference (ToRs), limited project staff and frequent changes in project directors. Particularly, the role of the

Project Director (PD) is crucial for ensuring that projects stay on track, however lack of qualified and experienced PDs is a significant hindrance. Further, frequent transfers as well as PDs on additional charge basis exacerbate the issue of delays. Governance inefficiencies also adds unnecessary delays, particularly in large-scale infrastructure projects that require frequent and timely approvals. This human resource and governance related challenges results in poor/slow decision-making, delayed execution of critical activities and undermine the quality of the outcomes. The subthemes, patterns and codes under theme 3 are summarized in the table below

Table 8: RQ 1: Theme 3, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Human resource & governance challenges	Human resource limitation	HR capacity gaps, Lack of technical expertise, Frequent project director transfers, Less project staff	Lack of skilled labor, less autonomy for PD, Non-technical appointments in key roles, Low salaries for project staff, Inability to attract top professionals, Understaffed execution of activities, Absence of technical oversight, Weak performance monitoring, Lack of HR development programs, Poor recruitment procedures, delayed recruitment, low compensation.
	Governance Issues	Bureaucratic inefficiencies, Approval delays, Lack of digitization, Poor project monitoring, Insufficient delegation of authority	Cumbersome approval processes, Slow decision-making, Lack of digitization, Multiple levels of bureaucratic approvals, Delay in NoC issuance, Over-centralization in governance, Redundant paperwork, slow reporting channels, Insufficient monitoring controls, Weak inter-departmental coordination.

The findings of Theme 3 are presented under two sub-themes (i) Human resource limitation (ii) Governance Issue, which are discussed as follows;

4.3.3.1 Human resource limitation

Human resource-related challenges are significant contributors to delays in project implementation. These include capacity issues, unclear ToRs, lack of experience and the allocation of fewer human resources at project sites. The Director General M/o WR emphasized, "*HR capacity issues affect quality of feasibility, DED, and project management issues*". The role of the

Project Director (PD) is particularly critical for the timely and successful completion of projects. However, several issues in the appointment and functioning of PDs cause delays. The Chief from Planning Commission pointed out that "*PDs lack knowledge of rules, regulations, financial obligations, relevant experience and administrative abilities*." Additionally, frequent transfers of PDs and appointment on additional charge are common issues. Monitoring Officer from Planning Commission noted, "*In small departments, additional charge of PD is given to sometimes a non-technical person and frequent transfers of PDs are also made*."

The root causes of human resource capacity issues often stem from inadequate pay scales for project staff. The Section officer M/o PD&SI highlighted, "*We are having inadequate project pay scales compared to market rates, creating quality hiring challenges. Further, the required qualification, experience and eligibility criteria are not precisely defined in PC-I*." Apart from quality challenges, there is also a significant quantity issue. Limited staffing by the executing agency delays project implementation. As noted by the Monitoring officer from Planning Commission, "*Limited staff is employed from the execution agency. Usually, PDs are overloaded with work*."

4.3.3.2 Governance Issue

Governance inefficiencies significantly contribute to delays in PSDP infrastructure projects. These challenges stem from bureaucratic inertia, absence of detailed guidelines for hiring project staff, inadequate delegation of administrative & financial powers to PDs, limited use of technology and ineffective system of regular monitoring. Additionally, delays in decision-making and issuance of NOCs further aggravate time overruns. The Monitoring officer from Planning Commission emphasized that: *"Project authorization and admin approval takes 2-3 months. It negatively affects the defined timelines in PC-Is. Further, NOCs is another delay factor caused by outdated systems in government departments and absence of centralization and digitization".* The Section officer M/o PD&SI further highlighted that non delegation of administrative and financial powers to PD also affects timelines, saying that; "*For every approval, PDs have to approach Section Officer in sponsoring department, who takes approval from PAOs. This process is time consuming which affect the project timeline".*

The above findings, indicates that governance challenges are systemic issues that significantly hinder the timelines of the projects. The interrelation between inadequate human resources and

governance bottlenecks cause prolong delays in timelines. Further these issues often lead to miscommunication, overlapping of responsibilities and duplication of efforts, which further delay project activities. Moreover, these also affect stakeholder engagement which is critical for successful project execution.

4.3.4 Theme-4: Unnecessary interventions and Stakeholder Conflicts

The fourth main theme is unnecessary interventions and stakeholder conflicts which highlights critical challenges in the planning & execution of PSDP infrastructure projects. The political interventions to haphazardly plan and approve the project or to change scope during execution phase, not only disrupt the project lifecycle but also leads to the prioritization of projects that may be politically motivated rather than based on actual developmental needs. It leads to critical challenge of misalignment between national development goals and project execution.

Lack of coordination or conflicts among stakeholders further exacerbate these challenges. As PSDP infrastructure projects involve a diverse range of stakeholders, including federal & provincial governments, contractors, local administration and donor agencies. The lack of coordination between stakeholders during project planning lead to fragmented efforts which waste valuable resources and also impacts the project timelines. The subthemes, patterns and codes under main theme 4 are summarized in the table below.

Table 9: RQ 1: Theme 4, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Unnecessary interventions & stakeholder conflicts	Unnecessary interventions	Political pressure, Addition of non-priority projects, Influence of interest groups, Project scope changes, Diversion of funds	Politically motivated projects, Resource misallocation due to political influence, Project location change, Influence of pressure groups, Rushed approval of projects, Donor-driven initiatives misaligned with local needs, Scope expansion without feasibility checks, Unapproved changes in scope, Budget changes due to political interventions, Policy inconsistency due to political leadership changes, Manipulation of project selection criteria.

	Lack of stakeholders' engagement	Stakeholder poor communication, Lack of inter-agency coordination, Absence of ownership.	Provincial-federal miscoordination, Ownership of projects issue, Lack of responsibility clarity, Poor multi-agency communication, non-engagement of local authorities, Exclusion of affected communities in planning, Weak stakeholder mediation, Inflexibility in responding to stakeholder concerns, Ignorance of grassroots-level issues

The findings of Theme 4 are presented under two sub-themes (i) Unnecessary interventions (ii) Lack of stakeholders' engagement, which are discussed as follows;

4.3.4.1 Unnecessary interventions

Unnecessary interventions result in inclusion of politically motivated and provincial nature projects in the federal PSDP. The incorporation of such projects diverts resources and affect the timelines of ongoing projects. The Monitoring officer from Planning Commission pointed out that: "A *number of politically motivated projects are added in PSDP, despite of limited resources. Actual detailed need-based assessment is not followed".* Political influence also results in rushed approval of projects without proper planning including feasibility studies. Deputy chief Planning Commission highlighted this issue stating: "*Undue pressure causes the project to plan and process in hurry as experienced in roads sector projects in few areas. No proper time is given for planning the project*".

Additionally, change or addition of scope during implementation, has been identified as reasons for delays as it requires change in project's pre-defined activity charts. The scope changes at later stages effects the timelines of other activities as well. The Monitoring officer from Planning Commission has highlighted that: "*Undue changes are made in project scope after approval due to unnecessary interventions by authorities such as PAO. The change in design require approval of new financial estimates*" Chief Planning Commission pointed out that: *"Addition of the unapproved scope in the project during construction will impact timeline. It also results in cost increase"*

Another challenge is donor-driven projects, which contribute to delays when the donor priorities do not align with national development needs. When these are included in PSDP, public finances are diverted to projects that may not address the most urgent developmental needs. These put financial burden on PSDP further to add that these projects face delays if conditions are put to hire foreign human resource. The Monitoring officer from Planning Commission has highlighted that: *"Donor influenced projects are also included in PSDP. Donor agency put condition to hire foreign contracting firm. Contractors are hired from foreign. For payment in dollars, approvals from multiple places to be taken".*

4.3.4.2 Lack of stakeholders' engagement

Projects that involve multiple stakeholders demand consultation and coordination during the planning stage as well as at implementation stage, in order to identify & address potential issues. As highlighted during interview by the Deputy Chief Planning Commission, improper coordination among stakeholders is one of the causes of delay especially for project implemented within provincial territories. "*Mega projects are more delayed as number of stakeholders are more. Especially umbrella projects in which provinces are involved".* Lack of coordination leads to lack of ownership among stakeholders, as highlighted by Chief from Planning Commission *"Lack of ownership among stakeholders cause delays and sometime projects could not be implemented".*

The discussion above indicates that unnecessary political interventions and lack of effective coordination among stakeholders are major barriers to the timely and efficient completion of PSDP infrastructure projects. Unnecessary political influence and interventions hinder the effective implementation of PSDP projects, these interferences result in projects that are not adequately planned or evaluated before implementation. Furthermore, the absence of proper stakeholders' engagement results in the lack of ownership, which leads to delays in project execution and in some cases, complete abandonment of projects, as emphasized by the Chief of Planning Commission. These issues lead to delays, cost overruns and misallocation of resources, which undermine, the objectives of PSDP.

4.3.5 Theme-5: Environmental and security challenges

The fifth main theme appeared during the discussion, with the stakeholders, was related to the environmental and security challenges. These challenges hurdle the execution of infrastructure projects. Such factors are, largely, beyond the control of project authorities and also have far-

reaching implications for project timelines and overall outcomes. Environmental disasters such as floods, earthquakes, and extreme weather conditions can disrupt construction activities, these can also damage infrastructure, which require rework at project site. Additionally, adverse weather conditions such as heavy rains or snow, make the construction sites inaccessible, halting progress for weeks or months and delaying the delivery of critical materials. Similarly, security risks in conflict-prone areas create unsafe working conditions for project staff and hinder the mobilization of resources. These risks escalate and delay the timelines. The subthemes, patterns and codes under main theme 5 are summarized in the table below.

Table 10: RQ 1: Theme 5, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Environmental & security challenges	Environmental and natural disasters	Climate vulnerability, unexpected disasters, Unpreparedness for calamities, Supply chain disturbances	Severe weather conditions, Lack of climate adaptation plans, Inadequate disaster management in projects, Seasonal project slowdowns, unexpected floods, Earthquake damages, Pandemic-induced project halts, Limited use of climate forecasting, Poor natural disaster risk assessment, Ineffective response strategies, Lack of alternative project designs, Failure to incorporate environment sustainable infrastructure
	Security Challenges	Security threats, Terrorist activities, Project site safety risks, conflicts, Workforce security issues	Terrorist threats at project site, Kidnapping risks for project staff, Unsafe work environments, Increased cost due to security measures, Conflicts near project areas, Frequent security issues, Armed group interferences, non-local workforce vulnerability, Disruptions from civil unrest, Poor security coordination, Risk of project abandonment, Difficulty in ensuring government protection

The findings of Theme 5 are presented under two sub-themes (i) Environmental and natural disasters (ii) Security Challenges, which are discussed below;

4.3.5.1 Environmental and natural disasters

Environmental challenges and natural disasters, including harsh weather conditions, floods and earthquakes and hurricanes, can significantly delay projects. Unfavorable weather conditions at project sites can halt construction activities while disasters such as floods can lead to rework of damaged structures. Additionally, in recent years, the COVID-19 pandemic has caused delays by halting construction and limiting workforce availability. Deputy Chief Planning Commission highlighted that "*One of the reasons of delays during last five years, was covid pandemic lockdowns. We do not cater for calamity risks properly*".

4.3.5.2 Security Challenges

In regions with adverse security conditions such as Balochistan, merged districts of KP and certain other areas, projects face delays due to security risks. These challenges disrupt project activities by hindering mobilization of resources and also create an unsafe environment for project teams. The Monitoring officer from Planning Commission emphasized, *"Security risks in these area lead to delays in project execution and cost increases due to additional security measures."* Further added by the Director General M/o WR *"security issues were faced in project area of Gomal Zam project in North Waziristan (Chinese engineers kidnapped), the project delayed as the staff couldn't work in the area"*. Chief from Planning Commission highlighted "*civil war among groups, terrorism in project area or surroundings cause human resource security issues and leads to delays*".

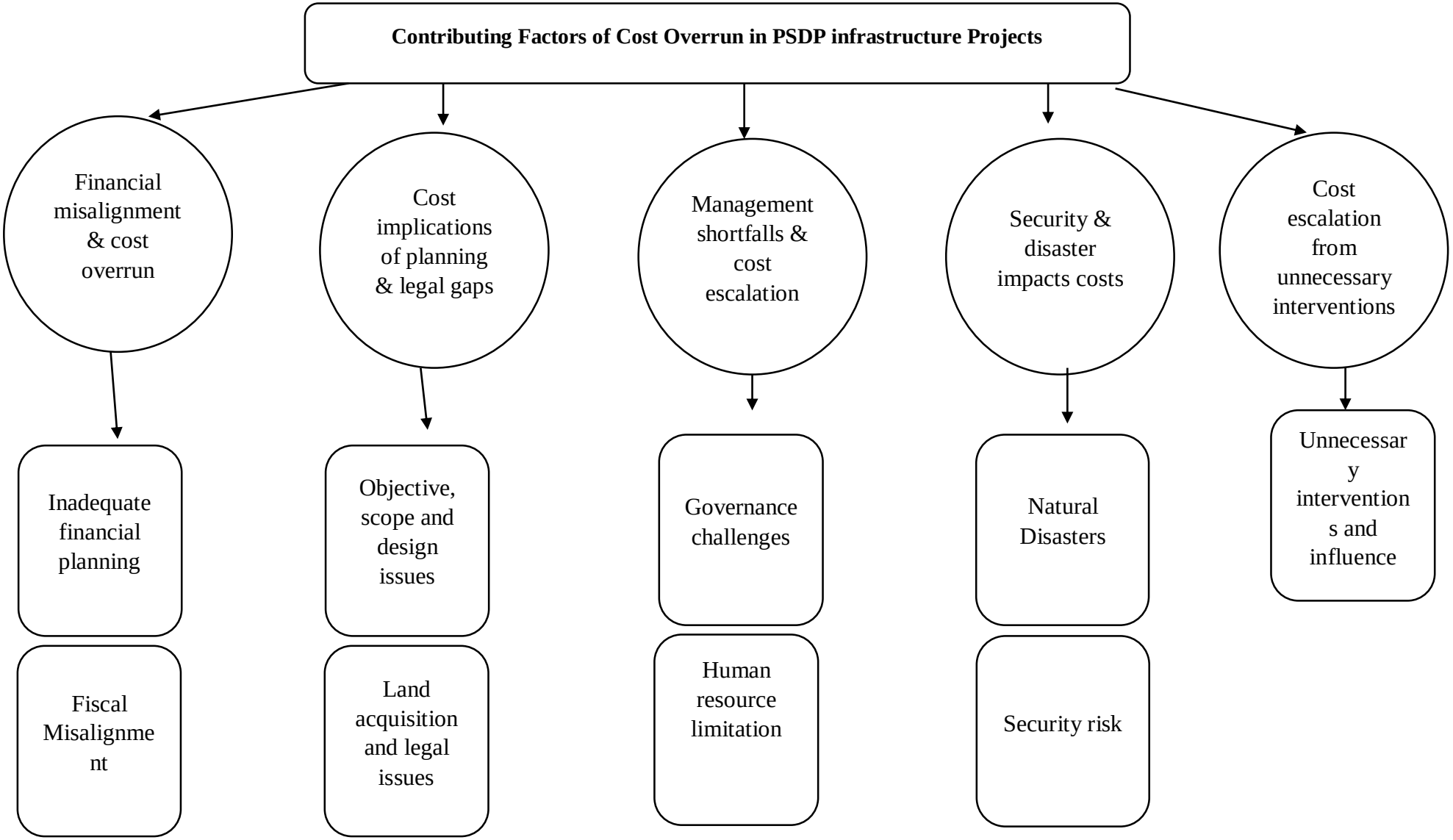
The above findings, indicates that Environmental and security challenges present risks to PSDP infrastructure projects, in terms of operational delays as well as costs escalation. The unpredictability of these factors makes them particularly challenging to manage within the constraints of PSDP projects. Environmental disasters, for instance can occur suddenly and without warning, leading to the destruction of partially completed structures or infrastructure. This necessitates reconstruction of damaged infrastructure and also readjustments to project budgets for the unforeseen disruptions. On the other hand, security challenges pose a different but equally complex challenge. Projects executed in volatile security conditions, often face prolonged delays due to threats to human resources and equipment. These external challenges add layers of complexity to the execution of PSDP projects.

4.4 FINDINGS RELATED TO RESEARCH QUESTION 2

Factors contributing to cost overruns in public sector infrastructure projects in Pakistan?

To address the research question 2 which was How do various factors contribute to cost overruns in public sector infrastructure projects in Pakistan, the questions were asked from the stakeholders. From the discussions, five key themes emerged i.e. financial misalignment & cost overrun, cost implications of planning & legal gaps, management shortfalls & cost escalation, security & disaster impact on costs and cost escalation from unnecessary interventions. These themes were further categorized into sub-themes which include inadequate financial planning, fiscal misalignment, objective, scope & design issues, land acquisition & legal issues, unnecessary interventions and influence, governance challenges, human resource limitation and natural calamity & security risks. A pictorial representation of these themes and sub-themes is provided below.

Figure 6: Thematic Map 2



Research Question 2: Thematic Analysis

4.4.1 Theme-1: Financial Misalignment and Cost Overruns

The first theme for addressing research question 2 has been emerged as financial misalignment and cost overruns. The financial misalignment poses significant risks to efficient utilization of resource. This issue arises primarily due to weak financial planning, unrealistic cost estimates, and poor alignment of financial resources with project requirement. Inadequate financial planning is one of the major causes of cost overruns as the projects are initiated with rough cost estimates that fail to account for inflation, exchange rate fluctuations or actual financial requirements during implementation. These inaccurate projections and undue rationalization of costs during financial appraisals, necessitate frequent revisions of cost estimates.

Further, fiscal misalignment compounds these issues, as delays in fund allocations and releases hinder the smooth execution of projects. Projects are included in the PSDP without adequately assessing the availability of financial resources, which leads to thin allocations that are insufficient to meet the project financial requirements. This misalignment, particularly in large-scale projects extend their timelines and multiply costs due to prolonged execution. The subthemes, patterns and codes under theme 1 are summarized in the table below.

Table 11: RQ 2: Theme 1, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Financial Misalignment & Cost Overruns	Inadequate Financial Planning	Rushed financial planning, Inaccurate cost estimates, Unrealistic financial projections, inaccurate inflation forecasting, Exchange rate fluctuations, Poor contingency planning,	Rough cost estimates, Inflation unaccounted, Exchange rate fluctuations, Poor forecasting, Lack of standard cost analysis, Inadequate contingency planning, Ignoring economic trends, inaccurate estimation of budget requirements.
	Fiscal Misalignment	Delayed fund releases, Budget constraints, Misallocation of financial resources, Limited funds for large projects, Inconsistent fiscal policies,	Late fund releases, Thin allocation of resources, Large project delays due to underfunding, Mismatch between approvals and actual releases, PSDP budget constraints, Overstretched project financing,

Themes	Sub-themes	Patterns	Codes
		Underfunded ongoing projects, Cash flow issues	Unanticipated fiscal pressure, Underestimation of financial risks.

The Theme 1 is categorized under two sub-themes (i) Inadequate financial planning and (ii) Fiscal Misalignment, which are discussed below;

4.4.1.1 Inadequate financial planning

Rough or inaccurate cost estimates prepared during the project financial planning stage has been highlighted as a significant contributing factor contributing to cost increases in PSDP projects. This issue often arises due to rushed planning processes or inadequate financial analysis which result in unrealistic projections. Such inaccuracies lead to issues during the implementation stage that necessitates revisions of cost estimates. Assistant Chief Planning Commission emphasized this issue, stating; "*Cost estimates are inaccurate, therefore frequent changes are made through revisions*". These adjustments in costs not only delay project timelines but also increase administrative costs.

Undue rationalization of costs during the financial appraisal of projects also leads to challenges during the procurement and implementation stages. This practice results in underestimated project costs it necessitates revisions of cost estimates and increase in the overall project cost. As highlighted by the Monitoring officer, *"In practice during rationalization, establishment charges are reduced, which compromises project requirements in the future. There are no documented guidelines for rationalization."* The lack of standardized guidelines for cost rationalization creates inconsistencies in financial planning of the projects.

Inflation rates and exchange rate fluctuation which are not anticipated during project financial planning contribute to cost overruns in PSDP projects. Both local and international market inflation impact project costs. Foreign-funded projects, particularly with foreign economic components (FEC) are especially vulnerable to global economic fluctuations. As noted by the Monitoring officer, *"For foreign-funded projects, factors of cost overrun include inflation due to wars, increases in fuel & material/machinery prices".* Similarly, locally funded projects face cost escalations in domestic markets which significantly raise project expenses. It was further highlighted, *"For locally funded projects increases in cost of materials, fuel prices, transportation costs, labor and electricity charges cause an increase in project costs".*

4.4.1.2 Fiscal Misalignment

Projects in the PSDP are approved with specific timelines and corresponding financial resource requirements. However, less allocation and delayed release of funds leads to increased costs and higher administrative expenses. Insufficient allocations and delayed quarterly releases have been identified as key contributors to cost overruns. Deputy Chief Planning Commission highlighted this issue, "*Flow of funds is weak. Less allocation of funds is done, and then releases are even lesser*." Similarly, an HR expert noted, "Quarterly fund releases are delayed. Finances are not released as per commitment, rather on the availability of funds from Finance Division".

The inclusion of projects in the PSDP without proper financial planning and realistic estimation of available resources creates significant constraints for ongoing projects. This fiscal misalignment cause delays and cost overruns in previously approved schemes. The allocation of limited resources across a large number of projects results in inadequate funding, which affect project timelines and increases costs. Chief from the Planning Commission highlighted this issue, stating, *"There is an issue of thin allocations. For example, a university was announced in ex-FATA at a cost of Rs. 5,000 million; during the last three years, an average of Rs. 50 million per year has been allocated. At this rate, we need 100 years to complete this project. Resources are not available as per demand, due to the large number of projects and the size of resources."*

The above findings highlight that challenges of inadequate financial planning and fiscal misalignment significantly hinder the successful implementation of infrastructure projects, and lead to cost overruns. Inaccurate cost estimates, poor financial analysis and a lack of standardized guidelines affects the project budgets and create obstacles during execution. Similarly, insufficient fund allocations and delays in f releases extend project timelines and projects cost escalates.

4.4.2 Theme-2: Cost Implications of Planning and Legal Gaps

The second theme for addressing research question 2 was emerged as planning and legal gaps which have profound implications on the costs of PSDP infrastructure projects. Poorly defined project objectives, unclear scopes and inaccurate design parameters at the planning stage, form the foundation for these challenges. When project's detailed engineering designs are flawed due to inadequate site investigations, the projects face frequent revisions and rework. This leads to increase in costs and timelines of infrastructure projects, in particular.

Legal challenges, particularly in land acquisition, cause severe cost implications, when land acquisition rates estimated in PC-I. fail to reflect market rates, projects face significant cost overruns due to revisions of budgets. Moreover, these results in legal disputes and court stay orders which lead to additional administrative expenses. These challenges impede project progress and also consume resources that could otherwise be allocated to project activities. The land acquisition challenges for large-scale projects like highways and dams' results in higher cost escalations. The subthemes, patterns and codes under theme 2 are summarized in the table below.

Table 12: RQ 2: Theme 2, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Cost Implications of Planning & Legal Gaps	Objective, Scope, and Design Issues	Unclear project scope, Design changes, Poor feasibility studies, Lack of technical investigation, Frequent project revisions, overly ambitious project targets, Improper project specifications	Unrealistic objectives, Over-ambitious targets, Lack of clear deliverables, inaccurate project design parameters, Errors in Detailed Engineering Design (DED), Lack of technical assessment, Improper site evaluation, unclear project Scope.
	Land Acquisition and Legal Issues	Land acquisition disputes, Legal conflicts, Political pressure on land acquisition, Stay orders, Delayed compensation settlements, Outdated land valuation	Lengthy land acquisition process, Compensation disputes, Market price discrepancies, Poor valuation of land rates, Litigation issues, court proceedings, Weak land ownership records, Resistance from local communities, Poor dispute resolution mechanisms

The Theme 2 is categorized under two sub-themes (i) Objective, scope and design issues and (ii) Land acquisition and legal issues, which are discussed below;

4.4.2.1 Objective, scope and design issues

In project management, the interaction between time, cost and scope forms a critical balance, referred to as project management triangle. Any change in one element impacts the others. Unclear project objectives and poorly defined scopes have been identified as significant contributors to cost escalations. Chief from Planning Commission emphasized, "*If the project concept with its objectives is not clear, then in the physical phase, time overruns occur and costs increase."*

Additionally, inaccuracies in Detailed Engineering Designs (DED) prepared by consultants also leads to cost overrun. The issue was also highlighted by the Monitoring officer, stating, "*Variation orders due to improper site investigation also leads to an increase in cost. Improper technical investigation causes issues of incorrect detailed engineering design*." As noted by the Chief, "*Incorrect Detailed Engineering Design (DED) causes inaccurate cost estimates. It is a wastage of time and resources*." These design flaws necessitate revisions and rework, adding to the project costs.

Furthermore, the nature of infrastructure projects often results in frequent changes to project designs and reworks, as pointed out by the Deputy Chief Planning Commission: "Infrastructure projects face more changes in scope therefore, they are more prone to cost overruns."

4.4.2.2 Land acquisition and legal issues

For large infrastructure projects such as highways and dams, land acquisition is a critical process, especially when private land is involved. If land rates in the PC-I are not accurately assessed based on prevailing market rates, project costs escalate. The actual land prices exceed those approved at the planning stage, this necessitates revisions and increase in overall project costs.

Land acquisition is further complicated by legal and administrative challenges. Litigation and court stay orders, interrupt the acquisition process leading to delays and additional costs. Political pressure and conflicts of interest among parties/stakeholders also contribute to these delays. The monitoring officer emphasized the complex nature of these issues, stating, *"Land acquisition rate, time delays, political pressure, court stay orders, litigation and conflict of interest, all are part of land acquisition. These issues are linked with both cost and time overruns"*.

The above findings indicates that cost implications of planning and legal gaps in PSDP infrastructure projects significantly hinders efficient project delivery. Poorly defined objectives, unclear scopes and inaccuracies in detailed engineering designs, lead to frequent revisions, rework and costs increases. Similarly, land acquisition and legal challenges such as inaccurate cost assessments, litigation and political interference, often resulting in significant overruns that undermine the efficiency and effectiveness of development initiatives.

4.4.3 Theme-3: Cost Escalation from Unnecessary Interventions

The third main theme is the cost escalation caused by unnecessary interventions. These interventions, are often driven by political influence and external pressures and disrupt planning as well as execution stages of infrastructure development projects. The undue involvement of interest groups and politically motivated stakeholders results in unplanned additions in project scope, resource misallocations and rushed approvals process. Such practices compromise the technical feasibility of projects and lead to frequent revisions, misaligned priorities and increased budgets. The subtheme, patterns and codes under theme 3 are presented in the table below.

Table 13: RQ 2: Theme 3, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Cost Escalation from Unnecessary Interventions	Unnecessary Interventions and Influence	Influence of interest groups, Unplanned additions in scope, Resource misallocation, Political favoritism, Rushed approvals, Misalignment of project priorities, Stakeholder conflicts	Politically motivated project selection, Project approvals without technical feasibility, unplanned project expansions, Poor alignment with national priorities, Rushed approvals, Unrealistic project timelines, Unclear project ownership, Unnecessary project amendments, Resource diversion for politically driven projects, Lack of checks on external interventions, Imposed project modifications

The finding of the theme 3 are discussed below.

4.4.3.1 Unnecessary interventions and l influence

Undue pressure impacts PSDP projects at two stages: during the approval process and during the execution. Initially, political influence is exerted to accelerates the project approval, which leaves insufficient time for detailed planning and accurate cost estimation. As a consequence, projects require cost revisions at execution stage. Deputy Chief Planning Commission noted, *"The PC-Is, due to undue pressure, gets approved from the forum based on rough cost estimates. Later on, issues arise and the project has to be revised."*

In the execution phase, political interventions frequently lead to scope changes or addition of scope. The monitoring officer emphasized, "*PDs also face pressure to change scope due to*

political influences". These modifications often involve additional activities or changes in the project design which increases budgets.

The above findings shows that undue influence in PSDP infrastructure projects directly contribute to cost escalations by undermining planning accuracy and diverting financial resources. Politically driven project inclusion in PSDP, rushed approvals and unplanned scope changes inflate costs and delay project outcomes.

4.4.4 Theme-4: Management Shortfalls and Cost Escalation

The fourth main theme is management shortfalls which is a critical contributing factor in the escalation of costs in PSDP infrastructure projects. The management related challenges stem from governance inefficiencies and human resource limitations. Governance challenges such as procedural delays, bureaucratic red tape and outdated systems, delays the execution of project, and lead to cost overruns. Slow decision-making, extends the project timelines and results an increase in administrative costs. Human resource constraints affect the quality of project through insufficient project staff, overburdened project directors (PDs) and capacity gaps which hinder the defined timelines. These issue consequently, lead to mismanagement and cost escalation. The subtheme, patterns and codes under theme 4 are presented in the table below.

Table 14: RQ 2: Theme 4, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Management Shortfalls & Cost Escalation	Governance Challenges	Bureaucratic inefficiencies, Lengthy approval processes, Slow decision-making, Governance bottlenecks, Poor digitalization, Inefficient oversight, delay in decision-making	Lack of automation in approvals, Cumbersome approval system, bureaucratic red tape, Inefficient project monitoring, Fragmented decision-making, Delays in issuing NOCs, Limited financial delegation, Lack of structured project governance, Interference in administration, Poor transparency in project execution
	Human Resource Limitation	Shortage of skilled project managers, Frequent PD transfers, Inadequate staffing, non-technical project directors, Poor capacity building, Lack of	Non-technical PD appointments, Lack of technical knowledge among project staff, Poor recruitment policies, Absence of HR capacity-building programs, Unclear PD roles and responsibilities, appointments on

	performance evaluation, Overburdened management, Staff hiring delays	additional charge, Bureaucratic delays in hiring, Low compensation for project staff, Failure to retain skilled workforce

The Theme 4 is further divided into two sub-themes (i) Governance challenges and (ii) Human resource limitation, which are discussed below;

4.4.4.1 Governance challenges

Governance challenges significantly impact project timelines and contribute to cost escalations in PSDP projects. Key issues include procedural delays in revisions, frequent transfers of project directors (PDs), appointment of non-technical personnel as PDs (on an additional charge basis), bureaucratic delays in fund approvals & releases and slow decision-making processes. These factors collectively hinder timely project implementation and exacerbate cost overruns. The Director General M/o WR emphasized, *"There are undue delays in processing of cases of revisions. Consultation among different government entities takes a lot of time. Due to delayed decisions, end consumer suffers."*

Further procedural and bureaucratic delays also contribute to cost escalations in large infrastructure projects, such as construction of highway. These delays stem from lengthy approval processes from line departments/PAO and the issuance of NOCs from various government entities. The root cause lies in the lack of digitization and reliance on outdated systems of filing and approvals, which slow down project activities. The monitoring officer highlighted this challenge, stating, *"In our government system, there is an absence of ease of business. After project approval, processes of authorization & administrative approvals take a lot of time. The old culture of filing, noting, and approvals causes delays. These initial delays ultimately affect the timelines defined in PC-Is, leading to cost escalations."*

4.4.4.2 Human resource limitation

Human resource constraints including insufficient staffing at project sites, lack of skilled project directors (PDs) and capacity gaps among project staff contribute to administrative & management challenges and delays in project execution. These delays result in cost escalations, as project timelines has to be extended and resources are consumed inefficiently. The monitoring officer emphasized, *"Limited staff from the executing agency affects project timelines. Further, PDs are usually overloaded with work".*

Additionally, the appointment of unqualified PDs compounds the issue. Assistant Chief Planning Commission noted, *"Responsibility of PD is given to a non-technical person on additional charge basis, with little knowledge of planning procedures. This creates issues during project implementation, causing delays and cost overruns"*.

The above findings of theme four highlights that management challenges in projects, which are driven by governance challenges and human resource limitations, represent a significant barrier to the successful execution of PSDP projects within planned budget. Procedural delays and non-digitization of processes contribute to slow progress, frequent revisions and costs escalation.

RQ:2 Theme 5

4.4.5 Theme-5: Security and Disaster Impacts costs

The last theme emerged for addressing RQ2 is natural disasters and Security risks. The impact of natural disaster on cost of infrastructure projects under PSDP could be significant. Natural calamities such as floods, hurricanes and earthquakes, etc. require major design changes, repair work and even complete reconstruction of damaged structures. These events disrupt timelines and require additional financial resources. Similarly, global pandemics like COVID-19 have delayed projects through affecting supply chains and increasing procurement costs. Similarly, in regions with heigh security risks, cost escalations are often caused by need for extensive security measures. Security concerns increase operational costs and also discourage international firms from participating in projects of these high security regions. The subtheme, patterns and codes under theme 5 are presented in the table below.

Table 15: RQ 2: Theme 5, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Security & Disaster Impacts Costs	Security Risks	Increased security expenses, High operational costs in conflict zones, Additional surveillance needs, Disruptions in supply chains, Slow emergency response, Labor shortages,	Workforce unavailability, Travel restrictions impacting projects, Special security provisions in conflict zones, Protection expenses for foreign contractors, Increased demand for protective measures, Increased hiring of security personnel, Conflict-driven market price surges

Natural Calamities	Extreme weather conditions, Floods and earthquakes, Poor adaptation measures, COVID-19 impact, Rising material costs, Supply chain breakdown, Emergency procurement delays, unexpected infrastructure damage, Risk miscalculations, Lack of resilience planning,	Pandemic-induced disruptions, Supply chain failures, Flood-related cost increase, Delayed reconstruction efforts, Poor emergency response planning, Unforeseen site conditions, Extreme climate effects on infrastructure, Ineffective hazard risk planning, No contingency measures for climate impact, Weak infrastructure resilience.

4.4.5.1 Natural calamity

Natural disasters such as floods, hurricanes, and other extreme events are factors that leads to cost escalations particularly in infrastructure projects. These events necessitate changes in structural designs or even complete rework due to damages. Additionally, recent projects have faced considerable cost overruns due to the impact of the COVID-19 pandemic. The pandemic disrupted supply chains, affecting availability and cost of materials. The monitoring officer emphasized, *"In the current scenario, an important factor of cost overrun is the pandemic (COVID-19). This factor is not area-specific and impacted major economies worldwide. Cost overruns emerged as the supply of materials and their procurement were severely affected."*

4.4.5.2 Security risks

Security risks also play a critical role in cost escalations, especially in high-risk areas. Projects implemented in regions with security concerns face delays due to the need for extensive security arrangements, which require collaboration of government agencies. The Chief from Planning Commission highlighted, *"Security concerns not only increase costs but also necessitate interventions by security agencies. International firms and engineers are often reluctant to invest and work in such regions, despite competitive international-level bidding prices."*

The above findings indicates that impact of natural disasters and security risks represents a substantial challenge to financial management and timely completion of infrastructure projects. Natural calamities such as floods, earthquakes and extreme weather conditions, demand for additional financial resources for repair of damages. These additional financial resources requirement in case of occurrence of these unforeseen events, cause increased budgets requirements, thereby contributing to cost overruns. Further security risks in high security regions

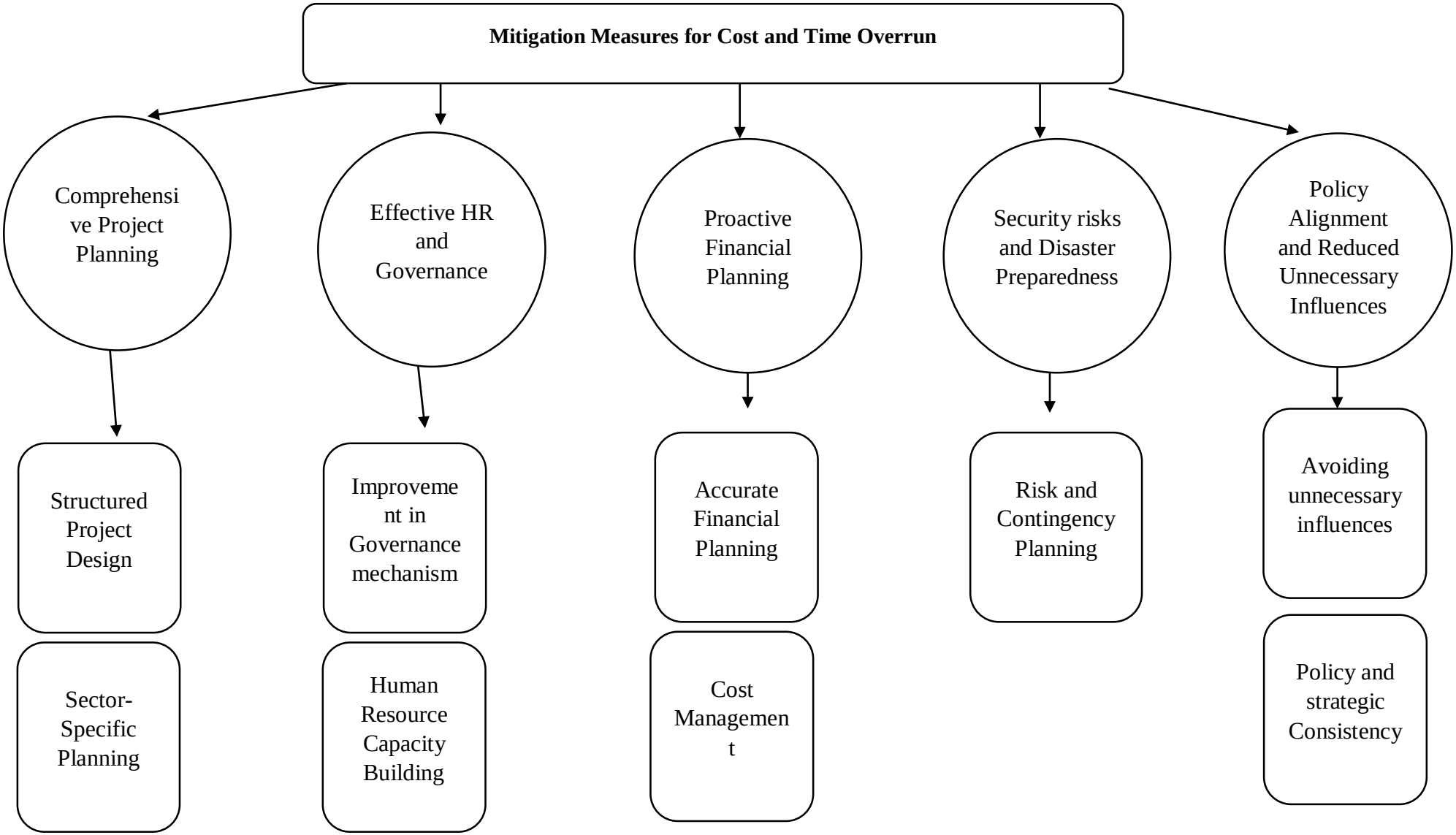
also escalate costs by requiring extensive safety arrangements as well as stakeholder engagement for the project execution. The safety of project personnel, materials and infrastructure demands extensive security arrangements, including collaboration with law enforcement agencies adds to the project costs.

4.5 FINDINGS RELATED TO RESEARCH QUESTION 3

How time and cost overruns be avoided or minimized during the project planning stage

To address the research question 3 How could time and cost overruns be avoided or minimized during the project planning stage, the discussions were conducted with research participants. From these discussions, five key themes emerged including Comprehensive Project Planning to Mitigate overruns, Effective HR and Governance to Prevent Overruns, Proactive Financial Planning for cost & time overruns control, Security risks and Disaster Preparedness, Policy Alignment and Reduced Unnecessary Influences. These themes were further categorized into sub-themes which include Structured Project Design, Sector-Specific Planning, Improvement in Governance mechanism, Human Resource Capacity Building, Accurate Financial Planning, Cost Management, Risk and Contingency Planning, Avoiding unnecessary influences and Policy and strategic Consistency. A pictorial representation of these themes and sub-themes is provided below.

Figure 7: Thematic Map 3



Research Question 3: Thematic Analysis

4.5.1 Theme-1: Comprehensive Project Planning to Mitigate overruns

Effective project physical planning is crucial for minimizing cost and time overruns in PSDP infrastructure projects. A structured approach of planning a project ensures that project objectives are clearly defined, roles are assigned accurately and resources are allocated efficiently. The insights from in depth interviews highlight the importance of proper feasibility studies, well-crafted Terms of Reference (ToRs) of key project personals and robust monitoring to address the challenges of overruns.

A well-conducted feasibility study ensures that design changes and rework during the implementation phase are minimized. The research participants emphasized that feasibility reports must be prepared by specialized consultants, in sufficient time and resources. Similarly, Clear and technically sound ToRs help ensure the feasibility study is aligned with the project's objectives. Sector-specific planning further strengthens the planning process by tailoring guidelines to the unique requirements of different nature of projects. Further, allocating required time for preliminary activities such as land acquisition, contractor selection and NOC issuance need to be included. These approaches, during the planning phase would help in smooth execution of projects and reduced cost and time overruns. The subtheme, patterns and codes under theme 1 are presented in the table below.

Table 16: RQ 3: Theme 1, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Comprehensive Project Planning to Mitigate Overruns	Structured Project Design	Robust feasibility studies, Clear Terms of Reference (ToRs), Strengthened Monitoring & Evaluation (M&E), Digitalized monitoring, Evaluation-based learning	Feasibility study quality, Consultant expertise, ToRs definition clarity, Digitized monitoring systems, Structured project review processes, Early issue identification, Impact assessment frameworks, Data-driven project planning
	Sector-Specific Planning	Sector-focused guidelines, Allocation of preliminary work time,	Differentiated project manuals, Infrastructure-specific guidelines, Social project frameworks,

Themes	Sub-themes	Patterns	Codes
		Simplified land acquisition process, Stakeholder engagement for planning, Market-based land valuation	Production sector-specific needs, Time allocation for preliminary activity, Inclusion of preparatory works in PC-I, Clear land acquisition timelines, Proactive land settlement approaches, stakeholder engagements.

The Theme 1 is further divided into two sub-themes (i) Structured Project Design and (ii) Sector-Specific Planning, which are discussed below;

4.5.1.1 Structured Project Design

Comprehensive project planning framework is essential to mitigate cost and time overruns in PSDP projects. Insights from expert interviews emphasized the need for proper feasibility study, clear Terms of Reference (ToRs) for consultants and a vigorous monitoring and evaluation (M&E) system.

Properly conducted feasibility studies are critical for minimizing rework, which often causes delays and cost escalations. The Chief from Planning Commission highlighted, "*If feasibility is done properly by consultants, then changes in design at later stages will be very few.*" This underlines the importance of dedicating sufficient time as well as resources for preparation of feasibility report. It was further emphasized, "*Feasibility reports affect the decision-making process. Each ministry should initiate one project focused on strengthening in-house experts, or hiring the consultants to conduct thorough feasibility studies*".

The preparation of PC-I & PC-II documents also depends on well-defined ToRs for consultants. Chief from Planning Commission noted, "ToRs of consultants and project key staff are the most important elements in PC-II. The quality of the feasibility report largely depends on the ToRs provided to the consultants." Monitoring officer added, "*ToRs should be developed by the relevant technical experts*" reinforcing the need for specialized input in defining project roles.

Experts further highlighted the importance of a strong and regular monitoring mechanism. This approach ensures that issues are identified and addressed promptly, reducing the risk of delays and cost increases. Chief from Planning Commission stressed, "*Projects should have a strong*

monitoring mechanism to assess the quality of work, financial flows, disbursements, machinery utilization and human resource engagement." To enhance efficiency the Chief PC proposed, "*Monitoring systems should be strengthened through the digitization of execution and monitoring processes*." This would streamline oversight and improve accountability.

Evaluation mechanisms are equally critical. Assistant Chief Planning Commission emphasized, "*Project evaluation is important to use lessons learned in future projects. During the planning stage, insights from previous projects of a similar nature should be consulted*." This feedback loop allows for continuous improvement and better-informed planning in subsequent projects.

4.5.1.2 **Sector-Specific Planning**

Experts have emphasized the need for sector-specific project planning and revision of existing project manual guidelines to address cost and time overruns in PSDP projects. The Planning Commission's manual for development project provides a generic framework for all stages of project implementation, while experts have noted that projects across different sectors i.e. infrastructure, social, and production, have unique challenges and distinct implementation parameters. Deputy Chief Planning Commission underscored this need, stating: *Project manuals should include guidelines specific to project types. For infrastructure, social, and production sectors, manuals should be different. We cannot pass every project from the same standard guidelines."* Sector-specific guidelines can make project planning more practical and adaptable, reducing delays and improving resource allocation.

For sector specific planning the experts have also stressed the importance of including time for preliminary activities in every PC-I as per requirement of the project. The preliminary activities include all works required before contractors are mobilized at the project site such as obtaining NOCs, evaluating contractors & consultants, procurement processes, land acquisition etc. Overlooking time required for these activities lead to delays during the execution phase. The monitoring officer highlighted: *"It is suggested that the time for preliminary works may be mentioned in PC-I explicitly. We cannot add a general time for this stage in manual guidelines as every project and department has its own requirement of time."*

Land acquisition for large infrastructure projects is a highly time-consuming process that often contributes to project delays and cost overruns. Experts have emphasized the importance of allocating sufficient time for land acquisition in PC-I to ensure realistic timelines. Further, the need for revising the Land Acquisition Act of 1894 has been highlighted. One of the key recommendations is to assess land at market rates and allocate funds accordingly, to prevent disputes and delays arising at later stage. The monitoring officer stressed, "*The land acquisition process needs to be simplified. The department can constitute a committee for assessing the market value of the required land through field surveys. The mean of all values can be calculated for best rates*." Simplifying land acquisition process and aligning it with market rates are essential to mitigate delay and cost overruns.

Engaging stakeholders during the planning phase is another critical strategy for mitigating disputes and ensuring project alignment with local needs. Deputy Chief Planning Commission emphasized the need for this approach stating *"At the planning stage, it should be mandatory to have stakeholder consultations/consensus to resolve anticipatory issues."* This participatory approach can reduce challenges during execution and contribute to timely completion of project with specified budget.

The above findings of theme 1 highlights that comprehensive project planning is indispensable for mitigating cost and time overruns in PSDP infrastructure projects. Detailed feasibility studies, clear ToRs, and robust M&E frameworks, would ensure that resources are utilized efficiently and objectives are met within specified timelines and planned budgets. The digitization of processes and strengthening of monitoring system, can further, streamline oversight processes.

The sector specific guidelines, would cater to the sector related issues. The stakeholder's consultations, as well as simplified land acquisition processes, would also be important in resolving the potential disputes and the alignment of projects with local requirements. These measures would optimize the utilization of resource and mitigate delays & cost escalations, for infrastructure initiatives

4.5.2 Theme-2: Effective Human Resource Management and Governance to Prevent Overruns

The theme-2 shows that effective human resource management and governance mechanisms, play a significant role, in mitigation of overruns. Financially autonomous Project Directors (PDs) and robust monitoring mechanisms allows decision makers to effectively, respond to challenges. The discussion during in depth interviews have emphasized the importance of financial autonomy for PDs to enable them to mobilize resources without procedural delays. Furthermore, the robust monitoring systems also ensures, oversight of project activities, efficiently. As digitization of monitoring processes would enhance transparency, reduce delays and also improve overall project efficiency.

Similarly, the skilled personnel and capacity-building initiatives could ensure efficient execution of projects. Additionally, capacity-building programs for Planning Commission officers to strengthen their expertise in project appraisal & monitoring, can enable them to address practical challenges effectively. By strengthening governance frameworks, investing in human resource development and aligning recruitment practices with project requirements, can minimize delays and cost escalations of PSDP projects. The subtheme, patterns and codes under theme 2 are presented in the table below.

Table 17: RQ 3: Theme 2, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Effective HR and Governance to Prevent Overruns	Improvement in Governance Mechanism	Financial autonomy for PDs, strengthened monitoring frameworks, Digitalization of approval/NOC processes, project oversight, Improved governance transparency	Enhanced financial authority for PDs, Decentralized control, Strengthened decision-making capacity, monitoring process digitization, Digitized monitoring dashboards, Automated NOC approval systems, Improved governance
	Human Resource Capacity Building	Project-specific HR recruitment, Training & capacity building, Skilled workforce hiring, Defined qualification criteria, Mandatory rotation for officers	Clear hiring guidelines in PC-I, HR experience benchmarks, technical expertise requirements, Project-based staffing needs, Continuous training programs, Inter-ministerial staff rotation, Competitive salaries for project HR, Standardized hiring frameworks

The Theme 2 is divided into two sub-themes (i) Improvement in Governance mechanism and (ii) Human Resource Capacity Building, which are discussed as follows.

4.5.2.1 Improvement in Governance mechanism

Effective governance has been directly linked to improved decision-making, financial autonomy for Project Directors (PDs) and the establishment of robust monitoring mechanisms for projects. Experts have argued that these measures are essential, for timely identification as well as resolution of project issues, which ensure better resource utilization. Granting financial autonomy to PDs, is critical, to improve project governance. This would empower them, to engage contractors and mobilize resources, without procedural delays. Deputy Chief Planning Commission suggested *"PD should be given financial autonomy to engage contractors & mobilize resources. As soon as the project gets approved, the PD should have sufficient finances in the account to initiate the work"*. This approach would eliminate the unnecessary delays, during the early stages of project.

It has been identified that regular monitoring mechanisms are crucial component, of improvement in project governance. It has already been stressed for formulation of rigorous frameworks for monitoring, during the project planning stage by the experts. Chief Planning Commission highlighted *"During execution, every activity needs to be monitored, such as financial flows, disbursement, quality of work, machinery utilization at the site and human resource engagement as per the schedule of activity decided with the contractor"*. It would provide critical insights into project progress, to address any issue during implementation phase.

Digitization of activities, especially, for mega projects is important to improve governance and monitoring mechanisms. It enhances transparency, enables real-time monitoring and ensures accountability. Experts emphasized that digitizing execution and monitoring processes would allow issues to be identified promptly and resolved efficiently. The Chief PC noted, *"Systems should be strengthened by digitization of execution and monitoring processes."* Additionally, digitizing approval and NOC procedures would significantly reduce procedural delays, thereby mitigating time and cost escalations.

4.5.2.2 Human Resource Capacity Building

Human resources play a pivotal role in ensuring the timely implementation of projects within the approved budget. for large infrastructure projects, the recruitment of key project personnel, contractors and consultants along with their capacity building is particularly critical. Experts have emphasized the importance of tailoring human resource recruitment guidelines according to the specific needs of each project.

A human resource expert noted, "The manual should clearly define recruitment guidelines to be included in the PC-I. The PC-I should include specific HR requirements as per the project's needs such as qualification, required fields of experience in years, age limits, contract duration, etc" . This would ensure that recruitment aligns closely with the technical & operational demands of each project, thereby avoiding delays caused by inexperienced project staff.

The above findings of theme 2 depicts the importance of hiring experienced project staff as a key factor in mitigating delays and cost overruns. Capacity building for Planning Commission officers was also identified as another critical area for improvement. As emphasized by the Director General M/o WR there is need to enhance the technical skills of officers involved in project appraisal & monitoring. This would strengthen their understanding of practical challenges in project implementation and improve their ability to appraise and monitor projects. Human resource management and governance reforms are indispensable for addressing cost and time overruns. Further robust monitoring mechanisms through digitization of processes would empower governance systems to identify and resolve challenges proactively.

4.5.3 Theme-3: Proactive Financial Planning for cost & time overruns control

The third main theme to address research question 3 is proactive financial planning. The efficient financial planning at the planning stage, combined with effective management of cost during implementation, would ensures optimization of financial resource. It includes accurate cost estimation, realistic rationalization and clearly defined financial timelines which can align project objectives with available resources. Projects face delays and increased expenditures when these components are overlooked.

Accurate financial planning at the PC-I stage, was particularly emphasized to ensure that financial resource requirements are aligned with expected budgetary allocations and anticipated releases. Realistic cost rationalization would further ensure that the estimates align with actual requirements. Effective cost management is equally critical during project implementation. Project Directors (PDs) with financial knowledge and administrative skills can better oversee expenditures and can ensure the adherence to financial guidelines. The subtheme, patterns and codes under theme 3 are described in the table below.

Table 18: RQ 3: Theme 3, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Proactive Financial Planning for Cost & Time Overruns Control	Accurate Financial Planning	Realistic cost estimation, Financial phasing based on available resources, Comprehensive financial timelines, Cost rationalization	Project phase-wise budgeting, Inflation-adjusted cost planning, Exchange rate fluctuation, Elimination of overestimated cost projections, Stringent financial review mechanisms, Improved financial forecasting, Cost-benefit optimization
	Cost Management	PDs with financial knowledge, Formation of project steering committees, Committee oversight, Limit cost-based project revisions, Enforced financial discipline	Transparency in expenditure tracking, Internal financial audits, Financial risk reduction strategies, Multiple stakeholder budget approvals, Expenditure rationalization, Avoidance of duplicated expenses, Market-rate procurement.

The Theme 3 is categorized in two sub-themes (i) Accurate Financial Planning and (ii) Cost Management, these are discussed as follows.

4.5.3.1 Accurate Financial Planning

Effective financial planning at the PC-I planning stage is crucial for mitigating cost overruns and ensuring the timely implementation of PSDP infrastructure projects. Experts have strongly emphasized the importance of accurate cost estimation, realistic cost rationalization and the inclusion of comprehensive financial timelines in PC-I documents. These are crucial for aligning project objectives with available resources and preventing disruptions during execution.

The proper financial estimation of the project scope requires detailed analysis and adequate time from the consultants. The Deputy Chief Planning Commission informed that "*Phasing of financial resources in PC-Is needs to be worked out properly, as per available allocations and anticipated releases*". Financial planning also include the financial timelines that practically outline the resource requirements. During each phase, it makes sure that the funds align to planned scope. Assistant Chief Planning Commission stressed that "*At the planning stage, scope and financial timelines should be realistic. Cost estimates should be aligned with objectives*". In order to avoid delay, due to lack of this financial planning, this alignment is required.

A key factor in effective financial planning was recognized as proper and realistic cost rationalization. It must be consultative and also based on approved cost estimation standards such as the Composite Schedule of Rates (CSR). Monitoring officer emphasized "*Cost rationalization should be realistic and consultative. The rationalization should be done on approved cost estimation basis (CSR)*". This would make sure cost estimates were really what the actual requirements are.

4.5.3.2 Cost Management

During the implementation of project, effective cost management, is essential for optimizing resource utilization. Experts have highlighted, the critical role of project directors (PDs) and other key personnel, in managing the costs of project. They have emphasized, the need for knowledge of public financial guidelines for project director. The Chief PC underscored the importance of equipping PDs with the necessary skills and experience, stating that "*The PDs should have knowledge of rules, regulations, financial obligations, relevant experience and administrative abilities to avoid cost escalation and delay*".

An equally important role, in cost management is played by monitoring. Experts have suggested that establishment of project steering committees as well as procurement committees at the project level, could enhance the financial oversight. The monitoring officer recommended that "*Project steering committees/procurement committees may be formed to cross-check financial matters and procurements at the project level*". Such measures will ensure transparency in expenditures.

Experts further proposed to limit the number of cost-based revisions, during project implementation. The Chief Planning Commission suggested that "For complex, core & large projects, there should be maximum, two cost-based revisions allowed, and for small projects (1-2 years duration), no cost-based revisions should be permitted". By utilization of this approach, there would be no repeated revisions, which brings delays and increase in project costs.

Findings of theme 3 highlighted, the importance of proactive financial planning and the effective cost management for minimizing overruns. Preparation of accurate estimation, realistic rationalization and comprehensive timelines, at the planning stage, set a foundation for achievement of project goals. During the implementation; financial oversight, skilled project directors and limits on cost revisions would ensure financial discipline which in turn would reduce overruns.

4.5.4 Theme-4: Security risks and Disaster Preparedness

Security risks and disaster preparedness has emerged as theme 4, to address research question 3. Substantial delays and cost escalations can be caused by these unforeseen events such as natural disasters, security threats or calamities. Therefore, it is critical to integrate, disaster risk assessment and contingencies planning at the project planning stage. It would lead to more resilient and adaptable projects and would also ensure efficiency in the execution stage.

The importance of well-defined contingencies plans has been highlighted by the experts. Furthermore, including flexible provisions into project manual to allows authorities, address emergencies promptly without waiting for lengthy procedural approvals, has been highlighted as an effective measure to reduce delays and disruptions. Further, security risks also demand proactive planning and resource allocation to ensure the safety, especially in high-risk areas. A comprehensive approach to disaster and security risk management, has been emphasized to maintain project timelines and ensure successful completion within defined budget. The subtheme, patterns and codes under theme 4 are described in the table below.

Table 19: RQ 3: Theme 4, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes

Security Risks and Disaster Preparedness	Risk and Contingency Planning	Integration of risk assessment in planning, Emergency response frameworks, Fast-track emergency approvals, Disaster-specific financial provisions, Strengthened risk mitigation policies	Integration of risk planning, Natural disaster preparedness, Contingency allocations, Risk-sensitive financial allocations, Emergency resource mobilization, Pre-approved emergency procurement, Budgetary flexibility for crisis management, Quick project redesign approval.

The finding of the theme 4 are discussed below.

4.5.4.1 Risk and Contingency Planning

Disaster risk assessment and integration of mitigation measures at the project planning stage are critical to avoid delays in case of a disaster. Experts have strongly emphasized the need for proactive planning to address potential risks during project implementation. The Assistant Chief Planning Commission stressed, *"Contingency plans should be well-defined at the planning stage and project staff should be well-trained to implement them."* This highlights the importance of disaster preparedness into project frameworks to minimize delays and costs escalation.

The Deputy Chief further emphasized the need for flexible provisions within manual for development project to handle emergency scenarios effectively. He noted *"Manuals should include a provision for emergency-based, calamity-based, war-based and strategic-based work. For instance, if floods wipe out a critical bridge/structure, project authorities cannot wait for PC-I revision. Provisions should be included in manual so that such activities can be processed within a limited time".* These provisions would ensure that urgent needs can be processed without delays. Additionally, the expert recommended granting financial autonomy to Project Directors (PDs) in such cases to mobilize resources and implement emergency measures. Integrating disaster risk assessment and emergency response mechanisms will ensures that projects can adapt to changing situations without compromising timelines and budgets.

The above findings highlight that integration of disaster and security risk framework is crucial measure to mitigate delays and cost escalations. Contingency planning, incorporating flexible provisions in project manual and financial autonomy to PDs to take decision could

minimize delays in case of any disaster. Inclusion of disaster and security risk management framework, in project planning would enhance projects resilience under challenging circumstances.

4.5.5 Theme-5: Policy Alignment and Reduced Unnecessary Influences

The theme five to address the research question three emerged as policy alignment & reduce unnecessary influences. The inclusion of poorly planned projects which have been influenced by political or external pressures, undermines the effective use of resources. Therefore, clear protocols for project approvals, scope and design changes need be established to mitigate inefficiencies. The importance of defining criteria for project inclusion in PSDP have been emphasized during interviews. It would enhance decision-making and reduce the likelihood of resource misallocation due to pressures.

Strategic alignment of development policy is another key measure as aligning projects with long-term development frameworks helps mitigates disruptions caused by political transitions. Development policies need to remain stable even with changes in government, further prioritization of the ongoing projects is essential for the efficient use of limited resources. Additionally, increasing the involvement of private sector representatives in project approval forums would enhance transparency and accountability. The subtheme, patterns and codes under theme 5 are presented in the table below.

Table 20: RQ 3: Theme 5, sub themes, patterns and codes

Themes	Sub-themes	Patterns	Codes
Policy Alignment and Reduced Unnecessary Influences	Avoiding Unnecessary Influences	Standardized project approval guidelines, Criteria-based inclusion in PSDP, Reduced political interference, Increased technical representation in decision-making	Clear PSDP inclusion policies, Reduction in political influence, Expert panel approvals, Minimized external interventions, Increased private sector representation, comprehensive project approval filters, prioritization of project, Transparency in decision-making
	Policy and Strategic Consistency	Long-term policy consistency, Priority funding for ongoing projects, Resource-focused	Development strategy alignment, Prioritization of pending projects, Sustainable project financing, Proportional allocation of fiscal

	PSDP planning, project selection, Limitations on excessive new projects	Strategic resources for new and ongoing, Reassessment of ongoing schemes, Improved national planning integration, Consistency in policy.

The Theme 5 is categorized in two sub-themes (i) Avoiding unnecessary influences and (ii) Policy and Strategic Consistency, these are discussed as follows.

4.5.5.1 Avoiding unnecessary influences

Rushed planning & approval processes are often driven by undue pressures which result in incomplete feasibility studies, unrealistic timelines and scope changes during implementation. Clear protocols on project approvals, scope revisions and design changes are vital to limit unnecessary changes during implementation which disrupt timelines and inflate costs. Experts have emphasized the importance of establishing well-defined criteria for inclusion of project in PSDP, to avoid inclusion of provincial-level initiatives under political influence. The Director General M/o WR stressed the need for clear policy guidelines, stating, "*One policy decision is required: what nature of project in every sector is to be financed through federal PSDP and which not*." This clarity would ensure that resources are allocated based on national priorities and project feasibility rather than external pressures, reducing the likelihood of resource misallocation.

To further prevent undue influence in project approvals, experts recommended increasing the representation of technical experts in approval forums. The Deputy Chief Planning Commission suggested, "*The representation of technical experts in approval forums should be increased, and 3-4 private members should be included*." Incorporating more technical expertise and private sector perspectives would enhance the transparency in decision-making.

4.5.5.2 Policy and Strategic Consistency

To ensure the effectiveness of PSDP projects, it is essential that the projects and programs included in each year PSDP, are aligned with the long-term development framework. This alignment would ensure consistency in development priorities and mitigate cost and time overrun challenges through provision of funds to ongoing schemes. The monitoring officer highlighted the importance of policy stability, stating, "*Development policy should be consistent, even with a*

change in government. If outcomes or objectives are not achieved, an inquiry should be conducted."

The critical need to prioritize the completion of ongoing projects has been emphasized by the participants so that sufficient funds may be allocated to these. Thin spread of resources is caused by the inclusion of an excessive number of new schemes in the PSDP which lead to delays and cost escalations. Experts have recommended to set a limit on the addition of new schemes in PSDP. The Director General M/o WR suggested that "*In infrastructure, for the next 3-5 years, only ongoing projects should be completed and no new projects should be initiated*". Thin spreading of resources would be prevented by this strategy and ongoing projects would be brought to completion without unnecessary delays as well as cost escalations.

As it can be seen from the above finding of theme 5, that it is necessary to align policy and minimize unnecessary influences, in order to enhance efficiency of projects. Project approval protocols are needed be clear in order to ensure that resources are aligned with the national priorities. Furthermore, by reduction of pressure, the PSDP projects can be executed within the budgets. In addition to that, the private sector expert's inclusion into the decision-making forums would be helpful in improving integrity of the approval process. To minimize the issue of cost and time overrun, the strategic alignment and efficient governance are crucial.

4.6 DISCUSSIONS OF FINDINGS

Persistent challenges are posed by the time and cost overruns in public sector infrastructure projects in Pakistan. The root of these overruns, is a number of interrelated factors, which hinder the implementation of projects and create inefficiency in the public resource utilization. The impacts of these overruns go past individual project levels; these negatively affect the broader economic benefits. The main purpose of this study is to explore the contributing factors of overruns in PSDP infrastructure projects and proposing mitigation measures at the project planning stage, to improve project management practices and ensure efficient utilization of public resources. Based on the insights from practitioners involved in federal project planning, implementation and monitoring following is the discussion for addressing each of three research questions.

4.6.1 Discussion of Factors Contributing to Time Overrun in PSDP Infrastructure Projects

The efficiency and effectiveness of public investments is undermined by time overrun in Public Sector Development Programme (PSDP). As per PMES, in PSDP 2023-24, the 60% of ongoing projects under NHA and water resources were beyond their schedules time. These delays are caused by a complex interplay of various systemic, financial as well as managerial factors. The delays affect success of project due to its direct influence on project cost (Rashid Kamran, 2022). The insights gathered from existing literature and interviews of the practitioner, involved in federal public sector project's planning, implementation & monitoring in Pakistan provided a deeper understanding of these delay factors. To understand these delays, it is essential to examine the related factors in a comprehensive manner, therefore these have been categorized into themes.

One of the most prominent factors contributing to time overrun in PSDP projects emerged in thematic analysis is, financial resource constraints coupled with inadequate financial planning. The in-depth interviews highlighted that financial phasing in PC-I document often lacks accuracy. This inaccuracy stems from poor cost estimation, failure to account for inflation, contingencies & exchange rate fluctuations. These lead to disruptions in procurement & construction activities. Inadequate financial allocation or delayed releases is another challenge, caused by resource constraint in the economy. The findings are aligned with the study by Memon et al. (2011), who has identified that cash flow & financial difficulties, poor site management and ineffective planning & scheduling are primary causes of delays in Malaysian construction projects. Likewise,

Dolage and Rathnamali (2013) emphasized that a significant cause of delays is inaccurate project planning & scheduling. The entire implementation schedule is disrupted by the mismatch between the planned & actual financing; it results in project delays.

A unique dimension is added by this study by highlighting that unrestricted inclusion of projects in the PSDP also exacerbates financial challenges. Thin spread of financial resources, across numerous projects is caused by this practice. No project receives adequate funds for timely completion, which create a cycle of inefficiency. The political & administrative pressures derive this practice and leads to overcommitment of financial resources. A systemic lack of financial prioritization and strategic allocation is reflected through this, which is further compounded by the inflationary pressures in Pakistan's economy.

Th findings of study align with the theory of optimism bias, which suggests that the decision-makers tend to systematically underestimate costs and timelines while overestimating the benefits of a project. In context of PSDP projects in Pakistan , this optimism bias leads to inadequate financial planning due to non-consideration of expected inflation. It futher leads to overestimation of availble resources in future and unristricted inlcusion of project in PSDP.

During the PC-I planning stage the deficiencies, contribute to delays in infrastructure projects. These deficiencies among others, include poorly defined project objectives, reliance on outdated or nonexistent feasibility studies and ambiguous Terms of Reference (ToRs) for consultants. The inaccurate designs & technical parameters are prepared due to poorly conducted feasibility studies. Johnson and Babu (2020) and Gupta and Kumar (2020) identify such design variations and frequent change of specifications, at the implementation stage, as one of the major causes of project delays. Moreover, political influence also creates unachievable goals and therefore delay timelines.

A persistent delay challenge in Pakistan's public sector is land acquisition, especially for large infrastructure projects. The issues, including disputes over outdated land rates, disputes with land owners and lengthy litigation processes are caused if land is not acquired before commencement of project. Idrees and Shafiq (2021) and Shah (2018), have documented these challenges in their studies. they emphasized that land acquisition delays are a significant bottleneck in infrastructure projects in Pakistan.

The challenges of unnecessary interventions and conflicts among stakeholders are closely linked with planning deficiencies & land acquisition. The politically motivated projects are rushed through the approval processes, without adequate feasibility and assessments. The projects are poorly planned and diverts resources from priority projects. At later stages costly revisions are necessitated, leading to further delays. It creates lack of ownership and conflicts among stakeholder and further inefficacies in the development process.

The human resource and governance challenges in infrastructure projects under the PSDP, undermine the effectiveness of public project management. The quality of the PC-I documents and feasibility studies are adversely impacted because of unclear Terms of Reference (ToRs) for consultants. Therefore, due to this lack of clarity, projects face poorly defined scopes, inaccurate cost estimates and poor risk assessments. Moreover, lack of experienced project staff and prevalent practice of assigning project directors on additional charge basis compound this issue. Dolage & Rathnamali (2013) and Osman & Mohamud (2022) mentioned that skilled and experienced labor is essential to meet the timelines of the project. They argued that key driver of inefficiencies in infrastructure projects was inadequate human resource capacity. According to Adam and Lindahl (2017), management factors are responsible for the project overruns, including lack of managerial skills, weak monitoring mechanisms and slow decision-making processes. Most of these inefficiencies in governance result into administrative issues and interrupt the continuity of project activities.

The impact of regional socio-political conditions on project outcomes has been noted by Enshassi, Al-Najjar, and Kumaraswamy (2009). The importance of understanding unique contextual factors for success of project have been underscored by their study. The significant delay factors during in-depth interviews have been identified as security risks in regions such as Balochistan and merged districts of Khyber Pakhtunkhwa, in Pakistan. These findings are aligned with study of Khan et al. (2018), which has identified tribal & political influences, as key contributors to delays. Security challenges represent hurdles, create unsafe environment for project teams that result into the failure of resource mobilization as well as disruption of construction activities.

Harsh weather and difficult terrain also make resource mobilization, a difficult task, at certain project locations. Likewise, Al-Hazim, Salem, and Ahmed (2017) have found that terrain

and weather conditions, are among the top factors which cause delays in infrastructure projects in Jordan. Dolage and Rathnamali (2013) have highlighted that adverse weather conditions & natural disasters have contributed to time overruns in Sri Lanka. The external challenges that are not satisfactorily addressed during the project planning, create delays and cost escalation during the project implementation.

The shortage of equipment & materials was included as a potential factor which contribute to overruns, in the conceptual framework for this study. The study by Memon et al. (2012) have emphasized the critical role of equipment & material availability, in delays. However, the project practitioners in Pakistan during interviews, did not emphasize this issue, as a major challenge. The stakeholders were more focused on financial mismanagement, governance inefficiencies and planning gaps. It suggests that infrastructure development challenges, in Pakistan, are deeply rooted in systemic & administrative issues rather than constraints related to equipment and materials.

The time overrun factors for Pakistan, identified through this study, share some similarities with other developing countries such as the studies from Sri Lanka, India and Malaysia, highlights common factors including financial difficulties, poor site management and inaccurate planning & scheduling. However, this study brings forth the systematic issue such as financial constraints due to unrestricted inclusion of projects in the PSDP, which shows that delays in Pakistan are predominantly, tied to institutional practices. This aspect has not been not emphasized in studies from India by Gupta & Kumar (2020) and Malaysia by Memon, et al. (2011). The material related factors have been highlighted by studies from Gaza strip (Enshassi, 2009 and India (Gupta & Kumar, 2020), which Pakistan practitioners did not consider as major contributors, they have more emphasized on ambiguous Terms of Reference, non-technical project directors and poor feasibility studies. These distinctions indicates that delay factors in Pakistan are more about inaccurate planning, political influence and governance issues.

All the identified themes and discussions have highlighted the critical need for systemic improvements at the project planning stage. In order to deliver projects on time, financial inaccuracies, planning gaps, governance inefficiencies, unnecessary interventions and external challenges, must be anticipated properly. The problem at the planning stage including unrealistic timelines, poorly defined objectives and inadequate feasibility study affects the project

implementation. It is a complex interplay of internal and external drivers of the delays. These findings directly address Research Question 1, which seek to explore the major factors of delays in PSDP infrastructure projects. It is essential to mitigate delays, in PSDP infrastructure projects, by addressing these challenges, through means of better planning and robust governance mechanisms.

4.6.2 Discussion of Factors Contributing to Cost Overrun in PSDP Infrastructure Projects

Cost overruns in PSDP infrastructure projects, represent a critical challenge, to the efficient public resources management. In PSDP 2023-24, the 25% of ongoing projects under NHA and water resources has exceeded their budgeted cost. A range of interconnected factors of cost escalations, have been provided by the insights gathered from expert interviews. The categorization of these factors into distinct themes, have provided a structured approach for addressing Research Question-2. The key inefficiencies have been emphasized by these themes which compromise the effectiveness of public investments.

The financial misalignment has been emerged, as recurring theme. The stakeholders consistently highlighted that fiscal constraints, inadequate financial planning and failure to accurately anticipate inflation & contingencies, are the major factors of cost overrun. These findings are in line with Johnson and Babu (2020). Their study had found that poor cost estimation and financial issues have been the main causative factor, of project cost escalations.

The issue of inclusion, of an excessive number of projects in PSDP without ensuring financial resources have been identified by this study. A thin distribution of resources is resulted due to this practice. It reduces the financial space for ongoing schemes and cause delays and multiple revisions. This unrestricted inclusion of projects, overburdens PSDP. It has also been emphasized that quarterly fund releases, are dictated more by resource availability rather than PC-I commitments. Which disrupts timelines, and create inefficiencies in the project lifecycle. These systemic financial mismanagement as well as poor fiscal discipline, escalate costs and reduce effectiveness of public investments.

Another critical theme emerged which is PC-I planning & legal gaps. This theme discusses the poorly defined scope of project and inaccurate detailed engineering design. These lead to

unrealistic targets, and necessitate adjustments as well as reworks, during execution phase. The lack of adequate site investigations during feasibility study, cause flaws in design, particularly in the large infrastructure projects, such as a dams. These findings are aligned with the study by Olupitan et al. (2021**),** on public sector projects in Nigeria, which underscores inadequate planning & design changes, amplify the cost overruns. Furthermore, projects timelines are disturbed due to inaccuracies in land rates, which leads to prolonged litigation.

These issues are exacerbated by the political pressures, as observed by Sarmento and Renneboog (2016). They argued that political decisions play critical role in cost deviations. Likewise, Idrees and Shafiq (2021), Shah (2018) and Khan et al. (2018) have noted that overruns have been caused by poor planning, governance gaps, legal hurdles in land acquisition and weak project management. These challenges highlights persistent lack of structured frameworks, at the planning stage.

The bureaucratic delays, slow decision-making and reliance on outdated processes were frequently cited by the experts, as major hindrances, to timely implementation of project, within budget. This is consistent with Khan, et al. (2021), who pointed out, that bureaucratic inertia, poor stakeholders' engagement and resources mismanagement, are the challenges of Pakistan's public sector. There is limited use of digitization in development projects, which increase administrative costs and reduce transparency & accountability. Low accountability is however indicated by Asiedu and Adaku (2019), as one of the significant drivers of cost overrun. The oversight is hampered by this lack of digitization and cause unchecked escalation of issues. Experts in this study emphasized the critical need for integrating digital monitoring systems to track progress, identify challenges early and enhance project transparency.

Moreover, capacity issues within human resources further hinder effective project management. The lack of trained staff and reliance on traditional practices, results in inefficient resource utilization. This aligns with the findings of Gupta & Kumar, (2020) and Shah, (2018). The authors have highlighted insufficient labour as contributor of overrun. Similarly, the challenges of productivitty of labor has been observed by Osman & Mohamud, (2022) and Memon, et al. (2011). Similarly, for large infrastructure projects, coordination among key stakeholders at planning stage in key to avoid issues at execution. Researchers including Olupitan,

(2021); Asiedu & Adaku, (2019); (Osman & Mohamud, (2022) have emphasized coordination gaps as contributor to overruns.

Infrastructure projects, due to their nature, are highly vulnerable to external risks such as natural disasters and security challenges. Structural damages caused by disasters lead to additional costs for repairs & rework which disrupt project schedules and escalate costs. The extensive security arrangements have to be taken due to, security risks in certain regions. These measures increase operational costs as well as discourage international contractors & consultants to work on these locations. The competitive bidding options become limited. This negatively, impacts the quality and cost-efficiency of the projects.

There is another critical issue that undermine the effective planning & management of projects which is political pressures during the project approval & execution phases. The inclusion of politically, motivated projects, with rough cost estimates and poorly defined scope, are caused by political interventions. The adverse effects of political influence have been emphasized, by Flyvbjerg (2007), he noted that political priorities, often, lead to the underestimation of costs and overestimation of benefits, during project planning. This misalignment creates unrealistic expectations, increase in costs and frequent revisions. These issues underscore, the need for technically driven approach, for project selection & management.

The participants, have highlighted, a major policy level challenge, which is unrestricted addition, of new projects in PSDP. It results in thin spreading of financial resources across PSDP. The importance of incorporating, preliminary activities, such as issuance of NOCs, and other administrative activities, have also been stressed. Adequate time, for these tasks, has to be allocated in project timelines, before initiation of construction works. It is also critical to prepare, standardized guidelines, for financial rationalization, which are aligned with project scopes, to avoid cost overruns. The issue of unrealistic rationalization aligns with the Triple Constraint Theory which highlights the interdependence between time, cost, and quality/scope. According to theory, changes or compromises in one constraint will inevitably affect the other two. When cost of project is rationalized unrealistically, the quality and timelines is affected.

The other developing countries such as Nigeria and Ghana highlight factors including variation orders, poor supervision and coordination challenges as key overrun factors, while this study identified a more chronic issue of unrestricted project inclusion in the PSDP without fiscal

discipline, in case of Pakistan. This finding emphasizes institutional and systemic issues that are distinct from other developing economies. The study from India by Gupta & Kumar (2020) reveals significant factors as, escalation of material & transportation price, change in project, frequent breakdown of the plant & equipment and rework due to errors. Pakistan's cost overruns stem from politically motivated project approvals, unclear scope, and funds allocations; not tied to project requirement. These practices highlight that PSDP project planning is highly affected due to political pressures. Another Pakistan-specific nuance is governance and capacity limitations. Although the issues of weak institutional environment and delays in decision making are also noted in Ghana and Nigeria. However, the challenges like weak digital oversight and non-technical project directors on additional charge basis, are unique to Pakistani context. Further the security related issues, reduce competition and increase project costs in few areas. The systemic and structural nature of these factors highlights challenges which are beyond project-level decision making.

The ability of the public sector, to undertake new initiatives, or to efficiently complete the ongoing, is badly, affected by cost overruns, in the PSDP projects. There is an inherent interconnection, between delays & cost overrun, wherein, one often causes or exacerbate the other. The extended project timelines, leads to higher cost of materials, labor, equipment & administrative charges. due to inflation and market fluctuations. The escalation in cost, require, the approval of additional funds, which delay the ongoing activities. In this way, a cycle of inefficiencies, is created, in public sector project implementation.

4.6.3 Discussion of Measures to Avoid or Mitigate Overruns in PSDP Infrastructure Projects

The critical insights, to mitigate cost & time overruns, have been provided, to address the Research Question-3, by the practitioners. The pivotal role of planning phase, has been stressed, to mitigate, cost and time overrun challenges. The successful project implementation requires, proper feasibility studies, realistic financial planning and clearly defined objectives. The addressing of these planning-stage challenges would enable PSDP projects, to adhere to approved timelines and budgets, consequently to ensure, the effective utilization of public resources.

The project practitioners, consistently, emphasized for comprehensive planning of projects, to reduce overruns, which emerged as a recurring theme in discussions. The importance of proper

planning & scheduling, has been highlighted by Memon et al. (2011), in minimization of time overruns. The track of the project is set from here. Similarly, Al–Hazim et al. (2017), contends that more efforts, should be employed during the planning, scheduling & cost estimation, to help counter overruns, especially, in complex infrastructure projects. Furthermore, Gupta and Kumar (2020) have also stressed, to make planning & scheduling, a continuous process. It needs to be an adaptive process, rather than, one-time exercise. This study, is also aligned with these perspectives, as it points gaps, at the planning stage, as critical drivers of inefficiencies.

The critical role of proper feasibility studies, and well-defined Terms of Reference (ToRs) for consultants, have been emphasized, to mitigate, the overruns. A foundation for informed decision-making, is set through conduct of proper feasibility studies. The importance of robust planning & feasibility assessments, has also been emphasized by Irfan et al. (2023), the author has indicated, its pivotal role, for prevention of disruptions at later stages. Similarly, Olupitan et al. (2021) has advocated, the comprehensive project planning, appointment of experienced design teams and adoption of proper scheduling practices, as essential measures, to curb overruns. It is significant, to allocate, adequate funds & sufficient time, to conduct feasibility studies, particularly, for large-scale infrastructure projects as highways & dams. Dolage and Rathnamali (2013), have highlighted, the importance of adequate time for consultants, to prepare, detailed project design.

The necessity of allocation of proper time, for land acquisition, has been highlighted by Shah (2018). Delays in acquiring land and legal disputes often result in project stagnation and also cost escalations. Experts in this study echoed these findings and further advocated for acquisition of land before commencement of project. Other preliminary activities such as processing NOCs, and initial procurement are also overlooked in the PC-I documents, which creates delays during implementation. This study also stresses the scheduling these activities at planning stage to avoid disruptions later. The time requirement for preliminary activities vary sector to sector or project to project, therefore, a one-size-fits-all approach cannot address these complexities. Instead, consultants must undertake detailed assessments during the planning phase to integrate these timelines into the PC-I.

Infrastructure, social and production sector projects, present unique challenges that necessitate tailored planning approaches. Sector-specific guidelines in the manual for development

projects could address these challenges effectively. As highlighted during in depth interviews. overambitious project objectives and poorly defined scopes, lead to project revisions during execution. Flyvbjerg (2007) underscores that overly optimistic planning, significantly disrupts implementation phases.

The financial planning, during PC-I formulation stage, has emerged as a critical determinant of project success. It directly, influence the timelines, budgets and efficiency of the project. The need for standardization, of cost rationalization process, has been emphasized, which is to be done through, detailed assessments of establishment charges and alignment of financial plans with project scopes. Flyvbjerg (2007) has focused, the importance of proper financial planning, in the early stages of the project formulation, to reduce overruns. The empowerment of Project Directors (PDs), with financial autonomy and reduction in bureaucratic delays, has been an important recommendation, from experts, to equip PDs, to mobilize necessary resource, timely.

As significant measure for mitigation of overruns, the engagement of experienced project staff & digitization of process, has also been highlighted. The importance of engagement of experienced staff & implementation of robust planning frameworks, has been emphasized by Olupitan et al. (2021), for mitigation of cost overruns, in Nigerian. Another key area, which has been identified, is digitizing of monitoring mechanisms. The oversight can be enhanced through real-time tracking of project progress, it would facilitate, early identification of issues. These findings, have been supported through the study by Osman and Mohamud (2022). The study recommends to tackle, the overruns, by utilization of, communication channels that are effective. In addition, at the project level, another level of oversight can be provided, through steering committees, their role would be, to speed up decision making, and enhance transparency & accountability.

The shift of development priorities, on account of change in political leadership has been highlighted. The tendency to add, a large number of new projects, in PSDP, lead to thin spread of finances. An alignment of the PSDP projects, with the country's long term development framework has been stressed by the experts. It would further help to mitigate resource fragmentation.

The Manual for Development Projects (2024) provides a procedural guideline for the preparation, appraisal, approval and implementation of PSDP projects, the study findings suggest

a disconnect between the guidelines and actual practices. Semi structured interviews have revealed that PC-I are prepared hastily to meet deadlines and projects submitted without feasibility studies. Further, the manual guidelines regarding stakeholder engagements, land acquisition before project initiation are treated as formality. Especially in case of politically motivated projects where timelines and technical planning are not done as per manual guidelines. This ultimately contributes to time and cost overruns. To mitigate this, the manual for development project guidelines needs to be binding.

The discussion has revealed, that the project planning stage is the most critical phase, for the intervention of mitigation measures, in order to address cost and time overruns in PSDP infrastructure projects. There in a need to systematic reforms, across various stages of project planning & implementation to mitigate overruns. Part of this can be achieved through improvement of efficiency of PSDP projects, by tackling of gaps, in financial planning, governance and resource allocation. These measures would be effective as approached in a disciplined and data driven way. These measures further need to be synchronized with national development priorities.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion and Summary of Key Findings

This research, provides the insights into the persistent time and cost overruns issues, in PSDP's infrastructure projects. These inefficiencies, arise from inadequate planning, human resource constraints, governance challenges and external factors. These challenges need to be addressed for enhancing the efficiency as well as impact of public sector investments, which would eventually facilitate sustainable socio-economic development in Pakistan

5.1.1 Research Question 1: Contributing Factors of Delays in PSDP Infrastructure Projects

The study has identified, five prominent factors which are contributing to delays in Public Sector Development Program (PSDP) infrastructure projects in Pakistan. These five factors include; improper financial planning & resource constraints, planning gaps & legal bottlenecks, human resource & governance challenges, unnecessary interventions & stakeholder conflicts and environmental & security challenges. Improper financial planning arises, from inaccurate cost estimates & poor forecasting, while financial constraints are caused by inadequate allocations & delayed fund releases. The planning gaps like improper feasibility studies, unclear project scopes, legal bottlenecks and challenges of land acquisition were also found to be significant contributors of project delays.

Human resource limitations such as lack of skilled personnel & frequent transfers of project staff, when combined with governance inefficiencies further, aggravates delays. Political interventions along with lack of stakeholder coordination were also identified as critical challenges, which often, resulted in, changes in scope and misalignment of resource. Factors which are external to project, such as natural disasters & extreme weather conditions, also necessitate, rework at site and these extends the timelines. Security risks, particularly, in the conflict-prone areas, have caused disruptions, in project timely implementation. The findings of research question one indicates that the identified challenges are interconnected in nature. Therefore, the need for comprehensive planning, proper resource allocation and improved governance mechanisms has been emphasized, to effectively, address the issue of delays.

5.1.2 Research Question 2: Contributing Factors of Cost Overrun in PSDP Infrastructure Projects

In order to address the research question two, this study have found, five major contributing factors to cost overruns in PSDP infrastructure projects in Pakistan. These include financial misalignment & inadequate cost planning, implications of planning & legal gaps, management shortfalls, unnecessary interventions and security risks & natural disasters. Financial misalignment leads to increase in costs, which stem from unrealistic cost estimation and delayed fund releases. Unclear project scopes as well as inadequate feasibility studies also results in, frequent revisions of project and escalation of cost.

Governance inefficiencies & human resource constraints such as insufficient workers at the project site and appointment of non-technical person as Project Director, have also been found as significant contributors to cost overruns. Likewise, rushed approvals and scope changes during implementation, led by political interventions, further inflate cost of the projects. Furthermore, external factors of projects such as natural disasters & security threats also cause significant additions in expenditures, for repair work and security arrangements. Consequently, this calls for accurate financial planning, improved governance & human resources capacity and proactive risk management to control PSDP cost escalations and improve efficiency of PSDP projects.

5.1.3 Research Question 3: Measures to minimize Overruns in PSDP Infrastructure Projects

To minimize the issues of cost and time overruns, in Public Sector Development Program (PSDP) infrastructure projects, the study has identified, the measures including comprehensive project planning, effective human resource management & governance, proactive financial planning, disaster preparedness & risk management plans, policy alignment and also reducing unnecessary influences. The critical measure such as comprehensive planning, robust feasibility studies, clear terms of reference (ToRs) and sector-specific guidelines, was highlighted to minimize overruns. The experts have also emphasized, the importance of digitized monitoring systems and stakeholder engagement at the project planning stage, in order to improve oversight as well as resolve potential disputes early.

On the other hand, effective governance & skilled human resource were also found pivotal for prevention of overruns. Key minimization measures for overruns also include grant of financial autonomy to PDs in the project management chain and strengthen the monitoring frameworks. Moreover, accurate cost estimation and realistic rationalization of costs was shown to be critical for control of project's costs. Furthermore, preparation of disaster & security risk frameworks were suggested, in order to assess the potential effects natural calamities & security threats on management. Finally, it was noted that successful alignment of resources with national priority are required for reduction of political & other external influences in project selection. These measures deal collectively with the factors responsible for cost and time overruns in PSDP infrastructure projects.

5.2 Implications

This study sheds the light on the reasons for persistent cost and time overruns in Public Sector Development Program (PSDP) infrastructure projects in Pakistan. On the basis of these findings, public sector project management inefficiencies could be addressed and future development of infrastructure initiatives could be improved. It highlighted the major reasons for delays and cost overruns in public sector projects such as poor coordination, inadequate planning, governance inefficiency, external factors, etc. There is need to pay attention to these areas of project planning & implementation. Stakeholders including government departments, project managers and policy makers can use these insights to adopt, robust planning frameworks, improve communication mechanisms and also strengthen the governance frameworks.

By these findings, policymakers could craft targeted reforms of improving organizational capacity, timely decision making and accountability mechanism in order to reduce wastage of resource. At the policy level, the findings have stressed the importance of incorporating, lessons learned from delayed & over budget projects, into the planning of future PSDP. This study can be used by policymakers for prioritizing the capacity building initiatives and strengthening of financial oversight. The project study points at the significance of synchronization of project schedules & budget, with technical parameters, in order to ensure accurate planning & allocation of resources. Finally, the study emphasizes the necessity for reform at the planning stage so that the challenges can be addressed effectively. Solving the problems on both policy and operational

level, is crucial for substantial improvement in the delivery of public sector infrastructure projects in Pakistan

This study contributes to literature on infrastructure development through a detailed analysis of cost & time overruns in Pakistan's context. The qualitative research approach of in-depth interviews & thematic analysis, were useful in the understanding, of the systemic and the context specific challenges in developing countries. This approach could serve for future research of similar contexts, to offer, understanding of the socio-political, economic and external factors influencing the project outcomes.

Finally, the study has broader implications, for socio-economic development as it is crucial to implement development initiative, within approved budgets and on timely basis, to supports economic growth. This research has the potential to minimize, the economic & social costs associated with project delays as it provides actionable mitigation measures for overruns. It contributes to the efficient utilization of public funds and support the long-term national development objectives.

5.3 Limitation of the Study

Although this study has contributed useful insight on the challenges, yet the research has been focused on projects of only sectors; road & water resource. This may restrict the generalizability of the findings, to other sectors, such as education, energy, etc. Roads and water resource projects, often are characterized by unique technical and managerial complexities, which may not fully represent dynamics of PSDP projects in other sectors.

The responses during in-depth interviews are subject to recall bias, as these may present personal as well as organizational agendas, therefore the issue of skewed understanding of underlying causes may arise. This study also identifies, themes & patterns, based on qualitative data, these may lack statistical validation. This limitation could be addressed with future research. Although there are these limitations, the results of this study are significant and set the basis for further studies.

5.4 Future Study Recommendations

The future research can focus on addressing challenges in specific sectors like health, education and energy, to understand the dynamics of each such sectors within PSDP portfolio. As

such studies could provide further details in sector specific issues. Although this research, could only focus on the immediate challenges of cost and time overruns in infrastructure projects, future research may investigate their long run impacts on the performance and outcomes of these projects.

Geographically or politically sensitive regions, such as Balochistan or merged districts of Khyber Pakhtunkhwa (KP), present unique challenges due to their socio-political contexts and infrastructural gaps. Region-specific studies can also offer localized insights into the area specific challenges to project's outcomes or the strategies to address area-specific challenges. Further, research on integrating environmental sustainability and climate resilience into project planning can align future infrastructure development in Pakistan, with global sustainability goals. It can provide insights for more efficient and sustainable public investments.

5.5 Recommendations

Based on the findings and conclusion of the study, following recommendations are made.

5.5.1 Strategic Policy Reforms

- There may be a limit on inclusion of new projects in PSDP each year, ensuring adequate resource allocation for ongoing schemes.
- Consistency may need to be ensured in development priorities across government transitions to avoid disruptions in project timelines and resource allocation.
- A criterion may be decided to differentiate between federal and provincial nature projects, to ensure that provincial nature projects are not included in PSDP due to political influence.
- Representation of private sector technical experts in project approval forums such as DDWP and CDWP may be included to ensure that decisions are based on technical aspects rather than political priorities.

5.5.2 Strengthening Financial and Physical Planning

- Comprehensive financial phasing may be included in PC-I documents, accounting for inflation, contingencies and exchange rate fluctuations for foreign-funded projects.
- Land Acquisition Act of 1894 may be revised to address current challenges, including outdated land valuation and prolonged litigation.

- For development projects dedicated committees may be formulated for land valuation using field assessments to determine market rates and ensure timely payments.
- Ensure realistic cost estimations by involving experienced consultants and using updated market rates.
- A standardized framework for cost rationalization may be established to avoid arbitrary reductions in establishment charges or other essential resources.
- For prequalification activities such as NOCs, the time requirement may be assessed and specifically mentioned in the PC-I timelines.
- Sufficient time and funds may be allocated for conducting feasibility studies, particularly for large infrastructure projects such as highways and dams.
- Clear and detailed Terms of Reference (ToRs) may be defined for consultants to ensure high-quality feasibility studies and designs.
- Contingency plans at the planning stage may be developed particularly for large infrastructure projects to address risks associated with natural disasters and financial provision may be set aside, for emergency work to allow immediate resource mobilization without requiring lengthy approval processes, in case of emergency requirements.

5.5.3 Enhancing Governance Mechanisms

- Project Directors (PDs) may be given financial autonomy to mobilize resources and expedite project execution. Frequent change of PDs or PDs on additional charge may be avoided.
- Regular capacity-building training programs for project management staff, may be organized focusing on public financial management, risk assessment, and planning techniques.
- Digitization of project approval, monitoring and reporting mechanisms may be ensured to improve transparency, reduce delays and enhance decision-making.

*****

REFERENCES

Asiedu, R. O., & Adaku, E. (2019). Cost overruns of public sector construction projects: a developing country perspective. *International Journal of Managing Projects in Business, Emerald insight*.

Canh, N. T., & Phong, N. A. (2018). Effect of Public Investment on Private Investment and Economic Growth: Evidence From Vietnam by Economic Industries. *Applied Economics and Finance Vol. 5, No. 2*, 95-110.

Ganiyu, S. A., Ebohon, O. J., & Ajayi, T. O. (2021). Understanding research paradigm in social sciences: A critique of two papers on critical success factors for BIM implementation.

Gbahabo , P. T., & Ajuwon , O. S. (2017). Effects of Project Cost Overruns and Schedule Delays in Sub-Saharan Africa. *European Journal of Interdisciplinary Studies, 3*(2). doi:10.26417/ejis.v3i2.p46-59

Islam, M. A., & Aldaihani, F. M. (2022). Justification for Adopting Qualitative Research Method, Research Approaches, Sampling Strategy, Sample Size, Interview Method,Saturation, and Data Analysis. *Journal of International Business and Management*.

Adam, A., & Lindahl, G. (2017). Aggregation of factors causing cost overruns and time delays in large public construction projects: Trends and implications. *Engineering Construction & Architectural Management*, 39-56.

Adebiyi, J. A. (2016). Research Design: A Review of Features and Emerging Development. *European Journal of Business and Management, 8*(11).

Al-Hazim, N., Abu Salem, Z., & Ahmed, H. (2017). Delay and Cost Overrun in Infrastructure Projects in Jordan. *Procedia Engineering*, 182, 18 – 24.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 77-101. doi:10.1191/1478088706qp063oa

Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., . . . Walker, K. (2020). Purposive sampling: complex or simple? Research case examples. *Journal of Research in Nursing*, 652-661. doi:DOI: 10.1177/1744987120927206

Dolage, D., & Rathnamali, D. (2013). Causes of Time Overrun in Construction Phase of Building Projects. *ENGINEER - Vol. XXXXVI*, 9-18.

Enshassi, A., Al-Najjar, J., & Kumaraswamy, M. (2009). Delays and cost overruns in the construction projects in the Gaza Strip. *Journal of Financial Management of Property and Construction*, 126-151.

Flyvbjerg, B. (2007). Policy and Planning for Large Infrastructure Projects: Problems, Causes, Cures . *Environment and Planning B Planning and Design*.

Galagali , A. A. (2017). Time-Cost-Quality Trade-off in Construction Project Management. *SSRG International Journal of Civil Engineering (SSRG – IJCE), 4*(8).

Guest, G., Bunce, A., & Johnson , L. (2006). How Many Interviews Are Enough?: An Experiment with Data Saturation and Variability. *Field Methods*.

Gupta, C., & Kumar, C. (2020). Study of factors causing cost and time overrun in construction projects. *International Journal of Engineering Research & Technology (IJERT)*, 202-206.

Idrees, S., & Shafiq, M. T. (2021). Factors for Time and Cost Overrun in Public Projects. *Journal of Engineering, Project, and Production Management*, 243-254.

Irfan, M., Khan , S. Z., Hassan, N., Hassan , M., Habib, M., Khan, S., & Khan, H. H. (2023). Role of Project Planning and Project Manager Competencies on Public Sector Project Success. *Sustainability MDPI*.

Johnson, R. M., & Babu, R. I. (2020). Time and cost overruns in the UAE construction industry: a critical analysis. *International Journal of Construction*, 402-411.

Khan, A., Hussain, A., Waris, M., Ismail, I., & Ilyas, M. (2018). INFRASTRUCTURE PROJECT GOVERNANCE: AN ANALYSIS OF PUBLIC SECTOR PROJECT IN NORTHERN PAKISTAN. *Journal of Governance and Integrity (JGI)*, Volume 1, Issue 2, 120-134.

Khan, A., Waris, M., Ullah, M., & Bokhari, I. H. (2021). Review of Public Sector Project Planning in Pakistan. *Pakistan Journal of Social Sciences (PJSS), Vol. 41*, 503-514.

KHAN, D. A., TURNER, P. R., & MAQSOOD, D. (2013, June). Factors that influence the success of public sector projects in Pakistan. *Conference Paper*.

Memon, A. H., Rahman, I. a., abdullah, M. R., & Aziz, A. A. (2011). Time Overrun in Construction Projects from the Perspective of Project Management Consultant (PMC). *Journal of Surveying, Construction & Property Vol. 2 Issue 1*, 54-66.

Noor, M. A., Khalfan, M. M., & Maqsood, T. (2012). Methods used to procure infrastructure projects in Pakistan: an overview. *Int. J. Procurement Management, Vol. 5*, 733-752.

Olupitan, A., Ajator, U., & Nzeneri, O. (2021). The Critical Causes and Effects of Cost Overruns in Public Sector Construction Projects in Port Harcourt, Nigeria. *International Journal of Scientific and Research Publications, Volume 11, Issue 10*.

Osman, L. A., & Mohamud, D. O. (2022). The Impact of Time Delay on Construction Projects Cost Overrun: A Case Study on Some of Construction Projects in Mogadishu-Somalia. *Journal of Positive School Psychology Vol.6*, 3884 - 3895.

Park, J. E. (2021). Schedule delays of major projects: what should we do about it? *Transport Reviews, Taylor & Francis Group*, 814-832.

PC. (2024). *Manual of Development Projects.*

Qazi, M. A., & Ammad, S. (2021). Public investment efficiency and sectoral economic growth in Pakistan. *Development Policy Review*, 450–470. doi:10.1111/dpr.12493

Rahman, A. H. (2014). SEM-PLS analysis of inhibiting factors of cost performance for large construction projects in malaysia: Perspective of clients and consultants. *The Scientific World Journal*.

Ranganathan, P., & Aggarwal, R. (2018). Study designs: Part 1 – An overview and classification. *Perspectives in Clinical Research, 9*(4).

Rashid Kamran, M. Q. (2022). Decision-making Process in Infrastructure Projects and Losses due to Delayed Decision-making in Public Sector Projects of Pakistan. *Journal of Infrastructure Development*, 24–36.

Raykar, P., & Ghadge, A. N. (2016). Analyzing the Critical Factors Influencing the Time Overrun and Cost Overrun in Construction Project. *International Journal of Engineering Research Volume No.5, Issue Special 1*, 21-25.

Salman Riazi, M. R. (2018). PROJECT DELAYS IN THE MALAYSIAN PUBLIC SECTOR: CAUSES,PATHOGENS AND THE SUPPLY CHAIN MANAGEMENT APPROACH. *International Journal of Technology*.

Sarmento, J. M., & Renneboog, L. (2016). Cost Overruns in Public Sector Investment Projects. *Public Works Management & Policy 2017, Vol. 22(2)*, 140–164.

Senses, S., & Kumral, M. (2024). Trade-off between time and cost in project planning: a simulation-based optimization approach. *Simulation: Transactions of the Society for Modeling and Simulation International*, 127–143.

Shah, S. H. (2018). *Appraisal of PSDP Projects' Implementation.* Islamabad: Planning Commission of Pakistan.

Shehu, Z., Endut, I. R., & Akintoye, A. (2014). Factors contributing to project time and hence cost overrun in the Malaysian construction industry. *Journal of Financial Management of Property and Construction, Vol. 19*, 55-75.

Shiferaw, A. T., & Klakegg, O. J. (2012). Linking Policies to Projects: The Key to Identifying the Right Public Investment Projects. *Project Management Journal, Vol. 43, No. 4*, 14–26. doi:10.1002/pmj.21279

Tahir, P. (2005). Institutional Machinery for Managing the Pakistan Economy. *The Lahore Journal of Economics, Special Edition*, 107-143.

Volden, G. H., & Welde, M. (2022). Public project success? Measuring the nuances of success through ex post evaluation. *International Journal of Project Management*, 703-714.

William, F. K. (2024). Interpretivism or Constructivism: Navigating Research Paradigms in Social Science Research. *International Journal of Research Publication, 143*(1). doi:1001431220246122

Zid, C., Kasim, N., & Soomro, A. R. (2020). Effective project management approach to attain project success, based on cost-time-quality. *Int. J. Project Organisation and Management, Vol. 12, No. 2*, 149-163.

APPENDIX-A: FACTORS CAUSING TIME & COST OVERRUN IDENTIFIED IN VARIOUS RESEARCH STUDIES

Author	Purpose of Study	Research Method	Main Factors
(Sarmento & Renneboog, 2016)	To investigate and analyze cost overruns in public investment projects in Portugal.	Hypothesis testing	Project size, Election year, Procurement laws, legal and regulatory environment and corruption
(Al-Hazim, Abu Salem, & Ahmed, 2017)	The study aims to investigate the factors that may cause overrun of the planned cost, allocated resources and scheduled time of infrastructure engineering projects in Jordan	Review of related literature, discussion with practitioners and study of final reports of projects	Terrain and Weather conditions
(Shah, 2018)	To carry out to review existing pace of implementation of development projects, assess cost over-run of PSDP projects, assess time over-run of PSDP on-going projects, identify bottlenecks in implementation of PSDP projects	Review of projects Monitoring & Evaluation Reports	Lack of decision making, lack of management capacity, turnover of Project Director (PD) and staff, delay in recruitment, governance issues, delay in procurement, contractor's problems coordination issues, delay in consultants' appointments/designing, nonexistence of PMU, land acquisition, law and orders, delay in releases.
(Olupitan, Ajator, & Nzeneri, 2021)	The Critical Causes and Effects of Cost Overruns in Public Sector Construction Projects in Port Harcourt, Nigeria	Review of Literature, Structured questionnaires	Variation orders, changes in scope of the project, cash flow and financial difficulties faced by contractors, and delays in decision making and adequate planning.
(Asiedu & Adaku, 2019)	To understanding causes of Project cost overrun from a system's perspective, especially from a less researched environment.in Ghana.	interview session, Questionnaire	Poor contract planning and supervision; change orders; weak institutional and economic environment of projects and lack of effective coordination among the contracting parties.
(Idrees & Shafiq, 2021)	To investigates delay and cost overrun factors within the context of public sector projects in Pakistan.	Existing literature, semi-structured interviews, questionnaire for hierarchy of factors.	Legal issues, such as court stay orders, land acquisition, relocation of public facilities; technical errors leading to low-quality drawings, rework, and errors at bidding stage; and Poor project management.

(Park, 2021)	Investigation of the frequency, magnitude, and characteristics of schedule delays occurring during the construction of 113 large public procurements built in the U.S. and the U.K	Hypothesis testing	Length of implementation phase, project type, and cost overrun.
(Gupta & Kumar, 2020)	To analyze the dominant causes of cost and time overruns and to identify feasible and realistic steps to reduce overruns in construction projects. In India	Literature review, questionnaire	Factors of delays: Material selection and changes in types and specifications during construction; Poor maintenance of equipment; Shortage of construction materials; Financing between the owner and the contractor; Shortage of labor; and Factors of cost overrun: Inflation and escalation of material price, Change in project by owner, High transportation cost, frequent breakdown of the construction plant and equipment and rework due to errors during construction.
(Osman & Mohamud, 2022)	To discover the challenges that can cause delay, determine the impacts of delay on construction projects cost overrun and to find out the method to avoid the time delay on cost overrun in Somalia's Construction industry.	Hypothesis testing, questionnaire.	Challenges: Lack of client's experience, changes in the extent of the project, lack of risk management during the execution phase, large number of participants of project, poor cost estimation. Impacts: Poor quality, change in desired design, arbitration between parts, disappointment in project team. Ways to minimize: Inspection and testing by consultants in construction, mitigate the effect of inhibiting factors in project control, hiring experience personal, monitoring and using technology.

(Adam & Lindahl, 2017)	To explore the impact that cost overruns and time delays exert on large public construction projects	40 journal articles reviewed. Trend data is visualized using a kiviat diagram	Management related causes are most stressed. Key decisions that impact both cost and time parameters are undertaken in the early planning phases of the project.
(Khan, Hussain, Waris, Ismail, & Ilyas, 2018)	To review the academic literature relating to the need for project governance on infrastructure to assess the potential causes of success & failure of project.	Review of literature & project document.	To link project monitoring and control functions to project governance. To incorporate different value systems, legal systems, corporate governance guidelines, religions and business practices.
(Khan, Waris, Ullah, & Bokhari, 2021)	to review the planning process of public sector projects undertaken in Pakistan	An appraisal of the relevant studies is conducted to figure out the various relevant themes which have not widely been discussed in Pakistan specific studies.	The study identifies inadequacies in the planning process and emphasizes the need for project governance and stakeholder management. An agreement of all relevant stakeholders and political parties on the economic issues of the country.
(KHAN, TURNER, & MAQSOOD, 2013)	To develop constructs for project success factors and project success criteria in the public sector of a developing country, Pakistan, and to explore the relationship between them.	Questionnaire, exploratory factor analysis. Multivariate regression analysis was used to investigate the relationships between project success factors (independent variables) and project success criteria (dependent variables).	Top management support, organizational & managerial environment and project Characteristics showed the largest impact on project success.

APPENDIX-B: INTERVIEW GUIDE

Module:1	**Understanding reasons of scheduled delays**	
1 Why do delays occur in the implementation of public sector infrastructure projects in Pakistan?		
Indicators	**Follow-up Questions**	**Specifying Questions**
Factors of delays Economic & Financial Project design & planning Natural calamities/ Disaster Political Legal Human resource Equipment & material availability Administrative & Governance	1.2 What are the major factors of delays in public sector infrastructure projects in Pakistan? 1.8 Are there certain projects that are more prone to face issue of delays? 1.10 What are the consequences of project delays on project outcomes?	1.3 Can you provide examples of projects where these factors played a critical role in delays? 1.4 How political, legal, economic environment and regulatory requirements impact project timelines? Can you provide example? 1.5 How does inadequate planning impact the overall project timeline? 1.6 What measures can be taken during the planning stage to mitigate the risk of delays? 1.7 What are the administrative & governance related challenges that effect project timelines? 1.9 Do the larger projects, are more likely to be delayed? Are the project at certain location are more prone to delay? 1.11 How important are these factors in terms of their impact on project timelines 1.12 How delays effects quality of projects targeted outcomes? 1.13 How do delays affect stakeholders or efficiency of resource allocation and the community at large?
Module:2	**Exploring Factors of Cost Overruns in PSDP Infrastructure Projects**	

2. How do various factors contribute to cost overruns in public sector infrastructure projects in Pakistan?		
Indicators	**Follow-up Questions**	**Specifying Questions**
Factors of cost overrun Economic & Financial Project design & planning Natural calamities/ Disaster Political Legal Human resource Equipment & material availability Administrative & Governance	2.1 What are the main factors that contribute to cost overruns in PSDP projects in Pakistan? 2.9 Can financial resources planning practices within projects lead to cost overrun 2.12 Are certain projects more prone to face issue of cost overrun? 2.14 How cost overrun effects project performance and outcomes?	2.3 Can you provide examples of projects where these factors played a critical role in cost overrun of projects? 2.4 How significant are these factors in terms of their impact on overall project budgets? 2.5 How do inadequate resource management and team inefficiencies contribute to cost escalations? 2.6 What types of contractual disputes or legal challenges are most common causing cost increase? 2.7 How do economic fluctuations or changes in regulatory requirements, impact project costs? 2.8 How does inadequate or unrealistic planning impact the overall project budget? 2.10 Have you observed issues in project budget allocation or expenditure control that leads to cost overrun? 2.11 Are there specific financial planning practices that have been particularly problematic? 2.13 How do factors such as project size, complexity, and duration influence cost overruns? 2.15 How cost overrun effects quality of projects targeted outcomes? 2.16 How do cost overrun affect future allocative efficiency for

		overall projects in PSDP or within the sector?
Module:3 Measures for avoiding or minimizing time and cost overruns		
3.1 How could time and cost overruns be avoided or minimized during the project planning stage?		
Indicators	**Follow-up Questions**	**Specifying Questions**
project planning guideline's effectiveness Need assessment /feasibility study Stakeholder consultation Conformity with sectoral goals Detailed Physical & financial scheduling Cost/Benefit Analysis Unit cost analysis Management structure Assessment of risks & uncertainties	3.2 What are the key components of effective planning and scheduling in public sector infrastructure projects? 3.7 What are the specific challenges you face during project planning process? 3.11 Can you suggest measures that can be implemented at the project planning stage to prevent or mitigate time and cost overruns?	3.3 How do these components contribute to the successful execution of projects? 3.4 Can you provide examples of projects that benefited from detailed planning and scheduling? 3.5 How are uncertainties accounted for during the planning phase, as per Manual for development project? 3.6 How effective are the prescribed procedures of Development Manual in mitigating overruns. 3.8 How do these challenges impact the overall planning and execution of projects? 3.9 Do the gaps exists in prescribed planning procedures and actual practices? 3.10 How you overcome these challenges? 3.12 What best practices or methodologies have proven effective in your experience? 3.13 How important are stakeholder engagement, experienced project staff in ensuring completion on time within specified cost?

		3.14 Do feasibility studies are helpful in reducing issue of overruns? 3.15 What specific lessons have been learned from previous projects regarding the avoidance of cost & time overruns? 3.16 What been most impactful of these? 3.17 Have you been able to apply lesson learned from past cost & time overrun to improve future project's implementation?